

# SN54ALS580B, SN74ALS580B, SN74AS580 OCTAL D-TYPE TRANSPARENT LATCHES WITH 3-STATE OUTPUTS

SDAS277 – JANUARY 1995

- 3-State Buffer-Type Outputs Drive Bus Lines Directly
- Bus-Structured Pinout
- Inverting-Logic Outputs
- Package Options Include Plastic Small-Outline (DW) Packages, Ceramic Chip Carriers (FK), Standard Plastic (N) and Ceramic (J) 300-mil DIPs, and Ceramic Flat (W) Packages

## description

These octal D-type transparent latches 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.

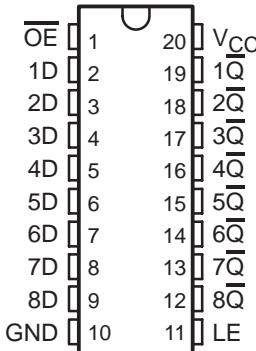
While the latch-enable (LE) input is high, outputs ( $\bar{Q}$ ) respond to the data (D) inputs. When LE is low, the outputs are latched to retain the data that was set up.

A buffered output-enable ( $\bar{OE}$ ) input can be used to place the eight outputs in either a normal logic state (high or low) or a 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.

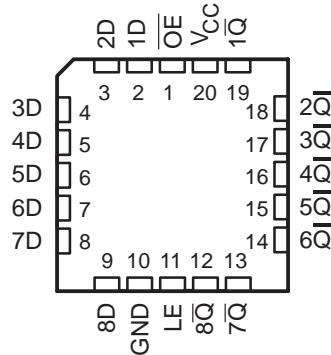
$\bar{OE}$  does not affect internal operations of the latches. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

The SN54ALS580B is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS580B and SN74AS580 are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

SN54ALS580B . . . J OR W PACKAGE  
SN74ALS580B, SN74AS580 . . . DW OR N PACKAGE  
(TOP VIEW)



SN54ALS580B . . . FK PACKAGE  
(TOP VIEW)



FUNCTION TABLE  
(each latch)

INPUTS			OUTPUT
$\bar{OE}$	LE	D	$\bar{Q}$
L	H	H	L
L	H	L	H
L	L	X	$\bar{Q}_0$
H	X	X	Z

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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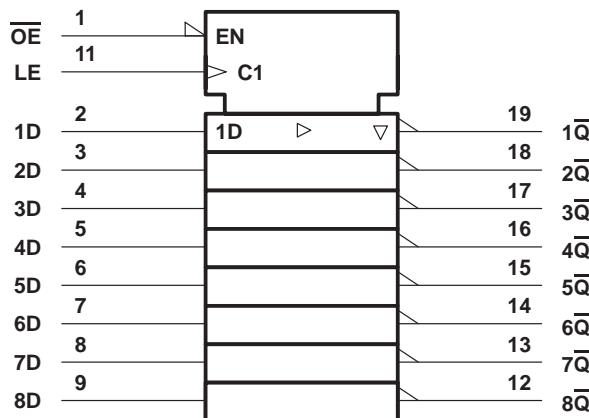
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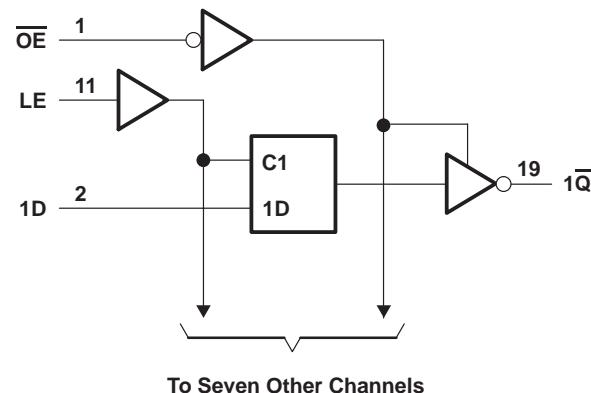
# SN54ALS580B, SN74ALS580B, SN74AS580 OCTAL D-TYPE TRANSPARENT LATCHES WITH 3-STATE OUTPUTS

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## logic symbol†



## logic diagram (positive logic)



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

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

Supply voltage, $V_{CC}$ .....	7 V
Input voltage, $V_I$ .....	7 V
Voltage applied to a disabled 3-state output .....	5.5 V
Operating free-air temperature range, $T_A$ : SN54ALS580B .....	-55°C to 125°C
SN74ALS580B .....	0°C to 70°C
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.

## recommended operating conditions

		SN54ALS580B			SN74ALS580B			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			0.7			0.8	V
$I_{OH}$	High-level output current			-1			-2.6	mA
$I_{OL}$	Low-level output current			12			24	mA
$t_w$	Pulse duration, LE high	15			15			ns
$t_{su}$	Setup time, data before LE $\downarrow$	20			10			ns
$t_h$	Hold time, data after LE $\downarrow$	12			10			ns
$T_A$	Operating free-air temperature	-55		125	0		70	°C

**SN54ALS580B, SN74ALS580B, SN74AS580  
OCTAL D-TYPE TRANSPARENT LATCHES  
WITH 3-STATE OUTPUTS**

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

PARAMETER	TEST CONDITIONS	SN54ALS580B			SN74ALS580B			UNIT
		MIN	TYP†	MAX	MIN	TYP†	MAX	
$V_{IK}$	$V_{CC} = 4.5 \text{ V}$ , $I_I = -18 \text{ mA}$			-1.2			-1.2	V
$V_{OH}$	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$ , $I_{OH} = -0.4 \text{ mA}$ $V_{CC} = 4.5 \text{ V}$	$V_{CC} - 2$			$V_{CC} - 2$			V
		$I_{OH} = -1 \text{ mA}$	2.4	3.3				
		$I_{OH} = -2.6 \text{ mA}$			2.4	3.2		
$V_{OL}$	$V_{CC} = 4.5 \text{ V}$	$I_{OL} = 12 \text{ mA}$	0.25	0.4	0.25	0.4		V
		$I_{OL} = 24 \text{ mA}$			0.35	0.5		
$I_{OZH}$	$V_{CC} = 5.5 \text{ V}$ , $V_O = 2.7 \text{ V}$			20			20	$\mu\text{A}$
$I_{OZL}$	$V_{CC} = 5.5 \text{ V}$ , $V_O = 0.4 \text{ V}$			-20			-20	$\mu\text{A}$
$I_I$	$V_{CC} = 5.5 \text{ V}$ , $V_I = 7 \text{ V}$			0.1			0.1	mA
$I_{IH}$	$V_{CC} = 5.5 \text{ V}$ , $V_I = 2.7 \text{ V}$			20			20	$\mu\text{A}$
$I_{IL}$	$V_{CC} = 5.5 \text{ V}$ , $V_I = 0.4 \text{ V}$			-0.13			-0.1	mA
$I_O^{\ddagger}$	$V_{CC} = 5.5 \text{ V}$ , $V_O = 2.25 \text{ V}$	-20	-112	-30	-112			mA
$I_{CC}$	$V_{CC} = 5.5 \text{ V}$	Outputs high	10	17	10	17		mA
		Outputs low	16	26	16	26		
		Outputs disabled	17	29	17	29		

† 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)	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$ , $C_L = 50 \text{ pF}$ , $R1 = 500 \Omega$ , $R2 = 500 \Omega$ , $T_A = \text{MIN to MAX}^{\$}$				UNIT	
			SN54ALS580B		SN74ALS580B			
			MIN	MAX	MIN	MAX		
$t_{PLH}$	D	$\bar{Q}$	3	26	3	18	ns	
			3	15	3	14		
$t_{PHL}$	LE	$\bar{Q}$	8	29	6	22	ns	
			4	22	6	21		
$t_{PZH}$	$\overline{OE}$	$\bar{Q}$	4	25	3	18	ns	
			4	21	4	18		
$t_{PZL}$	$\overline{OE}$	$\bar{Q}$	2	12	1	10	ns	
			3	22	1	15		

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



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WITH 3-STATE OUTPUTS**

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

Supply voltage, $V_{CC}$ .....	7 V
Input voltage, $V_I$ .....	7 V
Voltage applied to a disabled 3-state output .....	5.5 V
Operating free-air temperature range, $T_A$ : SN74AS580 .....	0°C to 70°C
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.

**recommended operating conditions**

		SN74AS580			UNIT
		MIN	NOM	MAX	
$V_{CC}$	Supply voltage	4.5	5	5.5	V
$V_{IH}$	High-level input voltage	2			V
$V_{IL}$	Low-level input voltage			0.8	V
$I_{OH}$	High-level output current			-15	mA
$I_{OL}$	Low-level output current			48	mA
$t_w^*$	Pulse duration, LE high	2			ns
$t_{SU}^*$	Setup time, data before LE↓	2			ns
$t_h^*$	Hold time, data after LE↓	3			ns
$T_A$	Operating free-air temperature	0		70	°C

\* On products compliant to MIL-STD-883, Class B, this parameter is based on characterization data but is not production tested.

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

PARAMETER	TEST CONDITIONS	SN74AS580			UNIT
		MIN	TYP‡	MAX	
$V_{IK}$	$V_{CC} = 4.5$ V, $I_I = -18$ mA			-1.2	V
$V_{OH}$	$V_{CC} = 4.5$ V to 5.5 V, $I_{OH} = -2$ mA	$V_{CC} - 2$			
	$V_{CC} = 4.5$ V, $I_{OH} = -15$ mA	2.4	3.3		
$V_{OL}$	$V_{CC} = 4.5$ V, $I_{OL} = 48$ mA	0.33	0.5		V
$I_{OZH}$	$V_{CC} = 5.5$ V, $V_O = 2.7$ V			50	µA
$I_{OZL}$	$V_{CC} = 5.5$ V, $V_O = 0.4$ V			-50	µA
$I_I$	$V_{CC} = 5.5$ V, $V_I = 7$ V			0.1	mA
$I_{IH}$	$V_{CC} = 5.5$ V, $V_I = 2.7$ V			20	µA
$I_{IL}$	$V_{CC} = 5.5$ V, $V_I = 0.4$ V			-0.5	mA
$I_O\$$	$V_{CC} = 5.5$ V, $V_O = 2.25$ V	-30	-112		mA
$I_{CC}$	$V_{CC} = 5.5$ V	Outputs high	62	100	mA
		Outputs low	65	106	
		Outputs disabled	71	115	

‡ 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,  $I_{OS}$ .



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**switching characteristics (see Figure 1)**

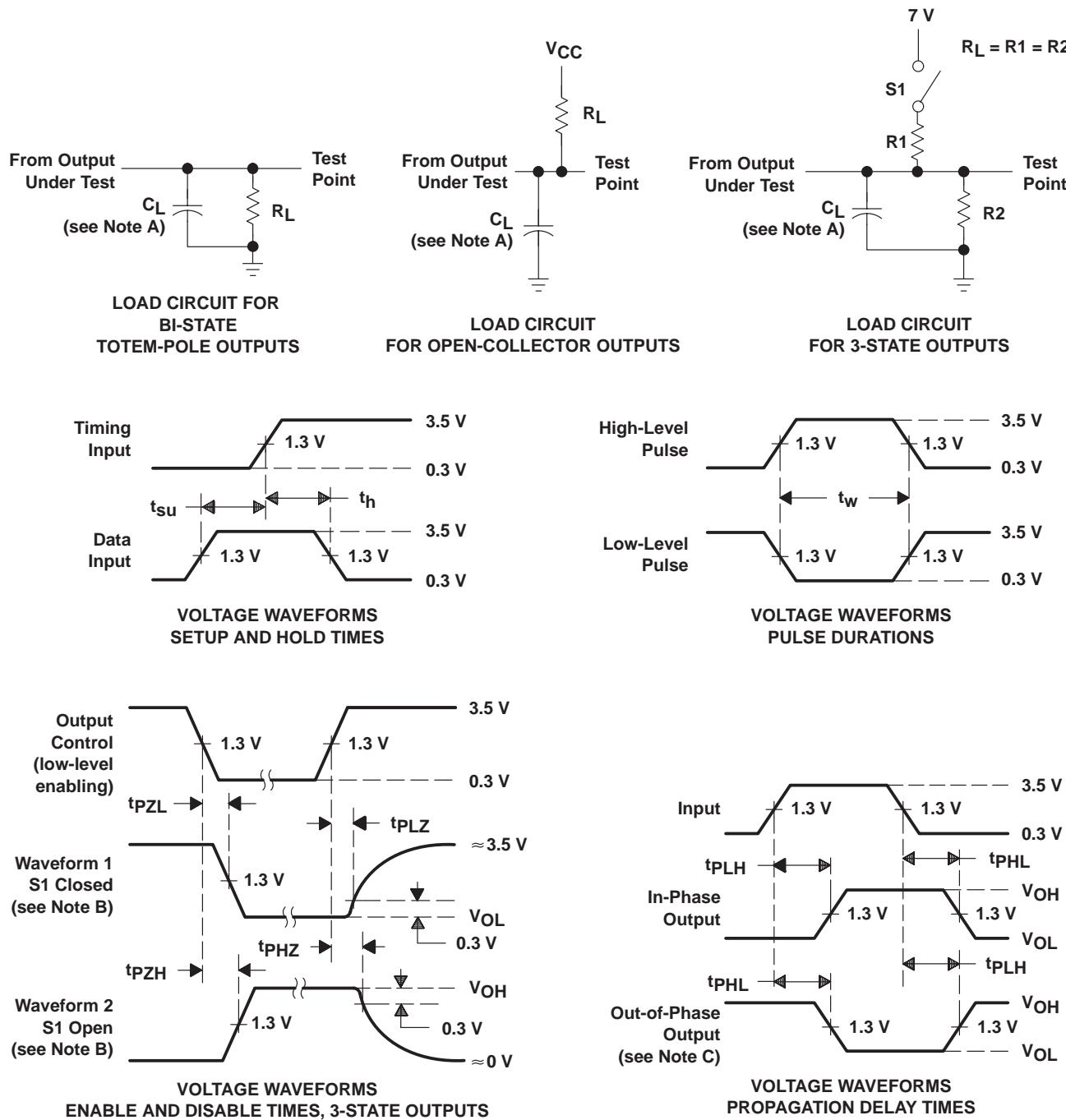
PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5\text{ V to }5.5\text{ V},$ $C_L = 50\text{ pF},$ $R1 = 500\text{ }\Omega,$ $R2 = 500\text{ }\Omega,$ $T_A = \text{MIN to MAX}^\dagger$		UNIT	
			SN74AS580			
			MIN	MAX		
$t_{PLH}$	D	$\bar{Q}$	3	7.5	ns	
$t_{PHL}$			3	7		
$t_{PLH}$	LE	$\bar{Q}$	5	9	ns	
$t_{PHL}$			4	8		
$t_{PZH}$	$\overline{OE}$	$\bar{Q}$	2	6.5	ns	
$t_{PZL}$			4	9.5		
$t_{PHZ}$	$\overline{OE}$	$\bar{Q}$	2	6.5	ns	
$t_{PLZ}$			2	7		

<sup>†</sup> For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

**SN54ALS580B, SN74ALS580B, SN74AS580  
OCTAL D-TYPE TRANSPARENT LATCHES  
WITH 3-STATE OUTPUTS**

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**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 (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
84012022A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	84012022A SNJ54ALS 580BFK	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
8401202RA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	8401202RA SNJ54ALS580BJ	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
8401202SA	ACTIVE	CFP	W	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	8401202SA SNJ54ALS580BW	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN54ALS580BJ	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	SN54ALS580BJ	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74ALS580BDWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS580B	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74ALS580BN	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74ALS580BN	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74ALS580BN3	OBsolete	PDIP	N	20		TBD	Call TI	Call TI	0 to 70		
SN74ALS580BNSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS580B	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74AS580DW	OBsolete	SOIC	DW	20		TBD	Call TI	Call TI	0 to 70		
SN74AS580DWR	OBsolete	SOIC	DW	20		TBD	Call TI	Call TI	0 to 70		
SN74AS580N	OBsolete	PDIP	N	20		TBD	Call TI	Call TI	0 to 70		
SNJ54ALS580BFK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	84012022A SNJ54ALS 580BFK	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SNJ54ALS580BJ	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	8401202RA SNJ54ALS580BJ	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SNJ54ALS580BW	ACTIVE	CFP	W	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	8401202SA SNJ54ALS580BW	<span style="background-color: red; color: white; padding: 2px;">Samples</span>

(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.

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

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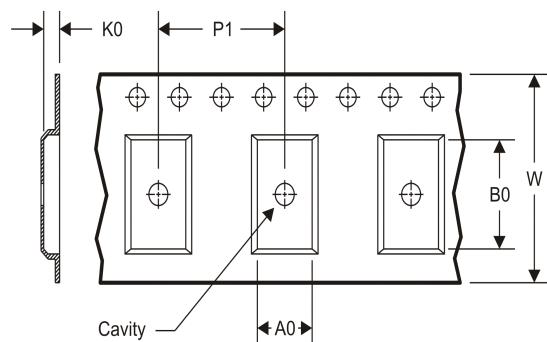
#### OTHER QUALIFIED VERSIONS OF SN54ALS580B, SN74ALS580B :

- Catalog: [SN74ALS580B](#)
- Military: [SN54ALS580B](#)

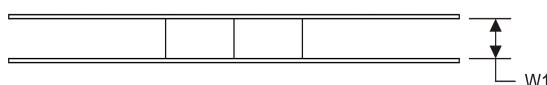
NOTE: Qualified Version Definitions:

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

**TAPE AND REEL INFORMATION**
**REEL DIMENSIONS**

**TAPE DIMENSIONS**


A0	Dimension designed to accommodate the component width
B0	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


**TAPE AND REEL INFORMATION**

\*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
SN74ALS580BDWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1
SN74ALS580BNSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1

**TAPE AND REEL BOX DIMENSIONS**

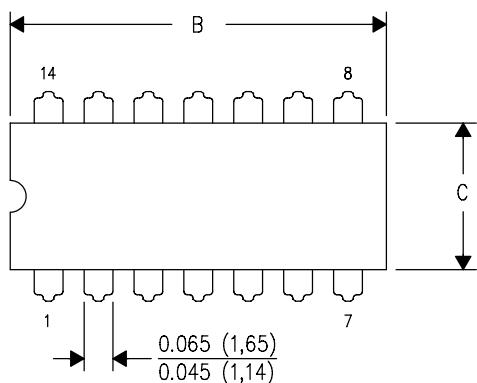
\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ALS580BDWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74ALS580BNSR	SO	NS	20	2000	367.0	367.0	45.0

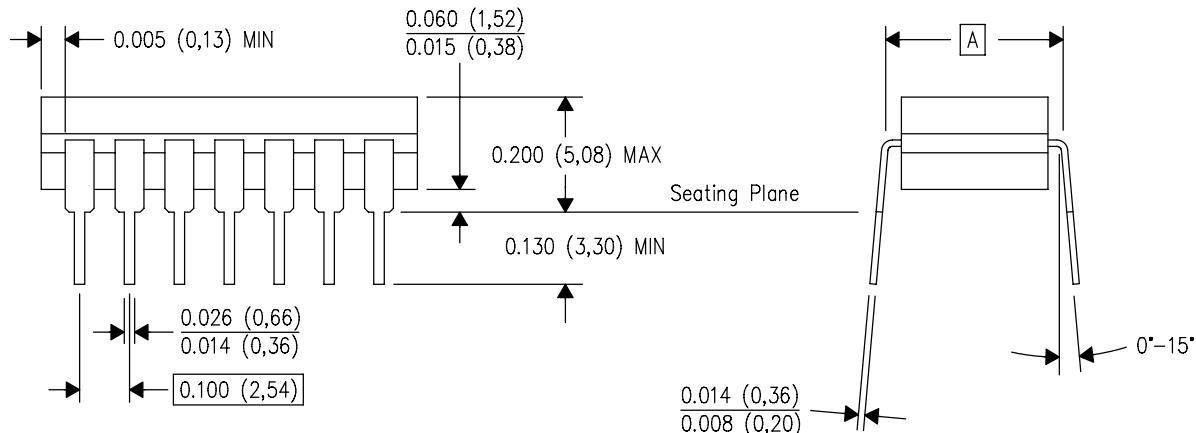
J (R-GDIP-T\*\*)

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)

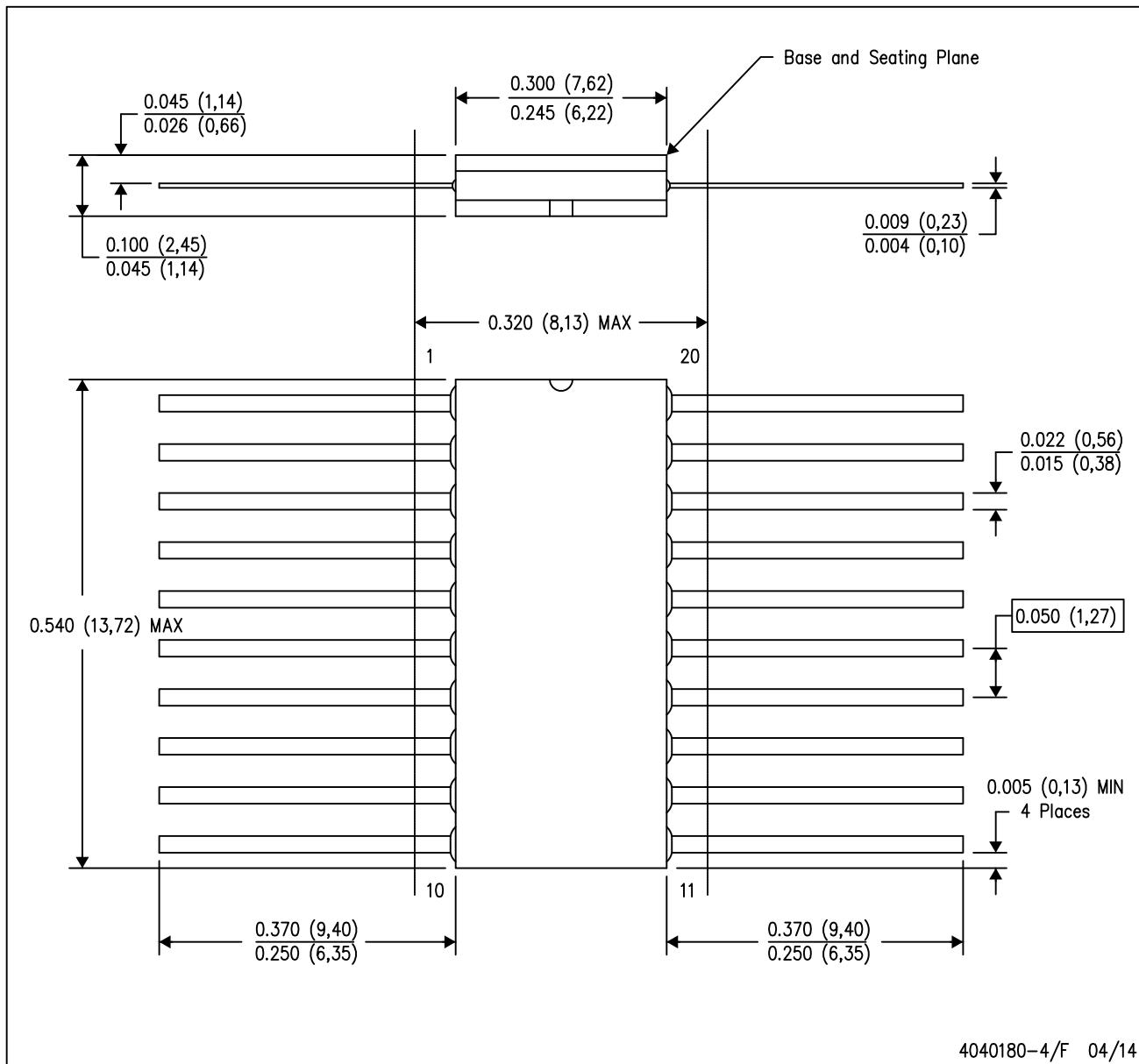


4040083/F 03/03

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-F20)

CERAMIC DUAL FLATPACK



4040180-4/F 04/14

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

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

28 TERMINAL SHOWN

LEADLESS CERAMIC CHIP CARRIER



NOTES:

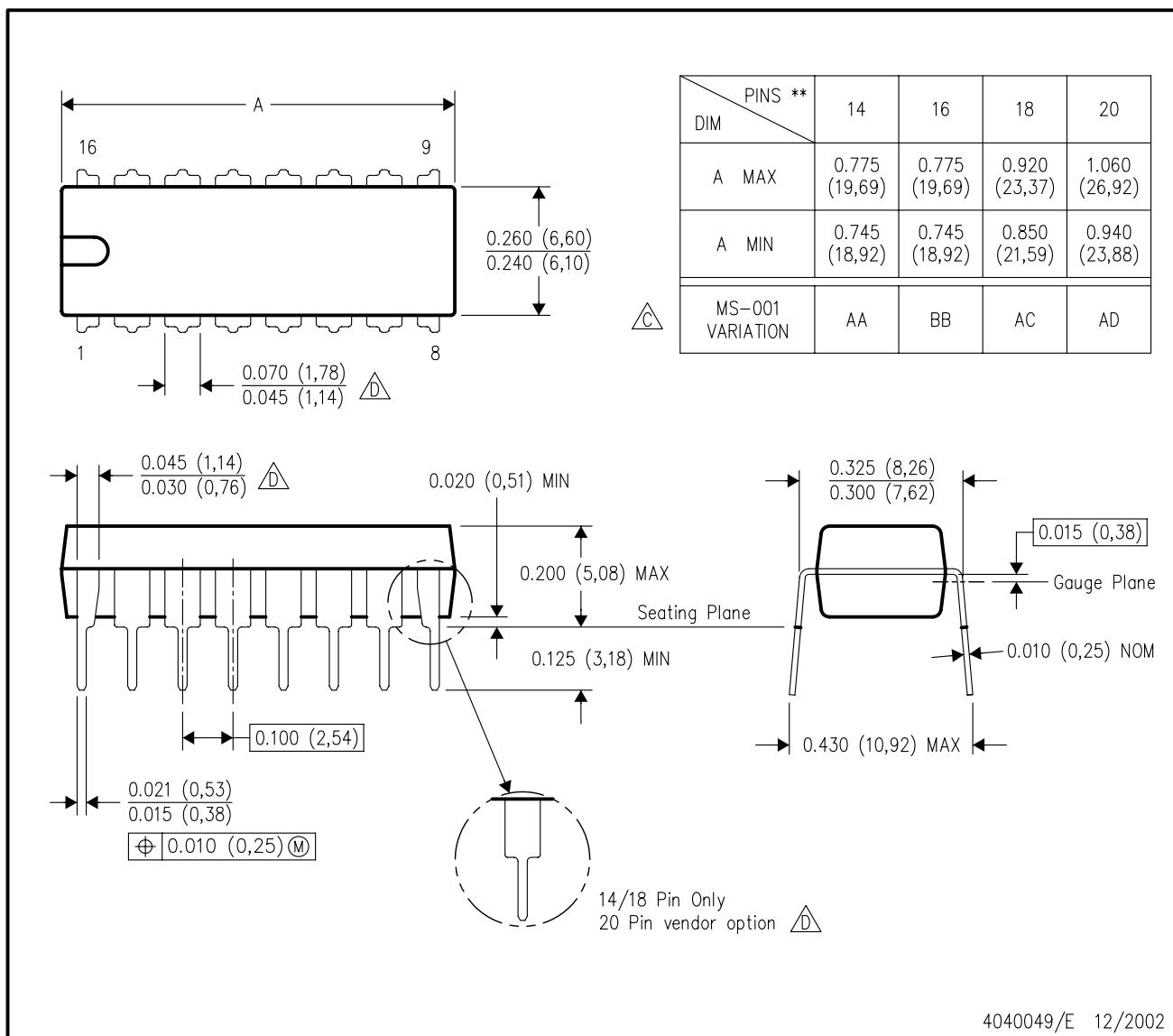
- All linear dimensions are in inches (millimeters).
- This drawing is subject to change without notice.
- This package can be hermetically sealed with a metal lid.
- Falls within JEDEC MS-004

4040140/D 01/11

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

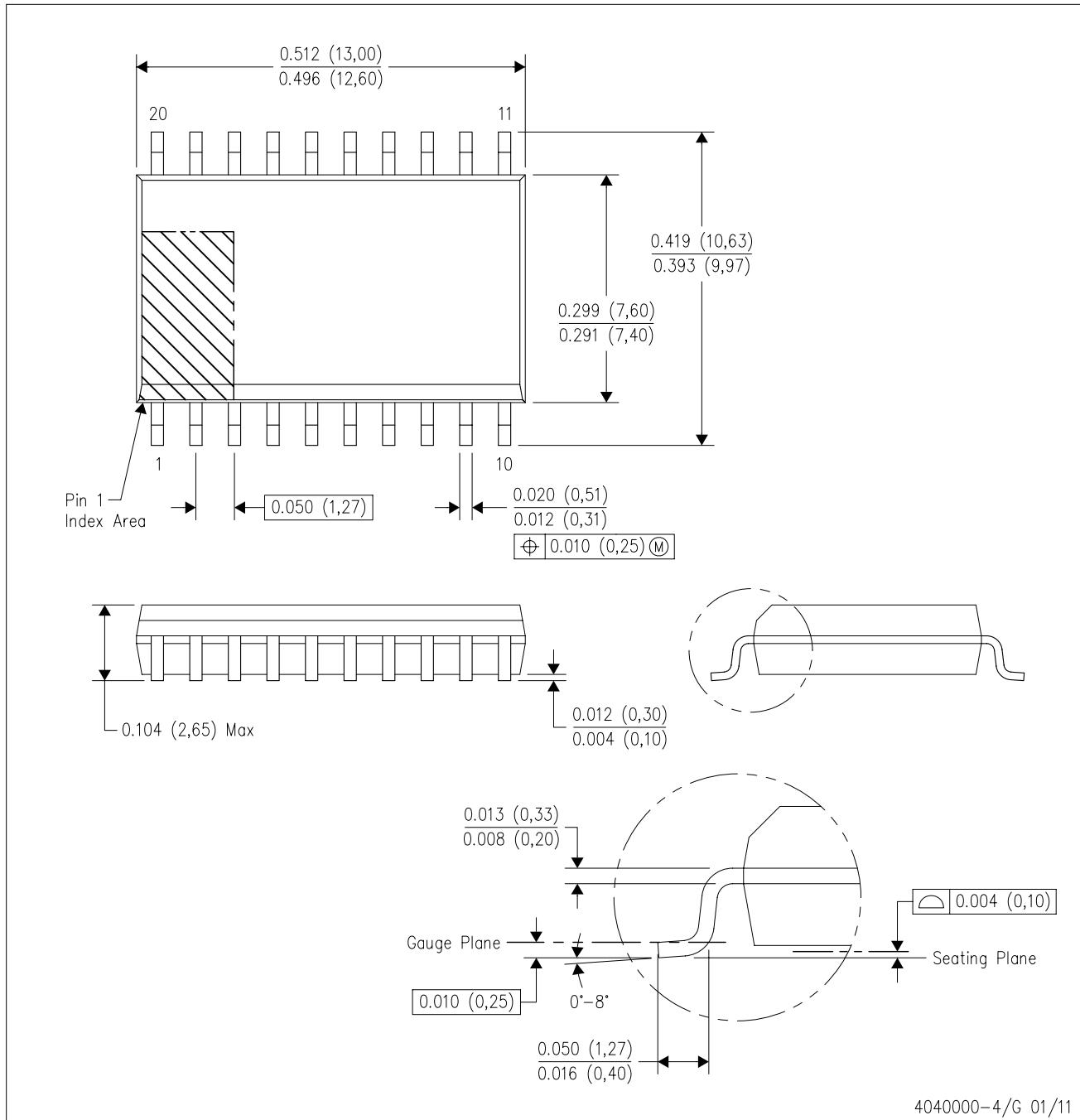
16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



DW (R-PDSO-G20)

PLASTIC SMALL OUTLINE

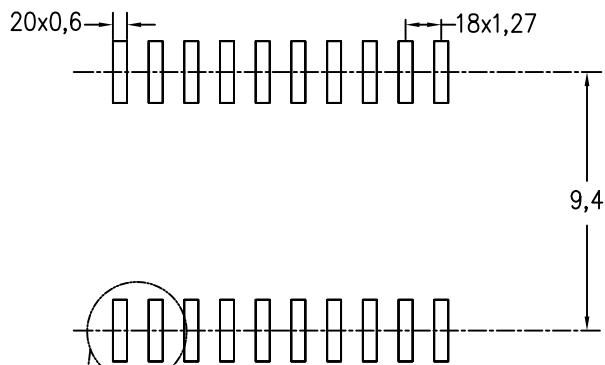
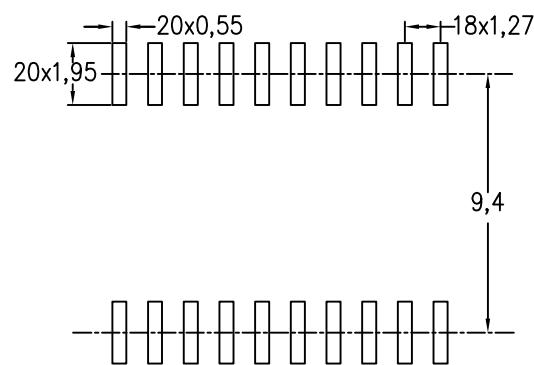


NOTES:

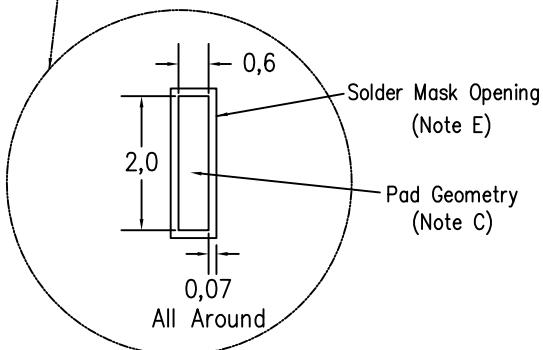
- All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.
- This drawing is subject to change without notice.
- Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0.15).
- Falls within JEDEC MS-013 variation AC.

DW (R-PDSO-G20)

PLASTIC SMALL OUTLINE

Example Board Layout  
(Note C)Stencil Openings  
(Note D)

Non Solder Mask Define Pad



4209202-4/F 08/13

NOTES:

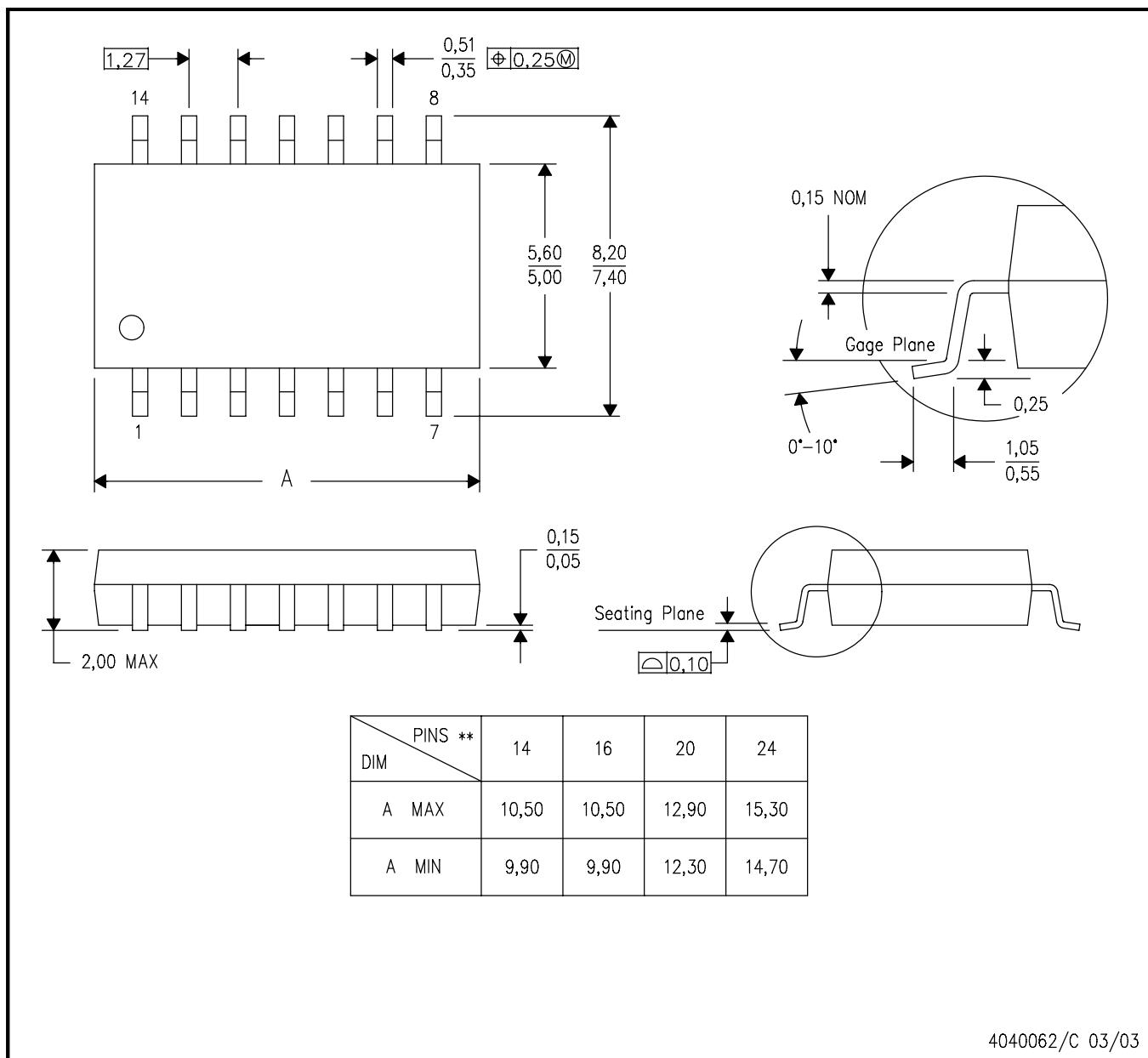
- All linear dimensions are in millimeters.
- This drawing is subject to change without notice.
- Refer to IPC7351 for alternate board design.
- Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525
- Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

## MECHANICAL DATA

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

14-PINS SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



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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