

SN54AS760, SN74ALS760, SN74AS760 OCTAL BUFFERS AND LINE DRIVERS WITH OPEN-COLLECTOR OUTPUTS

SDAS141A – DECEMBER 1983 – REVISED JANUARY 1995

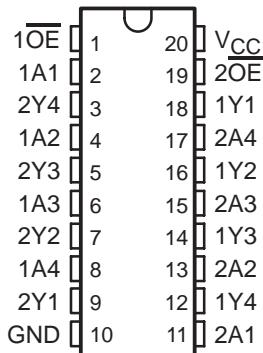
- Open-Collector Outputs Drive Bus Lines or Buffer Memory Address Registers
- Eliminates the Need for 3-State Overlap Protection
- pnp Inputs Reduce dc Loading
- Open-Collector Versions of 'ALS244 and 'AS244
- Package Options Include Plastic Small-Outline (DW) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

description

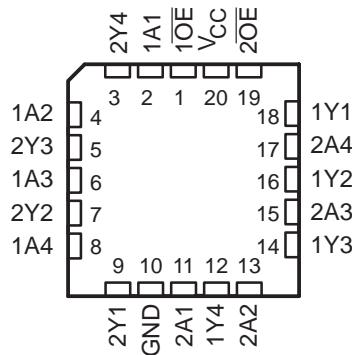
These octal buffers and line drivers are designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters by eliminating the need for 3-state overlap protection. With the 'AS756 and SN74AS757, these devices provide the choice of selected combinations of inverting outputs, symmetrical active-low output-enable (\overline{OE}) inputs, and complementary OE and \overline{OE} inputs.

The SN54AS760 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS760 and SN74AS760 are characterized for operation from 0°C to 70°C .

SN54AS760 . . . J PACKAGE
SN74ALS760, SN74AS760 . . . DW OR N PACKAGE
(TOP VIEW)



SN54AS760 . . . FK PACKAGE
(TOP VIEW)



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.

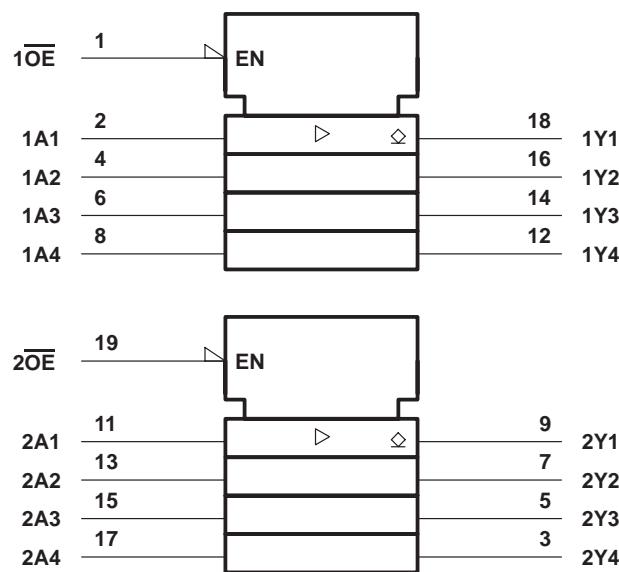


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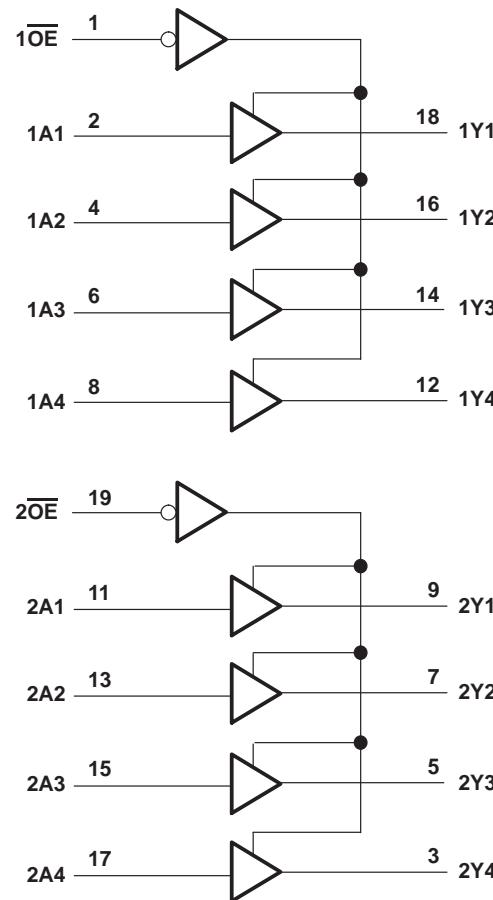
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logic symbol†



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

logic diagram (positive logic)



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

Supply voltage, V_{CC}	7 V
Input voltage, V_I	7 V
Off-state output voltage	7 V
Operating free-air temperature range, T_A : SN74ALS760	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

		SN74ALS760			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
V_{OH}	High-level output voltage		5.5		V
I_{OL}	Low-level output current		24		mA
T_A	Operating free-air temperature	0	70		°C



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

PARAMETER	TEST CONDITIONS	SN74ALS760			UNIT
		MIN	TYP†	MAX	
V_{IK}	$V_{CC} = 4.5 \text{ V}$, $I_I = -18 \text{ mA}$			-1.5	V
I_{OH}	$V_{CC} = 4.5 \text{ V}$, $V_{OH} = 5.5 \text{ V}$			0.1	mA
I_{OL}	$V_{CC} = 4.5 \text{ V}$	$I_{OL} = 12 \text{ mA}$	0.25	0.4	V
		$I_{OL} = 24 \text{ mA}$	0.35	0.5	
I_I	$V_{CC} = 5.5 \text{ V}$, $V_I = 7 \text{ V}$			0.1	mA
I_{IH}	$V_{CC} = 5.5 \text{ V}$, $V_I = 2.7 \text{ V}$			20	μA
I_{IL}	$V_{CC} = 5.5 \text{ V}$, $V_I = 0.4 \text{ V}$			-0.1	mA
I_{CC}	$V_{CC} = 5.5 \text{ V}$	Outputs high	9	15	mA
		Outputs low	15	19	

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

switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$, $C_L = 50 \text{ pF}$, $R_L = 500 \Omega$, $T_A = \text{MIN to MAX}^\ddagger$	UNIT	
			SN74ALS760		
			MIN	MAX	
t_{PLH}	A	Y	5	15	ns
			5	12	
t_{PHL}	\overline{OE}	Y	5	16	ns
			5	13	

‡ 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 (unless otherwise noted)§

Supply voltage, V_{CC}	7 V
Input voltage, V_I	7 V
Off-state output voltage	7 V
Operating free-air temperature range, T_A : SN54AS760	-55°C to 125°C
SN74AS760	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.

SN54AS760, SN74ALS760, SN74AS760
OCTAL BUFFERS AND LINE DRIVERS
WITH OPEN-COLLECTOR OUTPUTS

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recommended operating conditions

		SN54AS760			SN74AS760			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
V _{OH}	High-level output voltage			5.5			5.5	V
I _{OL}	Low-level output current			48			64	mA
T _A	Operating free-air temperature	-55	125	0	0	70	°C	

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

PARAMETER	TEST CONDITIONS	SN54AS760			SN74AS760			UNIT
		MIN	TYP†	MAX	MIN	TYP†	MAX	
V _{IK}	V _{CC} = 4.5 V, I _I = -18 mA			-1.2			-1.2	V
I _{OH}	V _{CC} = 4.5 V, V _{OH} = 5.5 V			0.1			0.1	mA
V _{OL}	V _{CC} = 4.5 V	I _{OL} = 48 mA		0.55				V
		I _{OL} = 64 mA					0.55	
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
				-1			-1	
I _{CC}	V _{CC} = 5.5 V	Outputs high	20	32	20	32		mA
		Outputs low	60	94	60	94		

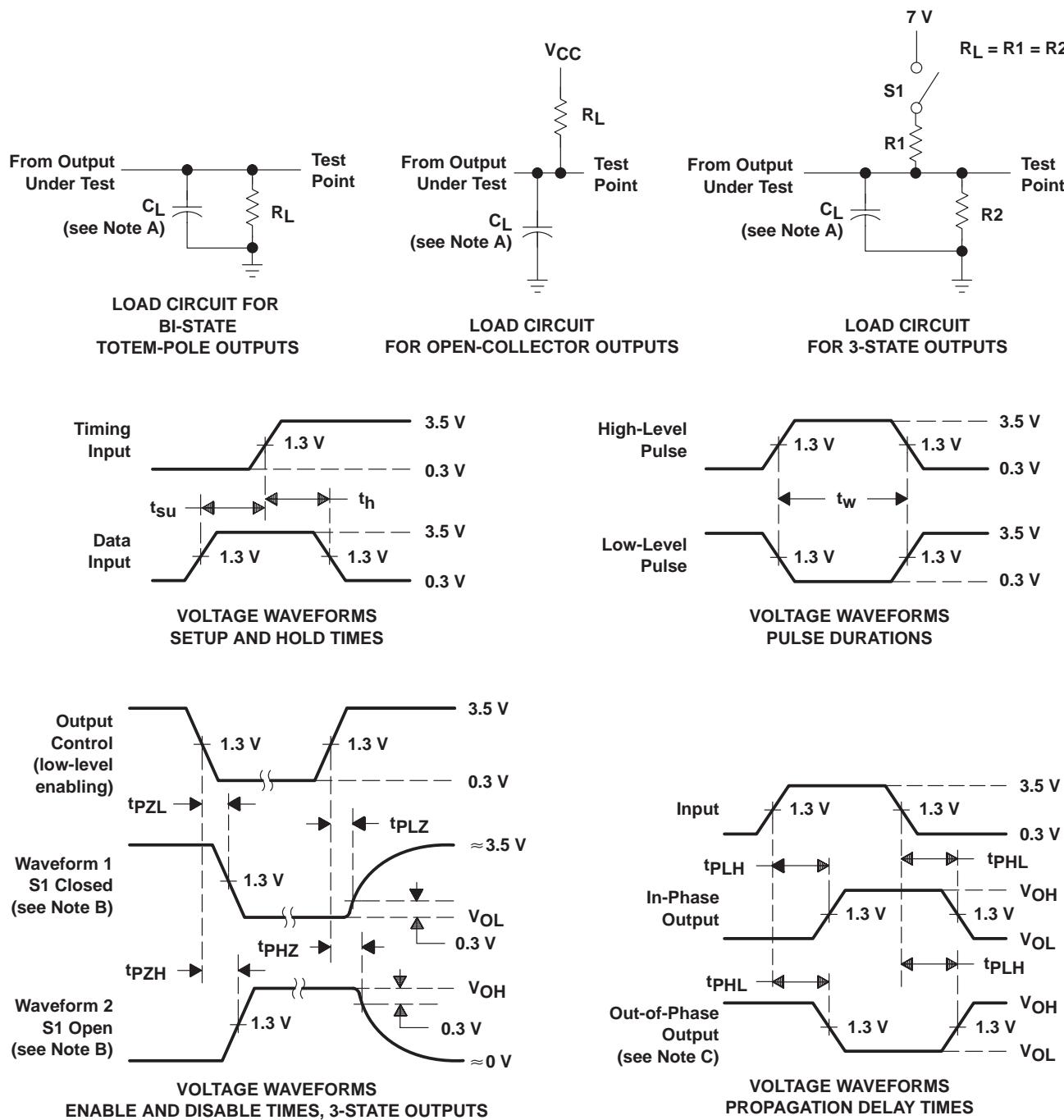
† All typical values are at V_{CC} = 5 V, T_A = 25°C.

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 = MIN to MAX‡				UNIT	
			SN54AS760		SN74AS760			
			MIN	MAX	MIN	MAX		
t _{PLH}	A	Y	3	19.5	3	18.5	ns	
t _{PHL}			1	7	1	6		
t _{PLH}	OE	Y	3	19.5	3	18.5	ns	
t _{PHL}			1	8	1	7		

‡ 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 ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
5962-87767012A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type
5962-8776701RA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type
SN74ALS760DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS760DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS760DWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS760DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS760DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS760DWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS760N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74ALS760NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74AS760DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS760DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS760DWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS760DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS760DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS760DWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS760N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74AS760N3	OBsolete	PDIP	N	20		TBD	Call TI	Call TI
SN74AS760NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74AS760NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS760NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS760NSRG4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SNJ54AS760FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type
SNJ54AS760J	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type
SNJ54AS760W	OBsolete	CFP	W	20		TBD	Call TI	N / A for Pkg Type

⁽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.

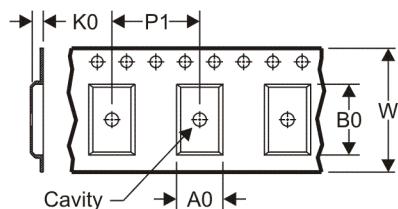
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

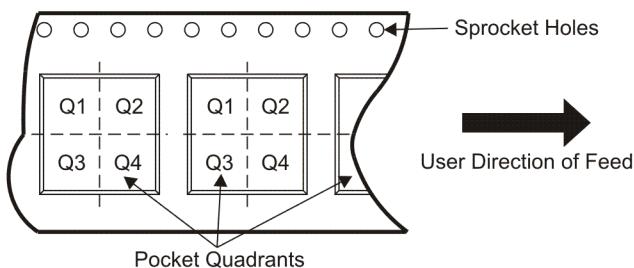
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TAPE AND REEL INFORMATION
REEL DIMENSIONS

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

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
SN74ALS760DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1
SN74AS760DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1
SN74AS760NSR	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

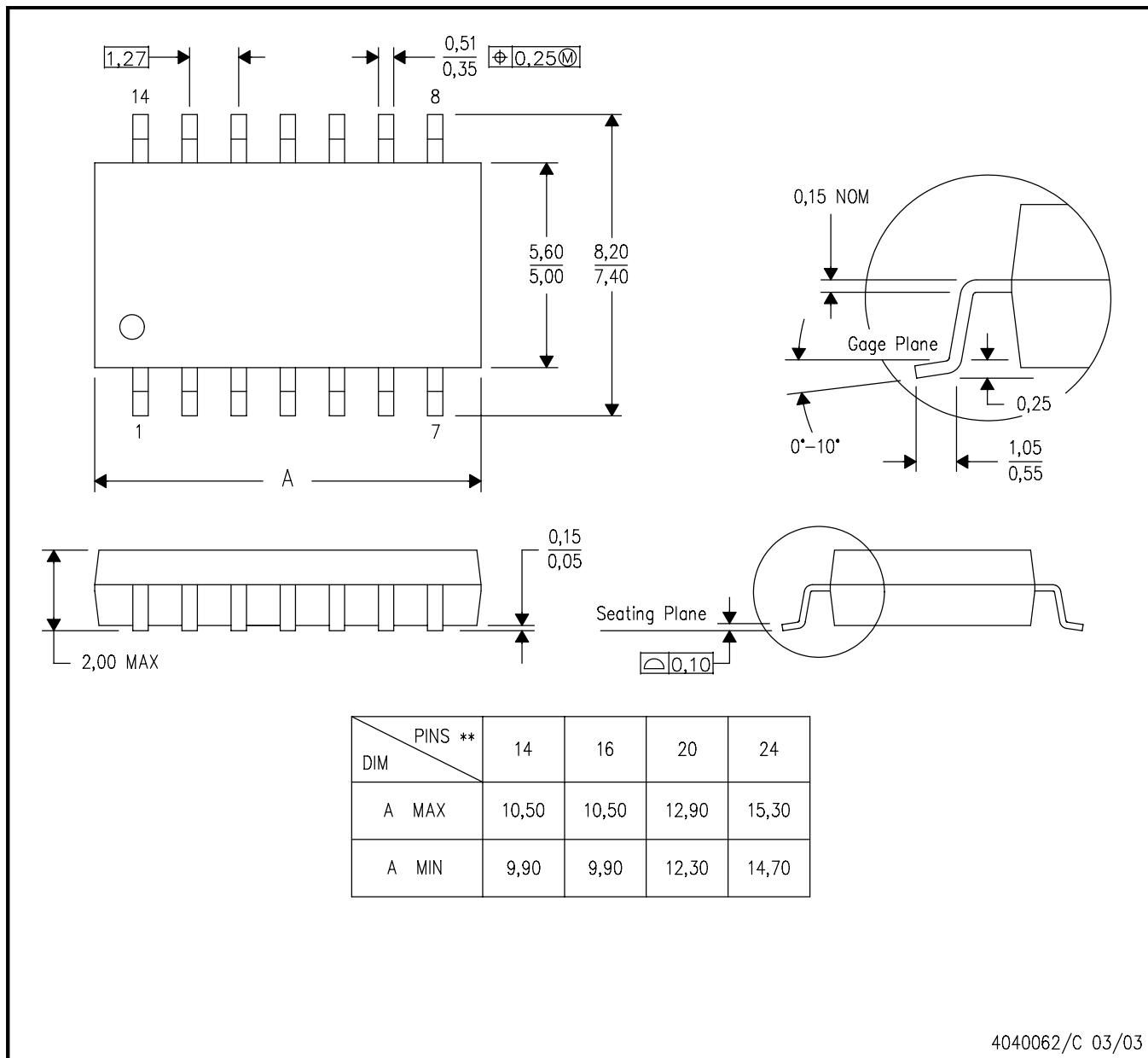
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ALS760DWR	SOIC	DW	20	2000	346.0	346.0	41.0
SN74AS760DWR	SOIC	DW	20	2000	346.0	346.0	41.0
SN74AS760NSR	SO	NS	20	2000	346.0	346.0	41.0

MECHANICAL DATA

NS (R-PDSO-G)**

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



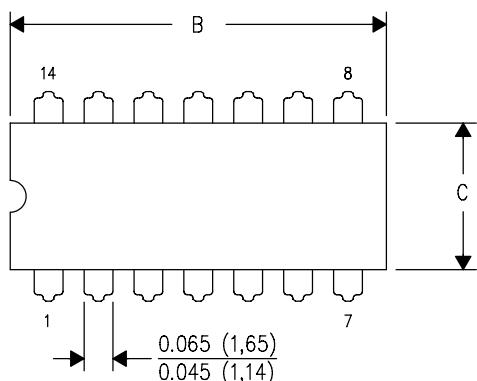
NOTES:

- 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.

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)



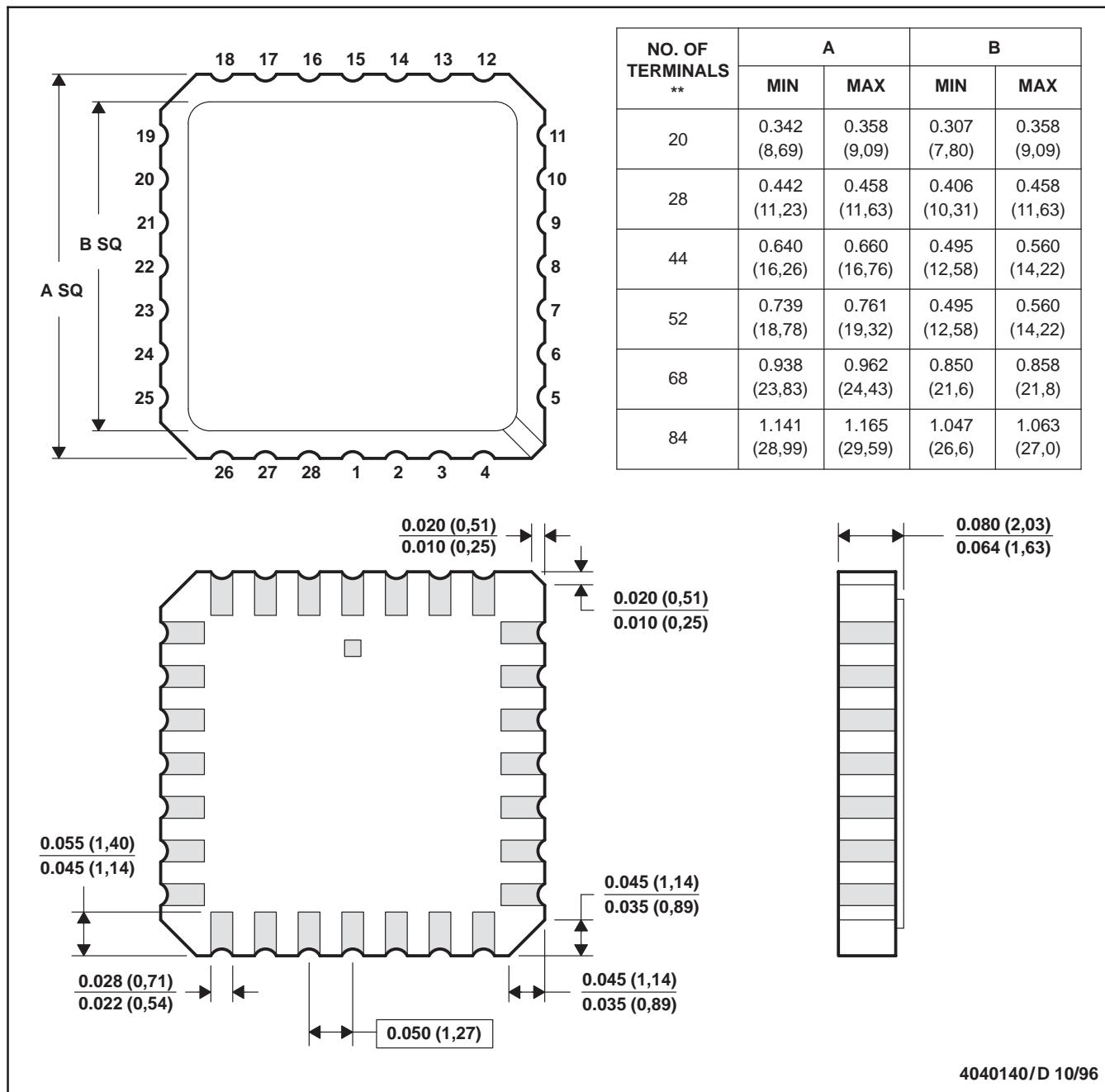
4040083/F 03/03

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.

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN

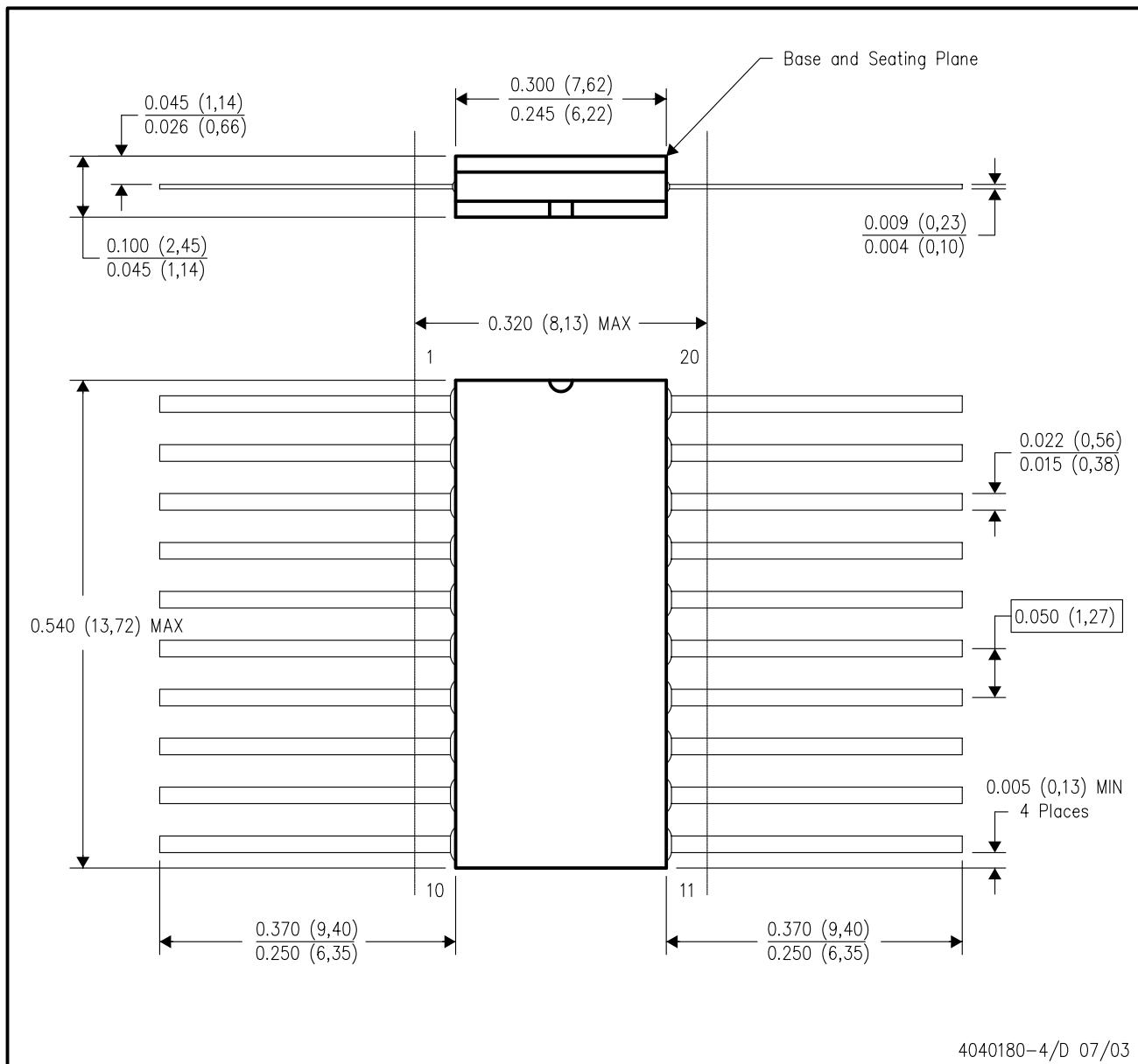


NOTES:

- 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

W (R-GDFP-F20)

CERAMIC DUAL FLATPACK

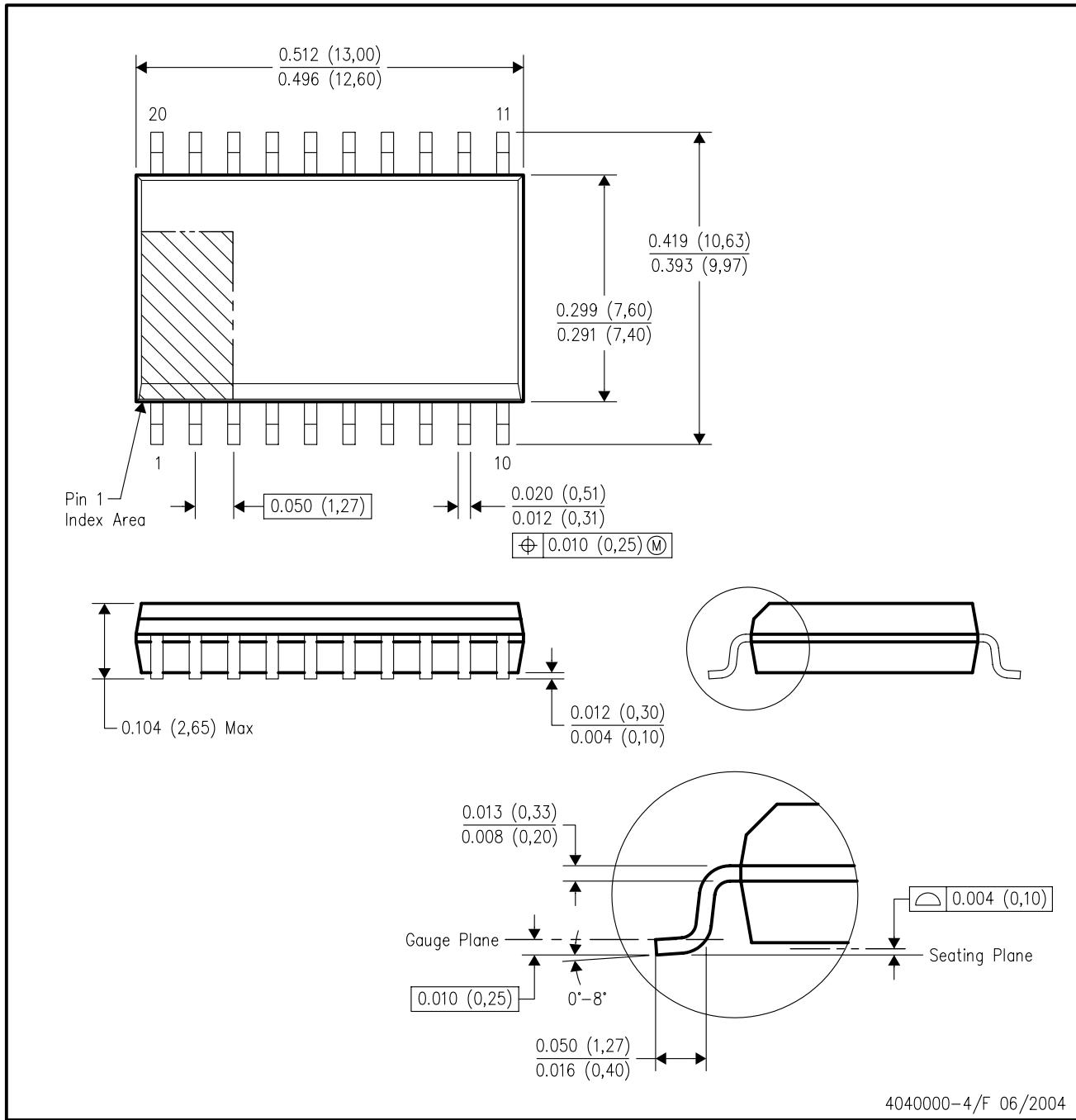


NOTES:

- 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 GDFP2-F20

DW (R-PDSO-G20)

PLASTIC SMALL-OUTLINE PACKAGE



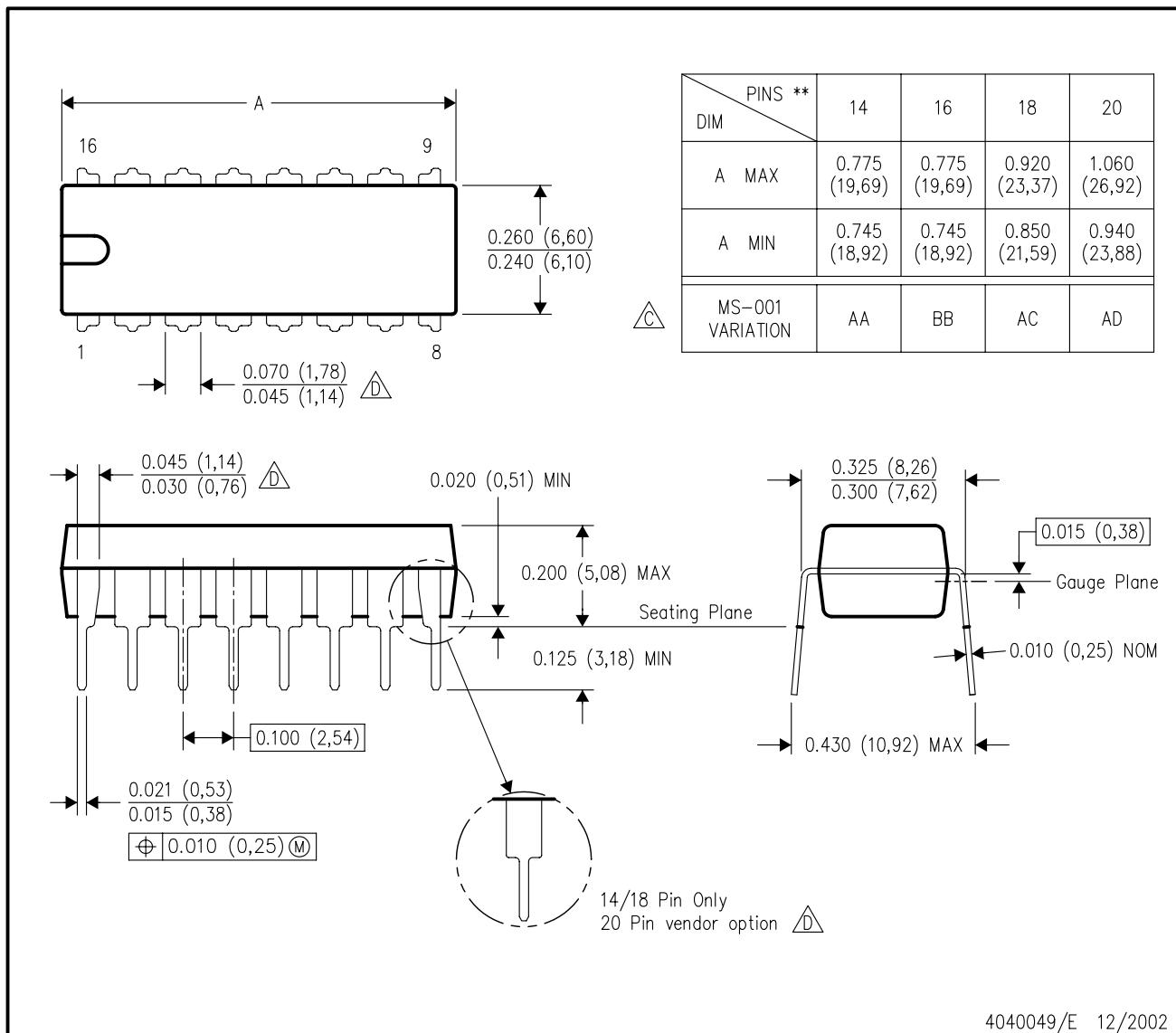
NOTES:

- 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-013 variation AC.

N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



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