

SN54ALS1245A, SN74ALS1245A OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

SDAS245A – DECEMBER 1982 – REVISED JANUARY 1995

- Bidirectional Bus Transceivers in High-Density 20-Pin Packages
- Low-Power Versions of 'ALS245 Series
- 'ALS1245 Series Is Identical to 'ALS1645 Series
- Package Options Include Plastic Small-Outline (DW) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

description

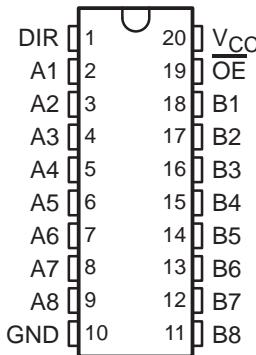
These octal bus transceivers are designed for asynchronous two-way communication between data buses. These devices transmit data from the A bus to the B bus or from the B bus to the A bus, depending on the logic level at the direction-control (DIR) input. The output-enable (OE) input can be used to disable the device so the buses are effectively isolated.

The SN54ALS1245A is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS1245A is characterized for operation from 0°C to 70°C .

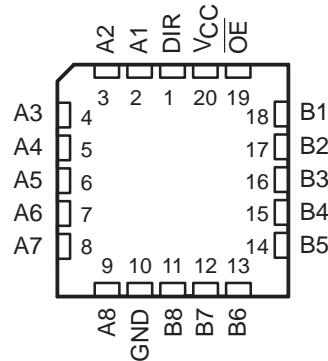
FUNCTION TABLE

INPUTS		OPERATION
OE	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

SN54ALS1245A . . . J PACKAGE
SN74ALS1245A . . . DW OR N PACKAGE
(TOP VIEW)



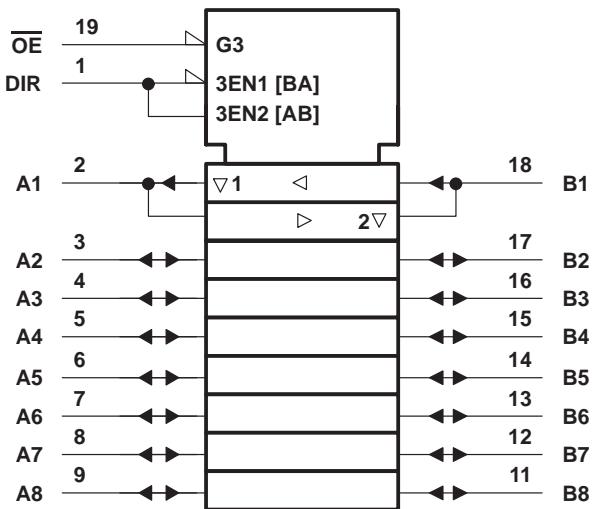
SN54ALS1245A . . . FK PACKAGE
(TOP VIEW)



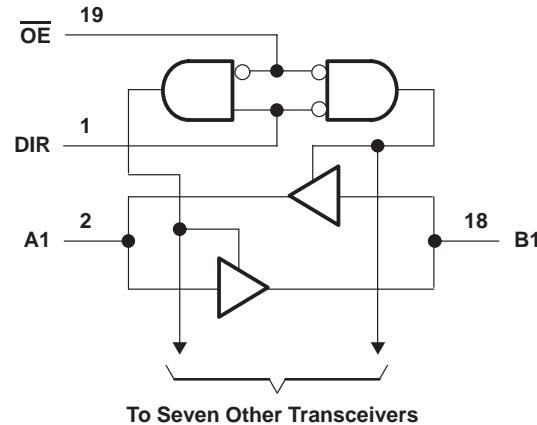
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OCTAL BUS TRANSCEIVERS
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logic symbol†



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 : All inputs	7 V
I/O ports	5.5 V
Operating free-air temperature range, T_A : SN54ALS1245A	–55°C to 125°C
SN74ALS1245A	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

		SN54ALS1245A			SN74ALS1245A			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			–12			–15	mA
I_{OL}	Low-level output current			8			16	mA
T_A	Operating free-air temperature	–55	125	0	0	70	0	°C

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

PARAMETER	TEST CONDITIONS	SN54ALS1245A			SN74ALS1245A			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
	$V_{CC} = 4.5 \text{ V}$	$I_{OH} = -3 \text{ mA}$	2.4	3.2	2.4	3.2		
		$I_{OH} = -12 \text{ mA}$	2					
		$I_{OH} = -15 \text{ mA}$				2		
V_{OL}	$V_{CC} = 4.5 \text{ V}$	$I_{OL} = 8 \text{ mA}$	0.25	0.4	0.25	0.4		V
		$I_{OL} = 16 \text{ mA}$			0.35	0.5		
I_I	Control inputs	$V_I = 7 \text{ V}$		0.1		0.1		mA
	A or B ports	$V_I = 5.5 \text{ V}$		0.1		0.1		
I_{IH}	Control inputs	$V_{CC} = 5.5 \text{ V}$	$V_I = 2.7 \text{ V}$	20		20		μA
	A or B ports‡			20		20		
I_{IL}	Control inputs	$V_{CC} = 5.5 \text{ V}$	$V_I = 0.4 \text{ V}$	-0.1		-0.1		mA
	A or B ports‡			-0.1		-0.1		
$I_O^§$	$V_{CC} = 5.5 \text{ V}$, $V_O = 2.25 \text{ V}$	-20	-112	-30	-112			mA
I_{CC}	$V_{CC} = 5.5 \text{ V}$	Outputs high	21	33	21	30		mA
		Outputs low	23	36	23	33		
		Outputs disabled	25	40	25	36		

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

‡ For I/O ports, the parameters I_{IH} and I_{IL} include the off-state output current.

§ 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)

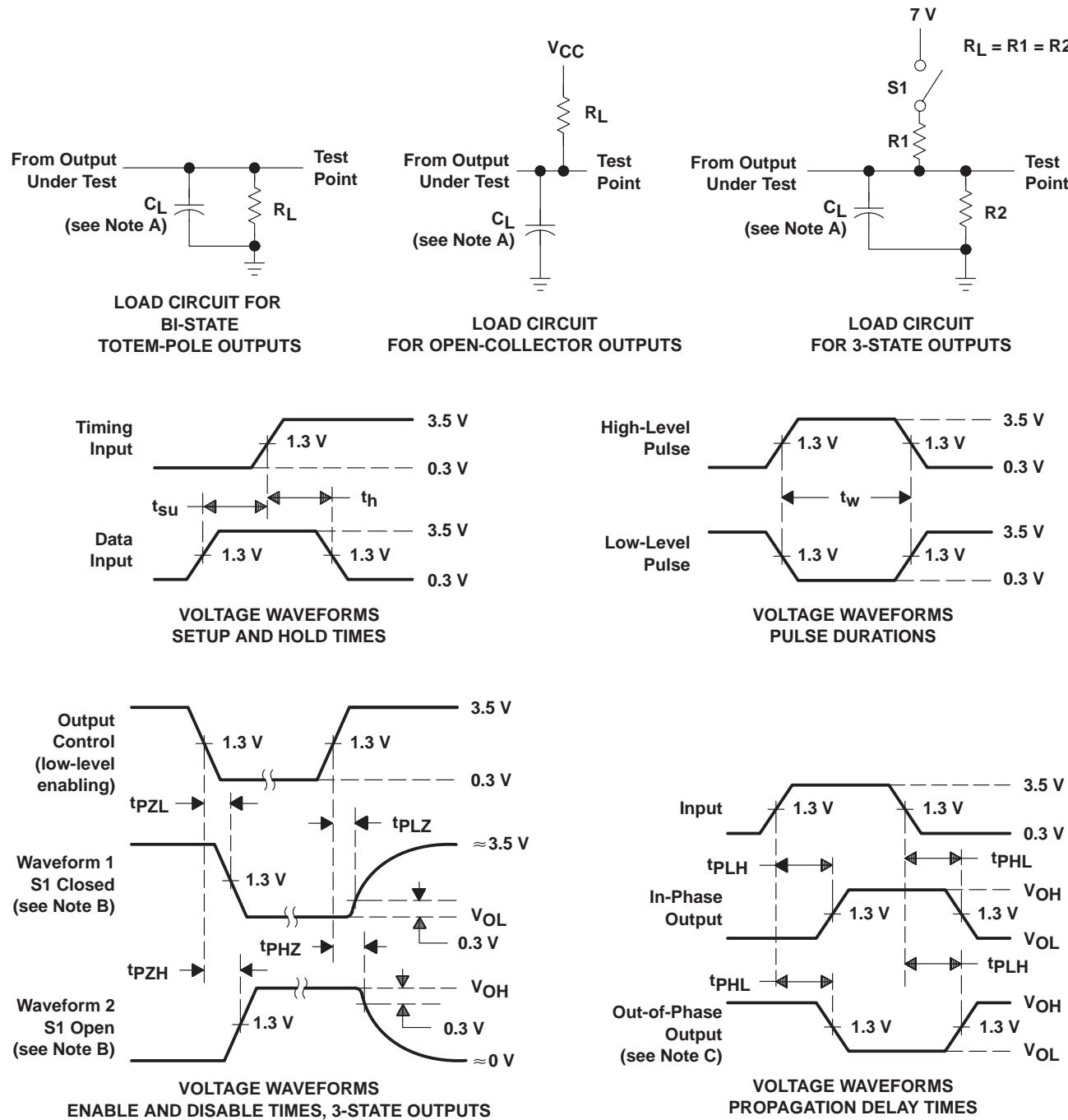
PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$, $C_L = 50 \text{ pF}$, $R1 = 500 \Omega$, $R2 = 500 \Omega$, $T_A = \text{MIN to MAX}^\dagger$				UNIT		
			SN54ALS1245A		SN74ALS1245A				
			MIN	MAX	MIN	MAX			
t_{PLH}	A or B	B or A	2	19	2	13	ns		
			2	15	2	13			
t_{PHL}	\overline{OE}	A or B	8	30	8	25	ns		
			8	29	8	25			
t_{PZH}	\overline{OE}	A or B	2	14	2	12	ns		
			3	30	3	18			
t_{PZL}									
t_{PHZ}									
t_{PLZ}									

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

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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	MSL Peak Temp ⁽³⁾
5962-88737012A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	N / A for Pkg Type
5962-8873701RA	ACTIVE	CDIP	J	20	1	TBD	Call TI	N / A for Pkg Type
SN54ALS1245AJ	ACTIVE	CDIP	J	20	1	TBD	Call TI	N / A for Pkg Type
SN74ALS1245ADW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS1245ADWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS1245ADWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS1245ADWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS1245AN	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74ALS1245ANE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74ALS1245ANSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS1245ANSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SNJ54ALS1245AFK	ACTIVE	LCCC	FK	20	1	TBD	Call TI	N / A for Pkg Type
SNJ54ALS1245AJ	ACTIVE	CDIP	J	20	1	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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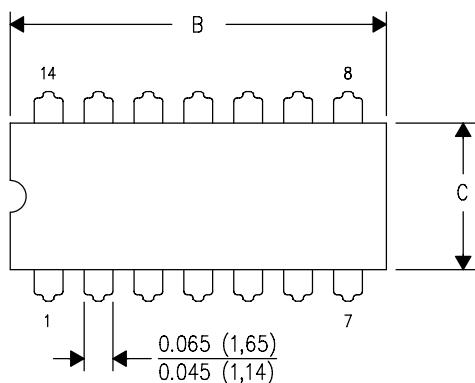
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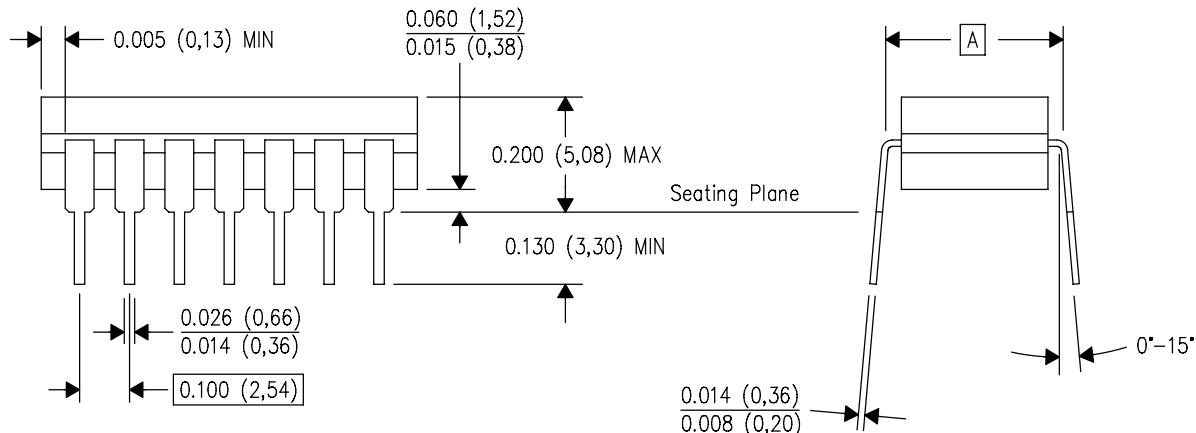
J (R-GDIP-T**)

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)



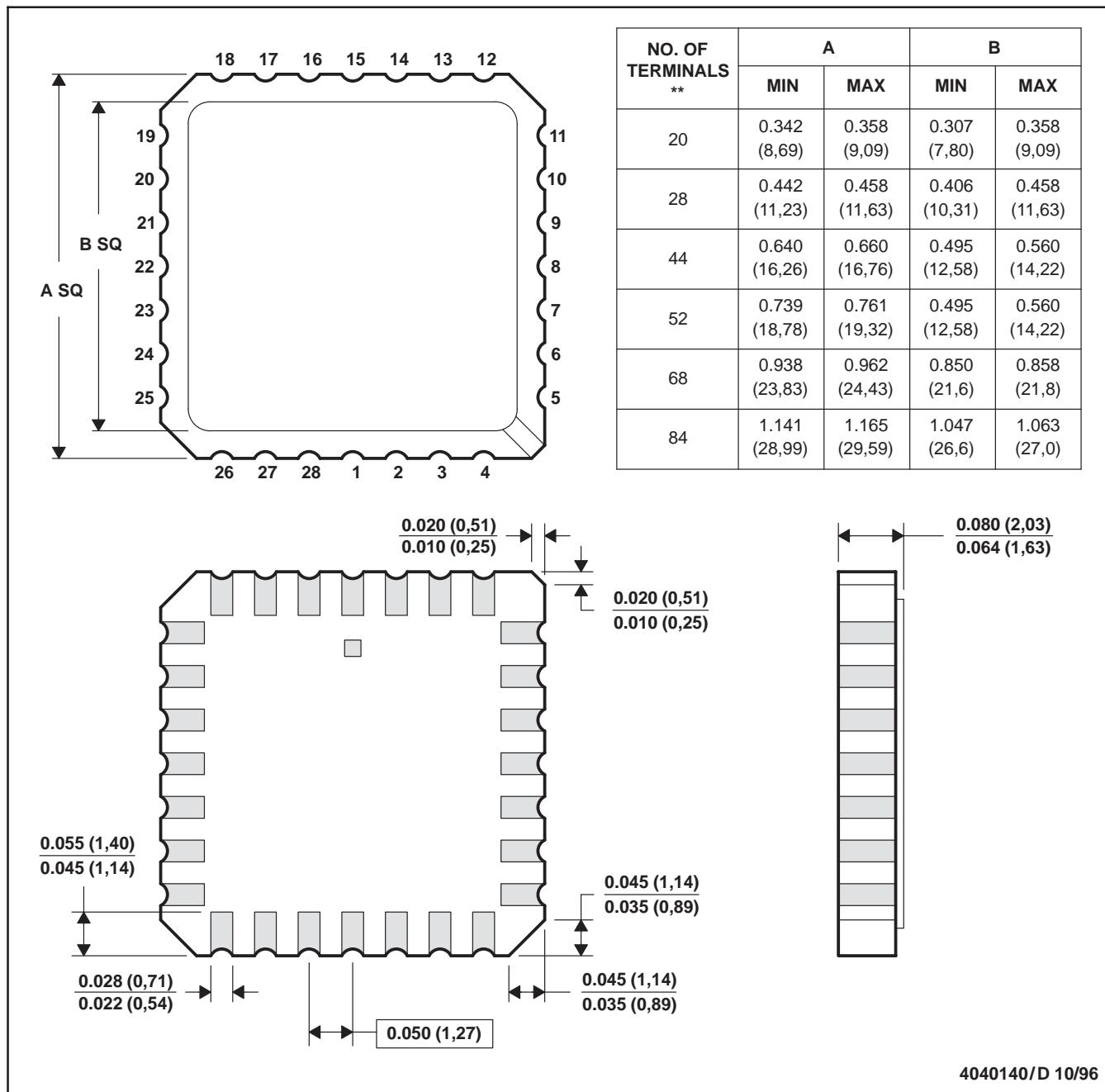
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NOTES: A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package is hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification 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



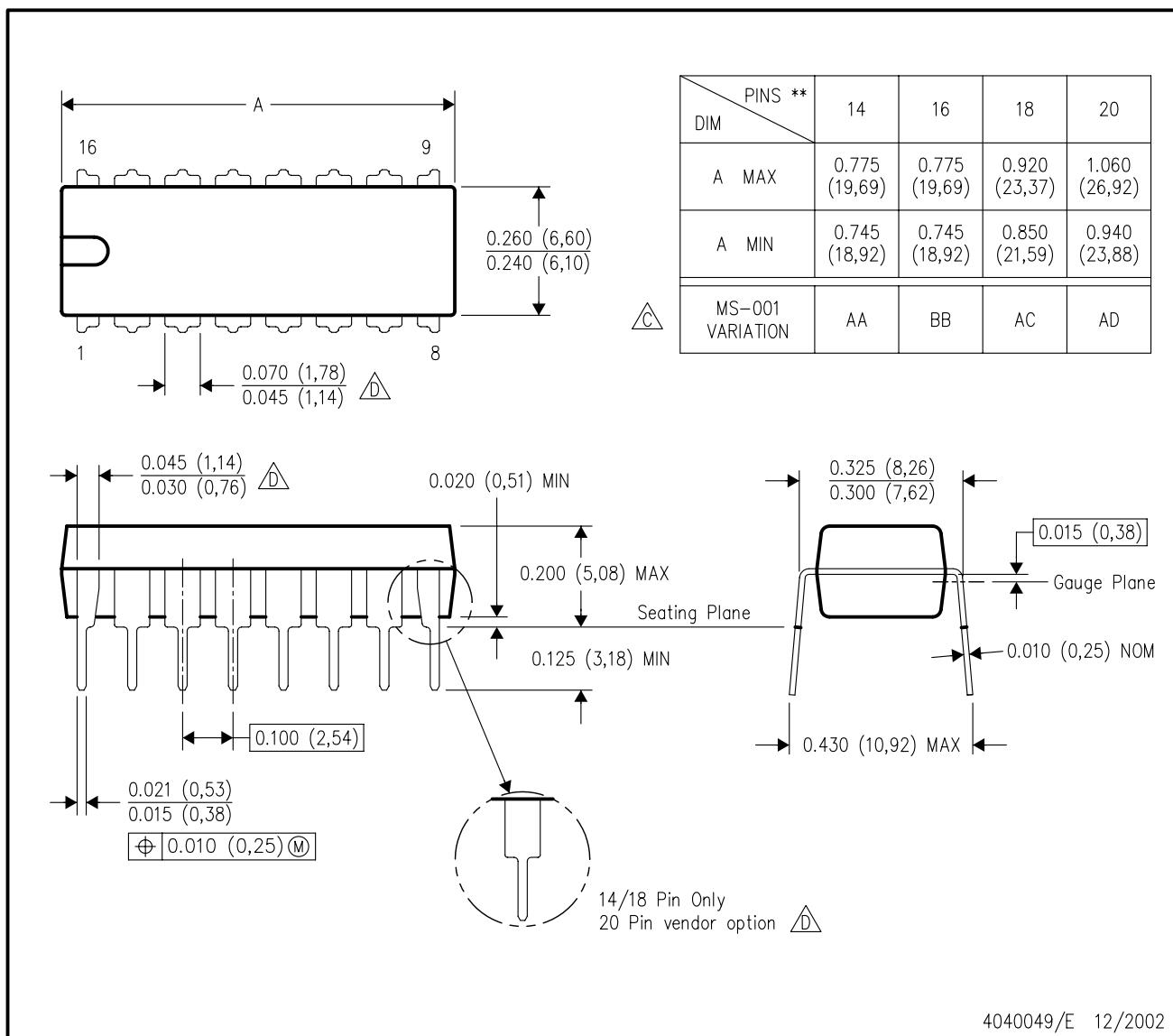
NOTES:

- 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

N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



NOTES: A. All linear dimensions are in inches (millimeters).

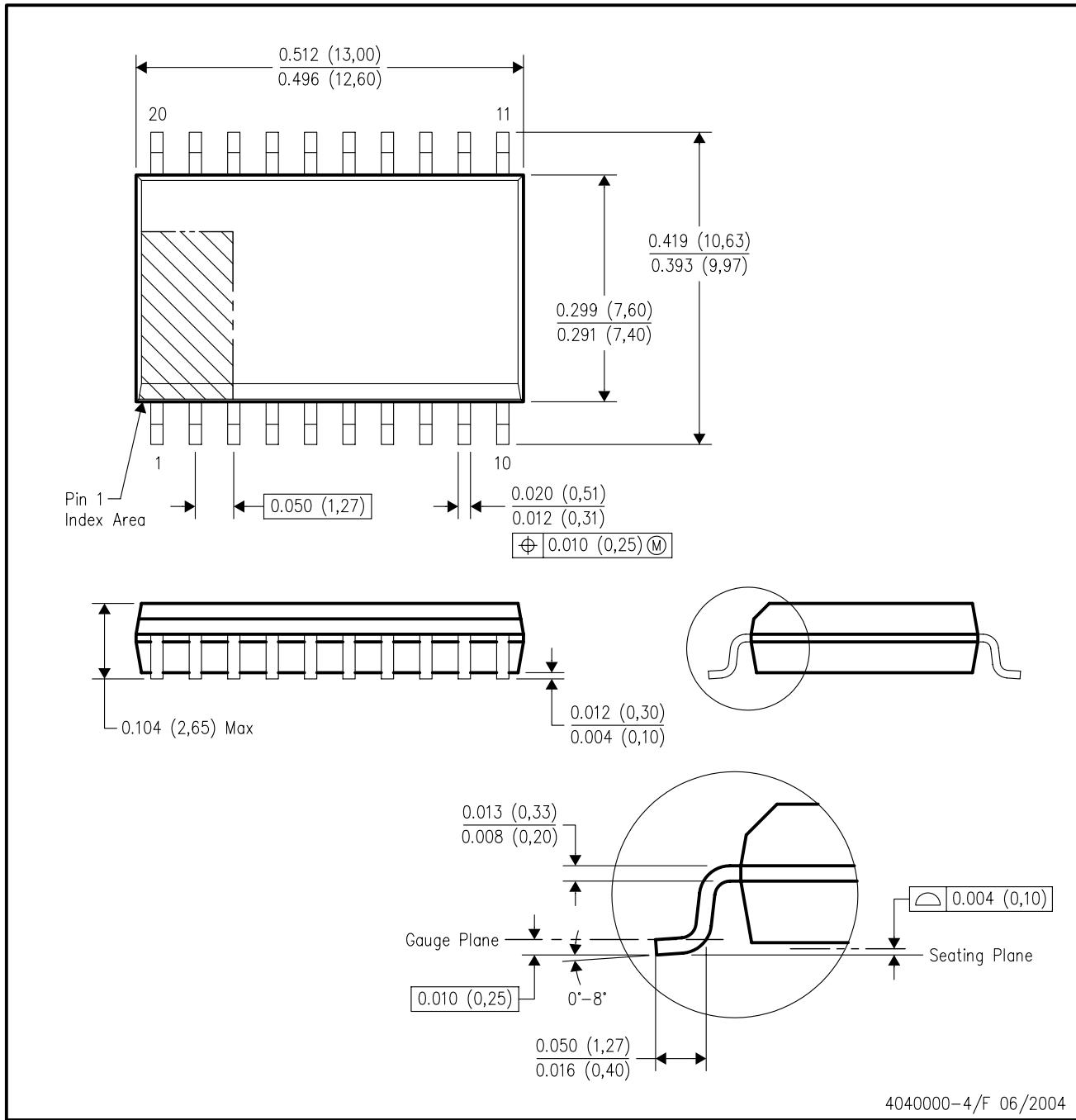
B. This drawing is subject to change without notice.

C. Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).

D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

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.

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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