

SN54ALS240A, SN54AS240A, SN74ALS240A, SN74AS240A

OCTAL BUFFERS/DRIVERS

WITH 3-STATE OUTPUTS

SDAS214E – DECEMBER 1982 – REVISED AUGUST 2002

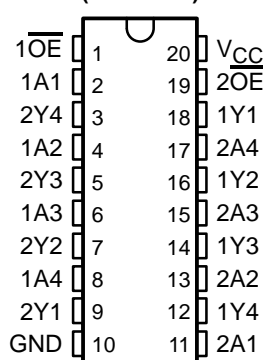
- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers
- pnp Inputs Reduce dc Loading

description/ordering information

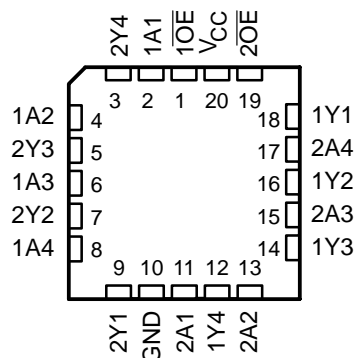
These octal buffers/drivers are designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. When these devices are used with the 'ALS241, 'AS241A, 'ALS244, and 'AS244A devices, the circuit designer has a choice of selected combinations of inverting and noninverting outputs, symmetrical active-low output-enable (\overline{OE}) inputs, and complementary OE and \overline{OE} inputs. These devices feature high fan-out and improved fan-in.

The -1 version of SN74ALS240A is identical to the standard version, except that the recommended maximum I_{OL} for the -1 version is 48 mA. There is no -1 version of the SN54ALS240A.

SN54ALS240A, SN54AS240A ... J OR W PACKAGE
SN74ALS240A ... DB, DW, N, OR NS PACKAGE
SN74AS240A ... DW OR N PACKAGE



SN54ALS240A, SN54AS240A ... FK PACKAGE
(TOP VIEW)



ORDERING INFORMATION

TA	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 70°C	PDIP – N	Tube	SN74ALS240AN	SN74ALS240AN
			SN74ALS240A-1N	SN74ALS240A-1N
			SN74AS240AN	SN74AS240AN
	SOIC – DW	Tube	SN74ALS240ADW	ALS240A
		Tape and reel	SN74ALS240ADWR	
		Tube	SN74ALS240A-1DW	ALS240A-1
		Tape and reel	SN74ALS240A-1DWR	
		Tube	SN74AS240ADW	AS240A
		Tape and reel	SN74AS240ADWR	
	SOP – NS	Tape and reel	SN74ALS240ANSR	ALS240A
			SN74ALS240A-1NSR	ALS240A-1
	SSOP – DB	Tape and reel	SN74ALS240ADBR	G240A
			SN74ALS240A-1DBR	G240A-1

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at 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.

**TEXAS
INSTRUMENTS**

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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.

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OCTAL BUFFERS/DRIVERS

WITH 3-STATE OUTPUTS

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description/ordering information (continued)

ORDERING INFORMATION

T _A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–55°C to 125°C	CDIP – J	Tube	SNJ54ALS240AJ	SNJ54ALS240AJ
			SNJ54AS240AJ	SNJ54AS240AJ
	CFP – W	Tube	SNJ54ALS240AW	SNJ54ALS240AW
			SNJ54AS240AW	SNJ54AS240AW
	LCCC – FK	Tube	SNJ54ALS240AFK	SNJ54ALS240AFK
			SNJ54AS240AFK	SNJ54AS240AFK

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

FUNCTION TABLE (each buffer)

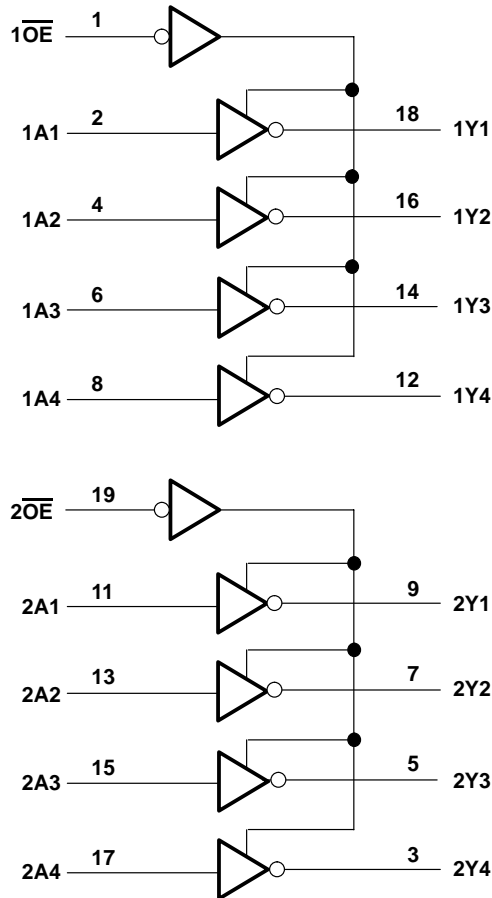
INPUTS		OUTPUT Y
\overline{OE}	A	
L	H	L
L	L	H
H	X	Z

SN54ALS240A, SN54AS240A, SN74ALS240A, SN74AS240A

OCTAL BUFFERS/DRIVERS WITH 3-STATE OUTPUTS

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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
Voltage applied to a disabled 3-state output	5.5 V
Package thermal impedance, θ_{JA} (see Note 1): DB package	70°C/W
DW package	58°C/W
N package	70°C/W
NS package	60°C/W
Storage temperature range, T_{stg}	–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.

NOTE 1: The package thermal impedance is calculated in accordance with JESD 51-7.

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OCTAL BUFFERS/DRIVERS

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recommended operating conditions

		MIN	NOM	MAX	UNIT
V _{CC}	Supply voltage	4.5	5	5.5	V
V _{IH}	High-level input voltage	2			V
V _{IL}	Low-level input voltage	SN54ALS240A		0.7	V
		SN74ALS240A, 'AS240A		0.8	
I _{OH}	High-level output current	SN54ALS240A, SN54AS240A		–12	mA
		SN74ALS240A, SN74AS240A		–15	
I _{OL}	Low-level output current	SN54ALS240A		12	mA
		SN74ALS240A		24	
				48†	
		SN54AS240A		48	
T _A	Operating free-air temperature	SN54ALS240A, SN54AS240A		–55	°C
		SN74ALS240A, SN74AS240A		0	

† Applies only to the -1 version and only if V_{CC} is between 4.75 V and 5.25 V

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

PARAMETER	TEST CONDITIONS		SN54ALS240A			SN74ALS240A			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} = −0.4 mA		V _{CC} − 2			V _{CC} − 2			V
	V _{CC} = 4.5 V	I _{OH} = −3 mA	2.4	3.2		2.4	3.2		
		I _{OH} = −12 mA	2						
		I _{OH} = −15 mA			2				
V _{OL}	V _{CC} = 4.5 V	I _{OL} = 12 mA	0.25 0.4		0.25 0.4				V
		I _{OL} = 24 mA			0.35 0.5				
		I _{OL} = 48 mA†			0.35 0.5				
I _{OZH}	V _{CC} = 5.5 V, V _O = 2.7 V		20			20			μA
I _{OZL}	V _{CC} = 5.5 V, V _O = 0.4 V		−20			−20			μA
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		−0.1			−0.1			mA
I _O §	V _{CC} = 5.5 V, V _O = 2.25 V		−20	−112		−30	−112		mA
I _{CC}	V _{CC} = 5.5 V	Outputs high	4 11		4 11				mA
		Outputs low	13 23		13 23				
		Outputs disabled	14 25		14 25				

† Applies only to the -1 version and only if V_{CC} is between 4.75 V and 5.25 V

‡ All typical values are at V_{CC} = 5 V, T_A = 25°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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electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS		SN54AS240A			SN74AS240A			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
			I _{OH} = −3 mA	2.4	3.4		2.4	3.4		
		V _{CC} = 4.5 V	I _{OH} = −12 mA	2.4						
			I _{OH} = −15 mA				2.4			
V _{OL}		V _{CC} = 4.5 V	I _{OL} = 48 mA	0.27 0.55						V
			I _{OL} = 64 mA				0.31 0.55			
I _{OZH}		V _{CC} = 5.5 V, V _O = 2.7 V		50			50			μA
I _{OZL}		V _{CC} = 5.5 V, V _O = 0.4 V		−50			−50			μA
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}	A inputs	V _{CC} = 5.5 V, V _I = 0.4 V		−1			−1			mA
	$\overline{\text{OE}}$ inputs			−0.5			−0.5			
I _{O‡}		V _{CC} = 5.5 V, V _O = 2.25 V		−50	−150		−50	−150		mA
I _{CC}		V _{CC} = 5.5 V	Outputs high	11	17		11	17		mA
			Outputs low	51	75		51	75		
			Outputs disabled	24	38		24	38		

† 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 V to 5.5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = MIN to MAX§				UNIT
			SN54ALS240A		SN74ALS240A		
			MIN	MAX	MIN	MAX	
t _{PLH}	A	Y	2	22	2	9	ns
t _{PHL}			2	11	2	9	
t _{PZH}	OE	Y	4	34	5	13	ns
t _{PZL}			5	26	5	18	
t _{PHZ}	OE	Y	1	15	2	10	ns
t _{PLZ}			3	24	3	12	

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

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switching characteristics (see Figure 1)

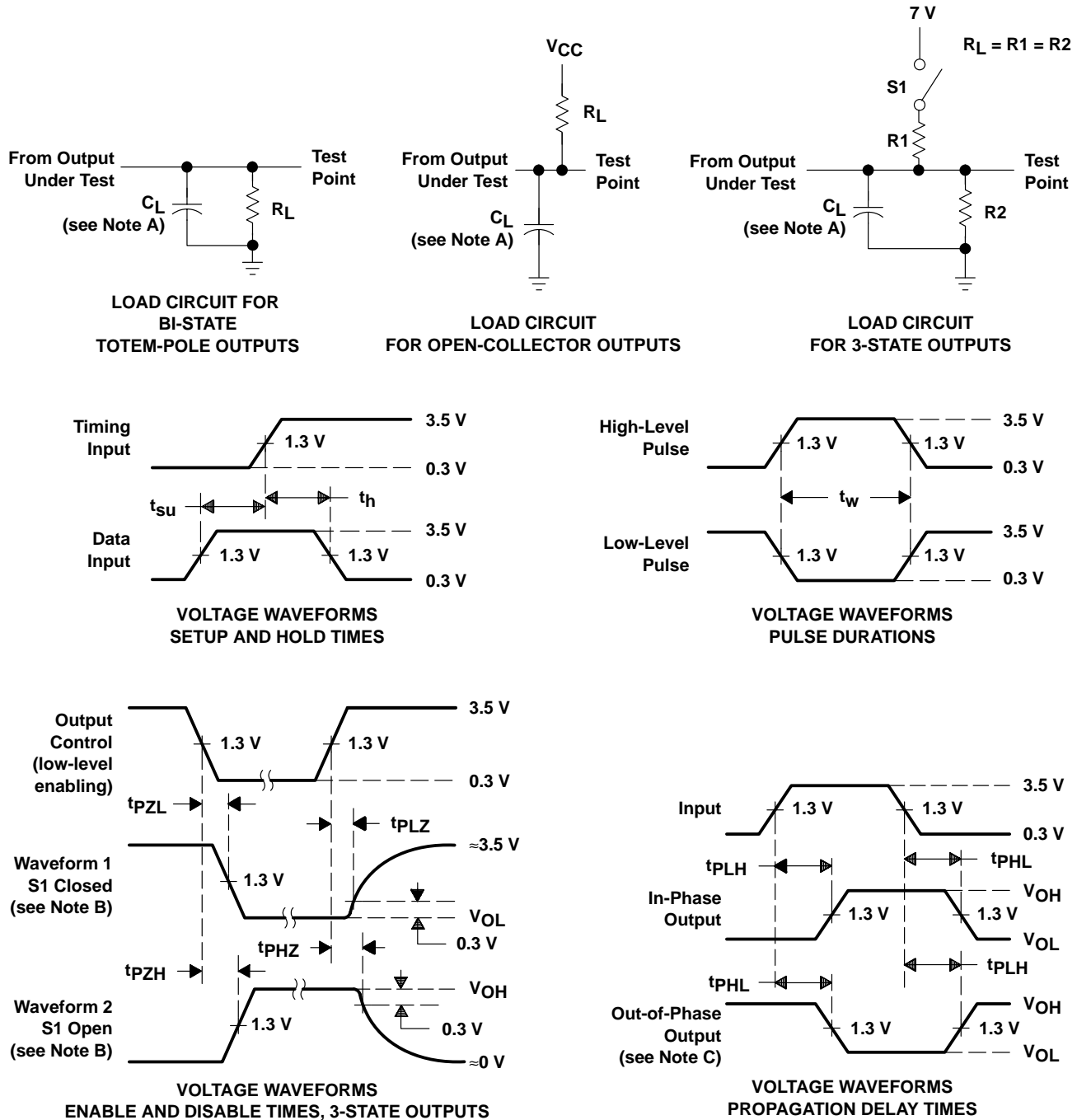
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = MIN to MAX†				UNIT
			SN54AS240A		SN74AS240A		
			MIN	MAX	MIN	MAX	
t _{PLH}	A	Y	1	7	1	6.5	ns
t _{PHL}			1.2	6.5	1.2	6.5	
t _{PZH}	\overline{OE}	Y	1	7	1	6.4	ns
t _{PZL}			1.1	9.5	1.1	9	
t _{PHZ}	\overline{OE}	Y	1.2	5.5	1.2	5	ns
t _{PLZ}			1.5	12.5	1.5	9.5	

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

SN54ALS240A, SN54AS240A, SN74ALS240A, SN74AS240A OCTAL BUFFERS/DRIVERS 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: $PRR \leq 1$ MHz, $t_r = t_f = 2$ 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⁾	Samples (Requires Login)
5962-8859101SA	ACTIVE	CFP	W	20	1	TBD	Call TI	Call TI	
JM38510/38301B2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
JM38510/38301BRA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	
M38510/38301B2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
M38510/38301BRA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	
SN54ALS240AJ	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	
SN74ALS240A-1DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ALS240A-1DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ALS240A-1DWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ALS240A-1N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74ALS240A-1NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74ALS240A-1NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ALS240A-1NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ALS240A-1NSRG4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ALS240ADW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ALS240ADWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ALS240ADWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ALS240ADWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ALS240ADWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ALS240ADWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ALS240AN	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
SN74ALS240ANE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74ALS240ANSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ALS240ANSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74ALS240ANSRG4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AS240ADW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AS240ADWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AS240ADWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AS240ADWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AS240ADWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AS240ADWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AS240AN	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74AS240ANE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74AS240ANSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AS240ANSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AS240ANSRG4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SNJ54ALS240AFK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
SNJ54ALS240AJ	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	
SNJ54ALS240AW	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type	
SNJ54AS240AFK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
SNJ54AS240AJ	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	
SNJ54AS240AW	ACTIVE	CFP	W	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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OTHER QUALIFIED VERSIONS OF SN54ALS240A, SN54AS240A, SN74ALS240A, SN74AS240A :

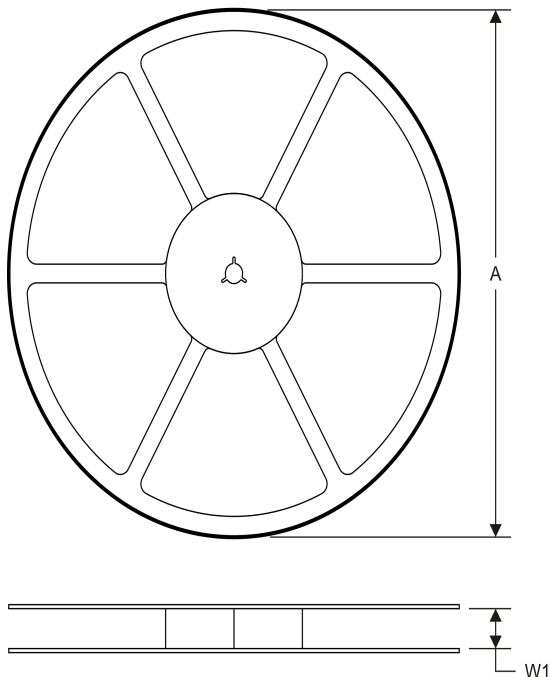
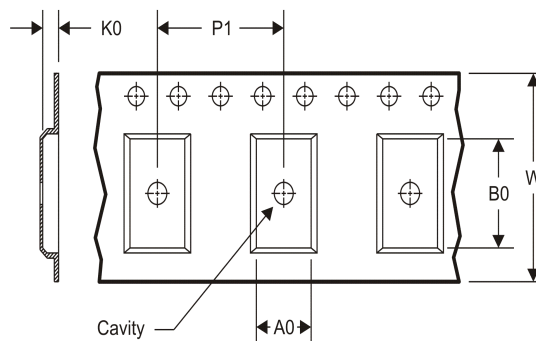
● Catalog: [SN74ALS240A](#), [SN74AS240A](#)

● Military: [SN54ALS240A](#), [SN54AS240A](#)

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
SN74ALS240A-1NSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1
SN74ALS240ADWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1
SN74ALS240ANSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1
SN74AS240ADWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1
SN74AS240ANSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1

TAPE AND REEL BOX DIMENSIONS



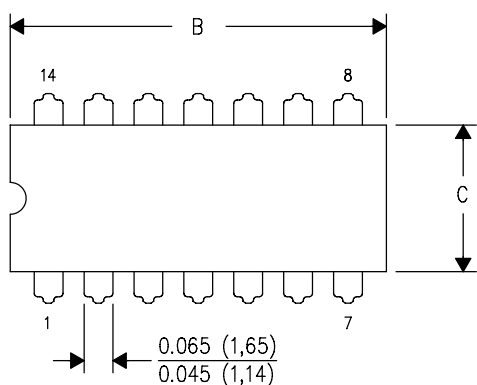
*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ALS240A-1NSR	SO	NS	20	2000	367.0	367.0	45.0
SN74ALS240ADWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74ALS240ANSR	SO	NS	20	2000	367.0	367.0	45.0
SN74AS240ADWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74AS240ANSR	SO	NS	20	2000	367.0	367.0	45.0

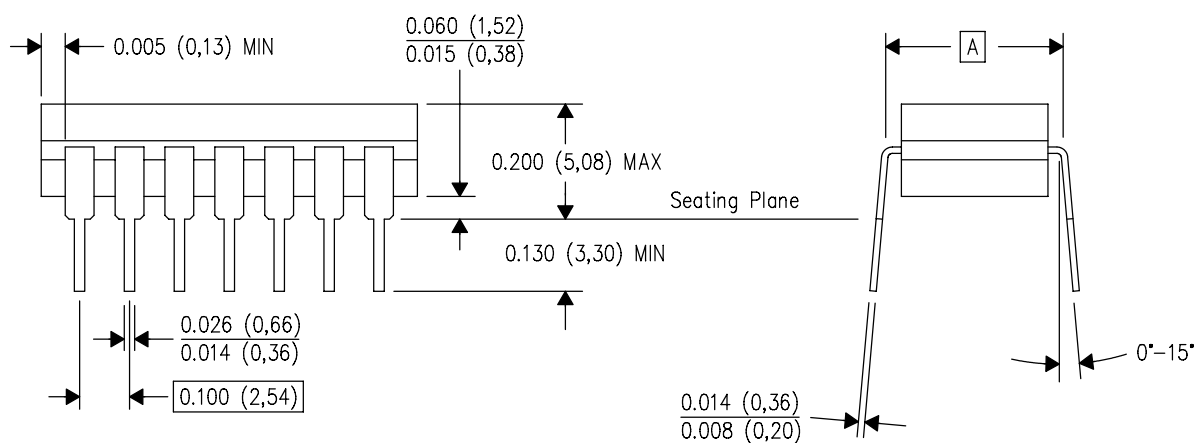
J (R-GDIP-T**)

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)

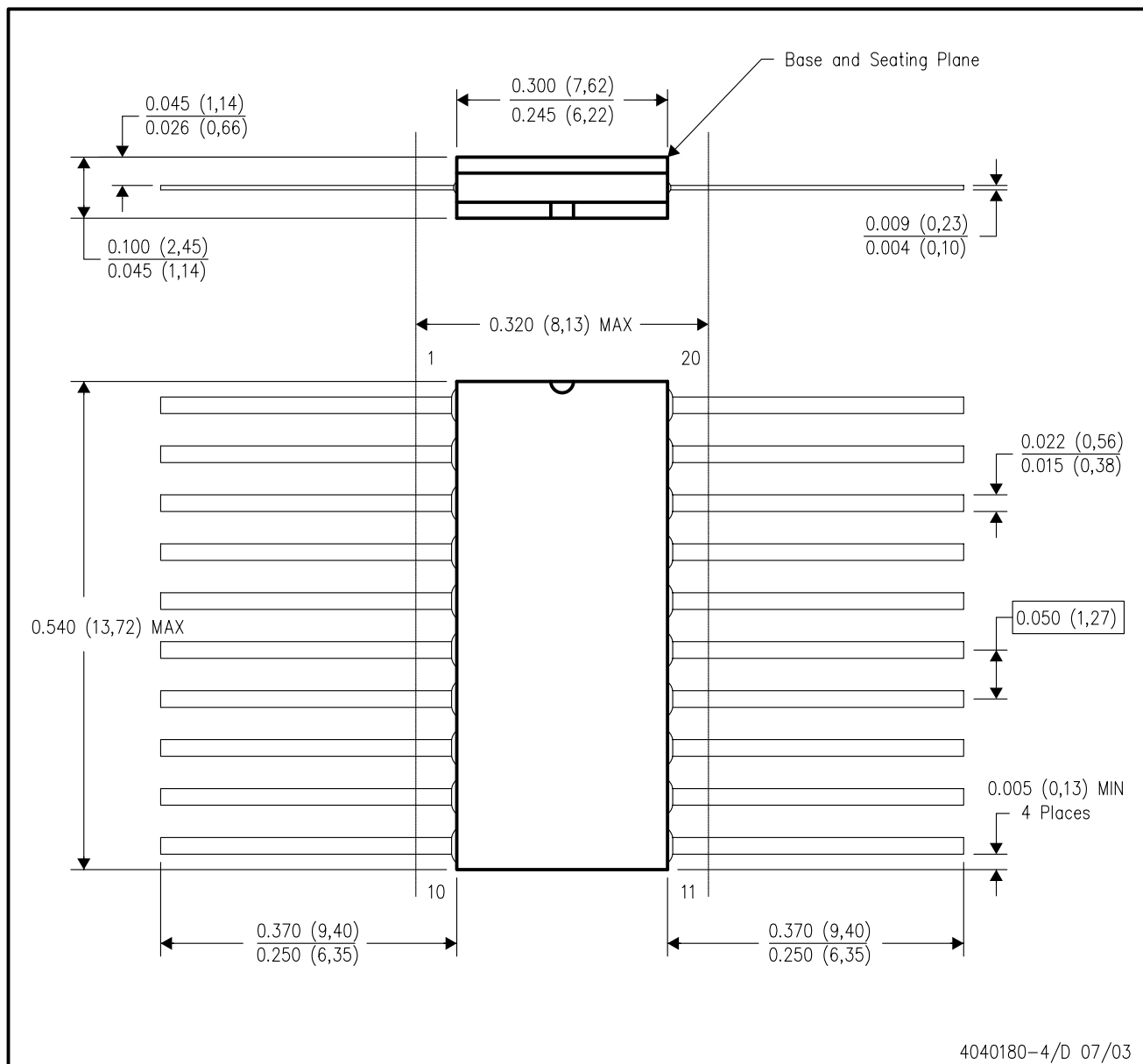


4040083/F 03/03

- 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



- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package can be hermetically sealed with a ceramic lid using glass frit.
 - Index point is provided on cap for terminal identification only.
 - Falls within Mil-Std 1835 GDFP2-F20

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



NO. OF TERMINALS **	A		B	
	MIN	MAX	MIN	MAX
20	0.342 (8,69)	0.358 (9,09)	0.307 (7,80)	0.358 (9,09)
28	0.442 (11,23)	0.458 (11,63)	0.406 (10,31)	0.458 (11,63)
44	0.640 (16,26)	0.660 (16,76)	0.495 (12,58)	0.560 (14,22)
52	0.740 (18,78)	0.761 (19,32)	0.495 (12,58)	0.560 (14,22)
68	0.938 (23,83)	0.962 (24,43)	0.850 (21,6)	0.858 (21,8)
84	1.141 (28,99)	1.165 (29,59)	1.047 (26,6)	1.063 (27,0)



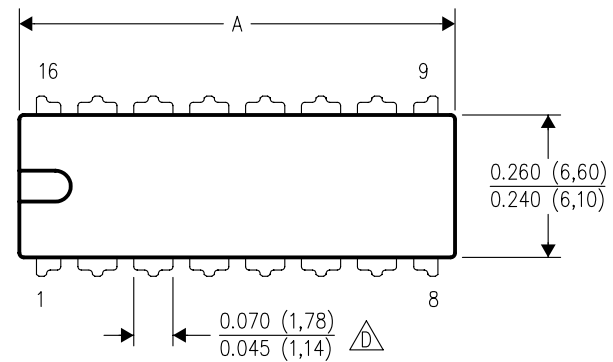
4040140/D 01/11

- 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

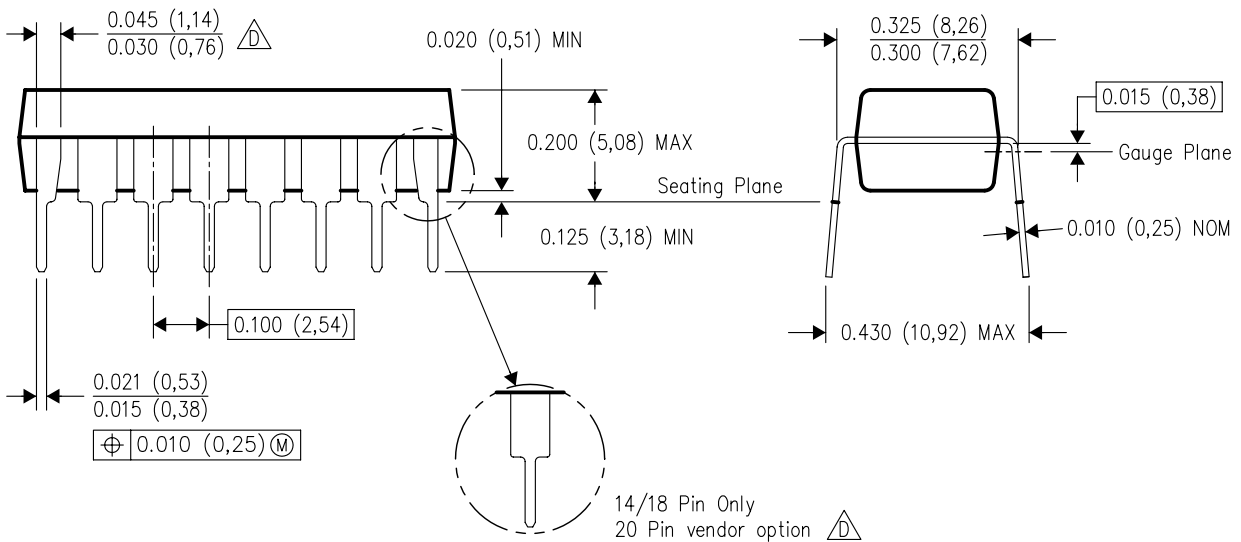
N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE





DIM \ PINS **	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS-001 VARIATION	AA	BB	AC	AD



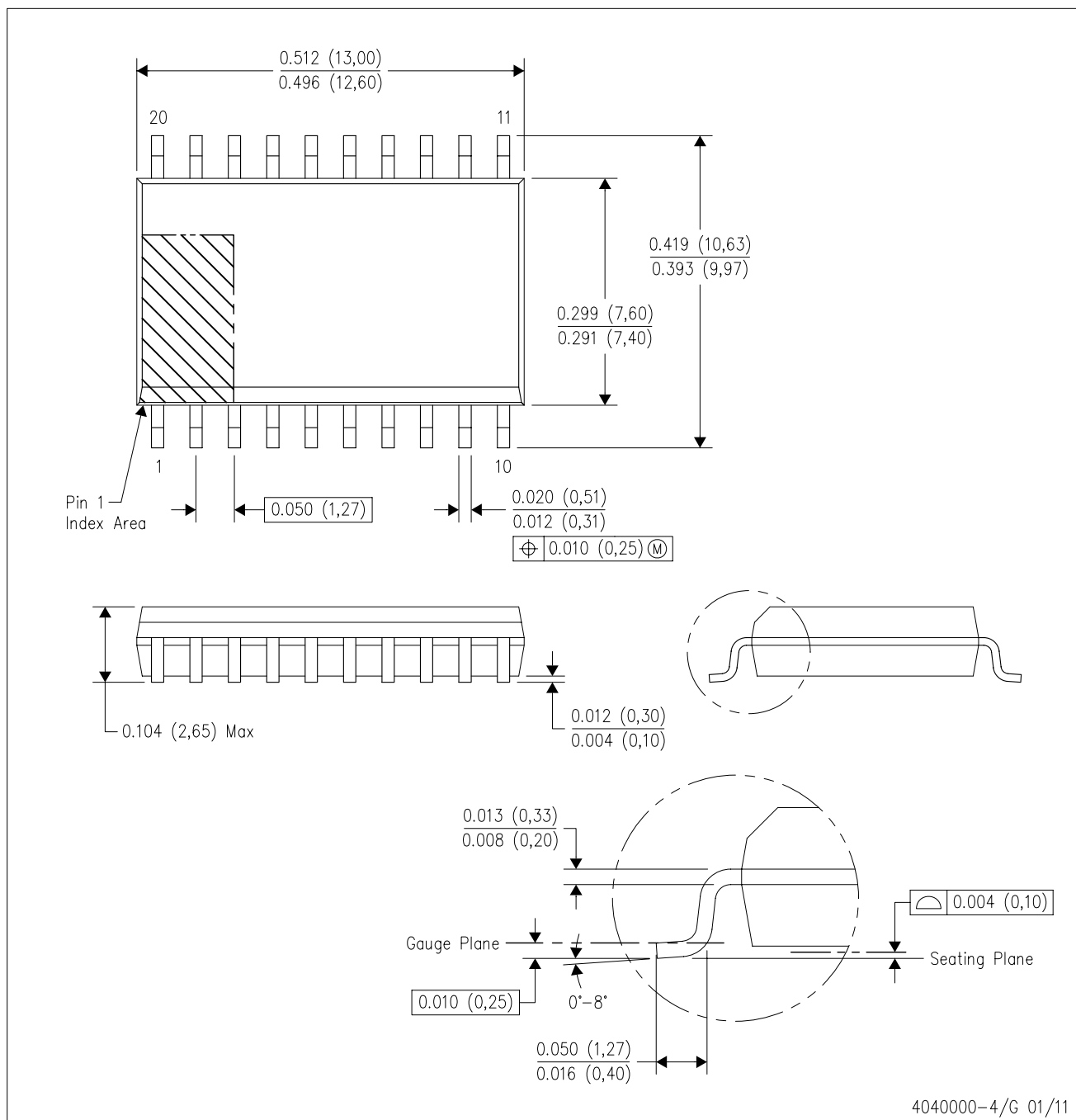
4040049/E 12/2002

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.

DW (R-PDSO-G20)

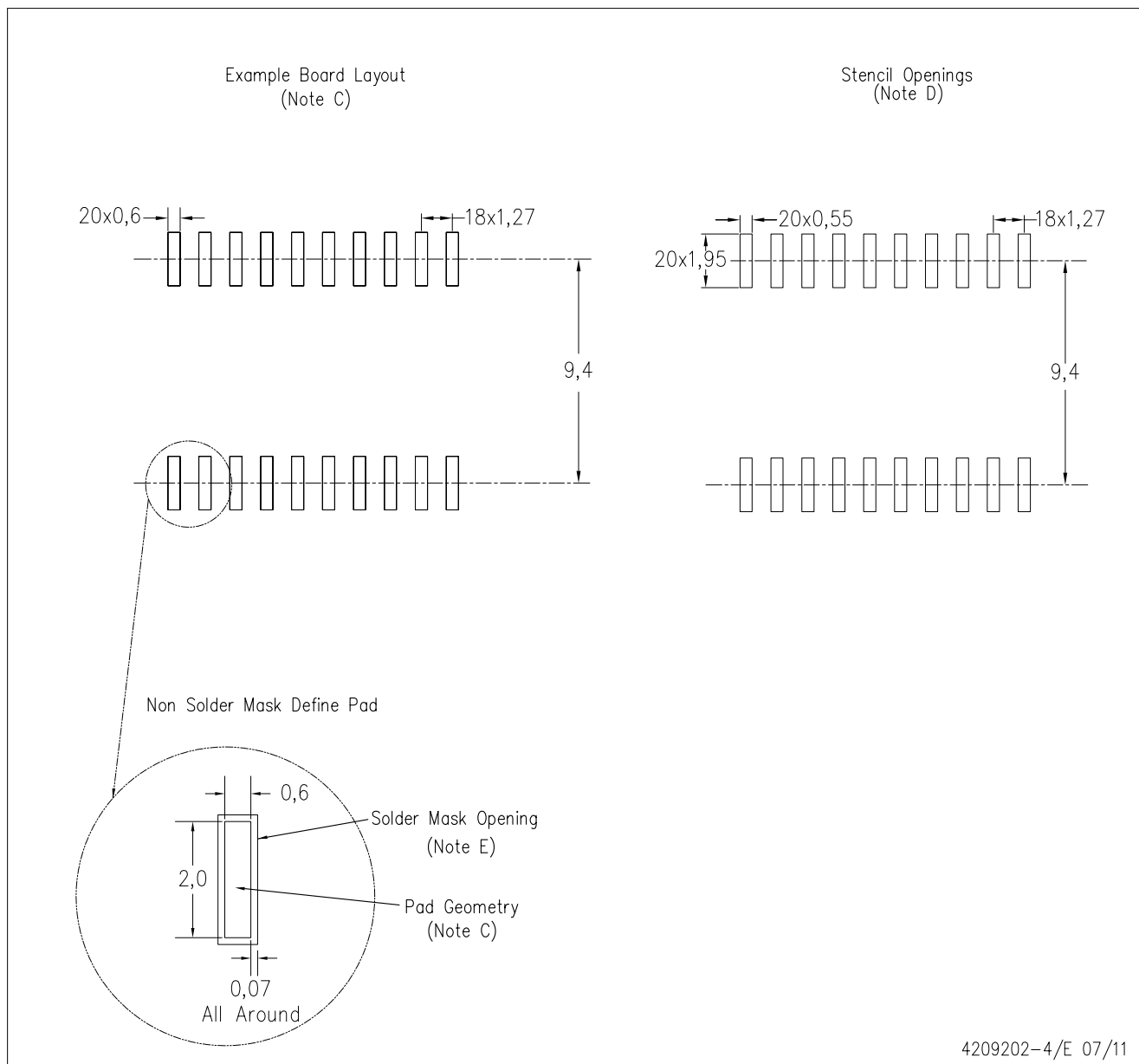
PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.
 - 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.

DW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Refer to IPC7351 for alternate board design.
 - D. 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
 - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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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