

SN54ALS373A, SN54AS373, SN74ALS373A, SN74AS373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SDAS083C – APRIL 1982 – REVISED MARCH 2002

- Eight Latches in a Single Package
- 3-State Bus-Driving True Outputs
- Full Parallel Access for Loading
- Buffered Control Inputs
- pnp Inputs Reduce dc Loading on Data Lines

description

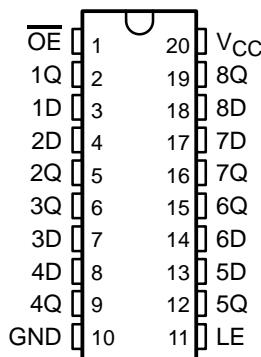
These octal transparent D-type latches feature 3-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. They are particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

While the latch-enable (LE) input is high, the Q outputs follow the data (D) inputs. When LE is taken low, the Q outputs are latched at the logic levels set up at the D inputs.

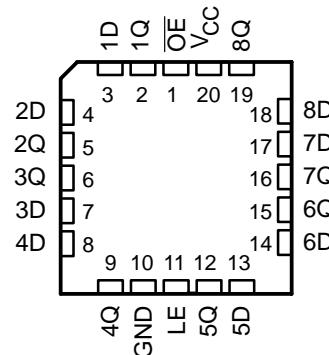
A buffered output-enable (\overline{OE}) input can be used to place the eight outputs in either a normal logic state (high or low) or a high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and the increased drive provide the capability to drive bus lines without interface or pullup components.

\overline{OE} does not affect internal operations of the latches. Old data can be retained or new data can be entered while the outputs are off.

SN54ALS373A, . . . J OR W PACKAGE
SN54AS373 . . . J PACKAGE
SN74ALS373A, SN74AS373 . . . DW, N, OR NS PACKAGE
(TOP VIEW)



SN54ALS373A, SN54AS373 . . . FK PACKAGE
(TOP VIEW)



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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.

**SN54ALS373A, SN54AS373, SN74ALS373A, SN74AS373
OCTAL TRANSPARENT D-TYPE LATCHES
WITH 3-STATE OUTPUTS**

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ORDERING INFORMATION

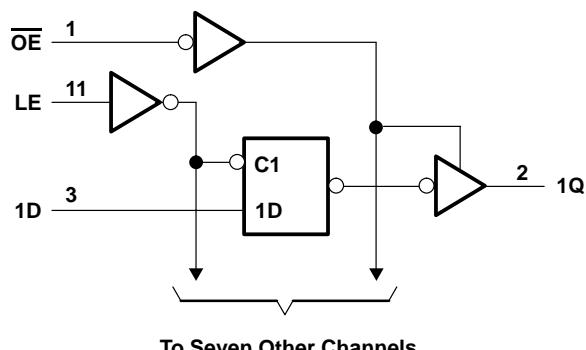
TA	PACKAGE [†]		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 70°C	PDIP – N	Tube	SN74ALS373AN	SN74ALS373AN
			SN74AS373N	SN74AS373N
	SOIC – DW	Tube	SN74ALS373ADW	ALS373A
		Tape and reel	SN74ALS373ADWR	
		Tube	SN74AS373DW	AS373
		Tape and reel	SN74AS373DWR	
	SOP – NS	Tape and reel	SN74ALS373ANSR	ALS373A
			SN74AS373NSR	74AS373
	CDIP – J	Tube	SNJ54ALS373AJ	SNJ54ALS373AJ
			SNJ54AS373J	SNJ54AS373J
		Tube	SNJ54ALS373AW	SNJ54ALS373AW
	LCCC – FK	Tube	SNJ54ALS373AFK	SNJ54ALS373AFK
			SNJ54AS373FK	SNJ54AS373FK

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

**FUNCTION TABLE
(each latch)**

INPUTS			OUTPUT Q
\overline{OE}	LE	D	
L	H	H	H
L	H	L	L
L	L	X	Q_0
H	X	X	Z

logic diagram (positive logic)



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absolute maximum ratings over operating free-air temperature range (SN54ALS373A, SN74ALS373A) (unless otherwise noted)[†]

† 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.

recommended operating conditions

		SN54ALS373A			SN74ALS373A			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 _A	Operating free-air temperature	-55		125	0		70	°C

timing requirements over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 1)

		SN54ALS373A		SN74ALS373A		UNIT
		MIN	MAX	MIN	MAX	
f_{clock}	Clock frequency					MHz
t_w	Pulse duration, LE high		12		10	ns
t_{su}	Setup time, data before LE↓		10		10	ns
t_h	Hold time, data after LE↓		7		7	ns

**SN54ALS373A, SN54AS373, SN74ALS373A, SN74AS373
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WITH 3-STATE OUTPUTS**

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

PARAMETER	TEST CONDITIONS	SN54ALS373A			SN74ALS373A			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
	$V_{CC} = 4.5 \text{ V}$	$I_{OH} = -1 \text{ mA}$	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	μA
I_{OZL}	$V_{CC} = 5.5 \text{ V}$, $V_O = 0.4 \text{ V}$			-20			-20	μA
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	μA
I_{IL}	$V_{CC} = 5.5 \text{ V}$, $V_I = 0.4 \text{ V}$			-0.1			-0.1	mA
I_O^{\ddagger}	$V_{CC} = 5.5 \text{ V}$, $V_O = 2.25 \text{ V}$	-20	-112	-30	-112			mA
I_{CC}	$V_{CC} = 5.5 \text{ V}$	Outputs high		9	16		9	16
		Outputs low		16	25		16	25
		Outputs disabled		17	27		17	27

† 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	
			SN54ALS373A			
			MIN	MAX		
t_{PLH}	D	Q	2	17	2	12
t_{PHL}			1	19	4	16
t_{PLH}	LE	Any Q	6	29	6	22
t_{PHL}			1	27	7	23
t_{PZH}	\overline{OE}	Any Q	6	22	1	18
t_{PZL}			5	24	5	20
t_{PHZ}	\overline{OE}	Any Q	2	16	1	10
t_{PLZ}			2	24	2	12

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

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**absolute maximum ratings over operating free-air temperature range (SN54AS373, SN74AS373)
(unless otherwise noted)[†]**

† 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 2: The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions

		SN54AS373			SN74AS373			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
I _{OH}	High-level output current			-12			-15	mA
I _{OL}	Low-level output current			32			48	mA
T _A	Operating free-air temperature	-55		125	0		70	°C

timing requirements over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 1)

		SN54AS373		SN74AS373		UNIT
		MIN	MAX	MIN	MAX	
f_{clock}	Clock frequency					MHz
t_w	Pulse duration, LE high		5.5*		4.5*	ns
t_{su}	Setup time, data before LE↓			2*	2*	ns
t_h	Hold time, data after LE↓			3*	3*	ns

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

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

PARAMETER	TEST CONDITIONS	SN54AS373			SN74AS373			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}	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$, $I_{OH} = -2 \text{ mA}$	$V_{CC}-2$			$V_{CC}-2$			V
	$V_{CC} = 4.5 \text{ V}$	$I_{OH} = -12 \text{ mA}$	2.4	3.2				
V_{OL}	$V_{CC} = 4.5 \text{ V}$	$I_{OL} = 32 \text{ mA}$	0.27	0.5				V
		$I_{OL} = 48 \text{ mA}$			0.32	0.5		
I_{OZH}	$V_{CC} = 5.5 \text{ V}$, $V_O = 2.7 \text{ V}$			50			50	μA
I_{OZL}	$V_{CC} = 5.5 \text{ V}$, $V_O = 0.4 \text{ V}$			-50			-50	μA
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	μA
I_{IL}	$V_{CC} = 5.5 \text{ V}$, $V_I = 0.4 \text{ V}$		-0.02	-0.5	-0.02	-0.5		mA
I_O^\ddagger	$V_{CC} = 5.5 \text{ V}$, $V_O = 2.25 \text{ V}$	-30	-112	-30	-112			mA
I_{CC}	$V_{CC} = 5.5 \text{ V}$	Outputs high	55	90	55	90		mA
		Outputs low	55	85	55	85		
		Outputs disabled	65	100	65	100		

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

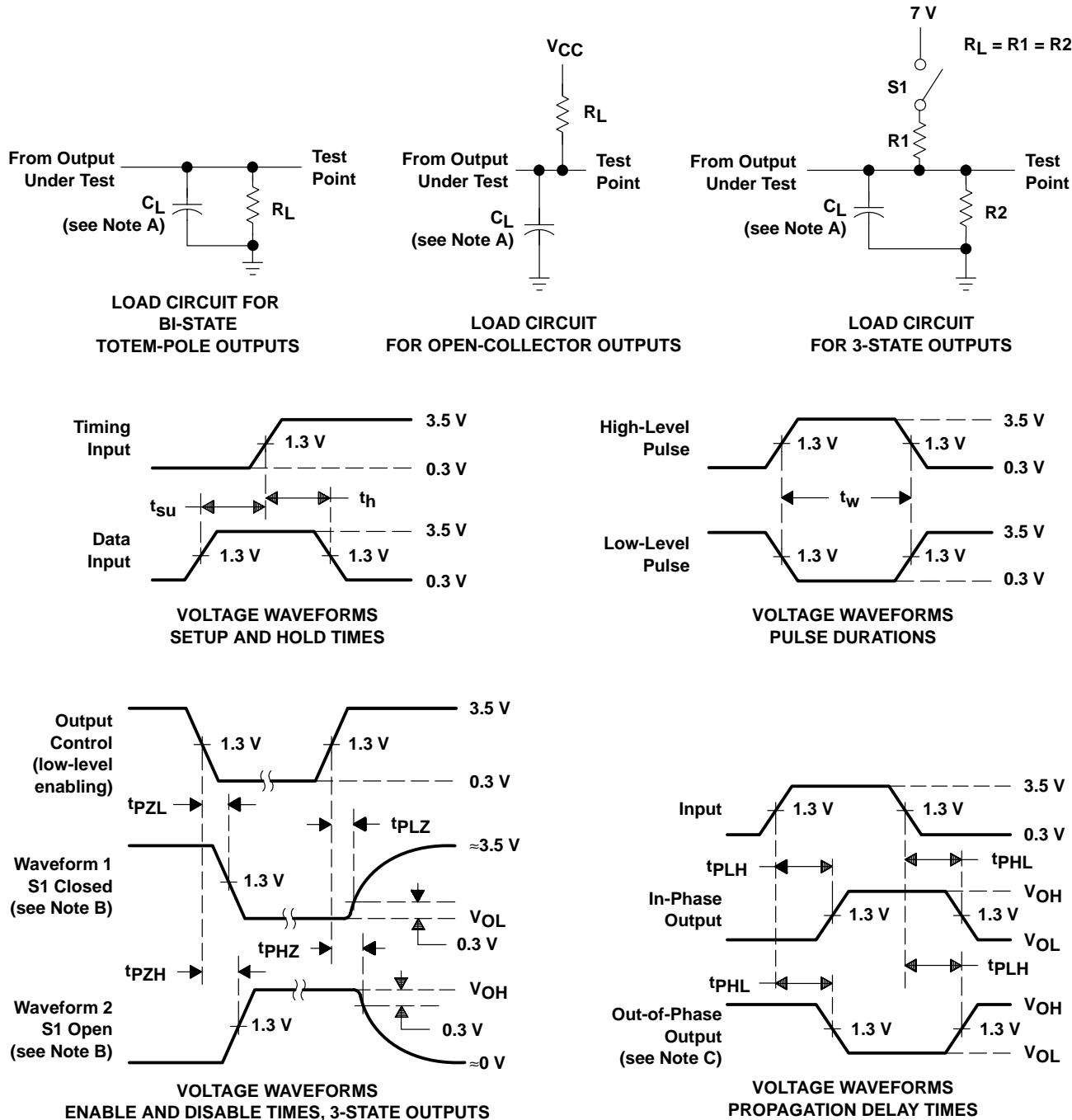
‡ The output conditions have been chosen to produce a current that closely approximates one-half of the true short-circuit output current, I_{OS} .

switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$, $C_L = 50 \text{ pF}$, $R1 = 500 \Omega$, $R2 = 500 \Omega$, $T_A = \text{MIN to MAX}^\S$				UNIT	
			SN54AS373		SN74AS373			
			MIN	MAX	MIN	MAX		
t_{PLH}	D	Q	3	9	3.5	6	ns	
t_{PHL}			3	8	3.5	6		
t_{PLH}	LE	Any Q	6.5	14.5	6.5	11.5	ns	
t_{PHL}			5	9	5	7.5		
t_{PZH}	\overline{OE}	Any Q	2	7.5	2	6.5	ns	
t_{PZL}			4.5	10.5	4.5	9.5		
t_{PHZ}	\overline{OE}	Any Q	3	10	3	6.5	ns	
t_{PLZ}			3	8	3	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 S_1 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 (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
83020012A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	83020012A SNJ54ALS 373AFK	Samples
8302001RA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	8302001RA SNJ54ALS373AJ	Samples
8302001SA	ACTIVE	CFP	W	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	8302001SA SNJ54ALS373AW	Samples
JM38510/37203B2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	JM38510/ 37203B2A	Samples
JM38510/37203BRA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 37203BRA	Samples
M38510/37203B2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	JM38510/ 37203B2A	Samples
M38510/37203BRA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 37203BRA	Samples
SN54ALS373AJ	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	SN54ALS373AJ	Samples
SN54AS373J	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	SN54AS373J	Samples
SN74ALS373ADBLE	OBsolete	SSOP	DB	20		TBD	Call TI	Call TI	0 to 70		
SN74ALS373ADBR	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	G373A	Samples
SN74ALS373ADW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS373A	Samples
SN74ALS373ADWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS373A	Samples
SN74ALS373ADWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS373A	Samples
SN74ALS373ADWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS373A	Samples
SN74ALS373AN	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74ALS373AN	Samples
SN74ALS373AN3	OBsolete	PDIP	N	20		TBD	Call TI	Call TI	0 to 70		
SN74ALS373ANSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS373A	Samples

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
SN74ALS373ANSRG4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS373A	Samples
SN74AS373DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	AS373	Samples
SN74AS373DWR	OBsolete	SOIC	DW	20		TBD	Call TI	Call TI	0 to 70	AS373	
SN74AS373DWRE4	OBsolete	SOIC	DW	20		TBD	Call TI	Call TI	0 to 70		
SN74AS373DWRG4	OBsolete	SOIC	DW	20		TBD	Call TI	Call TI	0 to 70		
SN74AS373N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74AS373N	Samples
SN74AS373N3	OBsolete	PDIP	N	20		TBD	Call TI	Call TI	0 to 70		
SN74AS373NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	74AS373	Samples
SNJ54ALS373AFK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	83020012A SNJ54ALS 373AFK	Samples
SNJ54ALS373AJ	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	8302001RA SNJ54ALS373AJ	Samples
SNJ54ALS373AW	ACTIVE	CFP	W	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	8302001SA SNJ54ALS373AW	Samples
SNJ54AS373FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	SNJ54AS 373FK	Samples
SNJ54AS373J	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	SNJ54AS373J	Samples

(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.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

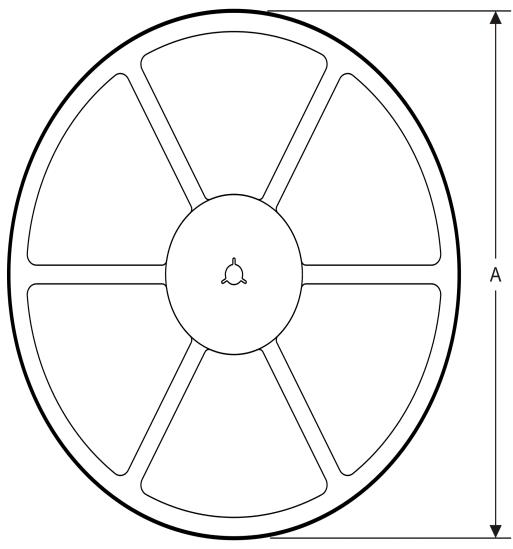
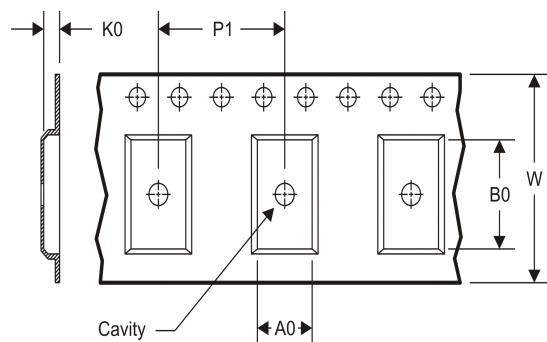
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

OTHER QUALIFIED VERSIONS OF SN54ALS373A, SN54AS373, SN74ALS373A, SN74AS373 :

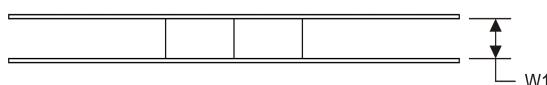
- Catalog: [SN74ALS373A](#), [SN74AS373](#)
- Military: [SN54ALS373A](#), [SN54AS373](#)

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
SN74ALS373ADBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74ALS373ADWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1
SN74ALS373ANSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1
SN74AS373NSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1

TAPE AND REEL BOX DIMENSIONS

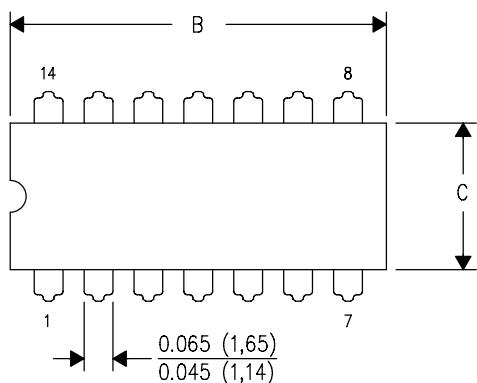

*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ALS373ADBR	SSOP	DB	20	2000	367.0	367.0	38.0
SN74ALS373ADWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74ALS373ANSR	SO	NS	20	2000	367.0	367.0	45.0
SN74AS373NSR	SO	NS	20	2000	367.0	367.0	45.0

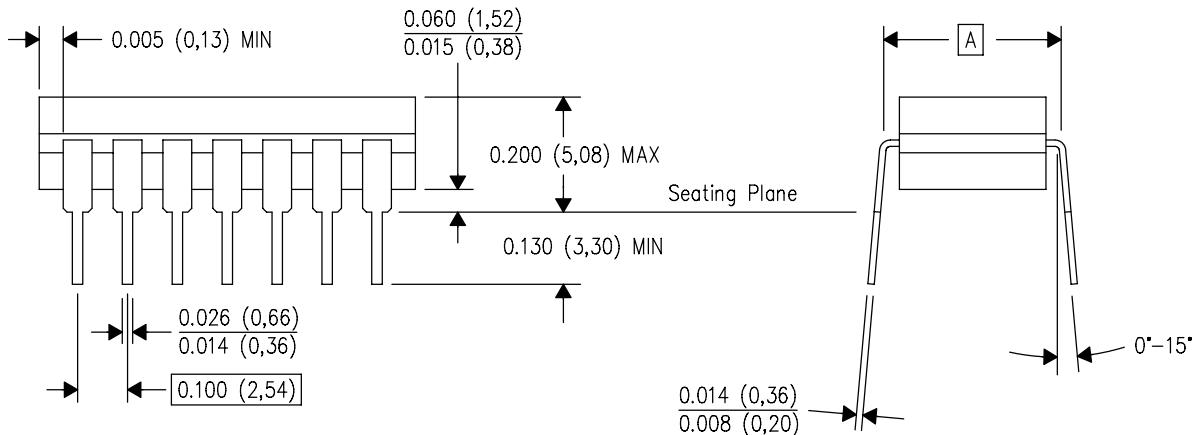
J (R-GDIP-T**)

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)

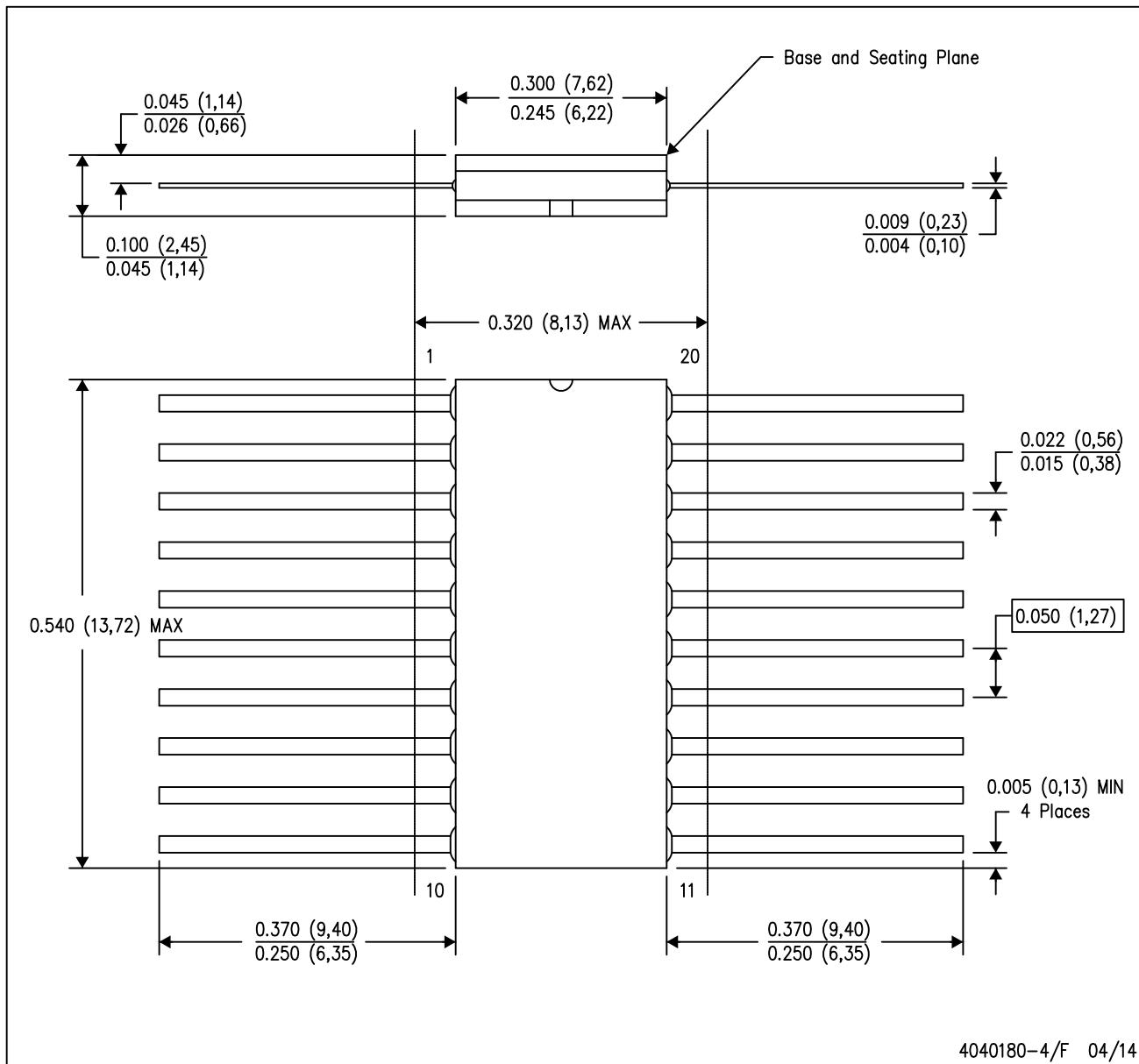


4040083/F 03/03

- 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

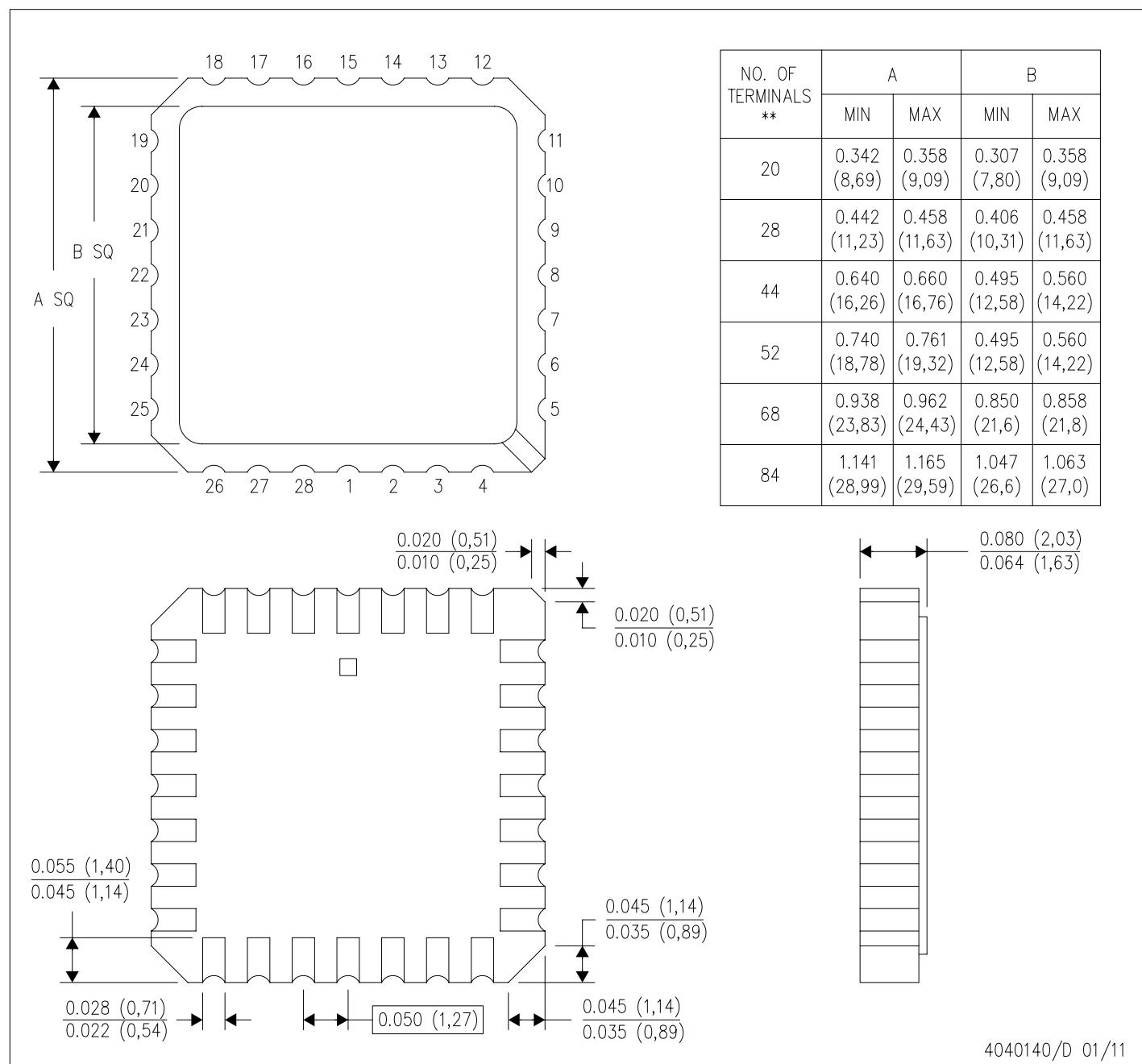


- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only.
 - E. Falls within Mil-Std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

FK (S-CQCC-N**)

28 TERMINAL SHOWN

LEADLESS CERAMIC CHIP CARRIER



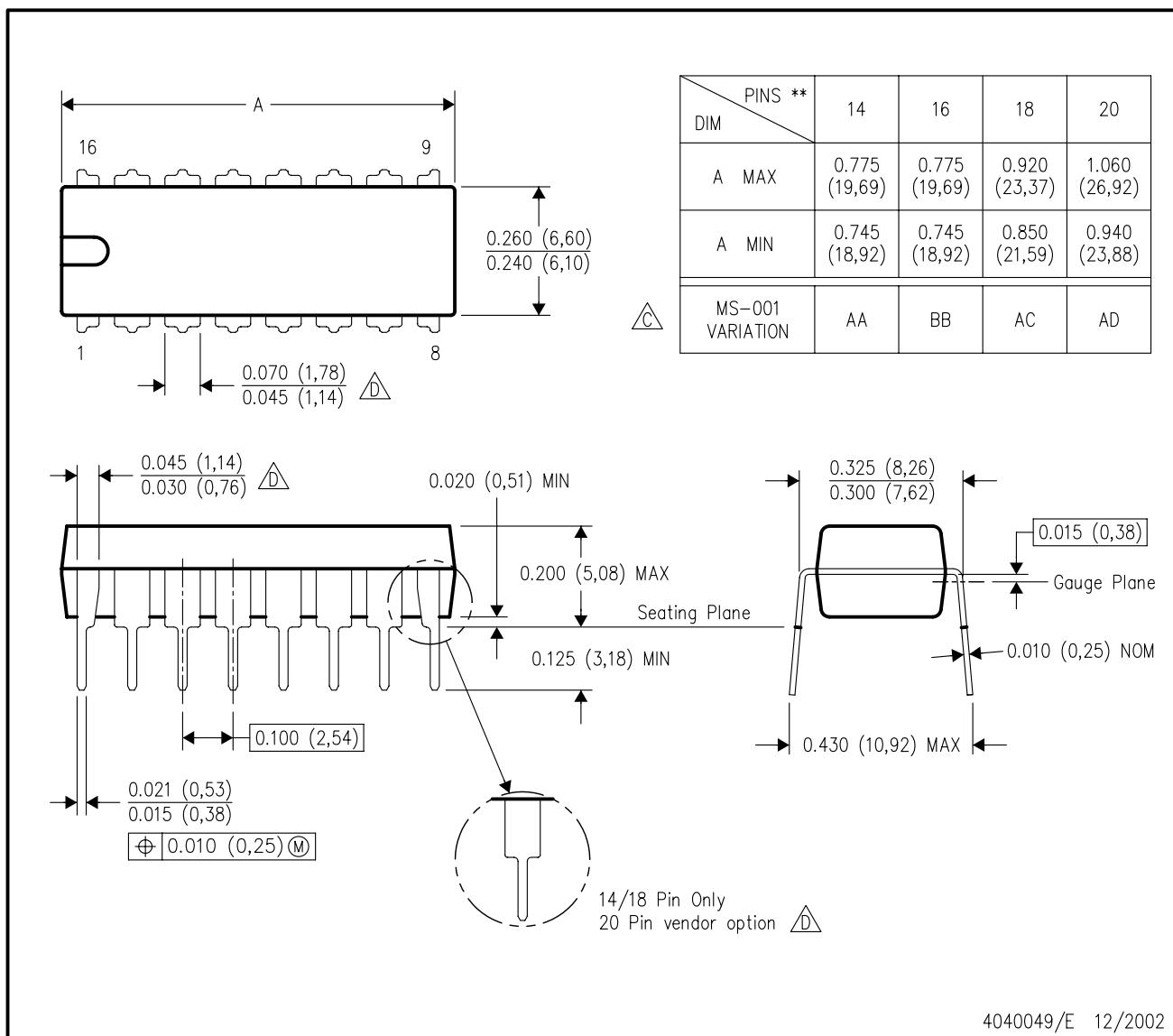
- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package can be hermetically sealed with a metal lid.
 - Falls within JEDEC MS-004

4040140/D 01/11

N (R-PDIP-T**)

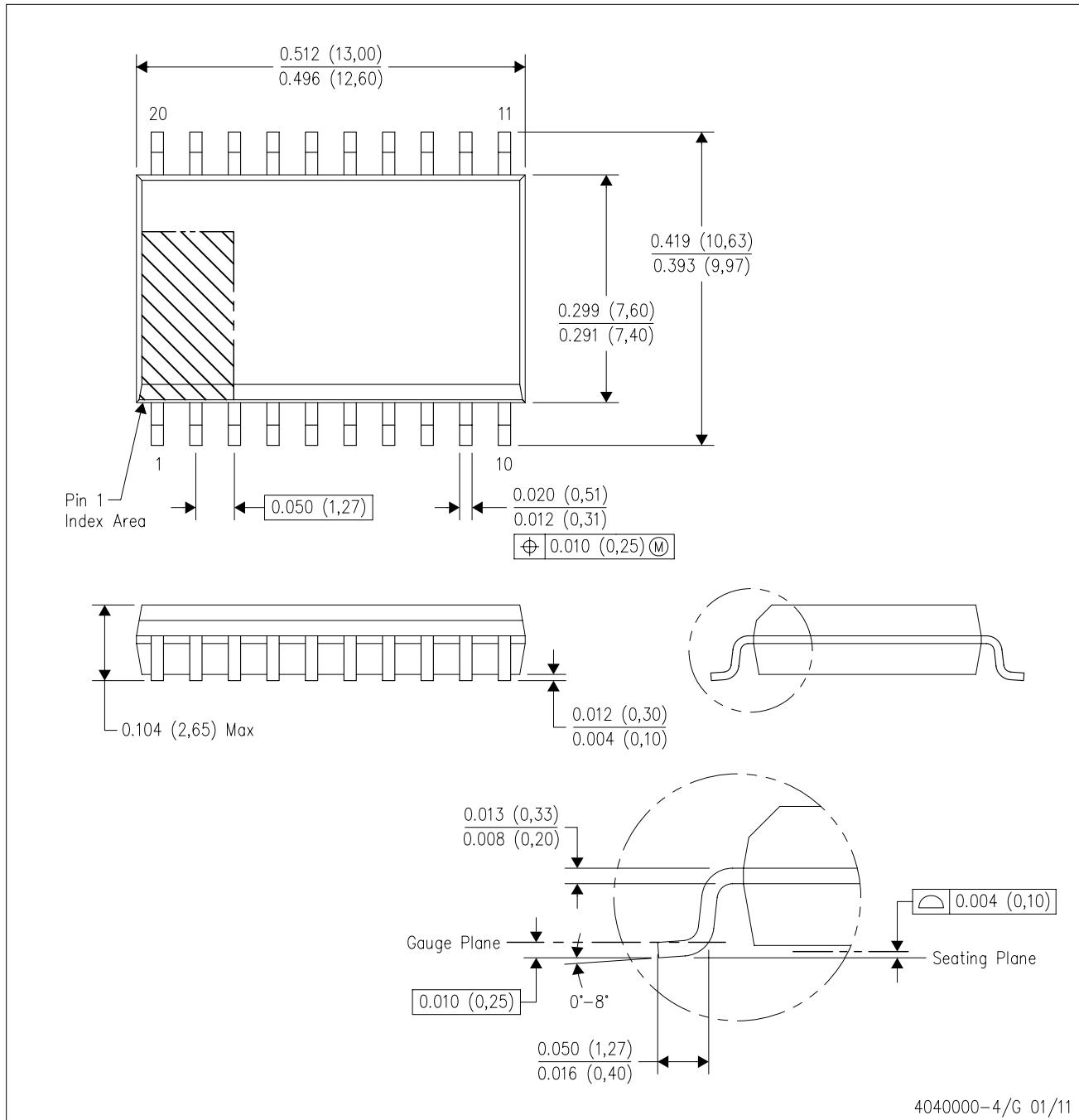
16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



DW (R-PDSO-G20)

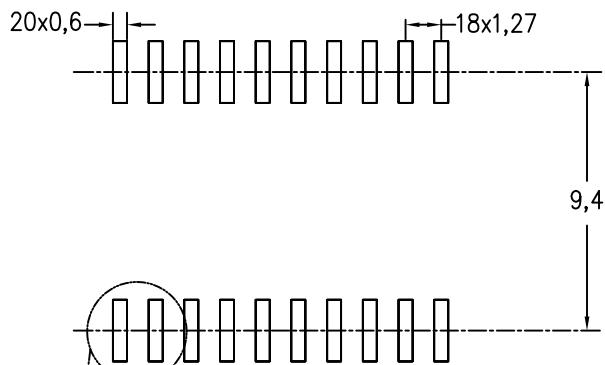
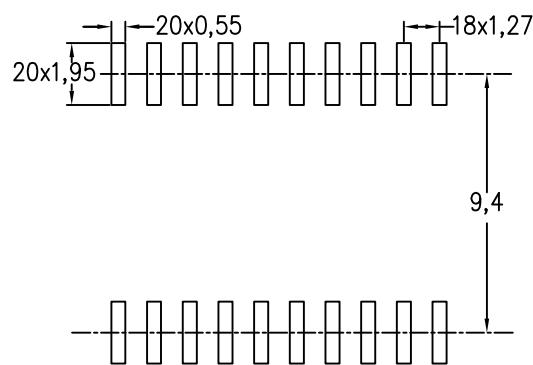
PLASTIC SMALL OUTLINE



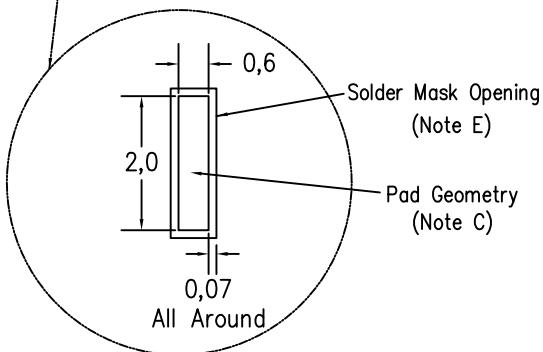
- NOTES:
- All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.
 - This drawing is subject to change without notice.
 - Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0.15).
 - Falls within JEDEC MS-013 variation AC.

DW (R-PDSO-G20)

PLASTIC SMALL OUTLINE

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

Non Solder Mask Define Pad



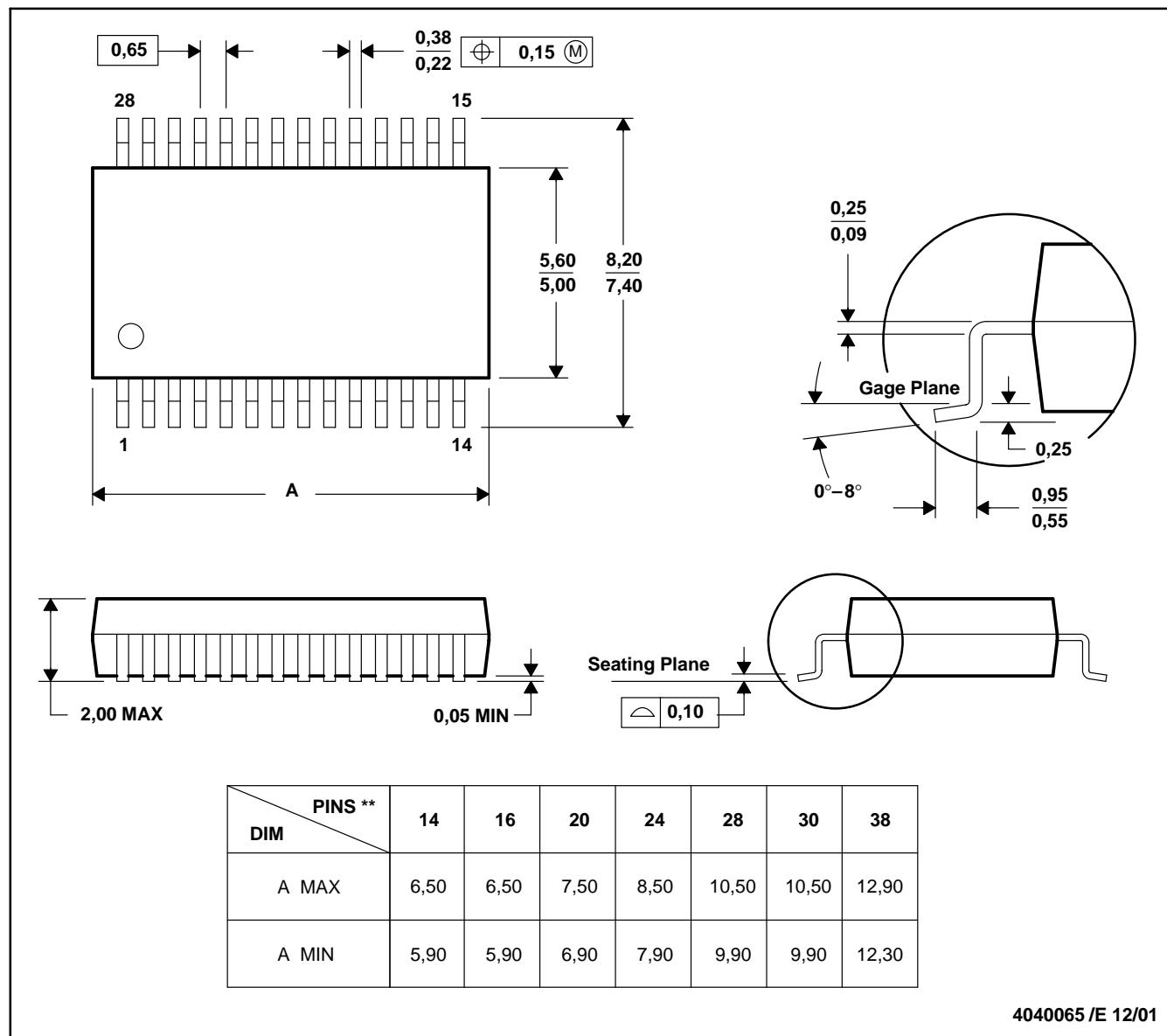
4209202-4/F 08/13

- 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.

DB (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

28 PINS SHOWN



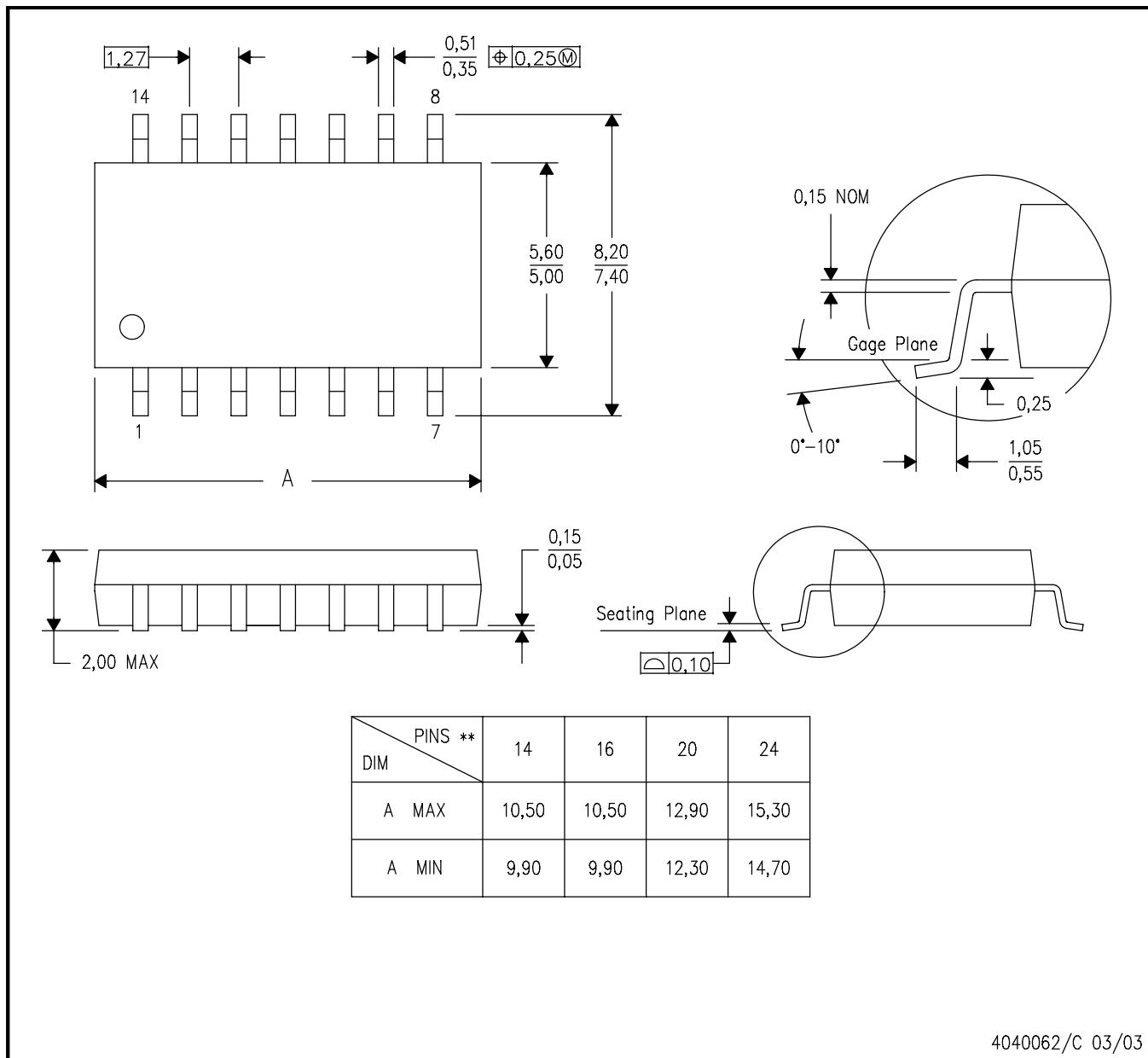
- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-150

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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