

# SN54ALS374A, SN54AS374, SN74ALS374A, SN74AS374 OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS

SDAS167C – APRIL 1982 – REVISED NOVEMBER 1999

- D-Type Flip-Flops in a Single Package With 3-State Bus Driving True Outputs
- Full Parallel Access for Loading
- Buffered Control Inputs
- Package Options Include Plastic Small-Outline (DW) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) DIPs

## description

These octal D-type edge-triggered flip-flops 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.

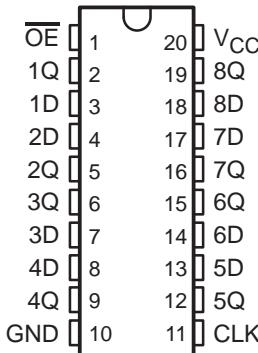
On the positive transition of the clock (CLK) input, the Q outputs are set to the logic levels set up at the data (D) inputs.

A buffered output-enable ( $\overline{OE}$ ) input places the eight outputs in either a normal logic state (high or low logic levels) or the 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.

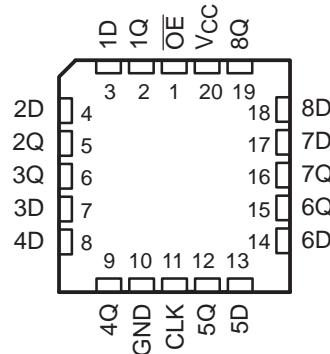
$\overline{OE}$  does not affect internal operations of the flip-flops. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

The SN54ALS374A and SN54AS374 are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS374A and SN74AS374 are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

SN54ALS374A, SN54AS374 . . . J PACKAGE  
SN74ALS374A, SN74AS374 . . . DW OR N PACKAGE  
(TOP VIEW)



SN54ALS374A, SN54AS374 . . . FK PACKAGE  
(TOP VIEW)



FUNCTION TABLE  
(each flip-flop)

INPUTS			OUTPUT
$\overline{OE}$	CLK	D	Q
L	↑	H	H
L	↑	L	L
L	H or L	X	Q <sub>0</sub>
H	X	X	Z



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**

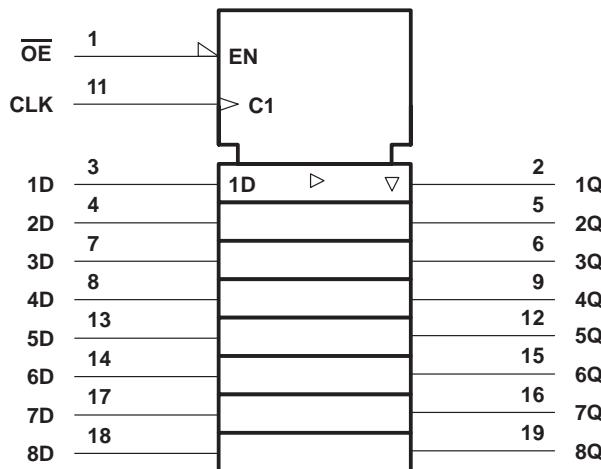
POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 1999, Texas Instruments Incorporated  
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.

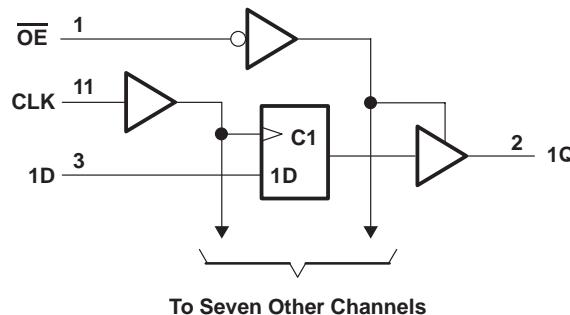
# SN54ALS374A, SN54AS374, SN74ALS374A, SN74AS374 OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS

SDAS167C – APRIL 1982 – REVISED NOVEMBER 1999

## 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)‡**

‡ 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.

## **recommended operating conditions**

		SN54ALS374A			SN74ALS374A			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V <sub>IH</sub>	High-level input voltage		2		2			V
V <sub>IL</sub>	Low-level input voltage			0.7			0.8	V
I <sub>OH</sub>	High-level output current			-1			-2.6	mA
I <sub>OL</sub>	Low-level output current			12			24	mA
T <sub>A</sub>	Operating free-air temperature	-55		125	0		70	°C

**SN54ALS374A, SN54AS374, SN74ALS374A, SN74AS374**  
**OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS**  
**WITH 3-STATE OUTPUTS**

SDAS167C – APRIL 1982 – REVISED NOVEMBER 1999

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

PARAMETER	TEST CONDITIONS	SN54ALS374A			SN74ALS374A			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	$\mu\text{A}$
$I_{OZL}$	$V_{CC} = 5.5 \text{ V}$ , $V_O = 0.4 \text{ V}$			-20			-20	$\mu\text{A}$
$I_I$	$V_{CC} = 5.5 \text{ V}$ , $V_I = 7 \text{ V}$			0.1			0.1	$\text{mA}$
$I_{IH}$	$V_{CC} = 5.5 \text{ V}$ , $V_I = 2.7 \text{ V}$			20			20	$\mu\text{A}$
$I_{IL}$	$V_{CC} = 5.5 \text{ V}$ , $V_I = 0.4 \text{ V}$			-0.2			-0.2	$\text{mA}$
$I_O^\ddagger$	$V_{CC} = 5.5 \text{ V}$ , $V_O = 2.25 \text{ V}$	-20	-112	-30	-112			$\text{mA}$
$I_{CC}$	$V_{CC} = 5.5 \text{ V}$	Outputs high	11	20	11	19		mA
		Outputs low	19	28	19	28		
		Outputs disabled	20	31	20	31		

† 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,  $I_{OS}$ .

**timing requirements over recommended operating free-air temperature range (unless otherwise noted)**

		SN54ALS374A		SN74ALS374A		UNIT
		MIN	MAX	MIN	MAX	
$f_{clock}$	Clock frequency		30		35	MHz
$t_w$	Pulse duration	CLK high or low	16.5	14		ns
$t_{su}$	Setup time	Data before $CLK\uparrow$	10	10		ns
$t_h$	Hold time	Data after $CLK\uparrow$	4	0		ns

**switching characteristics over recommended operating conditions (unless otherwise noted  
(see Figure 3))**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN54ALS374A		SN74ALS374A		UNIT
			MIN	MAX	MIN	MAX	
$t_{max}$			30		35		MHz
$t_{PLH}$	CLK	Q	3	14	3	12	ns
$t_{PHL}$			5	17	5	16	
$t_{PZH}$	$\overline{OE}$	Q	3	18	3	17	ns
$t_{PZL}$			5	21	5	18	
$t_{PHZ}$	$\overline{OE}$	Q	1	11	1	10	ns
$t_{PLZ}$			2	19	2	18	

**SN54ALS374A, SN54AS374, SN74ALS374A, SN74AS374  
OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS  
WITH 3-STATE OUTPUTS**

SDAS167C – APRIL 1982 – REVISED NOVEMBER 1999

**recommended operating conditions**

		SN54AS374			SN74AS374			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V <sub>IH</sub>	High-level input voltage	2			2			V
V <sub>IL</sub>	Low-level input voltage			0.7			0.8	V
I <sub>OH</sub>	High-level output current			-12			-15	mA
I <sub>OL</sub>	Low-level output current			32			48	mA
T <sub>A</sub>	Operating free-air temperature	-55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS	SN54AS374			SN74AS374			UNIT
		MIN	TYP†	MAX	MIN	TYP†	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = 4.5 V, I <sub>I</sub> = -18 mA		-1.2			-1.2		V
V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V to 5.5 V, I <sub>OH</sub> = -2 mA	V <sub>CC</sub> -2			V <sub>CC</sub> -2			V
	V <sub>CC</sub> = 4.5 V	I <sub>OH</sub> = -12 mA	2.4	3.2			2.4	
V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V	I <sub>OL</sub> = 32 mA	0.29	0.5				V
		I <sub>OL</sub> = 48 mA					0.34	
I <sub>OZH</sub>	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 2.7 V		50			50		µA
I <sub>OZL</sub>	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 0.4 V		-50			-50		µA
I <sub>I</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 7 V		0.1			0.1		mA
I <sub>IH</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 2.7 V		20			20		µA
I <sub>IL</sub>	OE, CLK Data	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0.4 V	-0.5			-0.5		mA
			-3			-2		
I <sub>O</sub> ‡	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 2.25 V	-30	-112		-30	-112		mA
I <sub>CC</sub>	V <sub>CC</sub> = 5.5 V	Outputs high	77	120		77	120	mA
		Outputs low	84	128		84	128	
		Outputs disabled	84	128		84	128	

† All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 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<sub>OS</sub>.

**timing requirements over recommended operating free-air temperature range (unless otherwise noted)**

		SN54AS374		SN74AS374		UNIT
		MIN	MAX	MIN	MAX	
f <sub>clock</sub>	Clock frequency		100*		125	MHz
t <sub>w</sub>	Pulse duration	CLK high	5.5*		4	ns
		CLK low	3*		3	
t <sub>su</sub>	Setup time	Data before CLK↑	3*		2	ns
t <sub>h</sub>	Hold time	Data after CLK↑	3*		2	ns

\* On products compliant to MIL-PRF-38535, this parameter is not production tested.

**SN54ALS374A, SN54AS374, SN74ALS374A, SN74AS374**  
**OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS**  
**WITH 3-STATE OUTPUTS**

SDAS167C – APRIL 1982 – REVISED NOVEMBER 1999

**switching characteristics over recommended operating conditions (unless otherwise noted)  
(see Figure 3)**

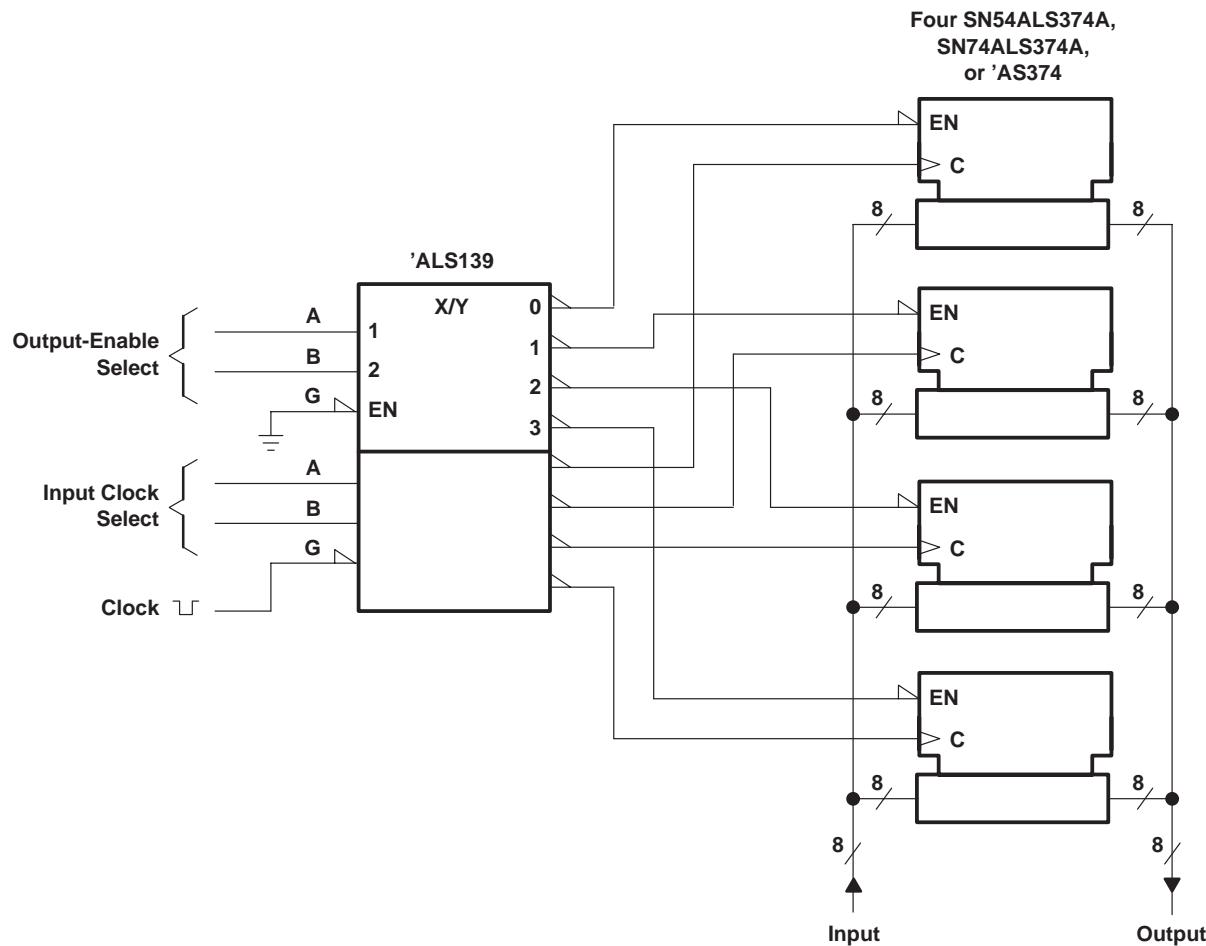
PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN54AS374		SN74AS374		UNIT
			MIN	MAX	MIN	MAX	
$f_{max}$			100*		125		MHz
$t_{PLH}$	CLK	Q	3	11	3	8	ns
$t_{PHL}$			4	11.5	4	9	
$t_{PZH}$	$\overline{OE}$	Q	2	7	2	6	ns
$t_{PZL}$			3	11	3	10	
$t_{PHZ}$	$\overline{OE}$	Q	2	10	2	6	ns
$t_{PLZ}$			2	7	2	6	

\* On products compliant to MIL-PRF-38535, this parameter is not production tested.

**SN54ALS374A, SN54AS374, SN74ALS374A, SN74AS374  
OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS  
WITH 3-STATE OUTPUTS**

SDAS167C – APRIL 1982 – REVISED NOVEMBER 1999

**APPLICATION INFORMATION**



**Figure 1. Expandable 4-Word by 8-Bit General File Register**

APPLICATION INFORMATION

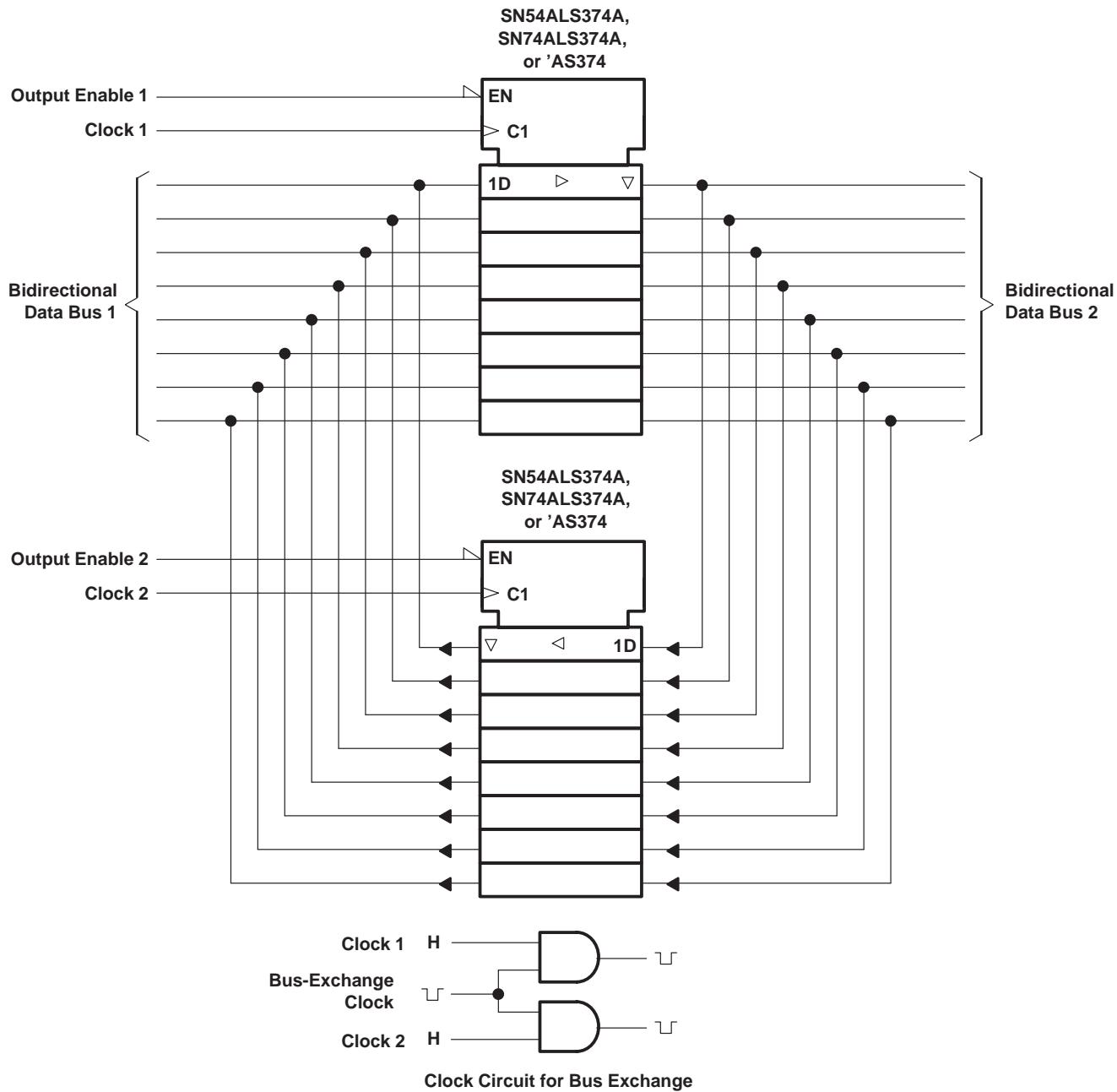
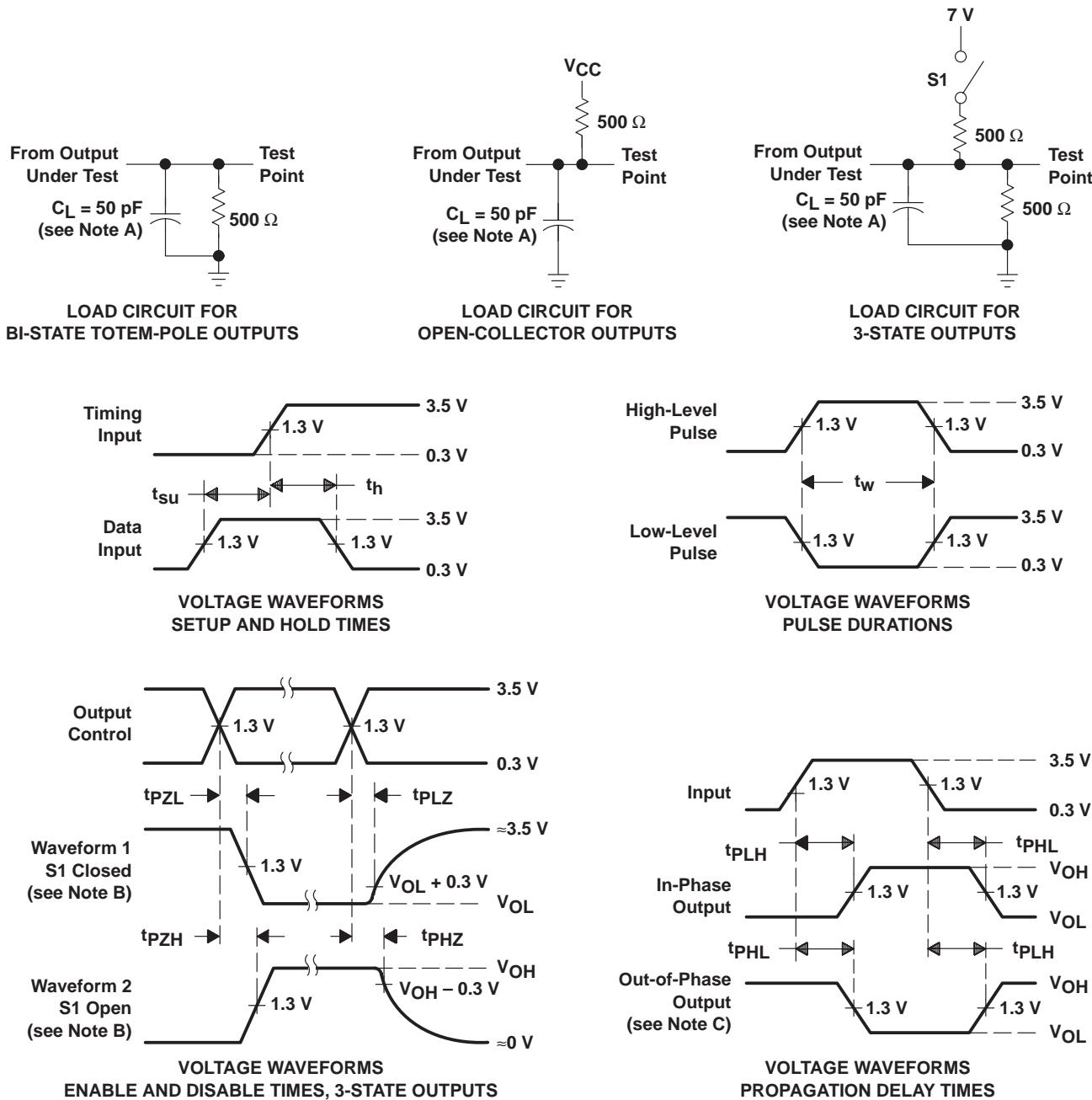


Figure 2. Bidirectional Bus Driver

**SN54ALS374A, SN54AS374, SN74ALS374A, SN74AS374  
OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS  
WITH 3-STATE OUTPUTS**

SDAS167C – APRIL 1982 – REVISED NOVEMBER 1999

**PARAMETER MEASUREMENT INFORMATION  
SERIES 54ALS/74ALS AND 54AS/74AS DEVICES**



**Figure 3. 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)	Op Temp (°C)	Device Marking (4/5)	Samples
5962-9756201Q2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962-9756201Q2A SNJ54AS374FK	<a href="#">Samples</a>
5962-9756201QRA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9756201QR A SNJ54AS374J	<a href="#">Samples</a>
5962-9756201QSA	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	5962-9756201QS A SNJ54AS374W	<a href="#">Samples</a>
83020022A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	83020022A SNJ54ALS374AFK	<a href="#">Samples</a>
8302002RA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	8302002RA SNJ54ALS374AJ	<a href="#">Samples</a>
8302002SA	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	8302002SA SNJ54ALS374AW	<a href="#">Samples</a>
JM38510/37204B2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	JM38510/37204B2A	<a href="#">Samples</a>
JM38510/37204BRA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/37204BRA	<a href="#">Samples</a>
M38510/37204B2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	JM38510/37204B2A	<a href="#">Samples</a>
M38510/37204BRA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/37204BRA	<a href="#">Samples</a>
SN54ALS374AJ	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	SN54ALS374AJ	<a href="#">Samples</a>
SN54AS374J	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	SN54AS374J	<a href="#">Samples</a>
SN74ALS374ADBLE	OBsolete	SSOP	DB	20		TBD	Call TI	Call TI	0 to 70		
SN74ALS374ADW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS374A	<a href="#">Samples</a>
SN74ALS374ADWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS374A	<a href="#">Samples</a>
SN74ALS374ADWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS374A	<a href="#">Samples</a>

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74ALS374ADWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS374A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74ALS374ADWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS374A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74ALS374ADWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS374A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74ALS374AN	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74ALS374AN	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74ALS374AN3	OBsolete	PDIP	N	20		TBD	Call TI	Call TI	0 to 70		
SN74ALS374ANE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74ALS374AN	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74ALS374ANSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS374A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74ALS374ANSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS374A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74ALS374ANSRG4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS374A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74AS374DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	AS374	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74AS374DWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	AS374	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74AS374N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74AS374N	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74AS374N3	OBsolete	PDIP	N	20		TBD	Call TI	Call TI	0 to 70		
SN74AS374NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74AS374N	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74AS374NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	74AS374	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74AS374NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	74AS374	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74AS374NSRG4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	74AS374	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SNJ54ALS374AFK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	83020022A SNJ54ALS 374AFK	<span style="background-color: red; color: white; padding: 2px;">Samples</span>

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SNJ54ALS374AJ	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	8302002RA SNJ54ALS374AJ	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SNJ54ALS374AW	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	8302002SA SNJ54ALS374AW	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SNJ54AS374FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962- 9756201Q2A SNJ54AS 374FK	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SNJ54AS374J	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9756201QR A SNJ54AS374J	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SNJ54AS374W	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	5962-9756201QS A SNJ54AS374W	<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.

---

**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 SN54ALS374A, SN54AS374, SN74ALS374A, SN74AS374 :**

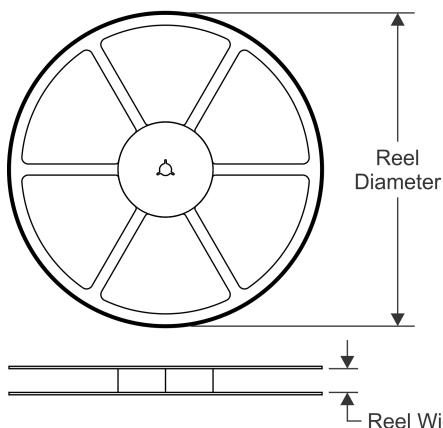
- Catalog: [SN74ALS374A](#), [SN74AS374](#)
- Military: [SN54ALS374A](#), [SN54AS374](#)

NOTE: Qualified Version Definitions:

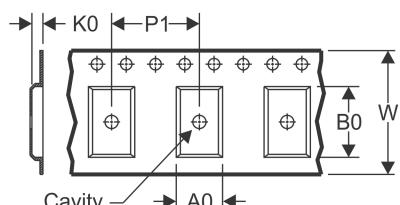
- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

## TAPE AND REEL INFORMATION

## REEL DIMENSIONS

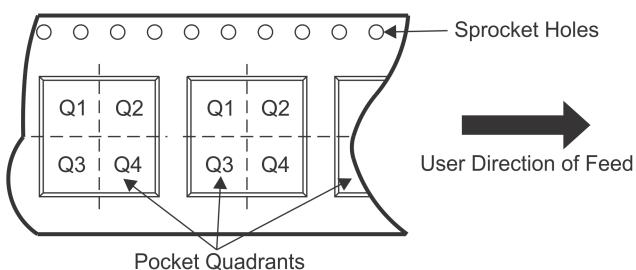


## TAPE DIMENSIONS



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

## QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



\*All dimensions are nominal

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	
SN74ALS374ADWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1	
SN74ALS374ANSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1	
SN74AS374NSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1	

**TAPE AND REEL BOX DIMENSIONS**

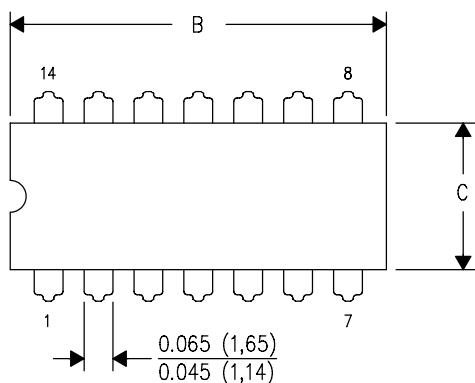

\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ALS374ADWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74ALS374ANSR	SO	NS	20	2000	367.0	367.0	45.0
SN74AS374NSR	SO	NS	20	2000	367.0	367.0	45.0

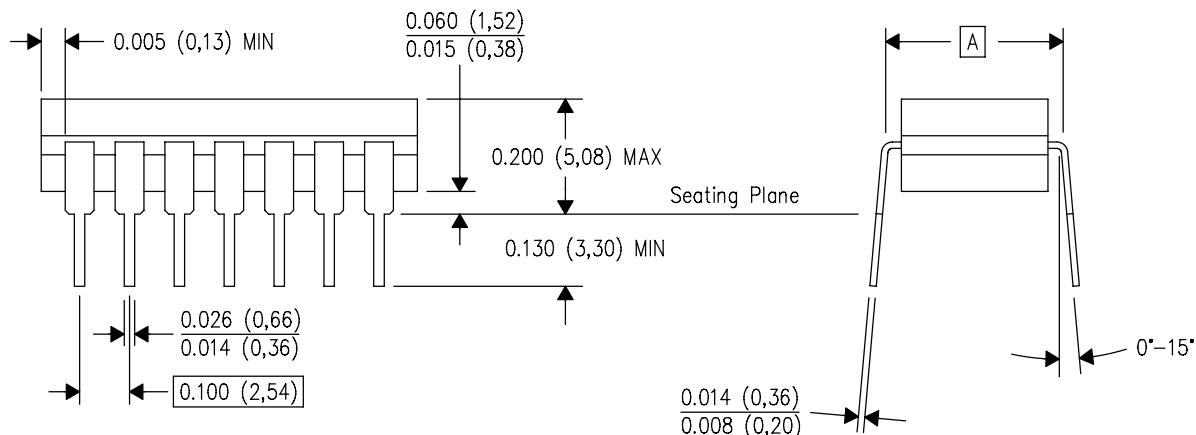
J (R-GDIP-T\*\*)

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)

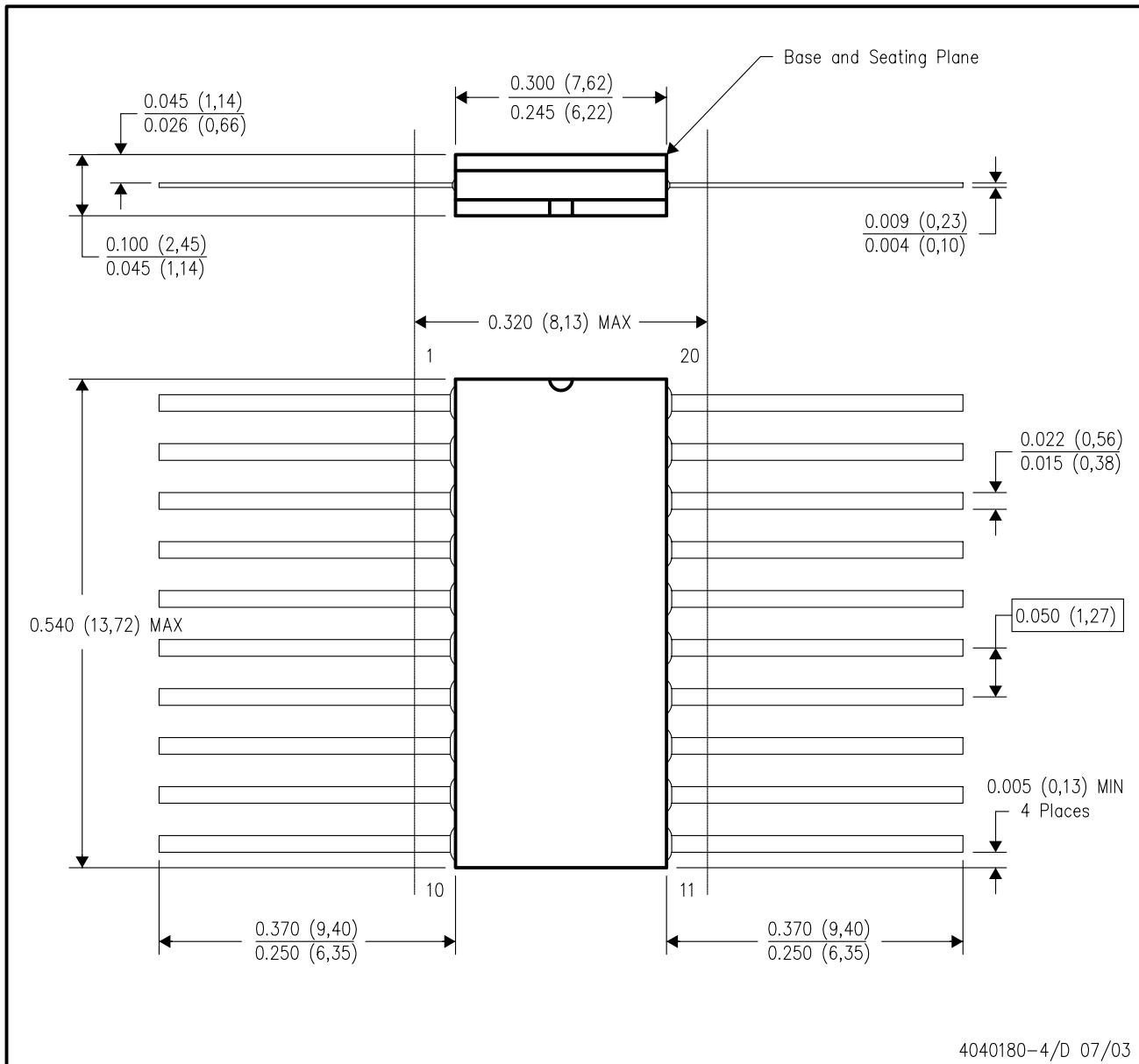


4040083/F 03/03

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



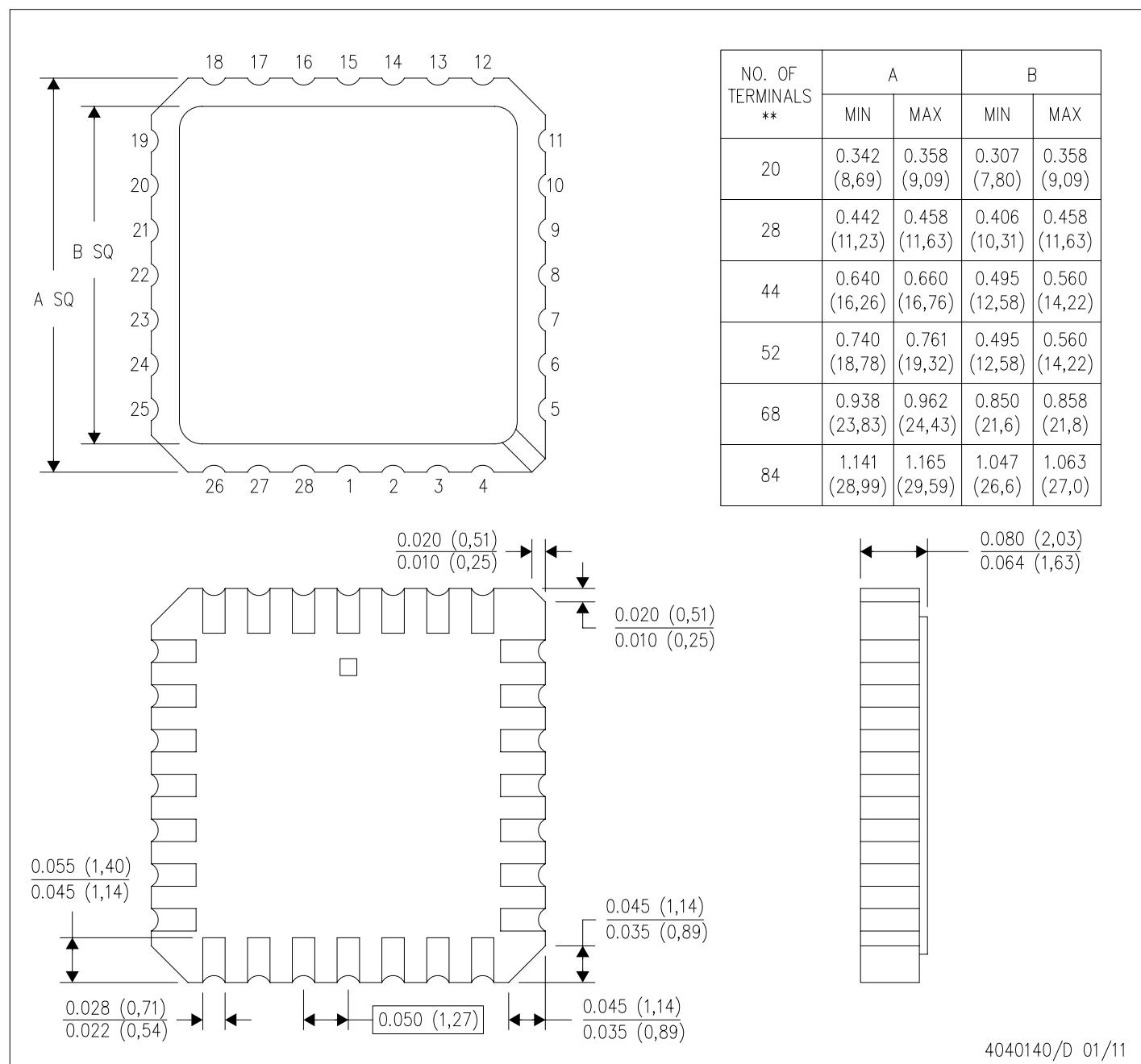
NOTES:

- 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:

- 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. Falls within JEDEC MS-004

4040140/D 01/11

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

16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



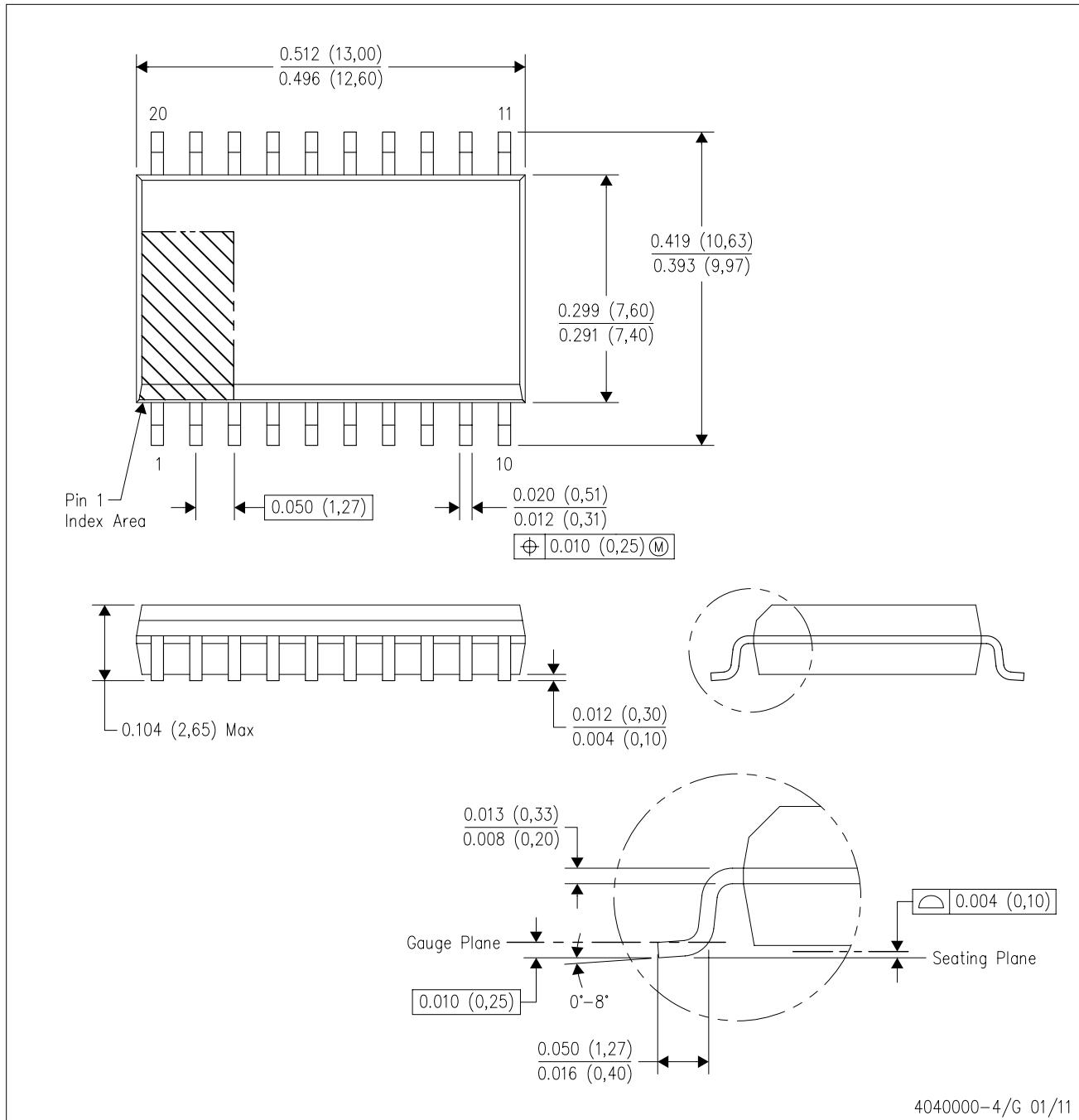
NOTES: A. All linear dimensions are in inches (millimeters).  
B. This drawing is subject to change without notice.

△ 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

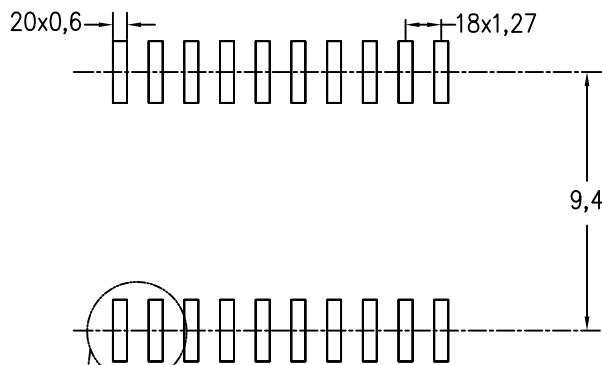
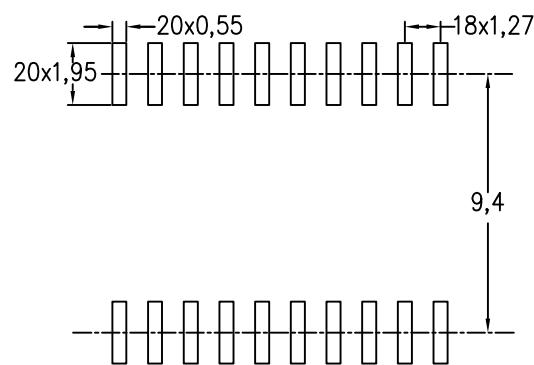


NOTES:

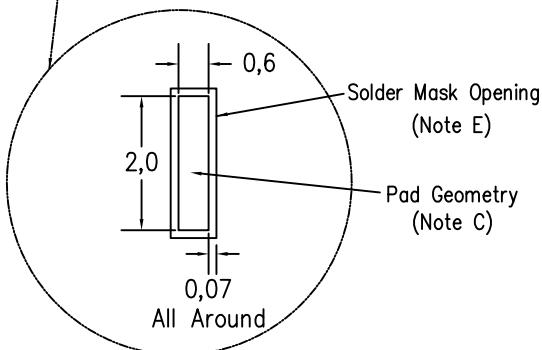
- All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.
- This drawing is subject to change without notice.
- Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0.15).
- Falls within JEDEC MS-013 variation AC.

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:

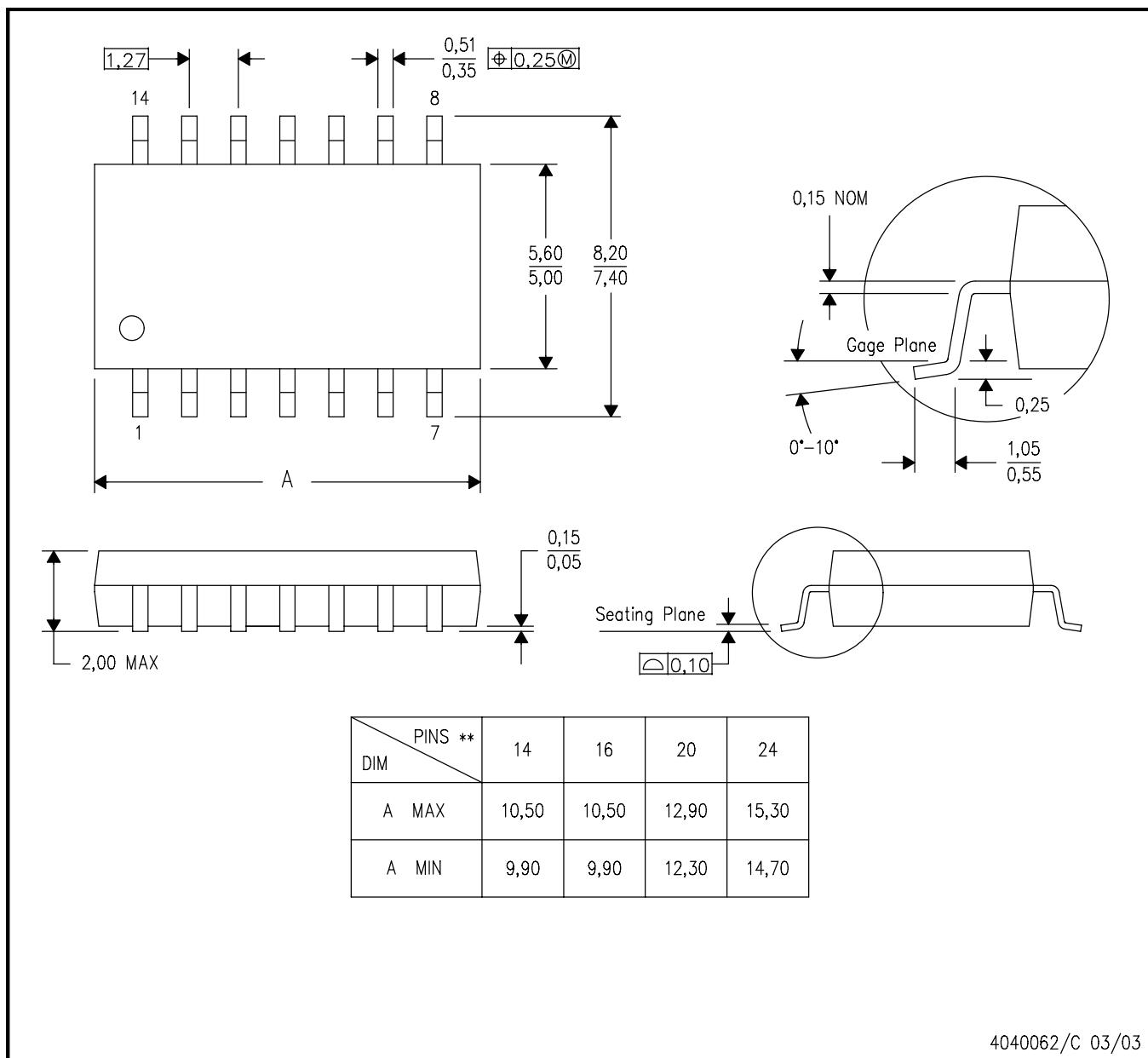
- All linear dimensions are in millimeters.
- This drawing is subject to change without notice.
- Refer to IPC7351 for alternate board design.
- Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site 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



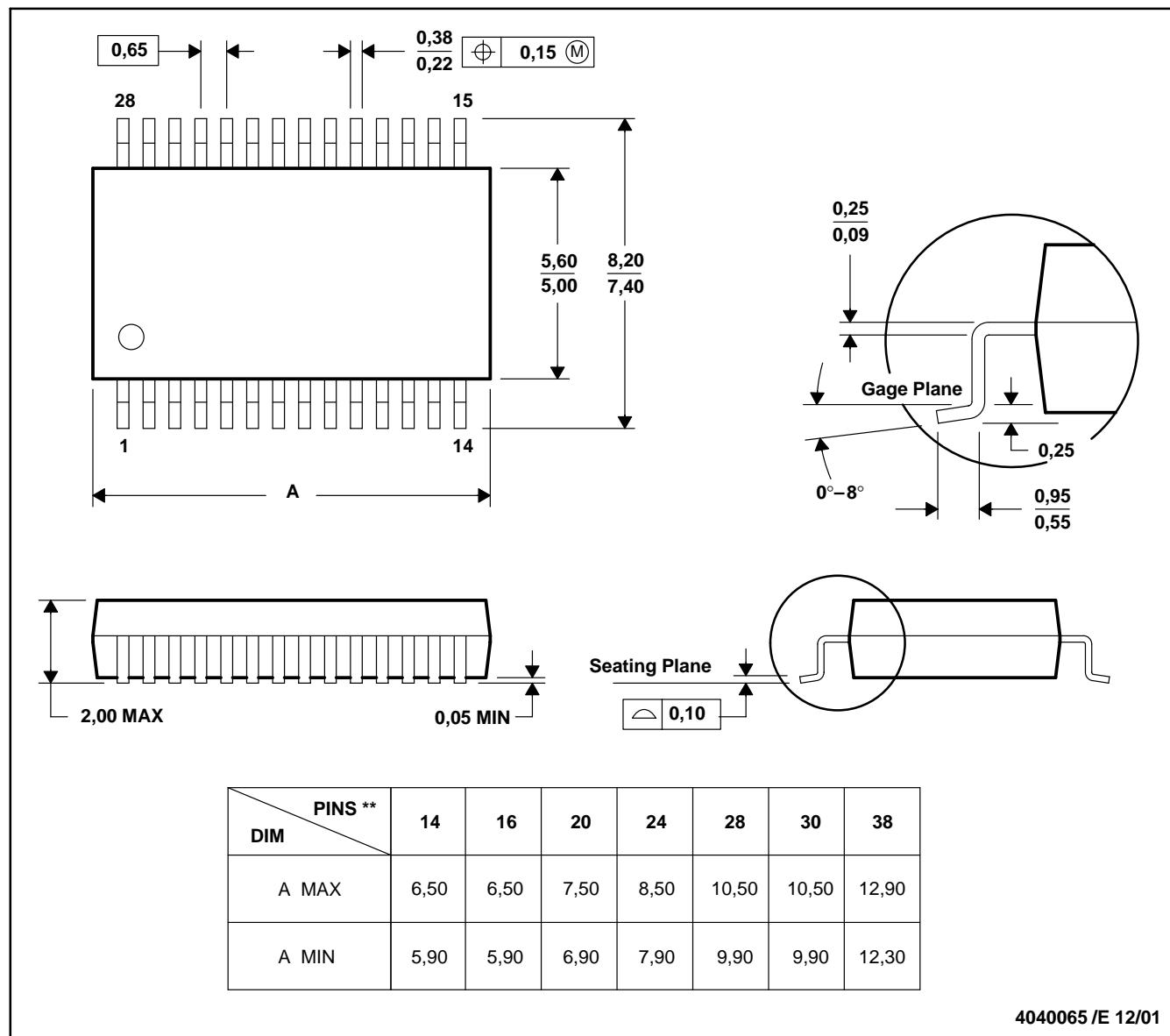
4040062/C 03/03

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.

## 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

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products	Applications
Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Amplifiers	<a href="http://amplifier.ti.com">amplifier.ti.com</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>
DLP® Products	<a href="http://www.dlp.com">www.dlp.com</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>
RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>
OMAP Applications Processors	<a href="http://www.ti.com/omap">www.ti.com/omap</a>
Wireless Connectivity	<a href="http://www.ti.com/wirelessconnectivity">www.ti.com/wirelessconnectivity</a>
	<b>TI E2E Community</b>
	<a href="http://e2e.ti.com">e2e.ti.com</a>