

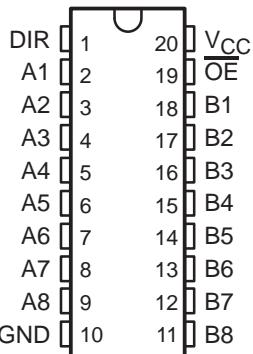
# SN74ALS638A, SN74ALS639A, SN74AS638A, SN74AS639 OCTAL BUS TRANSCEIVERS

SDAS123A – DECEMBER 1983 – REVISED JANUARY 1995

- Bidirectional Bus Transceivers in High-Density 20-Pin Packages
- Choice of True or Inverting Logic
- A-Bus Outputs Are Open Collector; B-Bus Outputs Are 3 State
- Package Options Include Plastic Small-Outline (DW) Packages and Standard Plastic (N) 300-mil DIPs

DEVICE	A OUTPUT	B OUTPUT	LOGIC
SN74ALS638A, SN74AS638A	Open collector	3 state	Inverting
SN74ALS639A, SN74AS639	Open collector	3 state	True

## DW OR N PACKAGE (TOP VIEW)



## description

These octal bus transceivers are designed for asynchronous two-way communication between open-collector and 3-state buses. The devices transmit data from the A bus (open-collector) to the B bus (3 state) or from the B bus to the A bus, depending on the logic level at the direction-control (DIR) input. The output-enable ( $\overline{OE}$ ) input can be used to disable the device so the buses are isolated.

The -1 version of SN74ALS638A is identical to the standard version, except that the recommended maximum  $I_{OL}$  is increased to 48 mA.

The SN74ALS638A, SN74ALS639A, SN74AS638A, and SN74AS639 are characterized for operation from 0°C to 70°C.

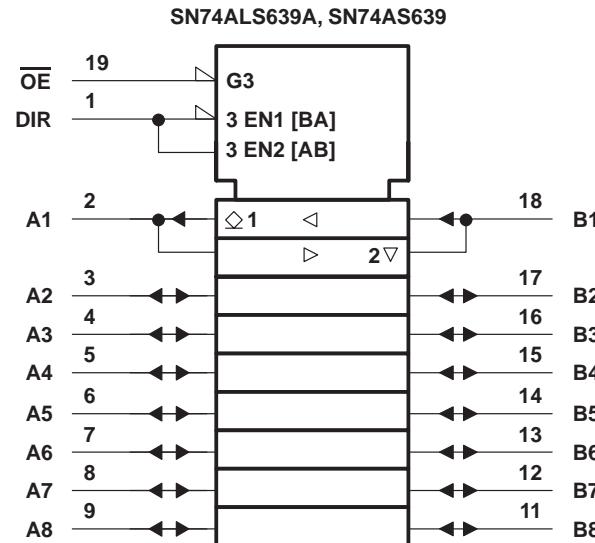
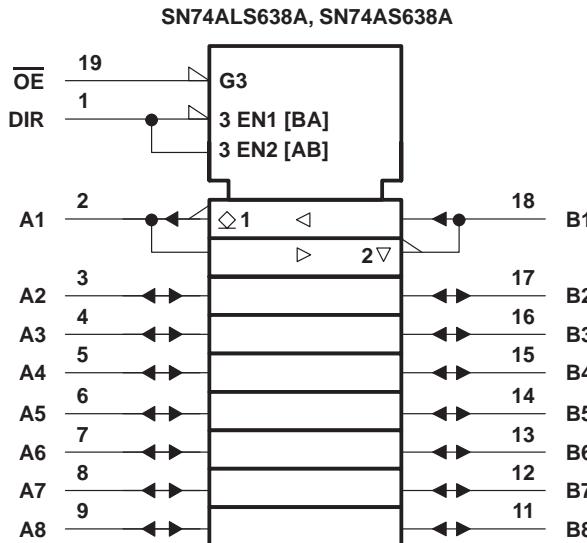
FUNCTION TABLE

INPUTS		OPERATION	
$\overline{OE}$	DIR	SN74ALS638A SN74AS638A	SN74ALS639A SN74AS639
L	L	B data to A bus	B data to A bus
L	H	$\overline{A}$ data to B bus	A data to B bus
H	X	Isolation	Isolation

# SN74ALS638A, SN74ALS639A, SN74AS638A, SN74AS639 OCTAL BUS TRANSCEIVERS

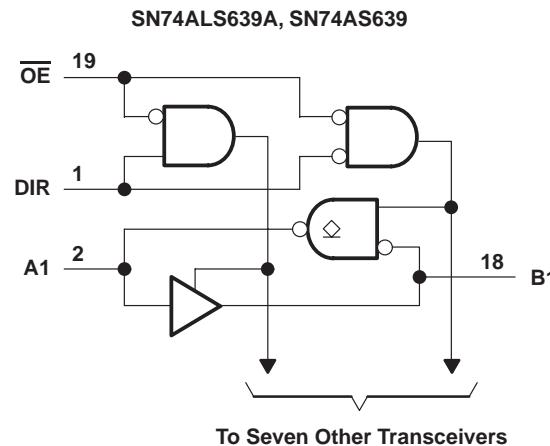
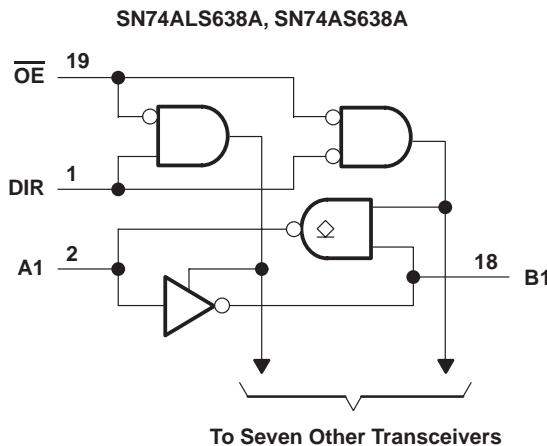
SDAS123A – DECEMBER 1983 – REVISED JANUARY 1995

## logic symbols<sup>†</sup>



<sup>†</sup> These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

## logic diagrams (positive logic)



## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>‡</sup>

Supply voltage, $V_{CC}$ .....	7 V
Input voltage, $V_I$ : All inputs .....	7 V
A-bus I/O ports .....	7 V
B-bus I/O ports .....	5.5 V
Operating free-air temperature range, $T_A$ : SN74ALS638A, SN74ALS639A .....	0°C to 70°C
Storage temperature range .....	-65°C to 150°C

<sup>‡</sup> 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.

# SN74ALS638A, SN74ALS639A, SN74AS638A, SN74AS639 OCTAL BUS TRANSCEIVERS

SDAS123A – DECEMBER 1983 – REVISED JANUARY 1995

## recommended operating conditions

		SN74ALS638A SN74ALS639A			UNIT
		MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	4.5	5	5.5	V
V <sub>IH</sub>	High-level input voltage	2			V
V <sub>IL</sub>	Low-level input voltage		0.8		V
V <sub>OH</sub>	High-level output voltage	A ports		5.5	V
I <sub>OH</sub>	High-level output current	B ports		-15	mA
I <sub>OL</sub>	Low-level output current	A or B ports		24	mA
				48 <sup>†</sup>	
T <sub>A</sub>	Operating free-air temperature	0	70		°C

<sup>†</sup> Applies only to the SN74ALS638A-1 version and only if V<sub>CC</sub> is between 4.75 V and 5.25 V

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

PARAMETER		TEST CONDITIONS			SN74ALS638A SN74ALS639A	UNIT
					MIN	
V <sub>IK</sub>		V <sub>CC</sub> = 4.5 V,	I <sub>I</sub> = -18 mA		-1.5	V
I <sub>OH</sub>	A ports	V <sub>CC</sub> = 4.5 V,	V <sub>OH</sub> = 5.5 V		0.1	mA
V <sub>OH</sub>	B ports	V <sub>CC</sub> = 4.5 V to 5.5 V,	I <sub>OH</sub> = -0.4 mA	V <sub>CC</sub> - 2		V
		V <sub>CC</sub> = 4.5 V	I <sub>OH</sub> = -3 mA	2.4	3.2	
			I <sub>OH</sub> = -15 mA	2		
V <sub>OL</sub>	A or B ports	V <sub>CC</sub> = 4.5 V	I <sub>OL</sub> = 12 mA	0.25	0.4	V
			I <sub>OL</sub> = 24 mA	0.35	0.5	
			I <sub>OL</sub> = 48 mA <sup>†</sup>	0.35	0.5	
I <sub>I</sub>	Control inputs	V <sub>CC</sub> = 5.5 V	V <sub>I</sub> = 7 V		0.1	mA
	A or B ports		V <sub>I</sub> = 5.5 V		0.1	
I <sub>IH</sub>	Control inputs	V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = 2.7 V		20	μA
	A or B ports <sup>§</sup>				20	
I <sub>IL</sub>	Control inputs	V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = 0.4 V		-0.1	mA
	A or B ports <sup>§</sup>				-0.1	
I <sub>O<sup>¶</sup></sub>	B ports	V <sub>CC</sub> = 5.5 V,	V <sub>O</sub> = 2.25 V	-30	-112	mA
I <sub>CC</sub>	SN74ALS638A	V <sub>CC</sub> = 5.5 V	Outputs high	18	30	mA
			Outputs low	26	41	
			Outputs disabled	16	30	
	SN74ALS639A	V <sub>CC</sub> = 5.5 V	Outputs high	25	40	
			Outputs low	30	50	
			Outputs disabled	33	54	

<sup>†</sup> Applies only to the SN74ALS638A-1 version and only if V<sub>CC</sub> is between 4.75 V and 5.25 V

<sup>‡</sup> All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

<sup>§</sup> For I/O ports, the parameters I<sub>IH</sub> and I<sub>IL</sub> include the off-state output current.

<sup>¶</sup> 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>.

# SN74ALS638A, SN74ALS639A, SN74AS638A, SN74AS639 OCTAL BUS TRANSCEIVERS

SDAS123A – DECEMBER 1983 – REVISED JANUARY 1995

## switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$ , $C_L = 50\text{ pF}$ , $R_L = 680\text{ }\Omega$ (A outputs), $R1 = R2 = 500\text{ }\Omega$ (B outputs), $T_A = \text{MIN to MAX}^{\dagger}$	UNIT			
			SN74ALS638A		SN74ALS639A		
			MIN	MAX	MIN	MAX	
$t_{PLH}$	A	B	2	12	2	12	ns
$t_{PHL}$			2	12	2	12	
$t_{PLH}$	B	A	8	25	10	30	ns
$t_{PHL}$			8	30	5	22	
$t_{PLH}$	$\overline{OE}$	A	5	25	10	30	ns
$t_{PHL}$			10	45	10	35	
$t_{PZH}$	$\overline{OE}$	B	5	20	6	21	ns
$t_{PZL}$			5	22	8	25	
$t_{PHZ}$	$\overline{OE}$	B	2	10	2	10	ns
$t_{PLZ}$			3	15	3	16	

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

## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>‡</sup>

Supply voltage, $V_{CC}$ .....	7 V
Input voltage, $V_I$ : All inputs .....	7 V
A-bus I/O ports .....	7 V
B-bus I/O ports .....	5.5 V
Operating free-air temperature range, $T_A$ : SN74AS638A, SN74AS639 .....	0°C to 70°C
Storage temperature range .....	-65°C to 150°C

<sup>‡</sup> 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

			SN74AS638A SN74AS639			UNIT
	MIN	NOM	MAX			
$V_{CC}$ Supply voltage	4.5	5	5.5	V		
$V_{IH}$ High-level input voltage		2		V		
$V_{IL}$ Low-level input voltage			0.8	V		
$V_{OH}$ High-level output voltage		A ports		5.5	V	
$I_{OH}$ High-level output current		B ports		-15	mA	
$I_{OL}$ Low-level output current		A or B ports		64	mA	
$T_A$ Operating free-air temperature	0		70	°C		

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

PARAMETER		TEST CONDITIONS		SN74AS638A		UNIT
				MIN	TYP†	
$V_{IK}$		$V_{CC} = 4.5 \text{ V}$ ,	$I_I = -18 \text{ mA}$		-1.2	V
$I_{OH}$	A ports	$V_{CC} = 4.5 \text{ V}$ ,	$V_{OH} = 5.5 \text{ V}$		0.1	mA
$V_{OH}$	B ports	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$ ,	$I_{OH} = -2 \text{ mA}$	$V_{CC} - 2$		V
		$V_{CC} = 4.5 \text{ V}$	$I_{OH} = -3 \text{ mA}$	2.4	3.2	
			$I_{OH} = -15 \text{ mA}$	2.4		
$V_{OL}$	A or B ports	$V_{CC} = 4.5 \text{ V}$ ,	$I_{OL} = 64 \text{ mA}$	0.35	0.55	V
$I_I$	Control inputs	$V_{CC} = 5.5 \text{ V}$	$V_I = 7 \text{ V}$	0.1		mA
	A or B ports		$V_I = 5.5 \text{ V}$	0.1		
$I_{IH}$	Control inputs	$V_{CC} = 5.5 \text{ V}$	$V_I = 2.7 \text{ V}$	20		$\mu\text{A}$
	A or B ports‡			70		
$I_{IL}$	Control inputs	$V_{CC} = 5.5 \text{ V}$	$V_I = 0.4 \text{ V}$	-0.5		mA
	A or B ports‡			-0.75		
$I_O\$$		$V_{CC} = 5.5 \text{ V}$ ,	$V_O = 2.25 \text{ V}$	-50	-150	mA
$I_{CC}$	SN74AS638A	$V_{CC} = 5.5 \text{ V}$	Outputs high	24	54	mA
			Outputs low	75	122	
			Outputs disabled	37	61	
	SN74AS639	$V_{CC} = 5.5 \text{ V}$	Outputs high	56	92	
			Outputs low	95	154	
			Outputs disabled	62	100	

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

‡ 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)

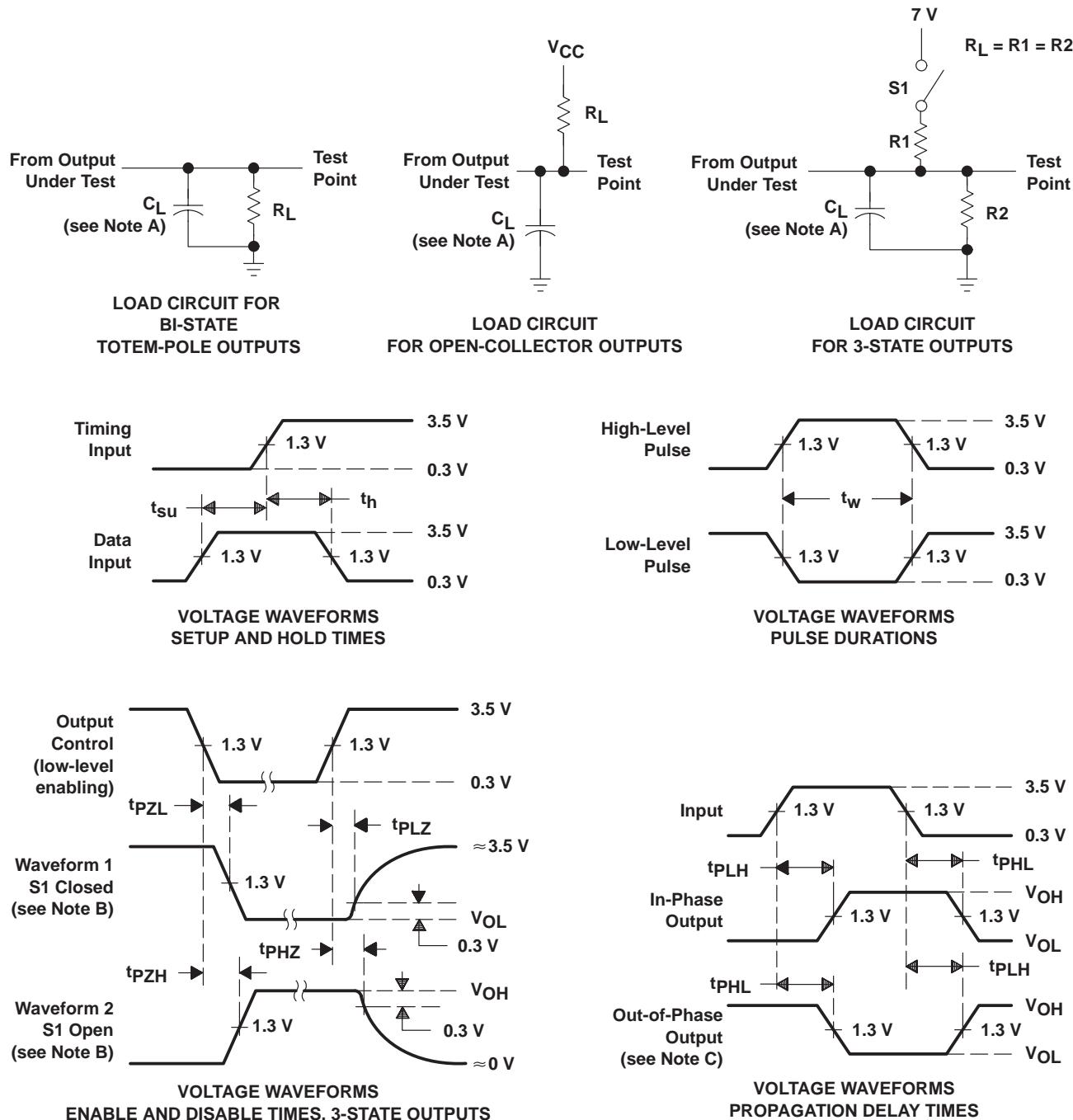
PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$ , $C_L = 50 \text{ pF}$ , $R_L = 500 \Omega$ (A outputs), $R_1 = R_2 = 500 \Omega$ (B outputs), $T_A = \text{MIN to MAX}^\dagger$				UNIT	
			SN74AS638A		SN74AS639			
			MIN	MAX	MIN	MAX		
$t_{PLH}$	A	B	2	7	2	9.5	ns	
			2	6.5	2	9		
$t_{PLH}$	B	A	5	20	5	22	ns	
			2	7	2	9		
$t_{PLH}$	$\overline{OE}$	A	5	19	5	21.5	ns	
			2	9	2	11.5		
$t_{PZH}$	$\overline{OE}$	B	2	8	2	10.5	ns	
			2	10	2	10.5		
$t_{PHZ}$	$\overline{OE}$	B	2	7	2	7	ns	
			2	10	2	10.5		

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

# SN74ALS638A, SN74ALS639A, SN74AS638A, SN74AS639 OCTAL BUS TRANSCEIVERS

SDAS123A – DECEMBER 1983 – REVISED JANUARY 1995

## 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 part number	Status (1)	Material type (2)	Package   Pins	Package qty   Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
<a href="#">SN74ALS638AN</a>	Active	Production	PDIP (N)   20	20   TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74ALS638AN
SN74ALS638AN.A	Active	Production	PDIP (N)   20	20   TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74ALS638AN
<a href="#">SN74ALS639ADW</a>	Active	Production	SOIC (DW)   20	25   TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS639A
SN74ALS639ADW.A	Active	Production	SOIC (DW)   20	25   TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS639A
<a href="#">SN74ALS639AN</a>	Active	Production	PDIP (N)   20	20   TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74ALS639AN
SN74ALS639AN.A	Active	Production	PDIP (N)   20	20   TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74ALS639AN

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

<sup>(2)</sup> **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

<sup>(3)</sup> **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

<sup>(4)</sup> **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

<sup>(5)</sup> **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

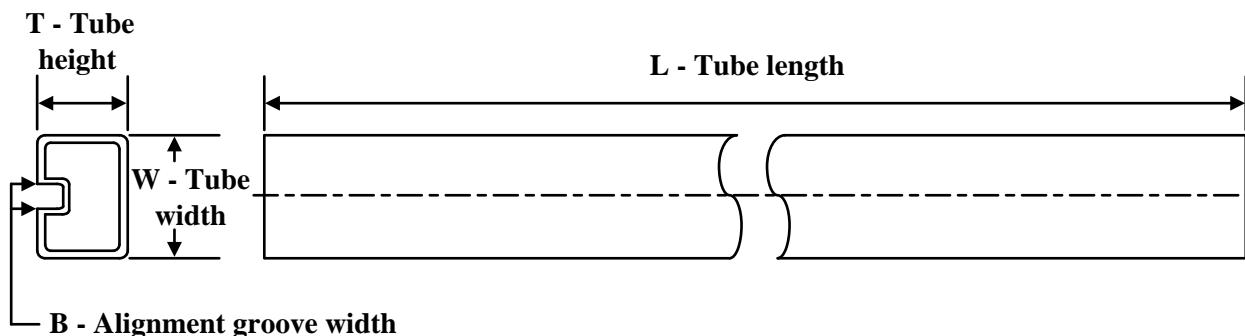
<sup>(6)</sup> **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part 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.



**TUBE**


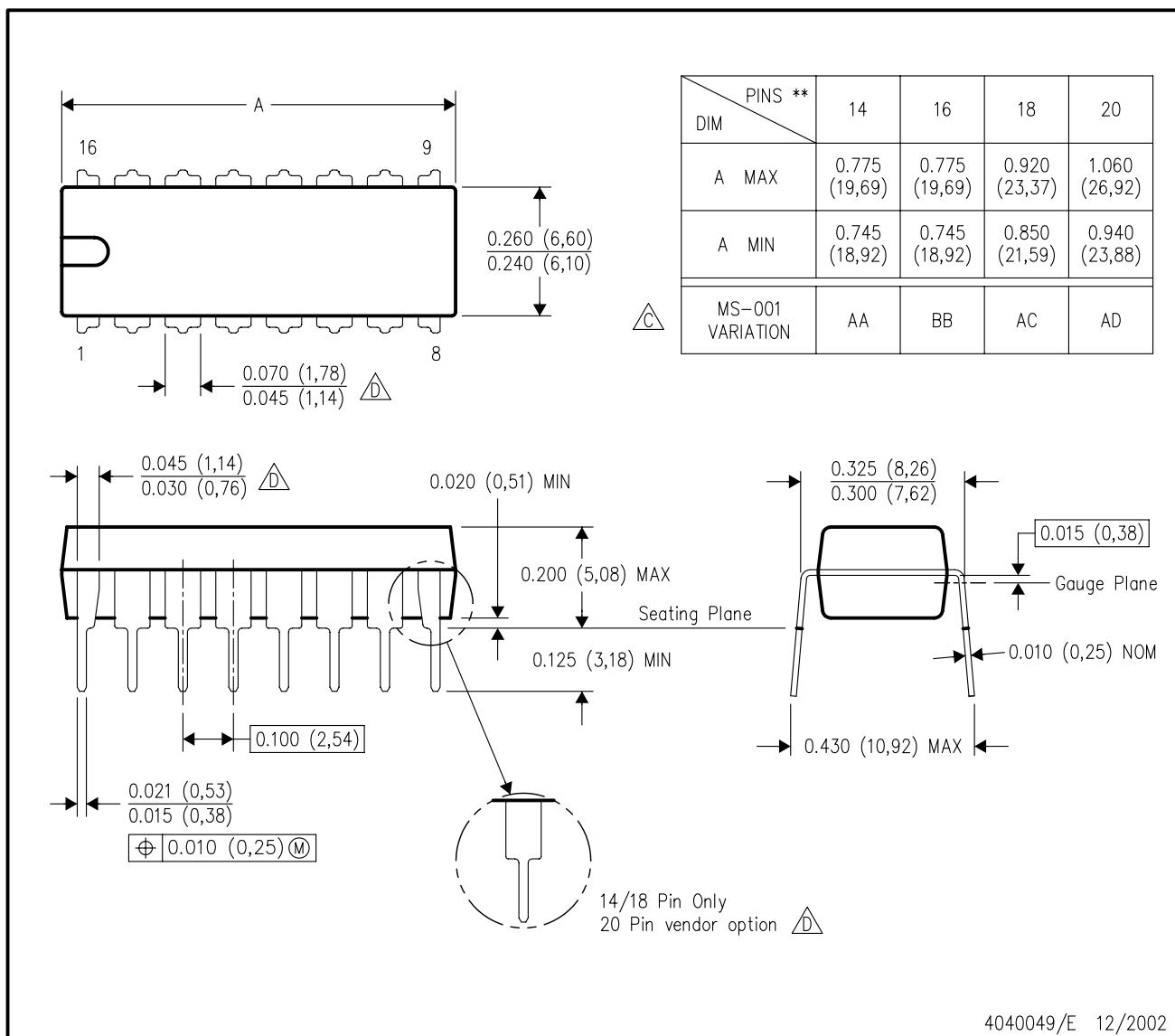
\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T ( $\mu$ m)	B (mm)
SN74ALS638AN	N	PDIP	20	20	506	13.97	11230	4.32
SN74ALS638AN.A	N	PDIP	20	20	506	13.97	11230	4.32
SN74ALS639ADW	DW	SOIC	20	25	507	12.83	5080	6.6
SN74ALS639ADW.A	DW	SOIC	20	25	507	12.83	5080	6.6
SN74ALS639AN	N	PDIP	20	20	506	13.97	11230	4.32
SN74ALS639AN.A	N	PDIP	20	20	506	13.97	11230	4.32

## 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.

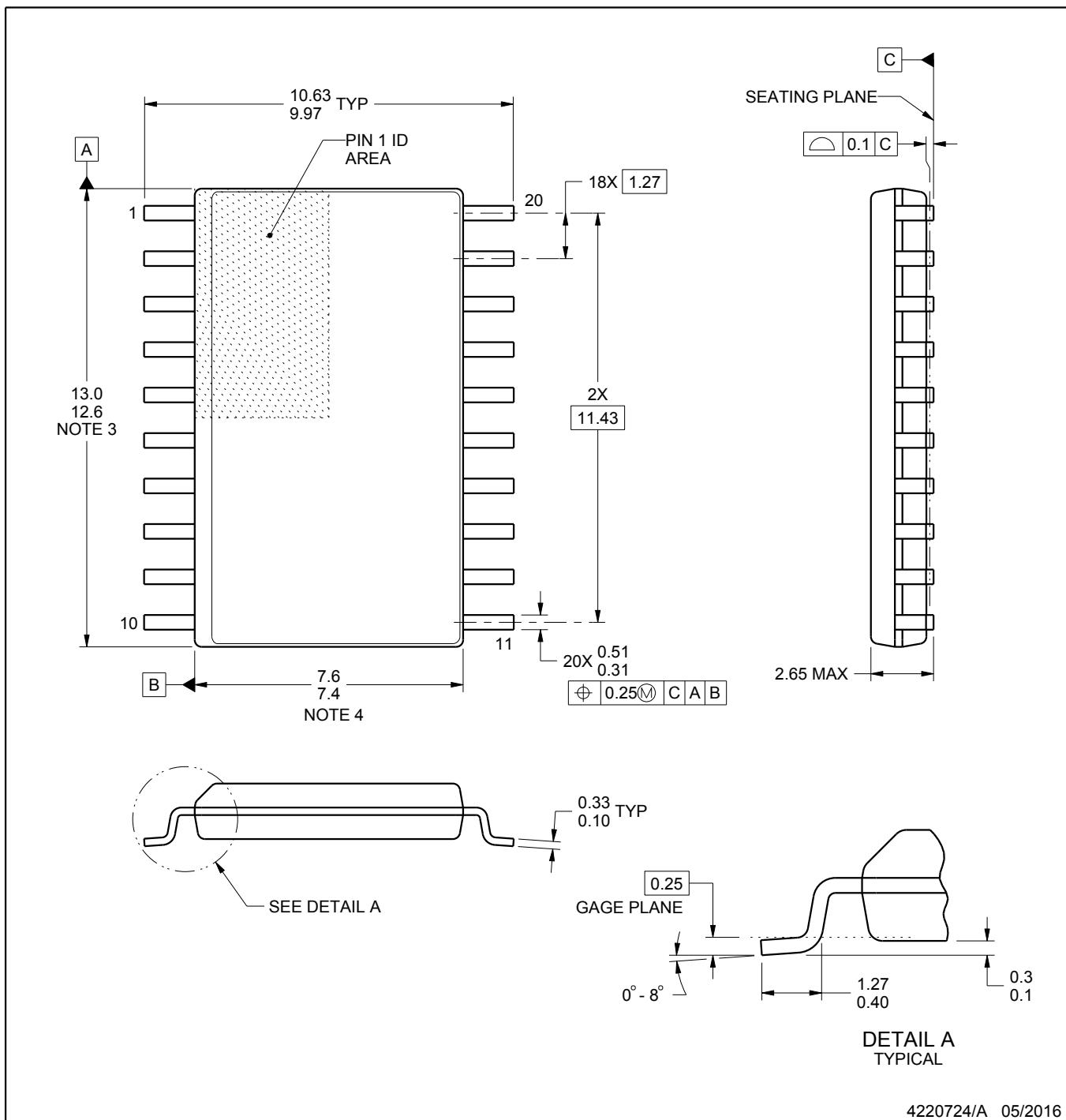
# PACKAGE OUTLINE

DW0020A



SOIC - 2.65 mm max height

SOIC

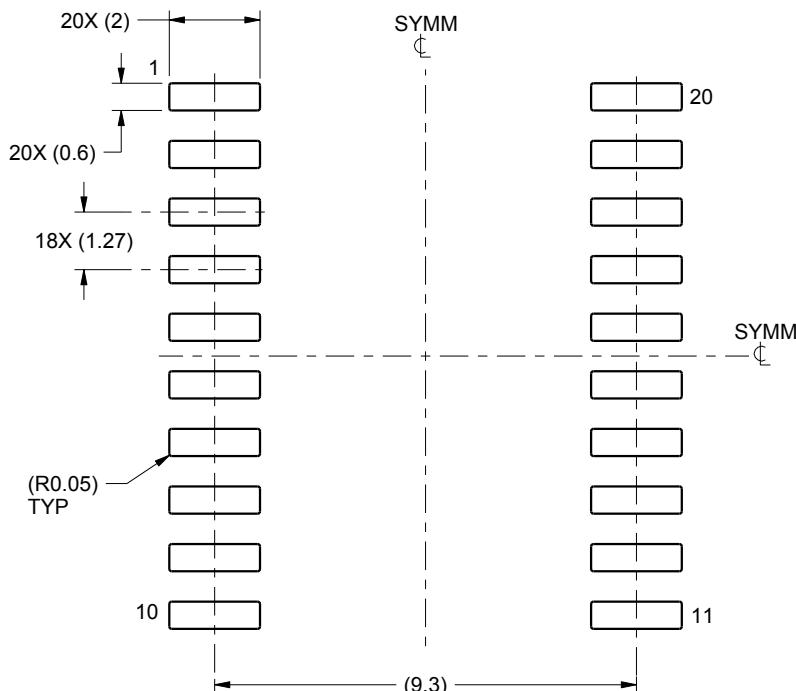


# EXAMPLE BOARD LAYOUT

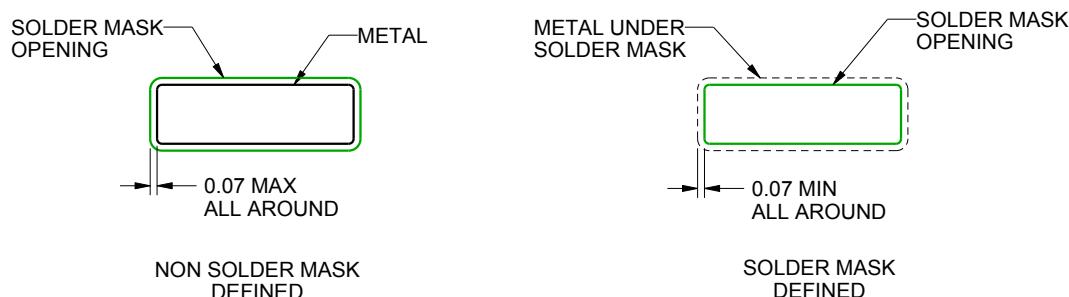
DW0020A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE  
SCALE:6X



SOLDER MASK DETAILS

4220724/A 05/2016

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

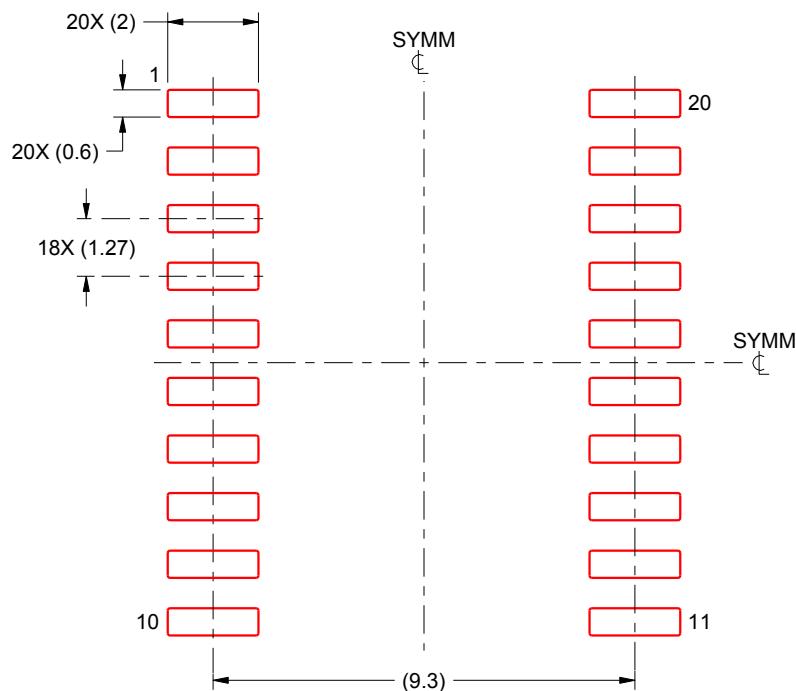
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:6X

4220724/A 05/2016

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

## IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you fully indemnify TI and its representatives against any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#), [TI's General Quality Guidelines](#), or other applicable terms available either on [ti.com](#) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

TI objects to and rejects any additional or different terms you may propose.

Copyright © 2026, Texas Instruments Incorporated

Last updated 10/2025