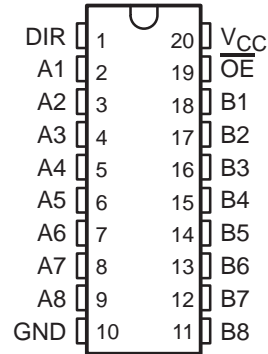


SN74ALS638A, SN74ALS639A, SN74AS638A, SN74AS639 OCTAL BUS TRANSCEIVERS

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

DW OR N PACKAGE
(TOP VIEW)



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

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

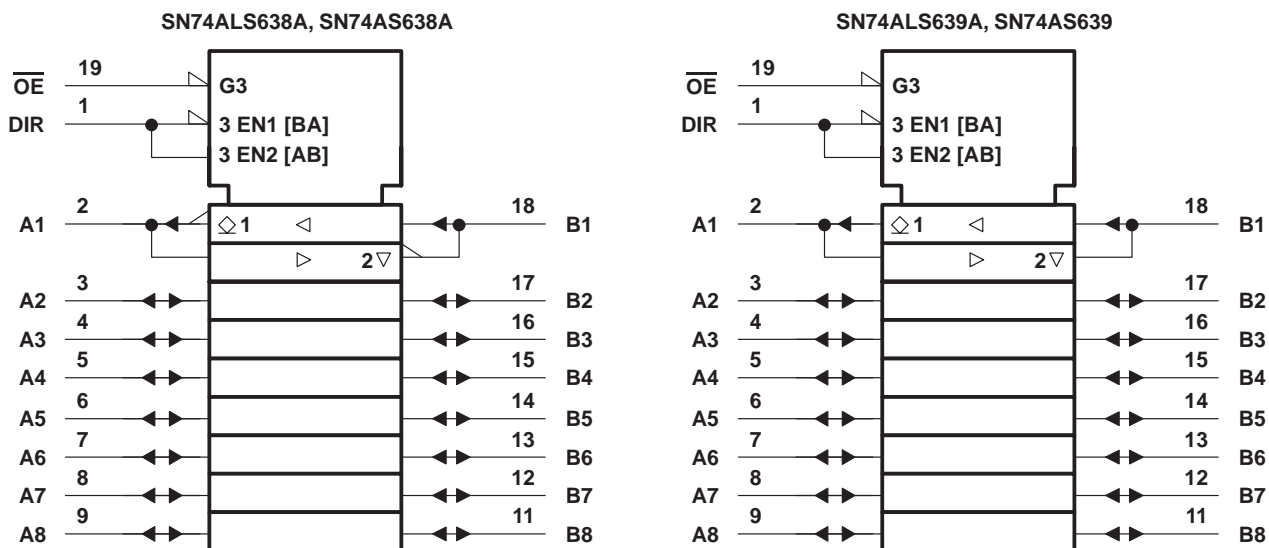
INPUTS		OPERATION	
\overline{OE}	DIR	SN74ALS638A SN74AS638A	SN74ALS639A SN74AS639
L	L	\overline{B} data to A bus	B data to A bus
L	H	\overline{A} data to B bus	A data to B bus
H	X	Isolation	Isolation

SN74ALS638A, SN74ALS639A, SN74AS638A, SN74AS639

OCTAL BUS TRANSCEIVERS

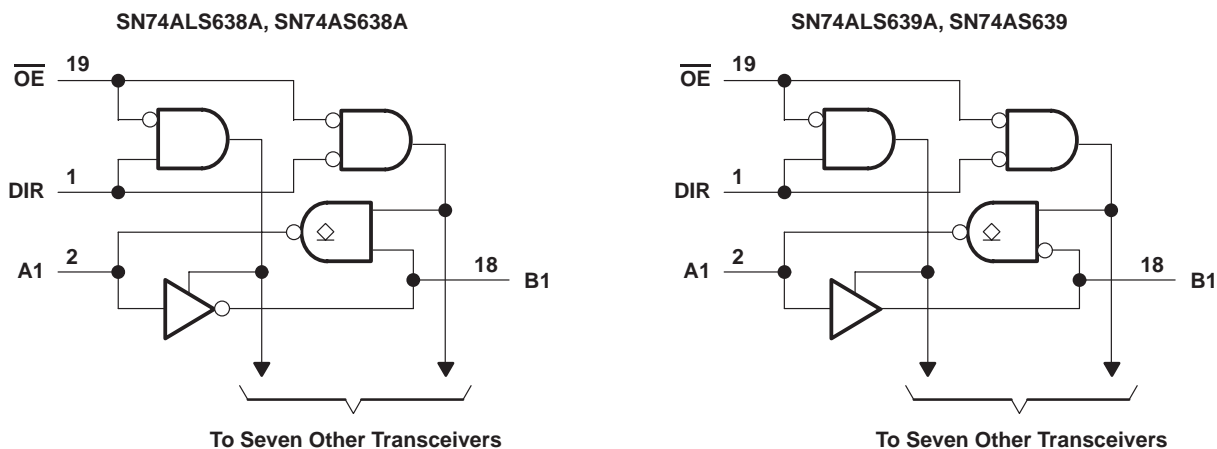
SDAS123A – DECEMBER 1983 – REVISED JANUARY 1995

logic symbols†



† 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)‡

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

‡ 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, SN74AS639A OCTAL BUS TRANSCEIVERS

SDAS123A – DECEMBER 1983 – REVISED JANUARY 1995

recommended operating conditions

		SN74ALS638A SN74ALS639A			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			5.5	V
I_{OH}	High-level output current			-15	mA
I_{OL}	Low-level output current			24	mA
				48†	
T_A	Operating free-air temperature	0		70	°C

† Applies only to the SN74ALS638A-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		SN74ALS638A SN74ALS639A		UNIT	
				MIN	TYP‡		MAX
V_{IK}		$V_{CC} = 4.5\text{ V}$,	$I_I = -18\text{ mA}$			-1.5	V
I_{OH}	A ports	$V_{CC} = 4.5\text{ V}$,	$V_{OH} = 5.5\text{ V}$			0.1	mA
V_{OH}	B ports	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$,	$I_{OH} = -0.4\text{ mA}$	$V_{CC} - 2$			V
		$V_{CC} = 4.5\text{ V}$	$I_{OH} = -3\text{ mA}$	2.4	3.2		
			$I_{OH} = -15\text{ mA}$	2			
V_{OL}	A or B ports	$V_{CC} = 4.5\text{ V}$	$I_{OL} = 12\text{ mA}$	0.25	0.4	V	
			$I_{OL} = 24\text{ mA}$	0.35	0.5		
			$I_{OL} = 48\text{ mA}^\dagger$	0.35	0.5		
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	μA
	A or B ports§					20	
I_{IL}	Control inputs	$V_{CC} = 5.5\text{ V}$,	$V_I = 0.4\text{ V}$			-0.1	mA
	A or B ports§					-0.1	
I_{O}^\parallel	B ports	$V_{CC} = 5.5\text{ V}$,	$V_O = 2.25\text{ V}$	-30		-112	mA
I_{CC}	SN74ALS638A	$V_{CC} = 5.5\text{ V}$	Outputs high	18	30	mA	
			Outputs low	26	41		
			Outputs disabled	16	30		
	SN74ALS639A		Outputs high	25	40		
			Outputs low	30	50		
			Outputs disabled	33	54		

† Applies only to the SN74ALS638A-1 version and only if V_{CC} is between 4.75 V and 5.25 V

‡ 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} .



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 V to 5.5 V, C _L = 50 pF, R _L = 680 Ω (A outputs), R ₁ = R ₂ = 500 Ω (B outputs), T _A = MIN to MAX†				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	

† 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)‡

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

‡ 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			5.5	V
I _{OH}	High-level output current			–15	mA
I _{OL}	Low-level output current			64	mA
T _A	Operating free-air temperature	0		70	°C



SN74ALS638A, SN74ALS639A, SN74AS638A, SN74AS639A OCTAL BUS TRANSCEIVERS

SDAS123A – DECEMBER 1983 – REVISED JANUARY 1995

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

PARAMETER		TEST CONDITIONS		SN74AS638A SN74AS639		UNIT	
				MIN	TYP†		MAX
V _{IK}		V _{CC} = 4.5 V,	I _I = -18 mA	-1.2		V	
I _{OH}	A ports	V _{CC} = 4.5 V,	V _{OH} = 5.5 V	0.1		mA	
V _{OH}	B ports	V _{CC} = 4.5 V to 5.5 V, I _{OH} = -2 mA		V _{CC} - 2		V	
		V _{CC} = 4.5 V, I _{OH} = -3 mA		2.4	3.2		
		V _{CC} = 4.5 V, I _{OH} = -15 mA		2.4			
V _{OL}	A or B ports	V _{CC} = 4.5 V,	I _{OL} = 64 mA	0.35	0.55	V	
I _I	Control inputs	V _{CC} = 5.5 V, V _I = 7 V		0.1		mA	
	A or B ports	V _{CC} = 5.5 V, V _I = 5.5 V		0.1			
I _{IH}	Control inputs	V _{CC} = 5.5 V, V _I = 2.7 V		20		μA	
	A or B ports‡			70			
I _{IL}	Control inputs	V _{CC} = 5.5 V, V _I = 0.4 V		-0.5		mA	
	A or B ports‡			-0.75			
I _{OS} §		V _{CC} = 5.5 V,	V _O = 2.25 V	-50	-150	mA	
I _{CC}	SN74AS638A	V _{CC} = 5.5 V		Outputs high	24	54	mA
				Outputs low	75	122	
				Outputs disabled	37	61	
	SN74AS639	V _{CC} = 5.5 V		Outputs high	56	92	
				Outputs low	95	154	
				Outputs disabled	62	100	

† All typical values are at V_{CC} = 5 V, T_A = 25°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 V to 5.5 V, C _L = 50 pF, R _L = 500 Ω (A outputs), R ₁ = R ₂ = 500 Ω (B outputs), T _A = MIN to MAX¶				UNIT
			SN74AS638A		SN74AS639		
			MIN	MAX	MIN	MAX	
t _{PLH}	A	B	2	7	2	9.5	ns
t _{PHL}			2	6.5	2	9	
t _{PLH}	B	A	5	20	5	22	ns
t _{PHL}			2	7	2	9	
t _{PLH}	OE	A	5	19	5	21.5	ns
t _{PHL}			2	9	2	11.5	
t _{PZH}	OE	B	2	8	2	10.5	ns
t _{PZL}			2	10	2	10.5	
t _{PHZ}	OE	B	2	7	2	7	ns
t _{PLZ}			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: $PRR \leq 1$ 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
SN74ALS638A-1N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74ALS638A-1N	Samples
SN74ALS638A-1NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS638A-1	Samples
SN74ALS638AN	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74ALS638AN	Samples
SN74ALS638ANSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS638A	Samples
SN74ALS639ADW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS639A	Samples
SN74ALS639AN	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74ALS639AN	Samples
SN74ALS639ANSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS639A	Samples
SN74AS638AN	NRND	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74AS638AN	
SN74AS639DW	OBSOLETE	SOIC	DW	20		TBD	Call TI	Call TI	0 to 70		
SN74AS639DWR	OBSOLETE	SOIC	DW	20		TBD	Call TI	Call TI	0 to 70		
SN74AS639N	OBSOLETE	PDIP	N	20		TBD	Call TI	Call TI	0 to 70		

(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.

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
SN74ALS638A-1NSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1
SN74ALS638ANSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1
SN74ALS639ANSR	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)
SN74ALS638A-1NSR	SO	NS	20	2000	367.0	367.0	45.0
SN74ALS638ANSR	SO	NS	20	2000	367.0	367.0	45.0
SN74ALS639ANSR	SO	NS	20	2000	367.0	367.0	45.0

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

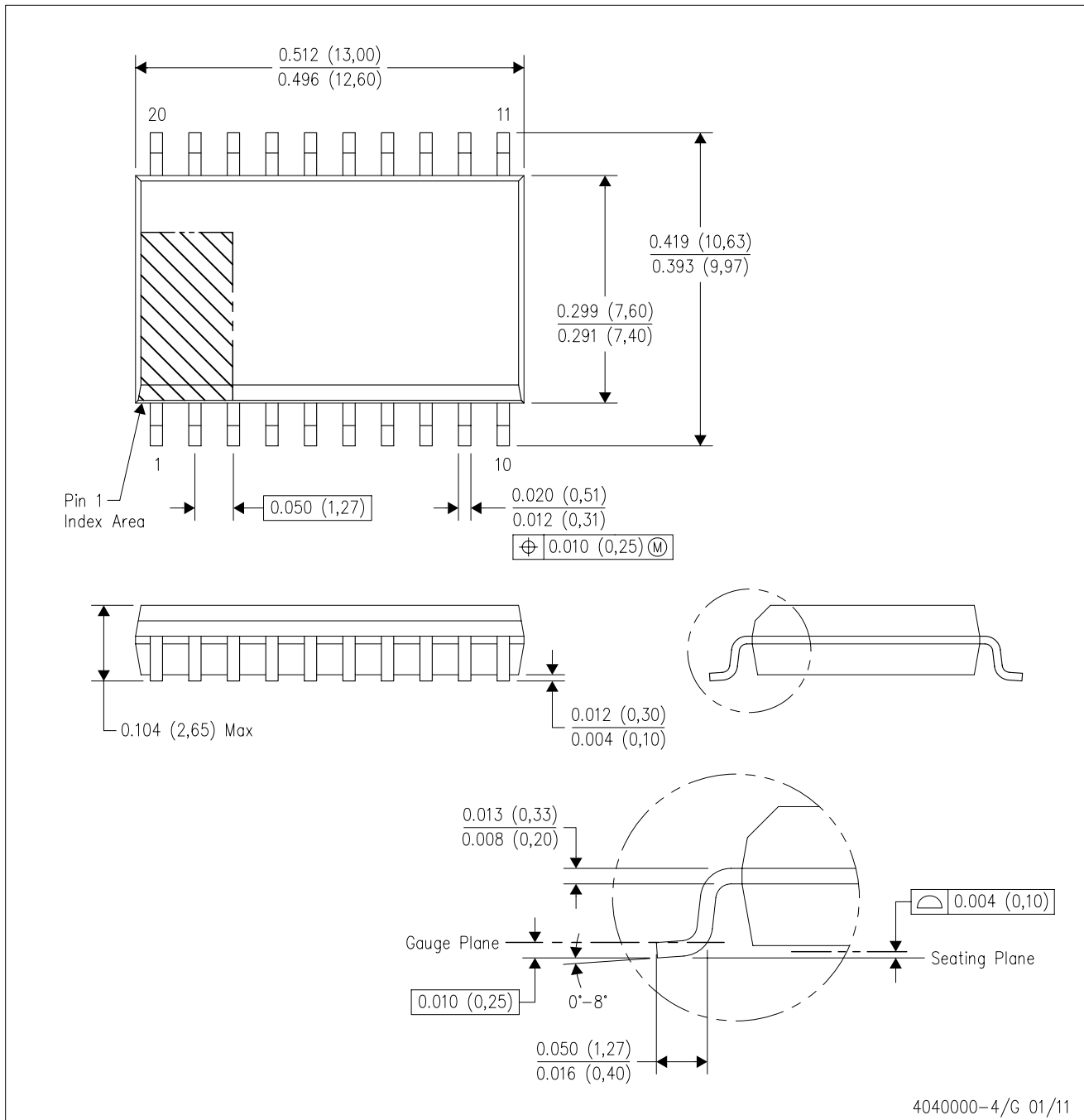
16 PINS SHOWN



- 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)

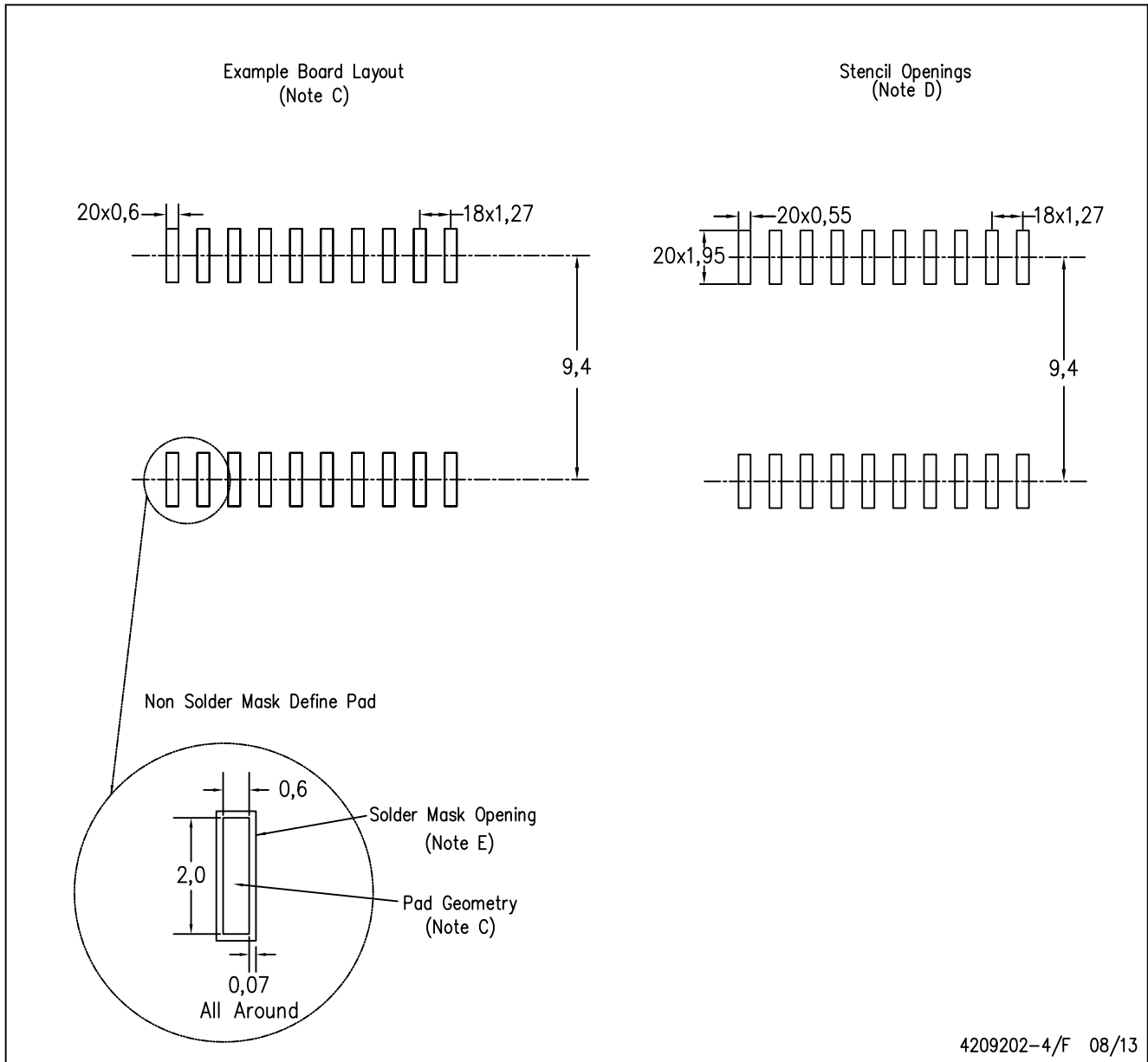
PLASTIC SMALL OUTLINE



- 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.

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

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Applications Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Automotive and Transportation	www.ti.com/automotive
Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Video and Imaging	www.ti.com/video

TI E2E Community

e2e.ti.com