

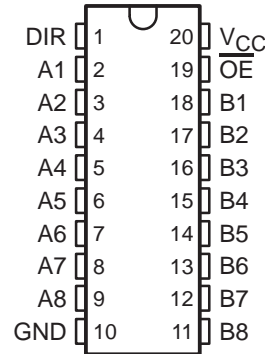
# SN74ALS641A, SN74ALS642A, SN74AS641 OCTAL BUS TRANSCEIVERS WITH OPEN-COLLECTOR OUTPUTS

SDAS300 – MARCH 1995

- Bidirectional Bus Transceivers in High-Density 20-Pin Packages
- Choice of True or Inverting Logic
- Package Options Include Plastic Small-Outline (DW) Packages and Standard Plastic (N) 300-mil DIPs

DEVICE	LOGIC
SN74ALS641A, SN74AS641	True
SN74ALS642A	Inverting

DW OR N PACKAGE  
(TOP VIEW)



## description

These octal bus transceivers are designed for asynchronous two-way communication between data buses. These devices transmit data from the A bus to the B bus or from the B bus to the A bus, depending upon the level at the direction-control (DIR) input. The output-enable ( $\overline{OE}$ ) input disables the device so that the buses are effectively isolated.

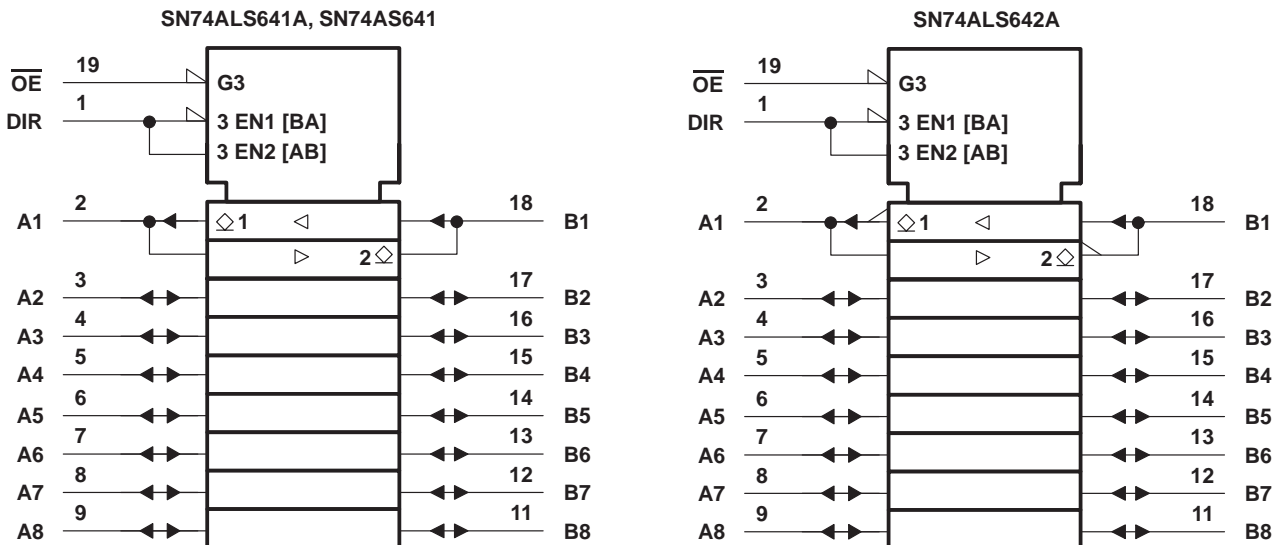
The -1 versions of the SN74ALS641A and SN74ALS642A are identical to the standard versions, except that the recommended maximum  $I_{OL}$  is increased to 48 mA in the -1 versions.

The SN74ALS641A, SN74ALS642A, and SN74AS641 are characterized for operation from 0°C to 70°C.

FUNCTION TABLE

INPUTS		OPERATION	
$\overline{OE}$	DIR	SN74ALS641A SN74AS641	SN74ALS642A
L	L	B data to A bus	$\overline{B}$ data to A bus
L	H	A data to B bus	$\overline{A}$ data to B bus
H	X	Isolation	Isolation

## logic symbols†

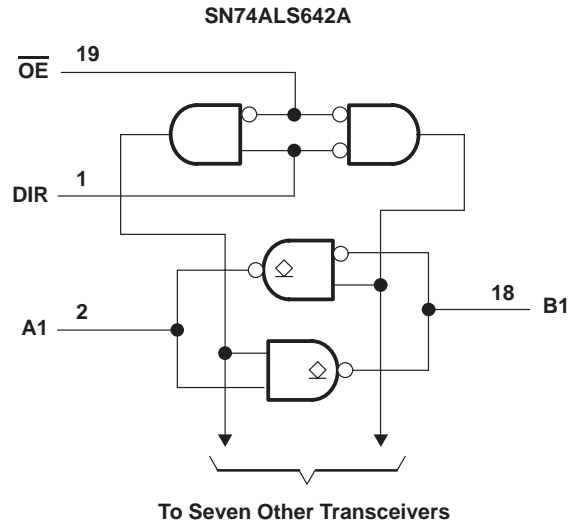
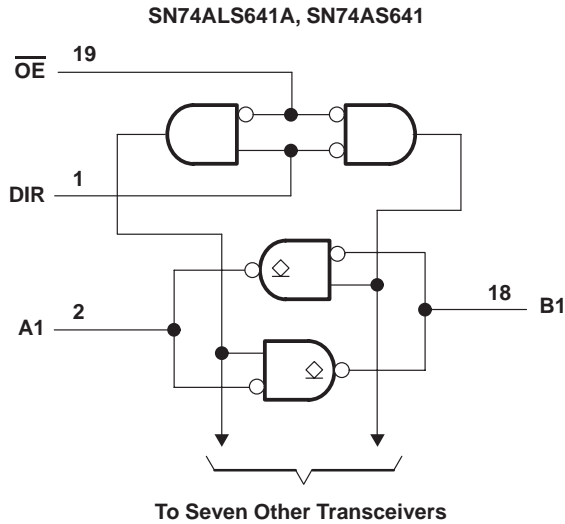


† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

# SN74ALS641A, SN74ALS642A, SN74AS641 OCTAL BUS TRANSCEIVERS WITH OPEN-COLLECTOR OUTPUTS

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## 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 and I/O ports	7 V
Operating free-air temperature range, $T_A$ : SN74ALS641A, SN74ALS642A	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

		SN74ALS641A SN74ALS642A			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
$I_{OL}$	Low-level output current			24	mA
				48‡	
$T_A$	Operating free-air temperature	0		70	°C

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

**SN74ALS641A, SN74ALS642A, SN74AS641**  
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**electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)**

PARAMETER		TEST CONDITIONS		SN74ALS641A SN74ALS642A			UNIT
				MIN	TYP†	MAX	
V <sub>IK</sub>		V <sub>CC</sub> = 4.5 V,	I <sub>I</sub> = -18 mA			-1.5	V
I <sub>OH</sub>		V <sub>CC</sub> = 4.5 V,	V <sub>OH</sub> = 5.5 V			0.1	mA
V <sub>OL</sub>		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‡		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
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§					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§					-0.1	
I <sub>CC</sub>	SN74ALS641A	V <sub>CC</sub> = 5.5 V	Outputs high		25	37	mA
			Outputs low		33	47	
	SN74ALS642A		Outputs high		8	15	
			Outputs low		18	28	

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

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

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

**switching characteristics (see Figure 1)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 4.5 V to 5.5 V, C <sub>L</sub> = 50 pF, R <sub>L</sub> = 680 Ω, T <sub>A</sub> = MIN to MAX¶				UNIT
			SN74ALS641A		SN74ALS642A		
			MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A or B	B or A	5	25	10	30	ns
t <sub>PHL</sub>			3	18	5	22	
t <sub>PLH</sub>	$\overline{\text{OE}}$	A or B	8	30	10	30	ns
t <sub>PHL</sub>			8	30	15	38	
t <sub>PLH</sub>	DIR	A or B	8	32	10	30	ns
t <sub>PHL</sub>			8	32	15	38	

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

# SN74ALS641A, SN74ALS642A, SN74AS641

## OCTAL BUS TRANSCEIVERS

### WITH OPEN-COLLECTOR OUTPUTS

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#### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage, $V_{CC}$	7 V
Input voltage, $V_I$ : All inputs and I/O ports	7 V
Operating free-air temperature range, $T_A$ : SN74AS641	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

		SN74AS641			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
$I_{OL}$	Low-level output current			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	SN74AS641			UNIT	
		MIN	TYP‡	MAX		
$V_{IK}$	$V_{CC} = 4.5\text{ V}$ , $I_I = -18\text{ mA}$			-1.2	V	
$I_{OH}$	$V_{CC} = 4.5\text{ V}$ , $V_{OH} = 5.5\text{ V}$			0.1	mA	
$V_{OL}$	$V_{CC} = 4.5\text{ V}$ , $I_{OL} = 64\text{ mA}$		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	
$I_{CC}$	$V_{CC} = 5.5\text{ V}$	Outputs high		50	82	mA
		Outputs low		84	136	

‡ 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.



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**switching characteristics (see Figure 1)**

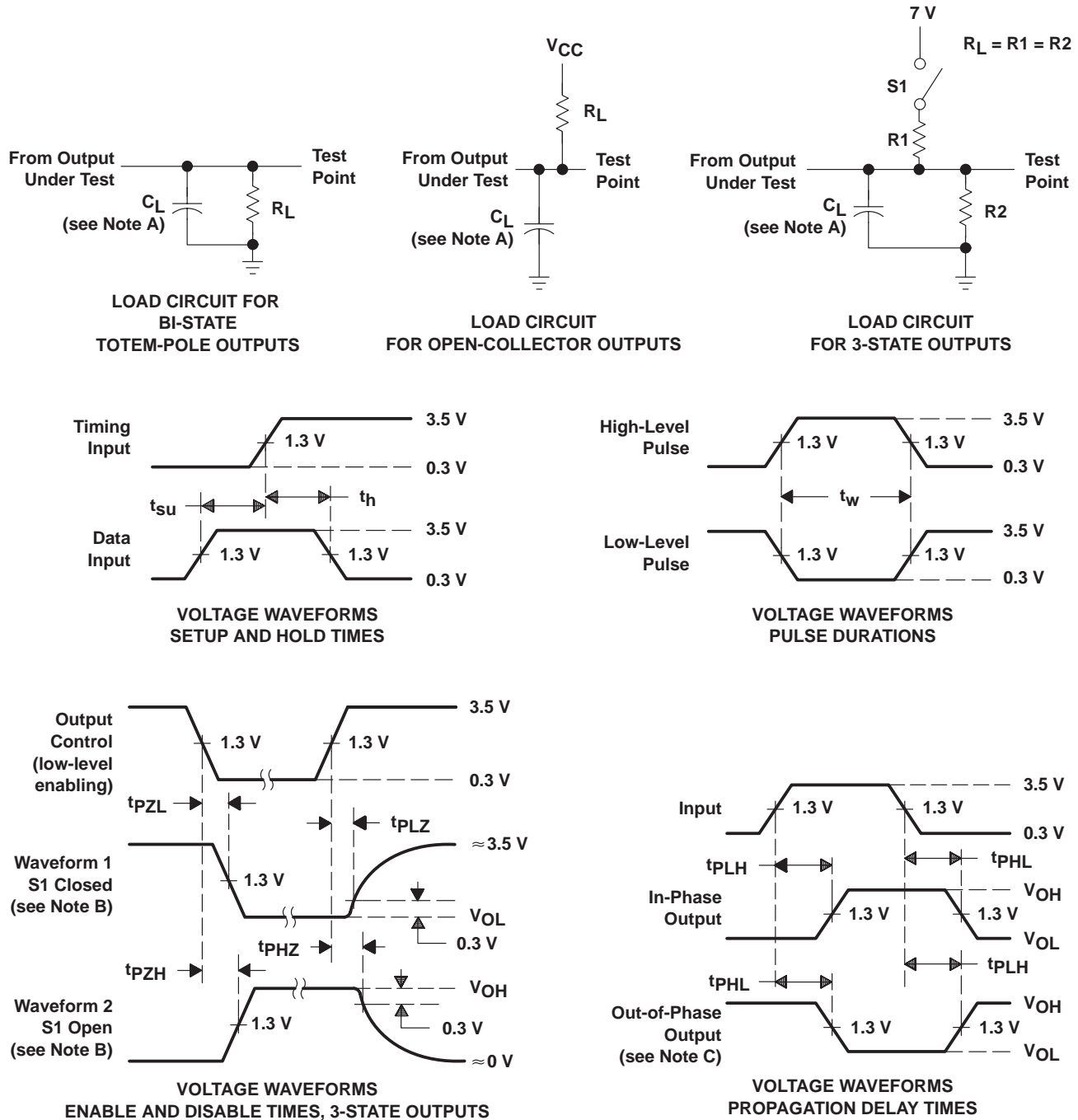
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 4.5 V to 5.5 V, C <sub>L</sub> = 50 pF, R <sub>L</sub> = 680 Ω, T <sub>A</sub> = MIN to MAX†		UNIT
			SN74AS641		
			MIN	MAX	
t <sub>PLH</sub>	A or B	B or A	5	21	ns
t <sub>PHL</sub>			1	7.5	
t <sub>PLH</sub>	$\overline{OE}$	A or B	5	21	ns
t <sub>PHL</sub>			1	9	
t <sub>PLH</sub>	DIR	A or B	5	22	ns
t <sub>PHL</sub>			1	10	

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

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



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.  
 C. When measuring propagation delay items of 3-state outputs, switch S1 is open.  
 D. All input pulses have the following characteristics:  $PRR \leq 1$  MHz,  $t_r = t_f = 2$  ns, duty cycle = 50%.  
 E. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms

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