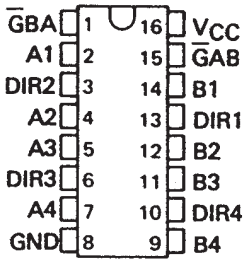
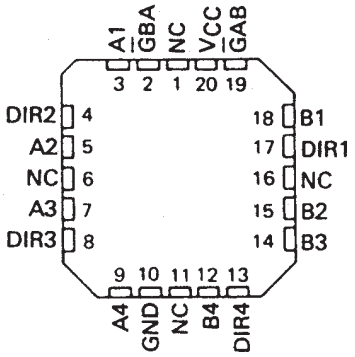
- 3-State Outputs Drive Bus Lines Directly
- P-N-P Inputs Reduce DC Loading on Bus Line
- Hysteresis at Bus Inputs Improves Noise Margins
- Flow-Thru Data Pinout (B Bus Opposite A Bus)
- Choice of True ('LS449) and Inverting ('LS446)

SN54LS446, SN54LS449 . . . J PACKAGE
SN74LS446, SN74LS449 . . . D OR N PACKAGE
(TOP VIEW)



SN54LS446, SN54LS449 . . . FK PACKAGE
(TOP VIEW)



NC - No internal connection

description

These quadruple bus transceivers are designed for data transmission from individual lines of the A bus to individual lines of the B bus or the reverse, depending on the logic levels at the direction-control pins DIR1 through DIR4. These direction controls (one for each channel) allow maximum flexibility in timing. The enable inputs $\overline{G}BA$ and $\overline{G}AB$ can be used to disable the A or B outputs respectively, or to disable both buses for effective isolation.

The SN54LS446 and SN54LS449 are characterized for operation over the full military temperature range of −55°C to 125°C. The SN74LS446 and SN74LS449 are characterized for operation from 0°C to 70°C.

FUNCTION TABLE

ENABLE $\overline{G}BA$	ENABLE $\overline{G}AB$	DIRECTION DIR	OPERATION 'LS446	OPERATION 'LS449
H	H	X	Isolation	Isolation
X	L	H	$\overline{A}$ data to B Bus	A data to B Bus
L	X	L	$\overline{B}$ data to A Bus	B data to A Bus
X	H	H	Isolation	Isolation
H	X	L	Isolation	Isolation

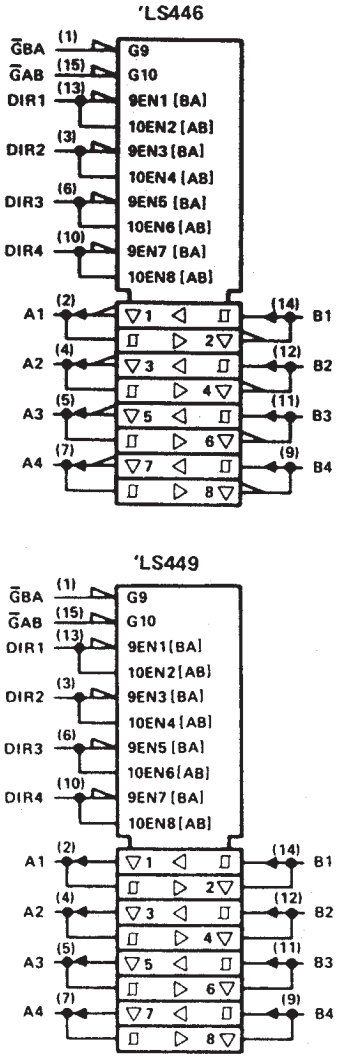
H = high level, L = low level, X = irrelevant

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

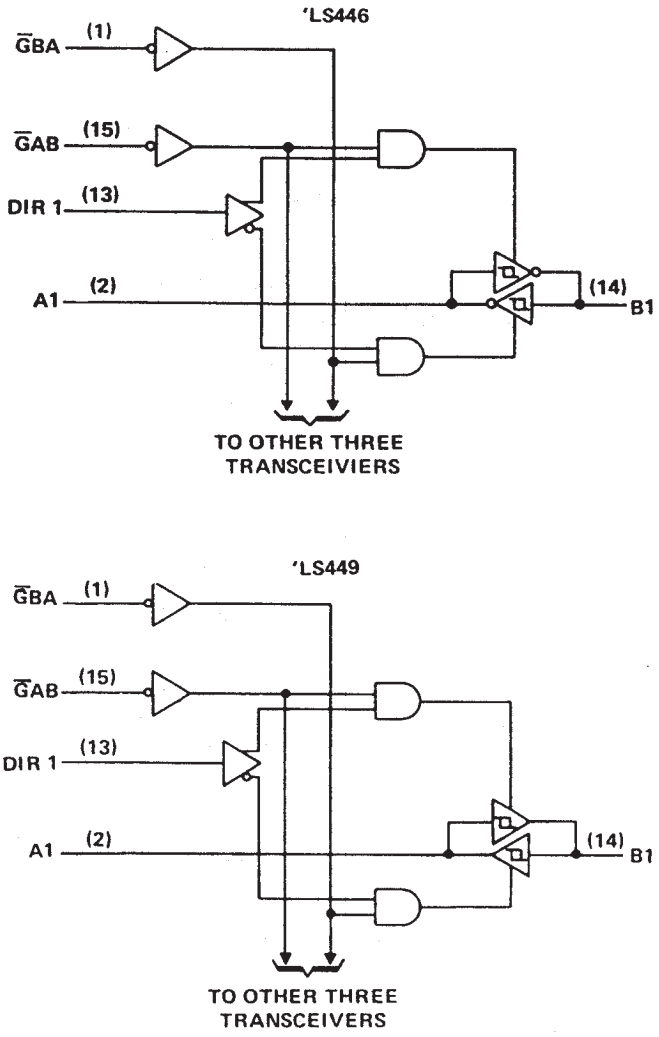
Supply voltage, V_{CC} (see Note 1) . . . . . 7 V
Input voltage . . . . . 7 V
Off-state output voltage . . . . . 5.5 V
Operating free-air temperature range: SN54LS' . . . . . −55°C to 125°C
SN74LS' . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

NOTE 1: Voltage values are with respect to the network ground terminal.

logic symbols†

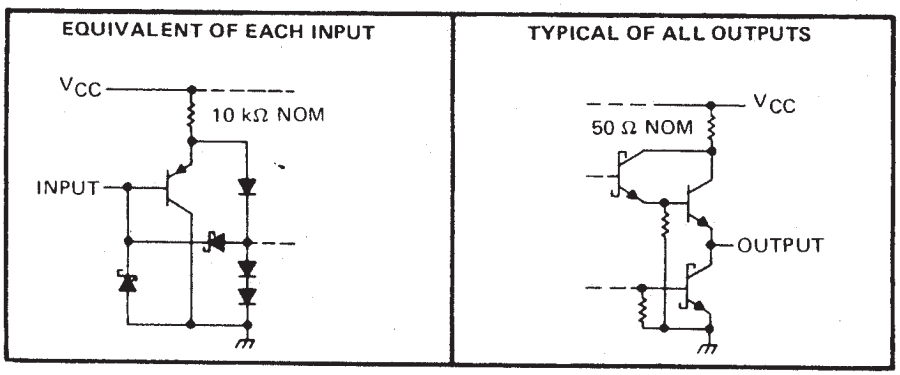


logic diagrams (positive logic)



† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for D, J, and N packages.

schematics of inputs and outputs



recommended operating conditions

PARAMETER	SN54LS446 SN54LS449			SN74LS446 SN74LS449			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC} (see Note 1)	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I_{OH}			–12			–15	mA
Low-level output current, I_{OL}			12			24	mA
Operating free-air temperature, T_A	–55		125	0		70	°C

NOTE 1: Voltage values are with respect to network ground terminal

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

PARAMETER			TEST CONDITIONS†		SN54LS446 SN54LS449			SN74LS446 SN74LS449			UNIT
					MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IH}	High-level input voltage				2			2			V
V_{IL}	Low-level input voltage						0.6			0.7	V
V_{IK}	Input clamp voltage		V_{CC} = MIN,	I_I = –18 mA			–1.5			–1.5	V
	Hysteresis ($V_{T+} - V_{T-}$), A or B input		V_{CC} = MIN		0.1	0.4		0.2	0.4		V
V_{OH}	High-level output voltage		V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = V_{IL} max	I_{OH} = –3 mA	2.4	3.4		2.4	3.4		V
				I_{OH} = MAX	2			2			
V_{OL}	Low-level output voltage		V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = V_{IL} max	I_{OL} = 12 mA		0.25	0.4		0.25	0.4	V
				I_{OL} = 24 mA					0.35	0.5	
I_{OZH}	Off-state output current, high-level voltage applied		V_{CC} = MAX, V_O = 2.7 V	$\overline{G}$ at 2 V,			20			20	µA
I_{OZL}	Off-state output current, low-level voltage applied		V_{CC} = MAX, V_O = 0.4 V	$\overline{G}$ at 2 V,			– 0.4			– 0.4	mA
I_I	Input current at maximum input voltage	A or B	V_{CC} = MAX,	V_I = 5.5 V			0.1			0.1	mA
		$\overline{G}$AB or $\overline{G}$BA		V_I = 7 V			0.1			0.1	
I_{IH}	High-level input current		V_{CC} = MAX,	V_I = 2.7 V			20			20	µA
I_{IL}	Low-level input current		V_{CC} = MAX,	V_I = 0.4 V			–0.4			–0.4	mA
I_{OS}	Short-circuit output current§		V_{CC} = MAX		–40		–225	–40		–225	mA
I_{CC}	Total supply current	'LS446	V_{CC} = MAX, Outputs open	Outputs high		35	56		35	56	mA
				Outputs low		39	63		39	63	
				Outputs at Hi-Z		42	68		42	68	
		'LS449		Outputs high		42	68		42	68	
				Outputs low		47	75		47	75	
				Outputs at Hi-Z		50	80		50	80	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.
§ Not more than one output should be shorted at a time, and duration of the short-circuit should not exceed one second.

switching characteristics at V_{CC} = 5 V, T_A = 25°C

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	'LS446			'LS449			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
t_{PLH} Propagation delay time, low-to-high-level output	A	B	C_L = 45 pF, R_L = 667 Ω, See Note 2		8	13		10	15	ns
	B	A			8	13		10	15	
t_{PHL} Propagation delay time, high-to-low-level output	A	B			7	12		11	17	ns
	B	A			7	12		11	17	
t_{PZL} Output enable time to low level	$\overline{G}$BA	A			24	40		21	35	ns
	$\overline{G}$AB	B			24	40		21	35	
t_{PZH} Output enable time to high level	$\overline{G}$BA	A			15	25		18	30	ns
	$\overline{G}$AB	B			15	25		18	30	
t_{PLZ} Output disable time from low level	$\overline{G}$BA	A	C_L = 5 pF, R_L = 667 Ω, See Note 2		14	25		14	25	ns
	$\overline{G}$AB	B			14	25		14	25	
t_{PHZ} Output disable time from high level	$\overline{G}$BA	A			10	15		10	15	ns
	$\overline{G}$AB	B			10	15		10	15	

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

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