

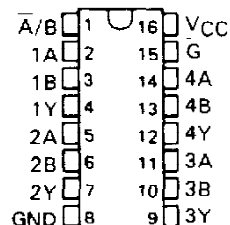
SN54LS257B, SN54LS258B, SN54S257, SN54S258, SN74LS257B, SN74LS258B, SN74S257, SN74S258 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

SDLS148 OCTOBER 1976 — REVISED MARCH 1988

- Three-State Outputs Interface Directly with System Bus
- 'LS257B and 'LS258B Offer Three Times the Sink-Current Capability of the Original 'LS257 and 'LS258
- Same Pin Assignments as SN54LS157, SN74LS157, SN54S157, SN74S157, and SN54LS158, SN74LS158, SN54S158, SN74S158
- Provides Bus Interface from Multiple Sources in High-Performance Systems

SN54LS257B, SN54S257,
SN54LS258B, SN54S258 . . . J OR W PACKAGE
SN74LS257B, SN74S257,
SN74LS258B, SN74S258 . . . D OR N PACKAGE

(TOP VIEW)



	AVERAGE PROPAGATION DELAY FROM DATA INPUT	TYPICAL POWER DISSIPATION†
'LS257B	9 ns	55 mW
'LS258B	9 ns	55 mW
'S257	4.8 ns	320 mW
'S258	4 ns	280 mW

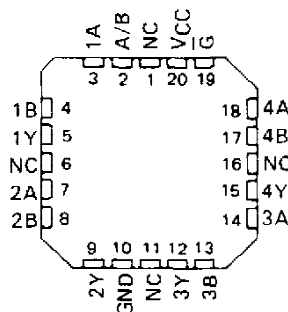
† Off state (worst case)

description

These devices are designed to multiplex signals from four-bit data sources to four-output data lines in bus-organized systems. The 3-state outputs will not load the data lines when the output control pin (G) is at a high-logic level.

Series 54LS and 54S are characterized for operation over the full military temperature range of -55°C to 125°C; Series 74LS and 74S are characterized for operation from 0°C to 70°C.

SN54LS257B, SN54S257,
SN54LS258B, SN54S258 . . . FK PACKAGE
(TOP VIEW)



NC—No internal connection.

FUNCTION TABLE

OUTPUT CONTROL	INPUTS		OUTPUT Y		
	SELECT	A	B	'LS257B 'S257	'LS258B 'S258
H	X	X	X	Z	Z
L	L	L	X	L	H
L	L	H	X	H	L
L	H	X	L	L	H
L	H	X	H	H	L

H = high level, L = low level, X = irrelevant,
Z = high impedance (off)

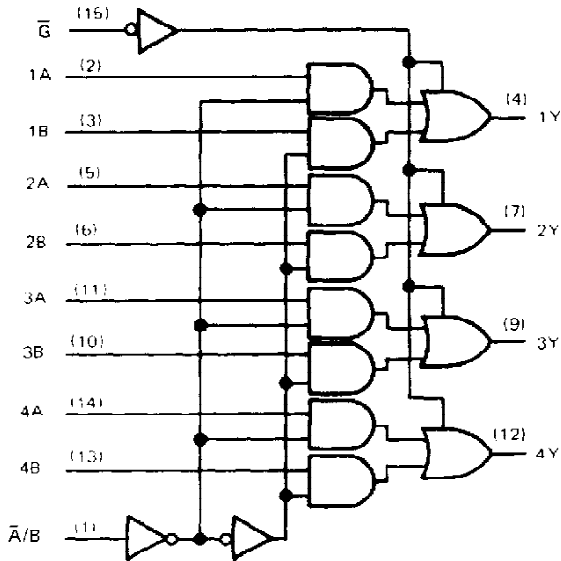
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TEXAS
INSTRUMENTS

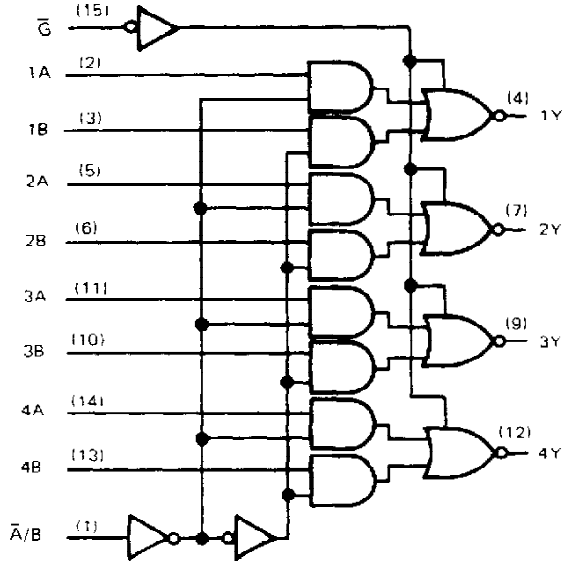
**SN54LS257B, SN54LS258B, SN54S257, SN54S258,
SN74LS257B, SN74LS258B, SN74S257, SN74S258**
QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

logic diagrams (positive logic)

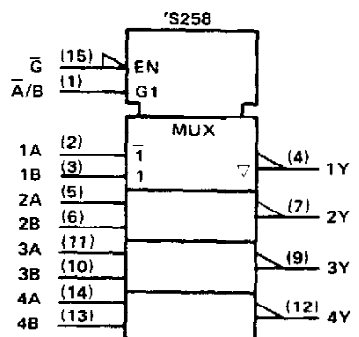
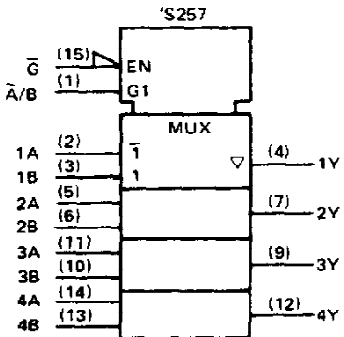
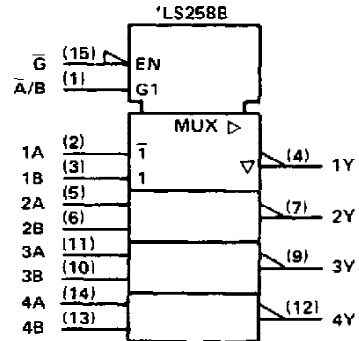
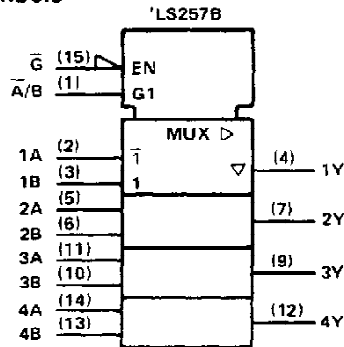
'LS257B, 'S257



'LS258B, 'S258



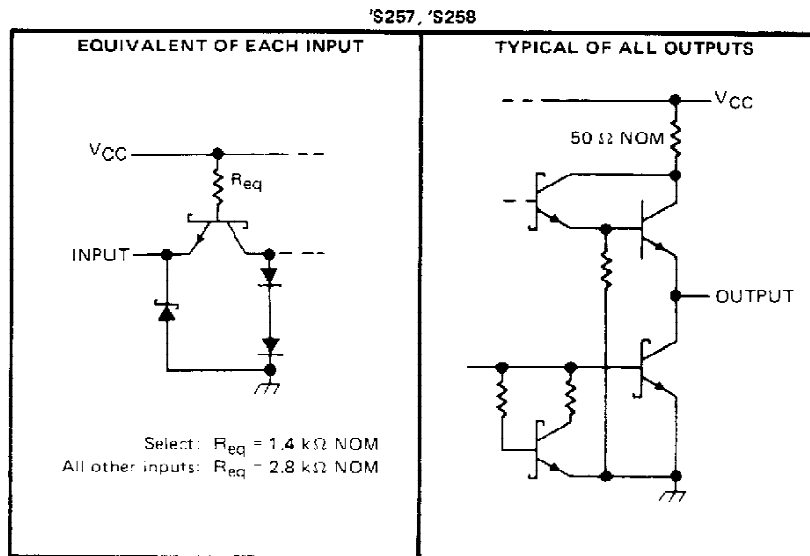
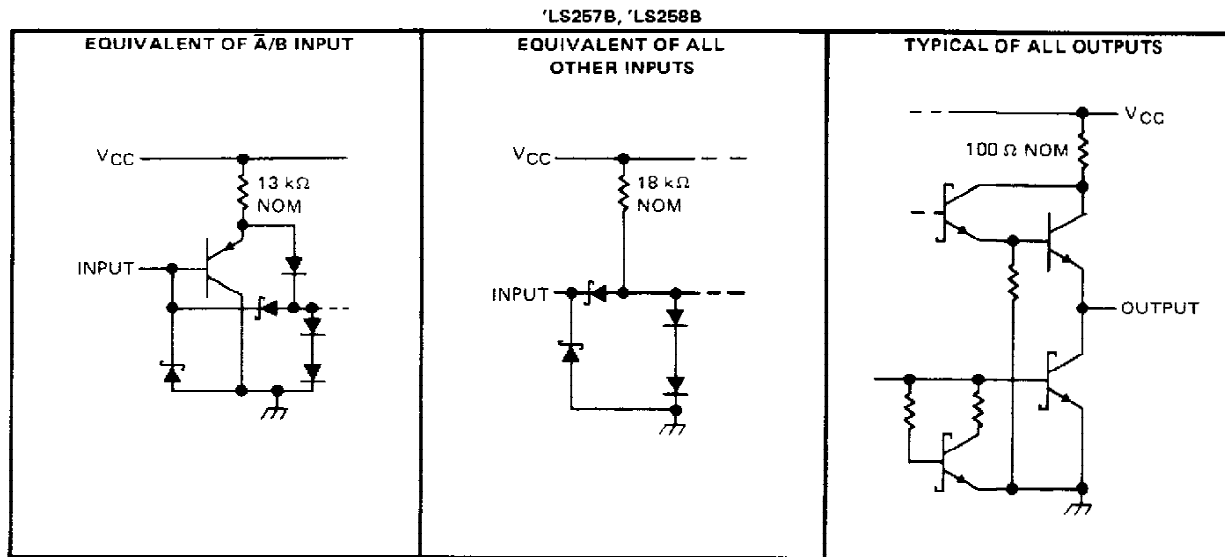
logic symbols†



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

**SN54LS257B, SN54LS258B, SN54S257, SN54S258,
SN74LS257B, SN74LS258B, SN74S257, SN74S258**
QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

schematics of inputs and outputs



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

Supply voltage, V_{CC} (see Note 1)	7 V
Input voltage: 'LS257B, 'LS258B Circuits	7 V
'S257, 'S258 Circuits	5.5 V
Off-state output voltage	5.5 V
Operating free-air temperature range: SN54LS', SN54S' Circuits	-55°C to 125°C
SN74LS', SN74S' Circuits	0°C to 70°C
Storage temperature range	-65°C to 150°C

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

SN54LS257B, SN54LS258B, SN74LS257B, SN74LS258B QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

recommended operating conditions

	SN54LS'			SN74LS'			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V _{CC} Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V _{IH} High-level input voltage	2			2			V
V _{IL} Low-level input voltage			0.7			0.8	V
I _{OH} High-level output current			-1			-2.6	mA
I _{OL} Low-level output current			12			24	mA
T _A Operating free-air temperature	-55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS [†]	SN54LS'		SN74LS'		UNIT	
		MIN	TYP [‡]	MAX	MIN		TYP [‡]
V _{IK}	V _{CC} = MIN, I _I = -18 mA			-1.5		-1.5	V
V _{OH}	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = MAX, I _{OH} = MAX	2.4	3.4	2.4	3.1		V
V _{OL}	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = MAX, I _{OL} = 12 mA	0.25	0.4	0.25	0.4		V
						0.35	0.5
I _{OZH}	V _{CC} = MAX, V _{IH} = 2 V, V _O = 2.7 V		20		20		μA
I _{OZL}	V _{CC} = MAX, V _{IH} = 2 V, V _O = 0.4 V		-20		-20		μA
I _I	V _{CC} = MAX, V _I = 7 V		0.1		0.1		mA
I _{IH}	V _{CC} = MAX, V _I = 2.7 V		20		20		μA
I _{IL}	V _{CC} = MAX, V _I = 0.4 V		-0.4		-0.4		mA
I _{OS} §	V _{CC} = MAX,	-30	-130	-30	-130		mA
I _{CC}	All outputs high	V _{CC} = MAX, See Note 2					mA
	All outputs low						
	All outputs off						
	All outputs high						
	All outputs low						
	All outputs off						

[†] 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.

NOTE 2: I_{CC} is measured with all outputs open and all possible inputs grounded while achieving the stated output conditions.

switching characteristics, V_{CC} = 5 V, T_A = 25°C, R_L = 667 Ω

PARAMETER [†]	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	'LS257B			'LS258B			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
t _{PLH}	Data	Any	C _L = 45 pF, See Note 3	8	13	7	12	ns		
t _{PHL}				10	15	11	17			
t _{PLH}	Select	Any		16	21	14	21			
t _{PHL}				17	24	19	24			
t _{PZH}	Output Control	Any		15	30	15	30		ns	
t _{PZL}				19	30	20	30			
t _{PHZ}	Output Control	Any	18	30	18	30	ns			
t _{PLZ}			16	25	16	25				

[†] t_{PLH} = propagation delay time, low-to-high-level output

t_{PHL} = propagation delay time, high-to-low-level output

t_{PZH} = output enable time to high level

t_{PZL} = output enable time to low level

t_{PHZ} = output disable time from high level

t_{PLZ} = output disable time from low level

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

SN54S257, SN54S258, SN74S257, SN74S258 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

recommended operating conditions

	SN54S'			SN74S'			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I_{OH}			-2			-6.5	mA
Low-level output current, I_{OL}			20			20	mA
Operating free-air temperature, T_A	-55		125	0		70	°C

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

PARAMETER		TEST CONDITIONS [†]	'S257			'S258			UNIT	
			MIN	TYP [‡]	MAX	MIN	TYP [‡]	MAX		
V_{IH}	High-level input voltage		2			2			V	
V_{IL}	Low-level input voltage				0.8			0.8	V	
V_{IK}	Input clamp voltage	$V_{CC} = \text{MIN.}, I_I = -18 \text{ mA}$			-1.2			-1.2	V	
V_{OH}	High-level output voltage	$V_{CC} = \text{MIN.}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OH} = -1 \text{ mA}$				2.7		2.7	V	
		$V_{CC} = \text{MIN.}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OH} = \text{MAX}$				2.4	3.4	2.4		3.4
						2.4	3.2	2.4		3.2
V_{OL}	Low-level output voltage	$V_{CC} = \text{MIN.}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OL} = 20 \text{ mA}$			0.5			0.5	V	
I_{OZH}	Off-state output current, high-level voltage applied	$V_{CC} = \text{MAX.}, V_{IH} = 2 \text{ V}, V_O = 2.4 \text{ V}$			50			50	μA	
I_{OZL}	Off-state output current, low-level voltage applied	$V_{CC} = \text{MAX.}, V_{IH} = 2 \text{ V}, V_O = 0.5 \text{ V}$			-50			-50	μA	
I_I	Input current at maximum input voltage	$V_{CC} = \text{MAX.}, V_I = 5.5 \text{ V}$			1			1	mA	
I_{IH}	High-level input current	S input			100			100	μA	
		Any other			50			50		
I_{IL}	Low-level input current	S input			-4			-4	mA	
		Any other			-2			-2		
I_{OS}	Short-circuit output current [§]	$V_{CC} = \text{MAX.}$	-40		-100			-40	-100	mA
I_{CC}	Supply current	All outputs high			44			36	56	mA
		All outputs low			60			52	81	
		All outputs off			64			56	87	

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

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

[§] Not more than one output should be shorted at a time and duration of the short-circuit should not exceed one second.

NOTE 2: I_{CC} is measured with all outputs open and all possible inputs grounded while achieving the stated output conditions.

switching characteristics, $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}, R_L = 280 \Omega$

PARAMETER [¶]	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	'S257			'S258			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
t_{PLH}	Data	Any	$C_L = 15 \text{ pF},$ See Note 3		5	7.5		4	6	ns
t_{PHL}					4.5	6.5		4	6	
t_{PLH}	Select	Any			8.5	15		8	12	ns
t_{PHL}					8.5	15		7.5	12	
t_{PZH}	Output Control	Any			13	19.5		13	19.5	ns
t_{PZL}					14	21		14	21	
t_{PHZ}	Output Control	Any	$C_L = 5 \text{ pF},$ See Note 3		5.5	8.5		5.5	8.5	ns
t_{PLZ}					9	14		9	14	

[¶] f_{max} = Maximum clock frequency

t_{PLH} = propagation delay time, low-to-high-level output

t_{PHL} = propagation delay time, high-to-low-level output

t_{PZH} = output enable time to high level

t_{PZL} = output enable time to low level

t_{PHZ} = output disable time from high level

t_{PLZ} = output disable time from low level

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

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