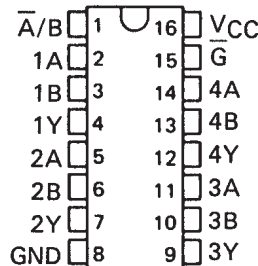


# SN54LS257B, SN54LS258B, SN54S257, SN54S258 SN74LS257B, SN74LS258B, SN74S257, SN74S258 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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 <sup>†</sup>
'LS257B	9 ns	55 mW
'LS258B	9 ns	55 mW
'S257	4.8 ns	320 mW
'S258	4 ns	280 mW

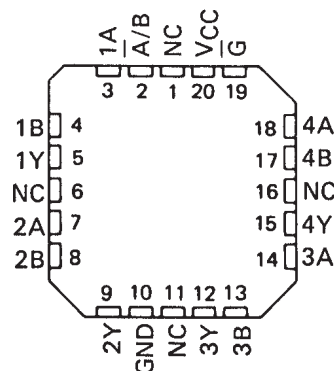
<sup>†</sup>Off state (worst case)

## 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 ( $\bar{G}$ ) is at a high-logic level.

Series 54LS and 54S are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ ; Series 74LS and 74S are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

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

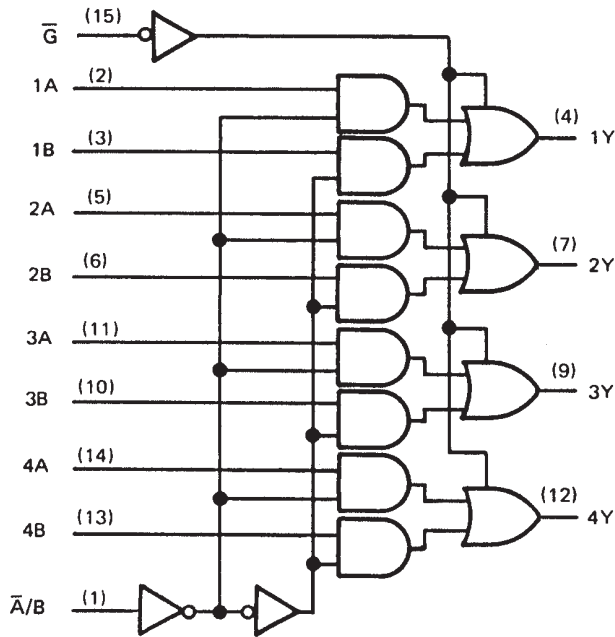
H = high level, L = low level, X = irrelevant,  
Z = high impedance (off)

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

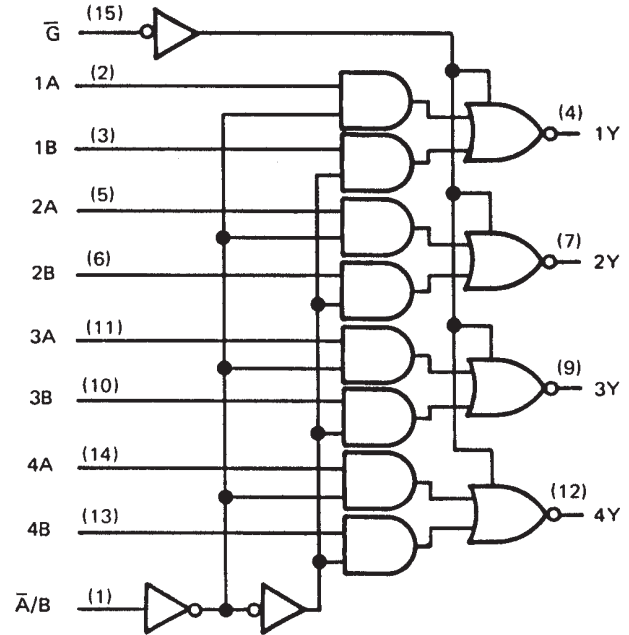
SDLS148 - OCTOBER 1976 - REVISED MARCH 1988

logic diagrams (positive logic)

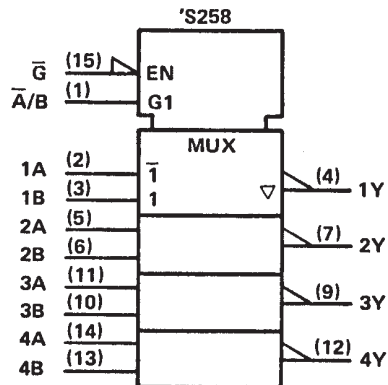
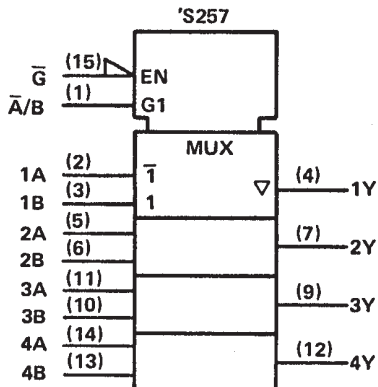
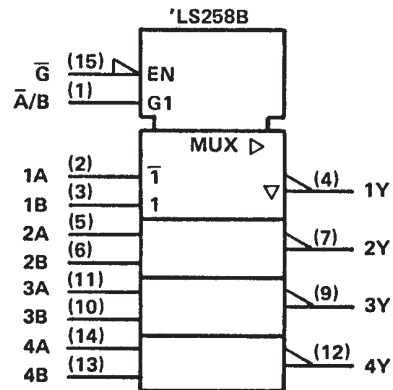
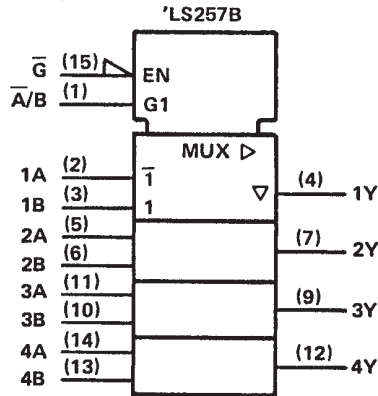
'LS257B, 'S257



'LS258B, 'S258



logic symbols†

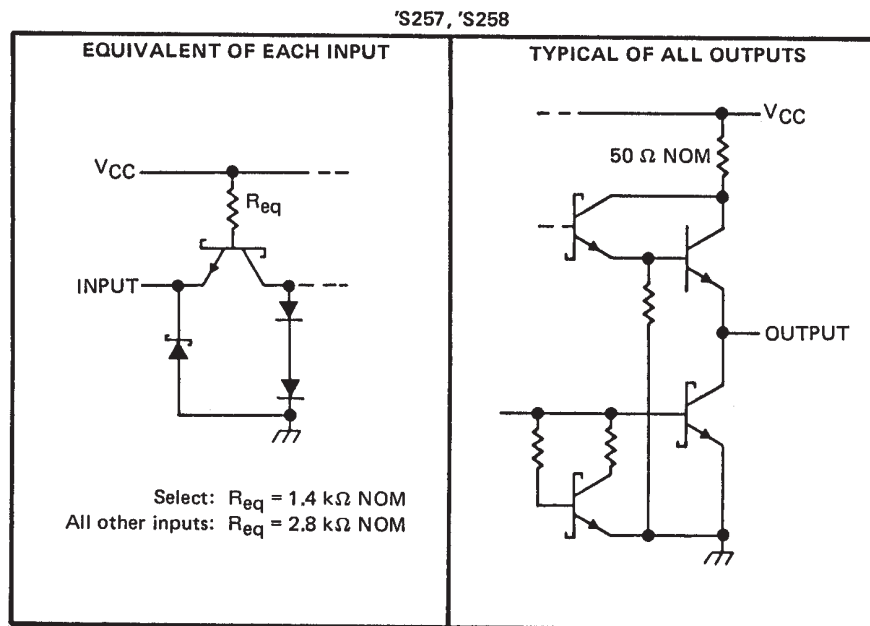
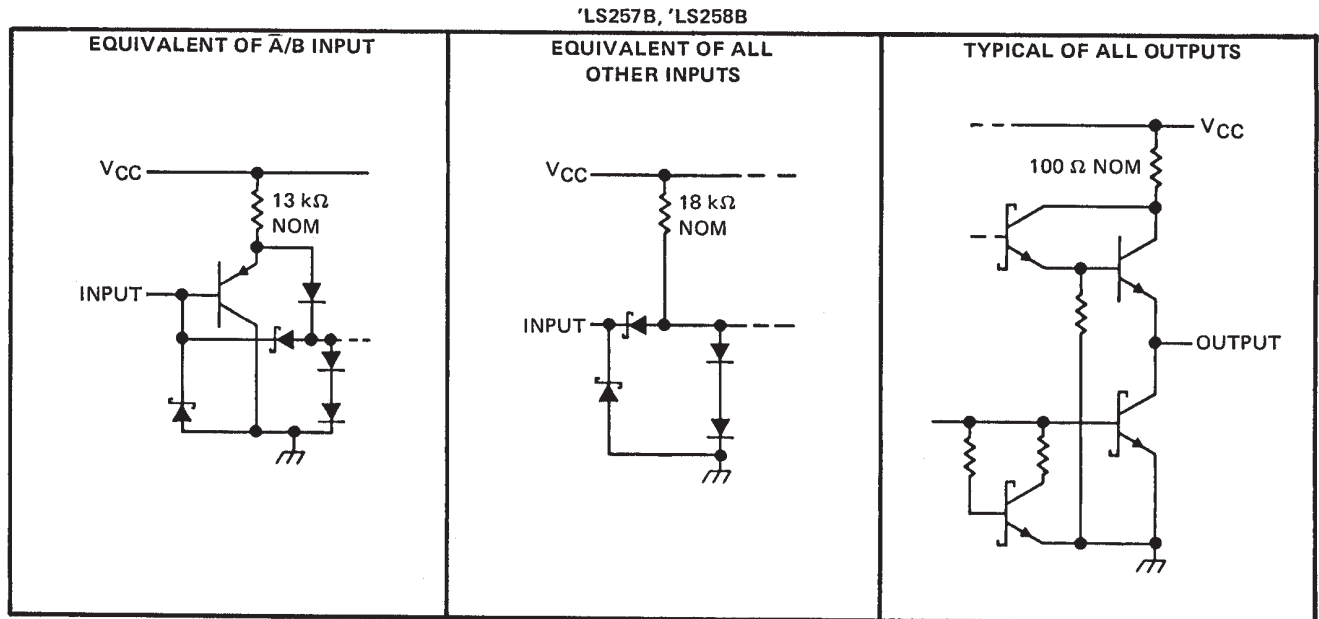


†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12. Pin numbers shown are for D, J, N, and W packages.

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

SDLS148 – OCTOBER 1976 – REVISED MARCH 1988

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 .....	$-55^{\circ}\text{C}$ to $125^{\circ}\text{C}$
SN74LS', SN74S' Circuits .....	$0^{\circ}\text{C}$ to $70^{\circ}\text{C}$
Storage temperature range .....	$-65^{\circ}\text{C}$ to $150^{\circ}\text{C}$

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

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

SDLS148 – OCTOBER 1976 – REVISED MARCH 1988

**recommended operating conditions**

	SN54LS'			SN74LS'			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub> Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub> High-level input voltage	2			2			V
V <sub>IL</sub> Low-level input voltage			0.7			0.8	V
I <sub>OH</sub> High-level output current			-1			-2.6	mA
I <sub>OL</sub> Low-level output current			12			24	mA
T <sub>A</sub> 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‡	MAX		
V <sub>IK</sub>	V <sub>CC</sub> = MIN, I <sub>I</sub> = -18 mA			-1.5			-1.5	V	
V <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX, I <sub>OH</sub> = MAX	2.4	3.4		2.4	3.1		V	
V <sub>OL</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX, I <sub>OL</sub> = 12 mA			0.25	0.4			V	
						0.35	0.5		
I <sub>OZH</sub>	V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V, V <sub>O</sub> = 2.7 V	20			20			μA	
I <sub>OZL</sub>	V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V, V <sub>O</sub> = 0.4 V	-20			-20			μA	
I <sub>I</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 7 V	0.1			0.1			mA	
I <sub>IH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7 V	20			20			μA	
I <sub>IL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V	-0.4			-0.4			mA	
I <sub>OS</sub> §	V <sub>CC</sub> = MAX,	-30		-130	-30		-130	mA	
I <sub>CC</sub>	All outputs high	V <sub>CC</sub> = MAX, See Note 2		'LS257B	8	12	8	12	mA
	All outputs low				12	18	12	18	
	All outputs off				13	19	13	19	
	All outputs high				6	9	6	9	
	All outputs low				10	15	10	15	
	All outputs off				11	16	11	16	

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

‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 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<sub>CC</sub> is measured with all outputs open and all possible inputs grounded while achieving the stated output conditions.

**switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C, R<sub>L</sub> = 667 Ω**

PARAMETER¶	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	'LS257B			'LS258B			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
t <sub>PLH</sub>	Data	Any	C <sub>L</sub> = 45 pF, See Note 3	8	13	7	12	ns		
t <sub>PHL</sub>				10	15	11	17			
t <sub>PLH</sub>	Select	Any		16	21	14	21			
t <sub>PHL</sub>				17	24	19	24			
t <sub>pZH</sub>	Output Control	Any		15	30	15	30		ns	
t <sub>pZL</sub>				19	30	20	30			
t <sub>PHZ</sub>	Output Control	Any	C <sub>L</sub> = 5 pF, See Note 3	18	30	18	30	ns		
t <sub>PLZ</sub>			16	25	16	25				

¶ t<sub>PLH</sub> = propagation delay time, low-to-high-level output

t<sub>PHL</sub> = propagation delay time, high-to-low-level output

t<sub>pZH</sub> = output enable time to high level

t<sub>pZL</sub> = output enable time to low level

t<sub>PHZ</sub> = output disable time from high level

t<sub>PLZ</sub> = output disable time from low level

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



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

SDLS148 – OCTOBER 1976 – REVISED MARCH 1988

## 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	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OH} = -1 \text{ mA}$	SN74S'			2.7			V
		$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OH} = \text{MAX}$	SN54S'			2.4 3.4			
			SN74S'			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 68			36 56			mA
		All outputs low	60 93			52 81			
		All outputs off	64 99			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	Any		13 19.5			13 19.5			ns
$t_{PZL}$	Control			14 21			14 21			
$t_{PHZ}$	Output	Any	5.5 8.5			5.5 8.5			ns	
$t_{PLZ}$	Control		9 14			9 14				

¶  $f_{\text{max}}$  = 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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