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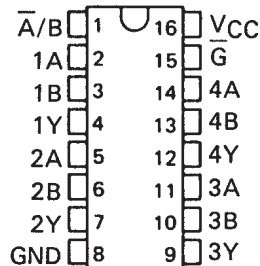# SN74LS257B, SN74LS258B, SN74S257, SN74S258
QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

- **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**

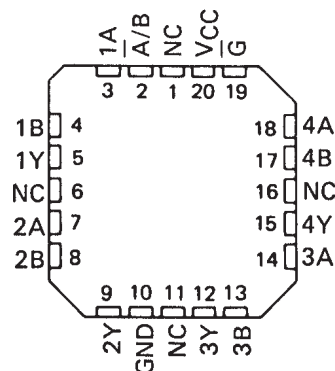|	AVERAGE PROPAGATION DELAY FROM DATA INPUT	TYPICAL POWER DISSIPATION[†]
'LS257B	9 ns	55 mW
'LS258B	9 ns	55 mW
'S257	4.8 ns	320 mW
'S258	4 ns	280 mW

[†]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 ($\overline{G}$) 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 . . . J OR W PACKAGE
SN74LS257B, SN74S257, SN74LS258B, SN74S258 . . . D OR N PACKAGE
(TOP VIEW)

```
        ____  ____
$\overline{A}$/B [ 1    16 ] V_CC
   1A [ 2    15 ] $\overline{G}$
   1B [ 3    14 ] 4A
   1Y [ 4    13 ] 4B
   2A [ 5    12 ] 4Y
   2B [ 6    11 ] 3A
   2Y [ 7    10 ] 3B
  GND [ 8     9 ] 3Y
```

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

```
           1A  A/B  NC  VCC  G
            3   2   1  20  19
      1B [ 4              18 ] 4A
      1Y [ 5              17 ] 4B
      NC [ 6              16 ] NC
      2A [ 7              15 ] 4Y
      2B [ 8              14 ] 3A
            9  10  11  12  13
           2Y  GND  NC  3Y  3B
```

NC–No internal connection.

FUNCTION TABLE

INPUTS				OUTPUT Y	
OUTPUT CONTROL	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)

TEXAS INSTRUMENTS

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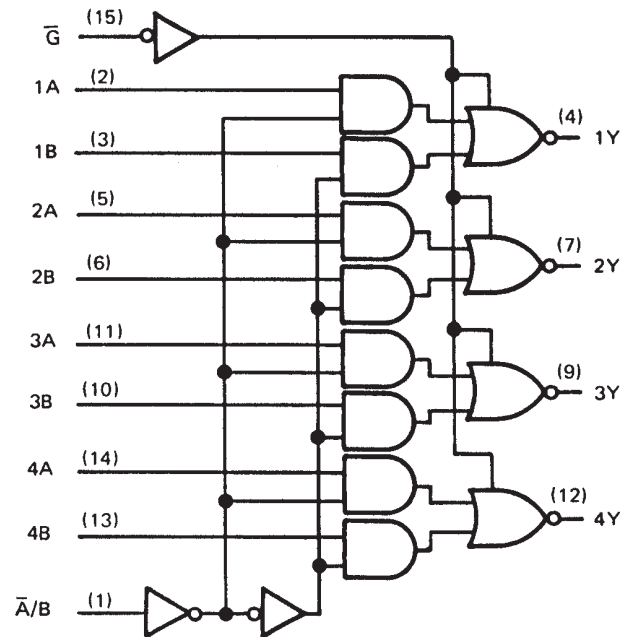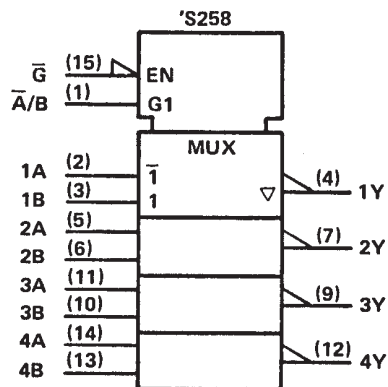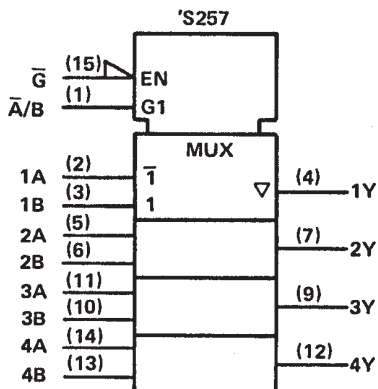## QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

logic diagrams (positive logic)
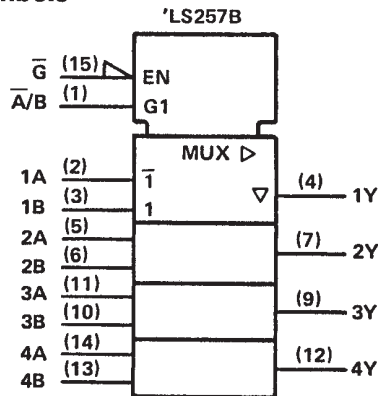
'LS257B, 'S257

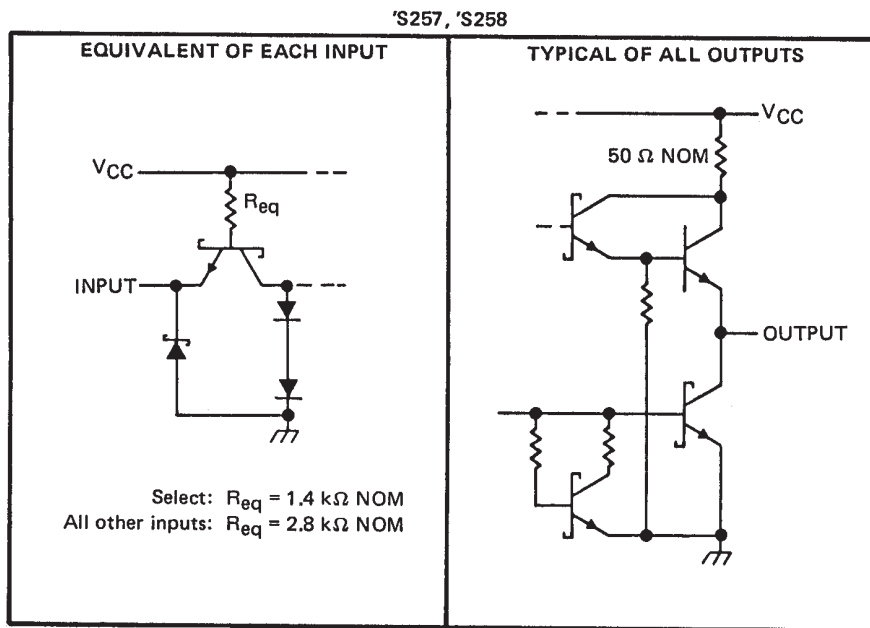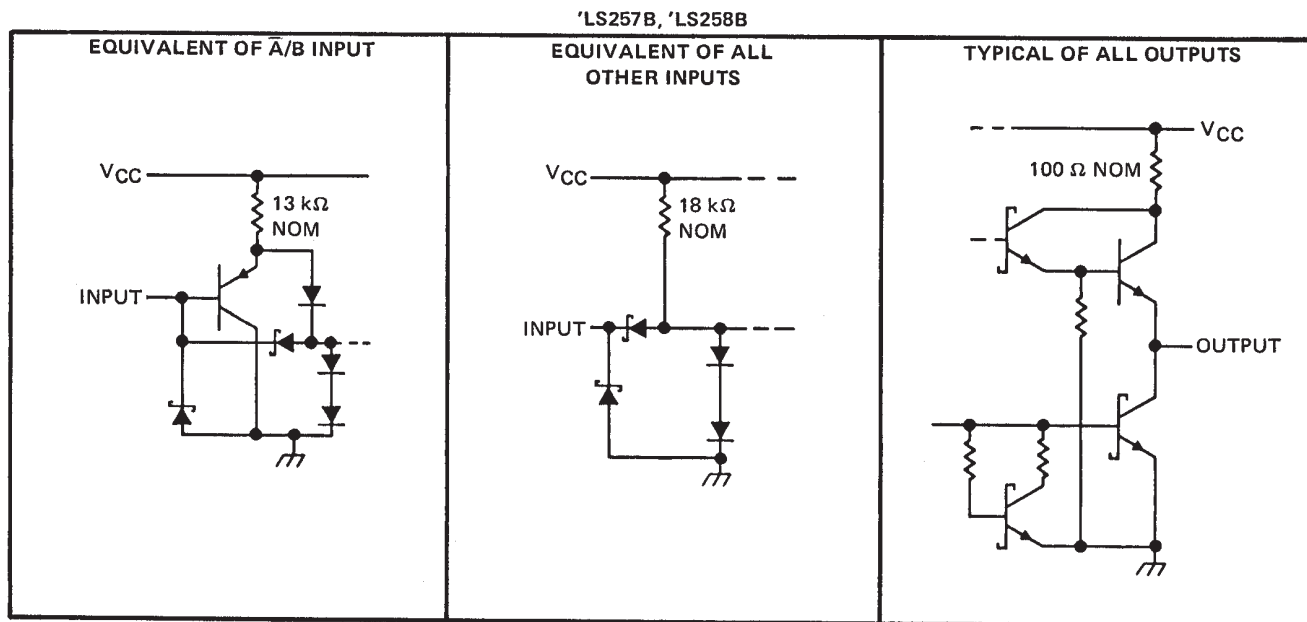'LS258B, 'S258

logic symbols†

'LS257B

'LS258B

'S257

'S258

†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.

schematics of inputs and outputs

'LS257B, 'LS258B

EQUIVALENT OF A̅/B INPUT	EQUIVALENT OF ALL OTHER INPUTS	TYPICAL OF ALL OUTPUTS

'S257, 'S258

EQUIVALENT OF EACH INPUT	TYPICAL OF ALL OUTPUTS

Select: R_{eq} = 1.4 kΩ NOM
All other inputs: R_{eq} = 2.8 kΩ NOM

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.

recommended operating conditions

		SN54LS' MIN	SN54LS' NOM	SN54LS' MAX	SN74LS' MIN	SN74LS' NOM	SN74LS' MAX	UNIT
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' MIN	SN54LS' TYP‡	SN54LS' MAX	SN74LS' MIN	SN74LS' TYP‡	SN74LS' MAX	UNIT
V_{IK}		V_{CC} = MIN,	I_I = − 18 mA				− 1.5			− 1.5	V
V_{OH}		V_{CC} = MIN, I_{OH} = MAX	V_{IH} = 2 V,	V_{IL} = MAX,	2.4	3.4		2.4	3.1		V
V_{OL}		V_{CC} = MIN, V_{IL} = MAX,	V_{IH} = 2 V,	I_{OL} = 12 mA		0.25	0.4		0.25	0.4	V
				I_{OL} = 24 mA					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	'LS257B			8	12		8	12	mA
	All outputs low					12	18		12	18	
	All outputs off					13	19		13	19	
	All outputs high		'LS258B			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_{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 MIN	'LS257B TYP	'LS257B MAX	'LS258B MIN	'LS258B TYP	'LS258B MAX	UNIT
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	C_L = 45 pF,	See Note 3		16	21		14	21	ns
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	C_L = 5 pF,	See Note 3		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
NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

t_{PZL} = output enable time to low level
t_{PHZ} = output disable time from high level
t_{PLZ} = output disable time from low level

TEXAS INSTRUMENTS

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} = MIN, I_I = −18 mA				−1.2			−1.2	V
V_{OH}	High-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = 0.8 V, I_{OH} = −1 mA	SN74S'	2.7			2.7			V
		V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = 0.8 V, I_{OH} = MAX	SN54S'	2.4	3.4		2.4	3.4		
			SN74S'	2.4	3.2		2.4	3.2		
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = 0.8 V, I_{OL} = 20 mA				0.5			0.5	V
I_{OZH}	Off-state output current, high-level voltage applied	V_{CC} = MAX, V_{IH} = 2 V, V_O = 2.4 V				50			50	μA
I_{OZL}	Off-state output current, low-level voltage applied	V_{CC} = MAX, V_{IH} = 2 V, V_O = 0.5 V				−50			−50	μA
I_I	Input current at maximum input voltage	V_{CC} = MAX, V_I = 5.5 V				1			1	mA
I_{IH}	High-level input current	S input	V_{CC} = MAX, V_I = 2.7 V			100			100	μA
		Any other				50			50	
I_{IL}	Low-level input current	S input	V_{CC} = MAX V_I = 0.5 V			−4			−4	mA
		Any other				−2			−2	
I_{OS}	Short-circuit output current§	V_{CC} = MAX		−40		−100	−40		−100	mA
I_{CC}	Supply current	All outputs high	V_{CC} = MAX, See Note 2		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 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 = 280 Ω

PARAMETER¶	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	'S257			'S258			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
t_{PLH}	Data	Any	C_L = 15 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 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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