QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

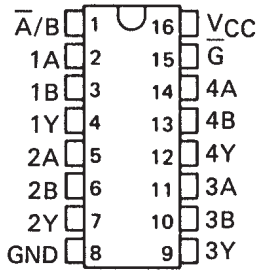
SDLS148 – OCTOBER 1976 – REVISED MARCH 1988

- **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**

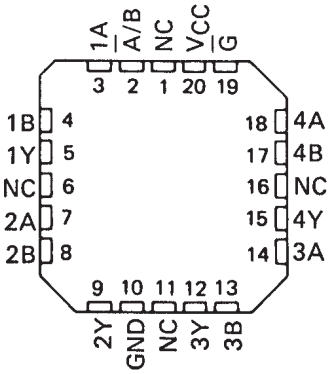
	AVERAGE PROPAGATION DELAY FROM DATA INPUT	TYPICAL POWER DISSIPATION†
'LS257B	9 ns	55 mW
'LS258B	9 ns	55 mW
'S257	4.8 ns	320 mW
'S258	4 ns	280 mW

†Off state (worst case)

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



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



NC–No internal connection.

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.

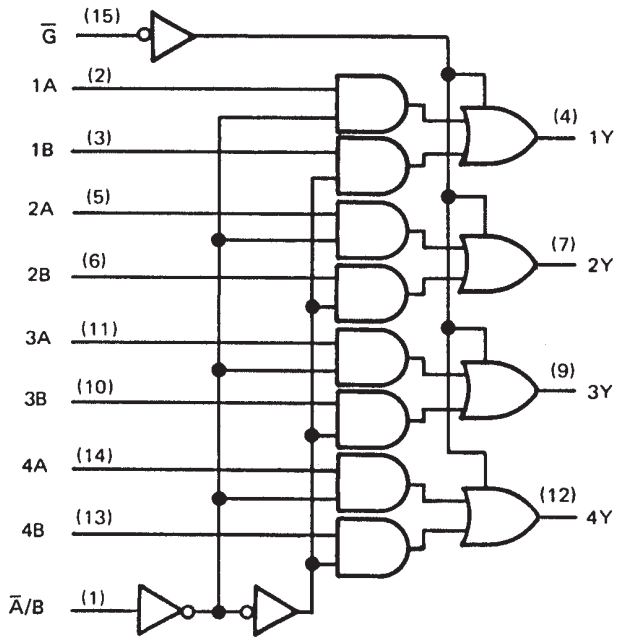
FUNCTION TABLE

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

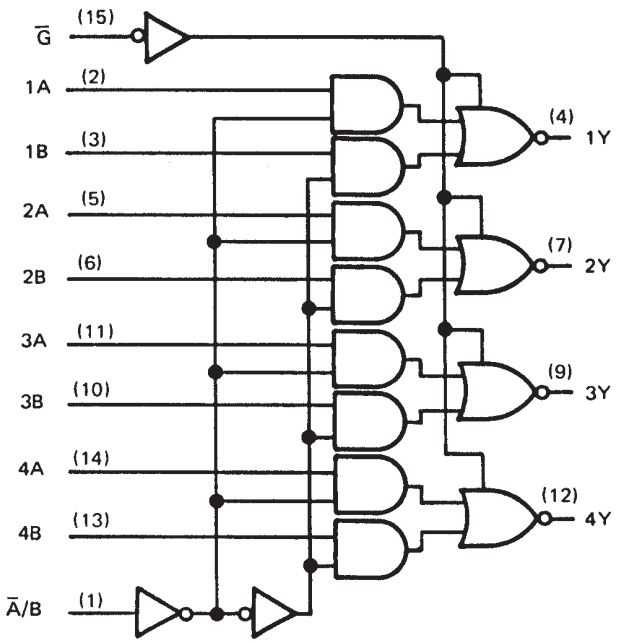
H = high level, L = low level, X = irrelevant,
Z = high impedance (off)

logic diagrams (positive logic)

'LS257B, 'S257

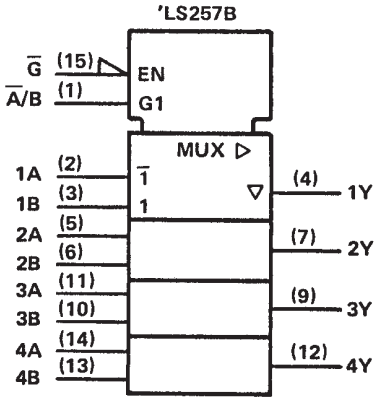


'LS258B, 'S258

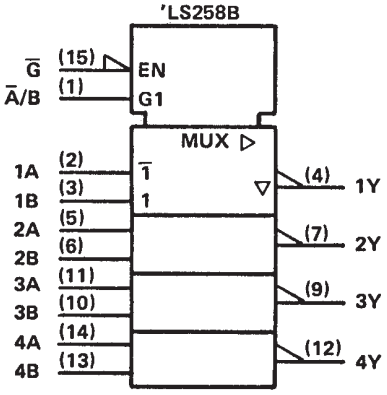


logic symbols†

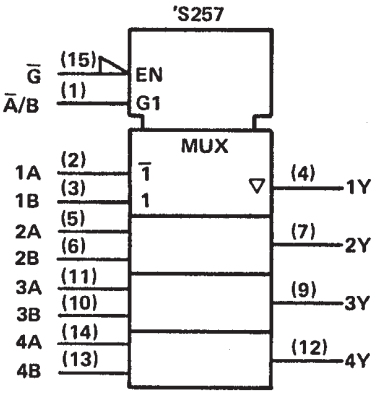
'LS257B



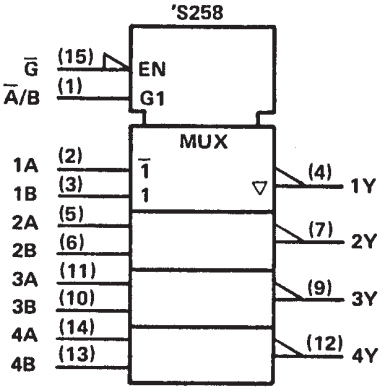
'LS258B



'S257



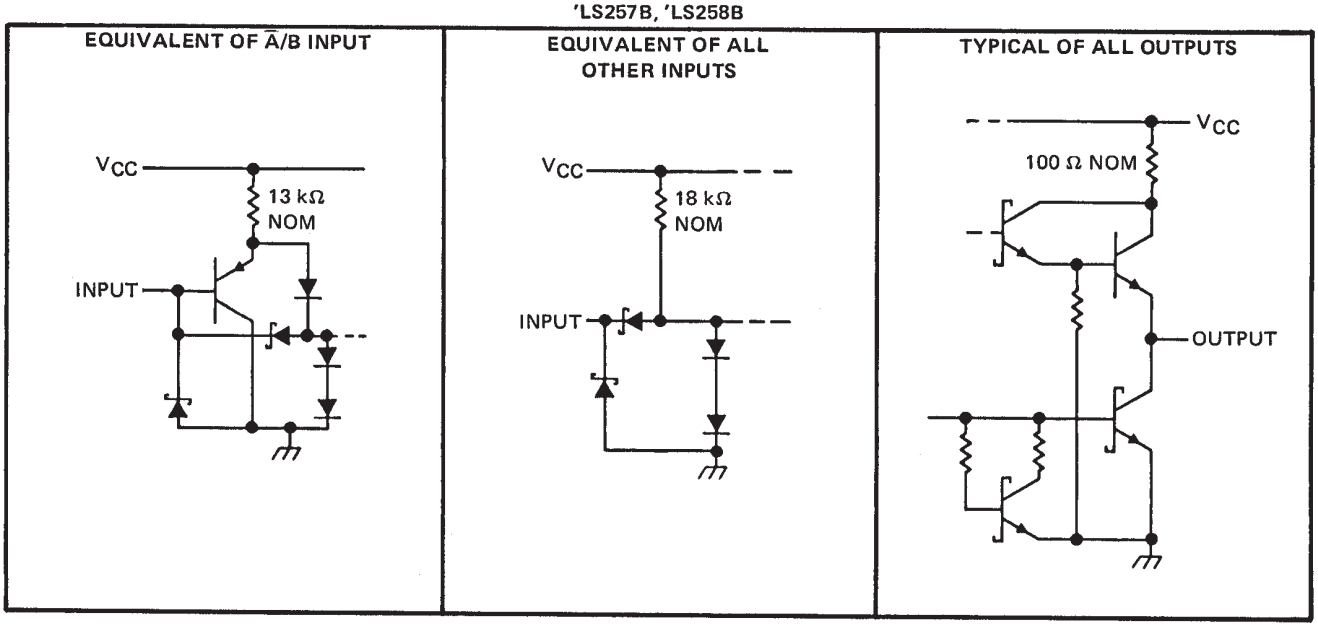
'S258



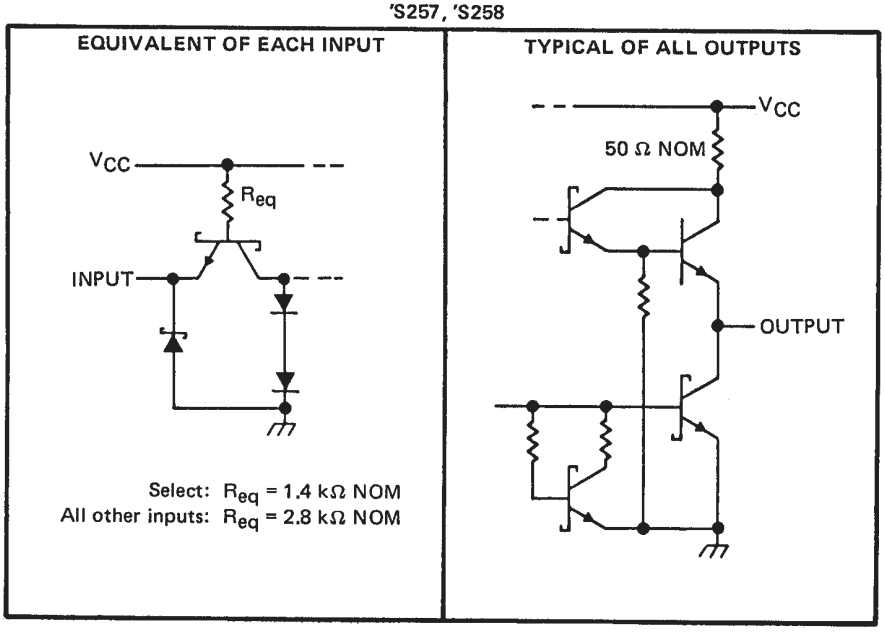
†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for D, J, N, and W packages.

schematics of inputs and outputs

'LS257B, 'LS258B



'S257, 'S258



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'			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‡	MAX	
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
			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			'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	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
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.

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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SN54S258, Quadruple 2-Line To 1-Line Data Selectors/Multiplexers

DEVICE STATUS: **ACTIVE**

PARAMETER NAME	SN54S258
Voltage Nodes (V)	5
Vcc range (V)	4.5 to 5.5
Input Level	TTL
Output Level	TTL
Output	3S
From	2
To	1

FEATURES

Back to Top

- 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

† Off state (worst case)

DESCRIPTION

Back to Top

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.

TECHNICAL DOCUMENTS

Back to Top

To view the following documents, Acrobat Reader 4.0 is required.

To download a document to your hard drive, right-click on the link and choose 'Save'.

DATASHEET

Back to Top

Full datasheet in Acrobat PDF: sn54s258.pdf (248 KB) (Updated: 03/01/1988)

APPLICATION NOTES

Back to Top

View Application Notes for Digital Logic

- Designing With Logic (Rev. C) (SDYA009C - Updated: 06/01/1997)
- Evaluation of Nickel/Palladium/Gold-Finished Surface-Mount Integrated Circuits (SZZA026 - Updated: 06/20/2001)

Product Folder: SN54S258, Quadruple 2-Line To 1-Line Data Selectors/Multiplexers

- Input and Output Characteristics of Digital Integrated Circuits (SDYA010 - Updated: 10/01/1996)
- Live Insertion (SDYA012 - Updated: 10/01/1996)
- Understanding and Interpreting Texas Instruments Standard-Logic Products Data Sh (Rev. A) (SZZA036A - Updated: 02/27/2003)

MORE LITERATURE

Back to Top

- Enhanced Plastic Portfolio Brochure (SGZB004, 387 KB - Updated: 08/19/2002)
- Logic Reference Guide (SCYB004, 1032 KB - Updated: 10/23/2001)
- MicroStar Junior BGA Design Summary (SCET004, 167 KB - Updated: 07/28/2000)
- Military Brief (SGYN138, 803 KB - Updated: 10/10/2000)
- Overview of IEEE Std 91-1984, Explanation of Logic Symbols Training Booklet (Rev. A) (SDYZ001A, 138 KB - Updated: 07/01/1996)
- Palladium Lead Finish User's Manual (SDYV001, 2041 KB - Updated: 11/01/1996)
- QML Class V Space Products Military Brief (Rev. A) (SGZN001A, 257 KB - Updated: 10/07/2002)

USER GUIDES

Back to Top

- LOGIC Pocket Data Book (SCYD013, 4837 KB - Updated: 12/05/2002)

PRICING/AVAILABILITY/PKG

Back to Top

DEVICE INFORMATION Updated Daily | **TI INVENTORY STATUS** As Of 09:00 AM GMT, 17 Apr 2003 | **REPORTED DISTRIBUTOR INVENTORY** As Of 09:00 AM GMT, 17 Apr 2003

ORDERABLE DEVICE	STATUS	PACKAGE TYPE | PINS	TEMP (°C)	DSCC NUMBER	PRODUCT CONTENT	BUDGETARY PRICING QTY | $US	STD PACK QTY	IN STOCK	IN PROGRESS QTY | DATE	LEAD TIME	DISTRIBUTOR COMPANY | REGION	IN STOCK	PURCHASE
8002301EA	ACTIVE	CDIP (J) | 16	-55 TO 125		View Contents	1KU | 4.42	1	379*	>10k | 20 May	8 WKS	None Reported View Distributors		
8002301FA	ACTIVE	CFP (W) | 16	-55 TO 125		View Contents	1KU | 8.11	1	65*	>10k | 20 May	8 WKS	None Reported View Distributors		
SN54S258J	ACTIVE	CDIP (J) | 16	-55 TO 125		View Contents	1KU | 3.79	1	536*	>10k | 20 May	8 WKS	None Reported View Distributors		
SNJ54S258FK	ACTIVE	LCCC (FK) | 20	-55 TO 125		View Contents	1KU | 11.20	1	0*	3536 | 20 May	8 WKS	None Reported View Distributors		
									>10k | 27 May				
SNJ54S258J	ACTIVE	CDIP (J) | 16	-55 TO 125	8002301EA	View Contents	1KU | 4.42	1	97*	>10k | 20 May	8 WKS	Rochester Electronics | Americas	17	BUY NOW
SNJ54S258W	ACTIVE	CFP (W) | 16	-55 TO 125	8002301FA	View Contents	1KU | 8.11	1	48*	>10k | 20 May	8 WKS	None Reported View Distributors		

Table Data Updated on: 4/17/2003

SN54LS258B, Quadruple 2-Line To 1-Line Data Selectors/Multiplexers
DEVICE STATUS: **ACTIVE**

PARAMETER NAME	SN54LS258B	SN74LS258B
Voltage Nodes (V)	5	5
Vcc range (V)	4.5 to 5.5	4.75 to 5.25
Input Level	TTL	TTL
Output Level	TTL	TTL
Output Drive (mA)		-2.6/24
Output	3S	3S
From	2	2
To	1	1

FEATURES

Back to Top

- 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
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† Off state (worst case)

DESCRIPTION

Back to Top

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TECHNICAL DOCUMENTS

Back to Top

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DATASHEET

Back to Top

Full datasheet in Acrobat PDF: sn54ls258b.pdf (248 KB) (Updated: 03/01/1988)

APPLICATION NOTES

Back to Top

View Application Notes for Digital Logic

- Designing With Logic (Rev. C) (SDYA009C - Updated: 06/01/1997)

Product Folder: SN54LS258B, Quadruple 2-Line To 1-Line Data Selectors/Multiplexers

- Designing with the SN54/74LS123 (Rev. A) (SDLA006A - Updated: 03/01/1997)
- Evaluation of Nickel/Palladium/Gold-Finished Surface-Mount Integrated Circuits (SZZA026 - Updated: 06/20/2001)
- Input and Output Characteristics of Digital Integrated Circuits (SDYA010 - Updated: 10/01/1996)
- Live Insertion (SDYA012 - Updated: 10/01/1996)
- TI IBIS File Creation, Validation, and Distribution Processes (SZZA034 - Updated: 08/29/2002)
- Understanding and Interpreting Texas Instruments Standard-Logic Products Data Sh (Rev. A) (SZZA036A - Updated: 02/27/2003)

MORE LITERATURE

Back to Top

- Enhanced Plastic Portfolio Brochure (SGZB004, 387 KB - Updated: 08/19/2002)
- Logic Reference Guide (SCYB004, 1032 KB - Updated: 10/23/2001)
- MicroStar Junior BGA Design Summary (SCET004, 167 KB - Updated: 07/28/2000)
- Military Brief (SGYN138, 803 KB - Updated: 10/10/2000)
- Overview of IEEE Std 91-1984, Explanation of Logic Symbols Training Booklet (Rev. A) (SDYZ001A, 138 KB - Updated: 07/01/1996)
- Palladium Lead Finish User's Manual (SDYV001, 2041 KB - Updated: 11/01/1996)
- QML Class V Space Products Military Brief (Rev. A) (SGZN001A, 257 KB - Updated: 10/07/2002)

USER GUIDES

Back to Top

- LOGIC Pocket Data Book (SCYD013, 4837 KB - Updated: 12/05/2002)

PRICING/AVAILABILITY/PKG

Back to Top

DEVICE INFORMATION
Updated Daily

ORDERABLE DEVICE	STATUS	PACKAGE TYPE | PINS	TEMP (°C)	DSCC NUMBER	PRODUCT CONTENT	BUDGETARY PRICING QTY | $US	STD PACK QTY
76038012A	ACTIVE	LCCC (FK) | 20	-55 TO 125		View Contents	1KU | 6.94	1
SN54LS258BJ	ACTIVE	CDIP (J) | 16	-55 TO 125		View Contents	1KU | 1.80	1
SNJ54LS258BFK	ACTIVE	LCCC (FK) | 20	-55 TO 125	76038012A	View Contents	1KU | 6.94	1
SNJ54LS258BJ	ACTIVE	CDIP (J) | 16	-55 TO 125	7603801EA	View Contents	1KU | 2.12	1
SNJ54LS258BW	ACTIVE	CFP (W) | 16	-55 TO 125	7603801FA	View Contents	1KU | 6.86	1
7603801EA	ACTIVE	CDIP (J) | 16	-55 TO 125		View Contents	1KU | 2.12	1
7603801FA	ACTIVE	CFP (W) | 16	-55 TO 125		View Contents	1KU | 6.86	1

TI INVENTORY STATUS
As Of 09:00 AM GMT, 17 Apr 2003

IN STOCK	IN PROGRESS QTY | DATE	LEAD TIME
67*	3757 | 20 May	6 WKS
	>10k | 27 May	
239*	>10k | 20 May	6 WKS
0*	3580 | 20 May	6 WKS
	>10k | 27 May	
47*	>10k | 20 May	6 WKS
48*	>10k | 20 May	6 WKS
0*	>10k | 20 May	6 WKS
0*	>10k | 20 May	6 WKS

REPORTED DISTRIBUTOR INVENTORY
As Of 09:00 AM GMT, 17 Apr 2003

DISTRIBUTOR COMPANY | REGION	IN STOCK	PURCHASE
None Reported View Distributors		
Avnet | Americas	9	BUY NOW
None Reported View Distributors		
EBV Electronik | Europe	100	BUY NOW
None Reported View Distributors		
Avnet-SILICA | Europe	117	BUY NOW
None Reported View Distributors		

Table Data Updated on: 4/17/2003

Product Folder: SN54LS258B, Quadruple 2-Line To 1-Line Data Selectors/Multiplexers