

SN54157, SN54LS157, SN54LS158, SN54S157, SN54S158, SN74157, SN74LS157, SN74LS158, SN74S157, SN74S158 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

MARCH 1974 — REVISED MARCH 1988

- Buffered Inputs and Outputs
- Three Speed/Power Ranges Available

TYPES	TYPICAL AVERAGE PROPAGATION TIME	TYPICAL POWER DISSIPATION
'157	9 ns	150 mW
'LS157	9 ns	49 mW
'S157	5 ns	250 mW
'LS158	7 ns	24 mW
'S158	4 ns	195 mW

applications

- Expand Any Data Input Point
- Multiplex Dual Data Buses
- Generate Four Functions of Two Variables (One Variable Is Common)
- Source Programmable Counters

description

These monolithic data selectors/multiplexers contain inverters and drivers to supply full on-chip data selection to the four output gates. A separate strobe input is provided. A 4-bit word is selected from one of two sources and is routed to the four outputs. The '157, 'LS157, and 'S157 present true data whereas the 'LS158 and 'S158 present inverted data to minimize propagation delay time.

FUNCTION TABLE

STROBE \bar{G}	INPUTS		OUTPUT Y		
	SELECT \bar{A}/\bar{B}	A	B	'157, 'LS157, 'S157	'LS158 'S158
H	X	X	X	L	H
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

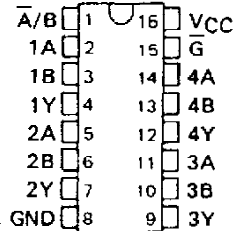
absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V_{CC} (See Note 1)	7 V
Input voltage: '157, 'S158	5.5 V
'LS157, 'LS158	7 V
Operating free-air temperature range: SN54'	-55°C to 125°C
SN74'	0°C to 70°C
Storage temperature range	-65°C to 150°C

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

SN54157, SN54LS157, SN54S157,
SN54LS158, SN54S158 . . . J OR W PACKAGE
SN74157 . . . N PACKAGE
SN74LS157, SN74S157,
SN74LS158, SN74S158 . . . D OR N PACKAGE

(TOP VIEW)



SN54LS157, SN54S157, SN54LS158,
SN54S158 . . . FK PACKAGE

(TOP VIEW)



NC - No internal connection

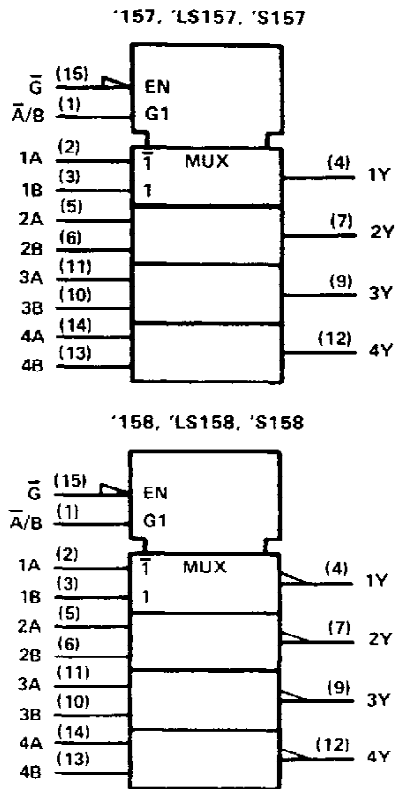
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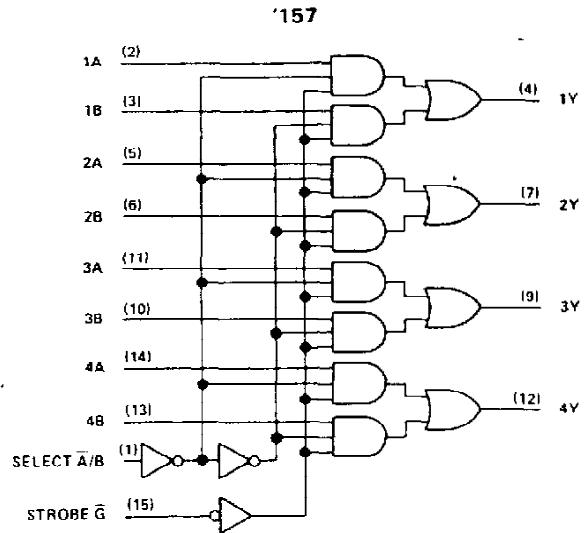
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**SN54157, SN54LS157, SN54LS158, SN54S157, SN54S158,
SN74157, SN74LS157, SN74LS158, SN74S157, SN74S158
QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS**

logic symbols†



logic diagram (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, N, and W packages.

schematics of inputs and outputs



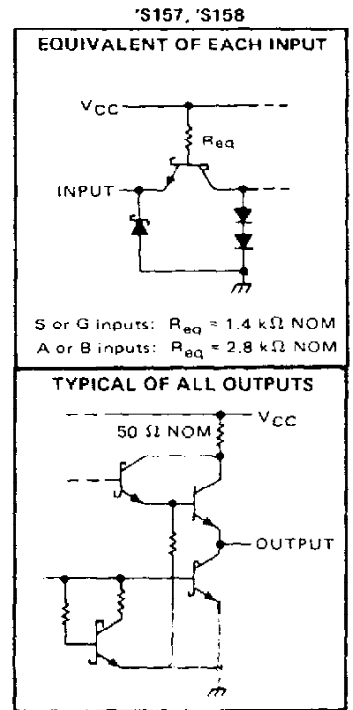
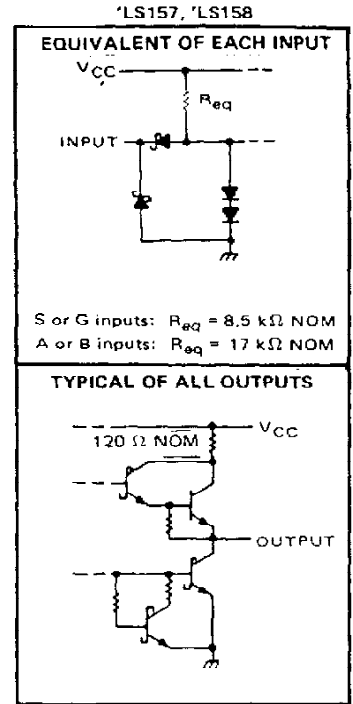
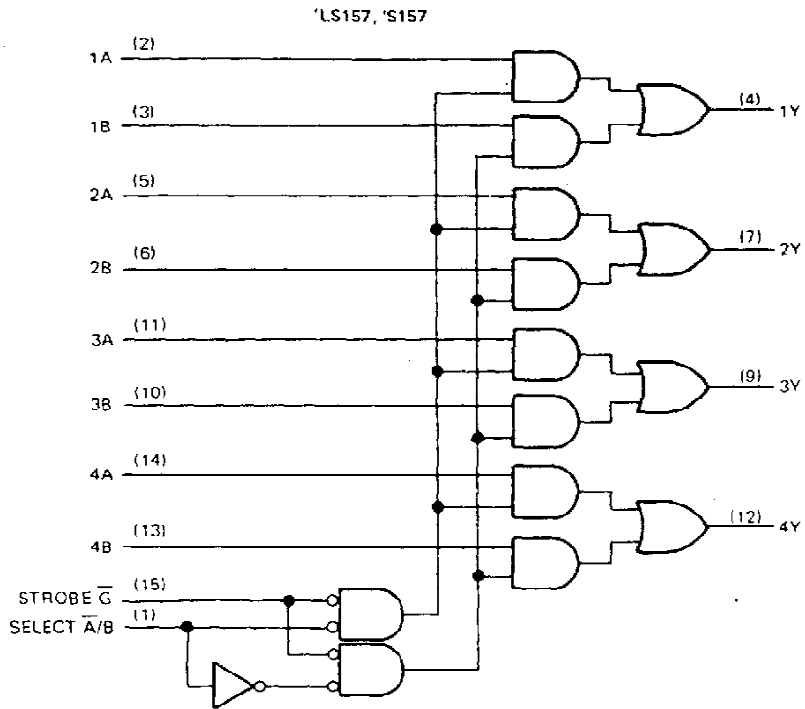
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SN54LS157, SN54LS158, SN54S157, SN54S158, SN74LS157, SN74LS158, SN74S157, SN74S158 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

logic diagrams (positive logic)

schematics of inputs and outputs



Pin numbers shown are for D, J, N, and W packages.

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SN54157, SN74157 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

recommended operating conditions

	SN54157			SN74157			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}			-800			-800	μ A
Low-level output current, I_{OL}			16			16	mA
Operating free-air temperature, T_A	-55		125	0		70	$^{\circ}$ C

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

PARAMETER	TEST CONDITIONS†	SN54157			SN74157			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	$V_{CC} = \text{MIN}$, $I_I = -12 \text{ mA}$			-1.5			-1.5	V
V_{OH} High-level output voltage	$V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $V_{IL} = 0.8 \text{ V}$, $I_{OH} = -800 \mu\text{A}$	2.4	3.4		2.4	3.4		V
V_{OL} Low-level output voltage	$V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $V_{IL} = 0.8 \text{ V}$, $I_{OL} = 16 \text{ mA}$		0.2	0.4		0.2	0.4	V
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	$V_{CC} = \text{MAX}$, $V_I = 2.4 \text{ V}$			40			40	μ A
I_{IL} Low level input current	$V_{CC} = \text{MAX}$, $V_I = 0.4 \text{ V}$			-1.6			-1.6	mA
I_{OS} Short-circuit output current‡	$V_{CC} = \text{MAX}$	-20		-55	-18		-55	mA
I_{CC} Supply current	$V_{CC} = \text{MAX}$. See Note 2		30	48		30	48	mA

†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 short-circuit should not exceed one second.

NOTE 2: I_{CC} is measured with 4.5 V applied to all inputs and all outputs open.

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

PARAMETER¶	FROM (INPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	Data	$C_L = 15 \mu\text{F}$, $R_L = 400 \Omega$, See Note 3		9	14	ns
t_{PHL}				9	14	
t_{PLH}	Strobe \bar{G}			13	20	ns
t_{PHL}				14	21	
t_{PLH}	Select \bar{A}/\bar{B}			15	23	ns
t_{PHL}				18	27	

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

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

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

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SN54LS157, SN54LS158, SN74LS157, SN74LS158 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

recommended operating conditions

	SN54LS ¹			SN74LS ¹			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V _{CC} Supply voltage	4.5	5	5.5	4.75	5	5.25	V
I _{OH} High-level output current			-400			-400	μA
I _{OL} Low-level output current			4			8	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 ¹			SN74LS ¹			UNIT
		MIN	TYP [‡]	MAX	MIN	TYP [‡]	MAX	
V _{IH} High-level input voltage		2			2			V
V _{IL} Low-level input voltage				0.7			0.8	V
V _{IK} Input clamp voltage	V _{CC} = MIN, I _I = -18 mA			-1.5			-1.5	V
V _{OH} High-level output voltage	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = MAX, I _{OH} = -400 μA	2.5	3.4		2.7	3.4		V
V _{OL} Low-level output voltage	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = MAX	I _{OL} = 4 mA		0.25	0.4	0.25	0.4	V
		I _{OL} = 8 mA				0.35	0.5	
I _I Input current at maximum input voltage	\bar{A}/B or \bar{G}	V _{CC} = MAX, V _I = 7 V		0.2		0.2		mA
	A or B							
I _{IH} High-level input current	\bar{A}/B or \bar{G}	V _{CC} = MAX, V _I = 2.7 V		40		40		μA
	A or B							
I _{IL} Low-level input current	\bar{A}/B or \bar{G}	V _{CC} = MAX, V _I = 0.4 V		-0.8		-0.8		mA
	A or B							
I _{OS} Short-circuit output current [§]	V _{CC} = MAX	-20	-100	-20	-100			mA
I _{CC} Supply current	V _{CC} = MAX, See Note 2	'LS157		9.7	16	9.7	16	mA
		'LS158		4.8	8	4.8	8	
		All A inputs at 4.5 V, All other inputs at 0 V		'LS158	6.5	11	6.5	

[†] 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 short circuit should not exceed one second.

NOTE 2: I_{CC} is measured with 4.5 V applied to all inputs and all outputs open.

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

PARAMETER [†]	FROM (INPUT)	TEST CONDITIONS	'LS157			'LS158			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
t _{PLH}	Data	C _L = 15 pF, R _L = 2 kΩ, See Note 3	9	14		7	12	ns	
t _{PHL}			9	14		10	15		
t _{PLH}	Strobe \bar{G}		13	20		11	17	ns	
t _{PHL}			14	21		18	24		
t _{PLH}	Select \bar{A}/B		15	23		13	20	ns	
t _{PHL}			18	27		16	24		

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

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

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


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SN54S157, SN54S158, SN74S157, SN74S158 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

recommended operating conditions

	SN54S157 SN54S158			SN74S157 SN74S158			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}			-1			-1	mA
Low-level output current, I_{OL}			20			20	mA
Operating free-air temperature, T_A	-55		125	0		70	$^{\circ}$ C

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

PARAMETER	TEST CONDITIONS†	SN54S157 SN74S157			SN54S158 SN74S158			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	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V},$ $V_{IL} = 0.8 \text{ V}, I_{OH} = -1 \text{ mA}$	Series 54S	2.5	3.4	Series 74S	2.5	3.4	V
		Series 74S	2.7	3.4	Series 74S	2.7	3.4	
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_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	$\overline{A/B}$ or \overline{G}			100			100	μ A
	A or B			50			50	
I_{IL} Low-level input current	$\overline{A/B}$ or \overline{G}			-4			-4	mA
	A or B			-2			-2	
I_{OS} Short-circuit output current §	$V_{CC} = \text{MAX}$			-40			-100	mA
I_{CC} Supply current	$V_{CC} = \text{MAX},$ All inputs at 4.5 V, See Note 2			50			39	mA
	$V_{CC} = \text{MAX},$ A inputs at 4.5 V, B,G,S, inputs at 0 V, See Note 2						81	

† 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.

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

PARAMETER ¶	FROM (INPUT)	TEST CONDITIONS	SN54S157 SN74S157			SN54S158 SN74S158			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
t_{PLH}	Data	$C_L = 15 \text{ pF},$ $R_L = 280 \Omega,$ See Note 3	5	7.5		4	6	ns	
t_{PHL}			4.5	6.5		4	6		
t_{PLH}	Strobe \overline{G}		8.5	12.5		6.5	11.5	ns	
t_{PHL}			7.5	12		7	12		
t_{PLH}	Select $\overline{A/B}$		9.5	15		8	12	ns	
t_{PHL}			9.5	15		8	12		

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

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

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

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PRODUCT SUPPORT: [TRAINING](#)

SN54LS158, Quadruple 2-Line To 1-Line Data Selectors/Multiplexers

DEVICE STATUS: **ACTIVE**

PARAMETER NAME	SN54LS158	SN74LS158
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)		-0.4/8
Output	2S	2S
From	2	2
To	1	1

FEATURES

[▲Back to Top](#)

- Buffered Inputs and Outputs
- Three Speed/Power Ranges Available

DESCRIPTION

[▲Back to Top](#)

These monolithic data selectors/multiplexers contain inverters and drivers to supply full on-chip data selection to the four output gates. A separate strobe input is provided. A 4-bit word is selected from one of two sources and is routed to the four outputs. The '157, 'LS157, and 'S157 present true data whereas the 'LS158 and 'S158 present inverted data to minimize propagation delay time.

DEVICE USES

[▲Back to Top](#)

- Expand Any Data Input Point
- Multiplex Dual Data Buses
- Generate Four Functions of Two Variables (One Variable Is Common)
- Source Programmable Counters

TECHNICAL DOCUMENTS

[▲Back to Top](#)

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DATASHEET

[▲Back to Top](#)

Full datasheet in Acrobat PDF: [sn54ls158.pdf](#) (332 KB) (Updated: 03/01/1988)

APPLICATION NOTES

[▲Back to Top](#)

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

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- [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)

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- [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 SUS	STD PACK QTY	IN STOCK	IN PROGRESS QTY DATE	LEAD TIME	DISTRIBUTOR COMPANY REGION	IN STOCK	PURCHASE
76033012A	ACTIVE	LCCC (FK) 20	-55 TO 125		View Contents	1KU 6.41	1	248*	3757 20 May	6 WKS	None Reported View Distributors		
									> 10k 27 May				
7603301EA	ACTIVE	CDIP (J) 16	-55 TO 125		View Contents	1KU 1.85	1	470*	> 10k 20 May	6 WKS	Avnet Americas	14	BUY NOW
											Rochester Electronics Americas	12	BUY NOW
7603301FA	ACTIVE	CFP (W) 16	-55 TO 125		View Contents	1KU 5.72	1	0*	> 10k 20 May	6 WKS	Avnet Americas	5	BUY NOW
SN54LS158J	ACTIVE	CDIP (J) 16	-55 TO 125		View Contents	1KU 1.56	1	189*	279 05 May	6 WKS	EBV Electronik Europe	175	BUY NOW
									> 10k 20 May		Rochester Electronics Americas	81	BUY NOW
											Avnet Americas	8	BUY NOW
SNJ54LS158FK	ACTIVE	LCCC (FK) 20	-55 TO 125	76033012A	View Contents	1KU 6.41	1	131*	3580 20 May	6 WKS	None Reported View Distributors		
									> 10k 27 May				
SNJ54LS158J	ACTIVE	CDIP (J) 16	-55 TO 125	7603301EA	View Contents	1KU 1.85	1	9*	> 10k 20 May	6 WKS	None Reported View Distributors		

Product Folder: SN54LS158, Quadruple 2-Line To 1-Line Data Selectors/Multiplexers

SNJ54LS158W	ACTIVE	CFP (W) 16	-55 TO 125	7603301FA	View Contents	1KU 5.72	1	43*	> 10k 20 May	6 WKS	None Reported View Distributors		
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