

# SN54HC158, SN74HC158 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

SCLS296B – JANUARY 1996 – REVISED JUNE 2000

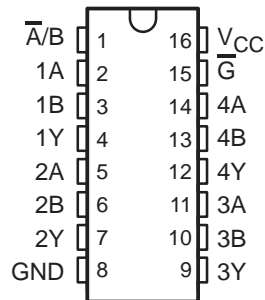
- Package Options Include Plastic Small-Outline (D), Thin Shrink Small-Outline (PW), and Ceramic Flat (W) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) DIPs

## description

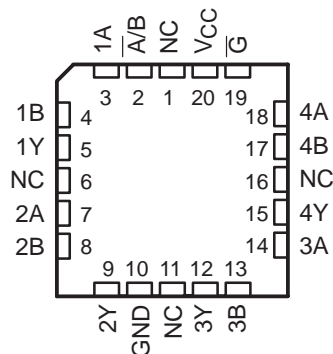
These monolithic data selectors/multiplexers contain inverters and drivers that supply full data selection to the four output gates. A separate strobe ( $\bar{G}$ ) input is provided. A 4-bit word is selected from one of two sources and is routed to the four outputs. The 'HC158 outputs provide inverted data.

The SN54HC158 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74HC158 is characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

SN54HC158 . . . J OR W PACKAGE  
SN74HC158 . . . D, N, OR PW PACKAGE  
(TOP VIEW)



SN54HC158 . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection

FUNCTION TABLE

INPUTS					OUTPUT Y
$\bar{G}$	SELECT $\bar{A}/\bar{B}$	DATA			
		A	B		
H	X	X	X	H	
L	L	L	X	H	
L	L	H	X	L	
L	H	X	L	H	
L	H	X	H	L	



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**TEXAS  
INSTRUMENTS**

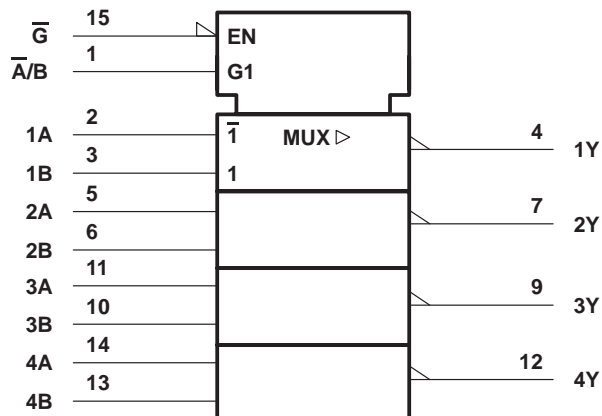
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# SN54HC158, SN74HC158 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

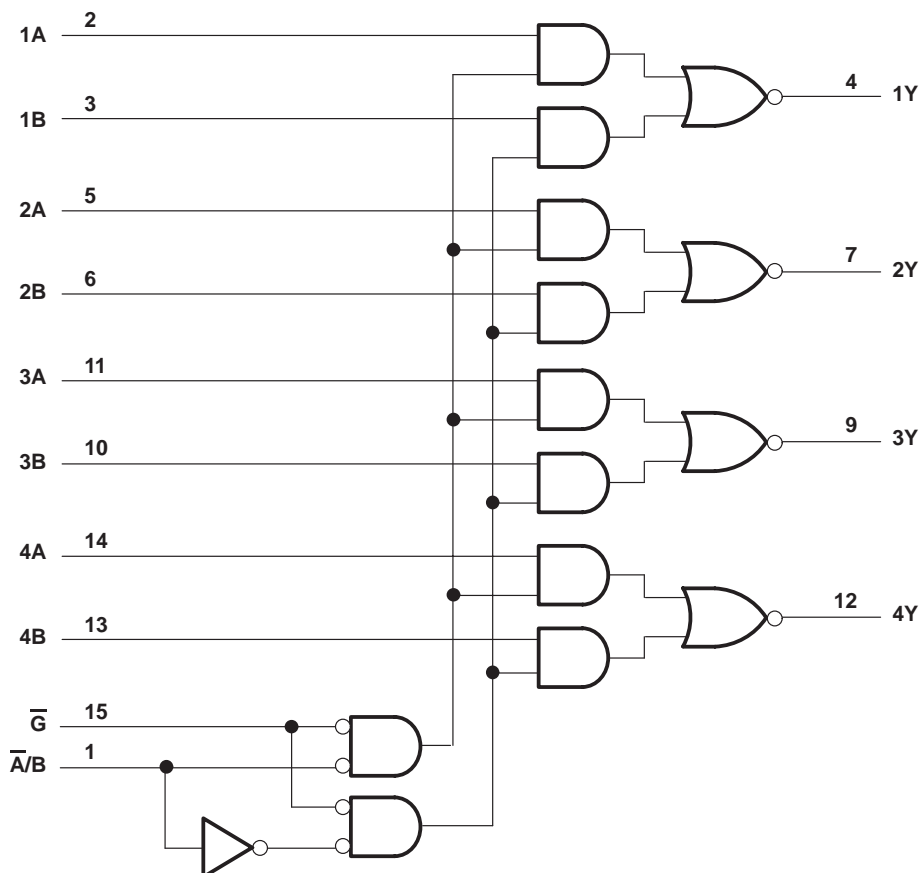
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## logic symbol†



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

## logic diagram (positive logic)



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



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# SN54HC158, SN74HC158

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

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### absolute maximum ratings over operating free-air temperature range†

Supply voltage range, $V_{CC}$ .....	–0.5 V to 7 V	
Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ ) (see Note 1) .....	±20 mA	
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) (see Note 1) .....	±20 mA	
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ ) .....	±35 mA	
Continuous current through $V_{CC}$ or GND .....	±70 mA	
Package thermal impedance, $\theta_{JA}$ (see Note 2):	D package .....	73°C/W
	N package .....	67°C/W
	PW package .....	108°C/W
Storage temperature range, $T_{stg}$ .....	–65°C to 150°C	

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.  
 2. The package thermal impedance is calculated in accordance with JESD 51.

### recommended operating conditions (see Note 3)

		SN54HC158			SN74HC158			UNIT	
		MIN	NOM	MAX	MIN	NOM	MAX		
$V_{CC}$	Supply voltage	2	5	6	2	5	6	V	
$V_{IH}$	High-level input voltage	$V_{CC} = 2$ V		1.5	$V_{CC} = 2$ V		1.5	V	
		$V_{CC} = 4.5$ V		3.15	$V_{CC} = 4.5$ V		3.15		
		$V_{CC} = 6$ V		4.2	$V_{CC} = 6$ V		4.2		
$V_{IL}$	Low-level input voltage	$V_{CC} = 2$ V		0	0.5	$V_{CC} = 2$ V		V	
		$V_{CC} = 4.5$ V		0	1.35	$V_{CC} = 4.5$ V			1.35
		$V_{CC} = 6$ V		0	1.8	$V_{CC} = 6$ V			1.8
$V_I$	Input voltage	0		$V_{CC}$	0		$V_{CC}$	V	
$V_O$	Output voltage	0		$V_{CC}$	0		$V_{CC}$	V	
$t_t$	Input transition (rise and fall) time	$V_{CC} = 2$ V		0	1000	$V_{CC} = 2$ V		ns	
		$V_{CC} = 4.5$ V		0	500	$V_{CC} = 4.5$ V			500
		$V_{CC} = 6$ V		0	400	$V_{CC} = 6$ V			400
$T_A$	Operating free-air temperature	–55		125	–40		85	°C	

NOTE 3: All unused inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

# SN54HC158, SN74HC158 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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

PARAMETER	TEST CONDITIONS		V <sub>CC</sub>	T <sub>A</sub> = 25°C			SN54HC158		SN74HC158		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V <sub>OH</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -20 μA	2 V	1.9	1.998		1.9		1.9	V	
			4.5 V	4.4	4.499		4.4		4.4		
			6 V	5.9	5.999		5.9		5.9		
		I <sub>OH</sub> = -6 mA	4.5 V	3.98	4.3		3.7		3.84		
		I <sub>OH</sub> = -7.8 mA	6 V	5.48	5.8		5.2		5.34		
V <sub>OL</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 20 μA	2 V		0.002	0.1		0.1		0.1	V
			4.5 V		0.001	0.1		0.1		0.1	
			6 V		0.001	0.1		0.1		0.1	
		I <sub>OL</sub> = 6 mA	4.5 V		0.17	0.26		0.4		0.33	
		I <sub>OL</sub> = 7.8 mA	6 V		0.15	0.26		0.4		0.33	
I <sub>I</sub>	V <sub>I</sub> = V <sub>CC</sub> or 0		6 V		±0.1	±100		±1000		±1000	nA
I <sub>CC</sub>	V <sub>I</sub> = V <sub>CC</sub> or 0, I <sub>O</sub> = 0		6 V			8		160		80	μA
C <sub>i</sub>			2 V to 6 V		3	10		10		10	pF

switching characteristics over recommended operating free-air temperature range, C<sub>L</sub> = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub>	T <sub>A</sub> = 25°C			SN54HC158		SN74HC158		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A or B	Y	2 V		63	125		190		160	ns
			4.5 V		13	25		38		32	
			6 V		11	21		32		27	
	A̅/B	Y	2 V		67	125		190		160	
			4.5 V		18	25		38		31	
			6 V		14	21		32		27	
	G̅	Y	2 V		59	115		170		145	
			4.5 V		16	23		34		29	
			6 V		13	20		29		25	
t <sub>t</sub>		Y	2 V		28	60		90		75	ns
			4.5 V		8	12		18		15	
			6 V		6	10		15		13	

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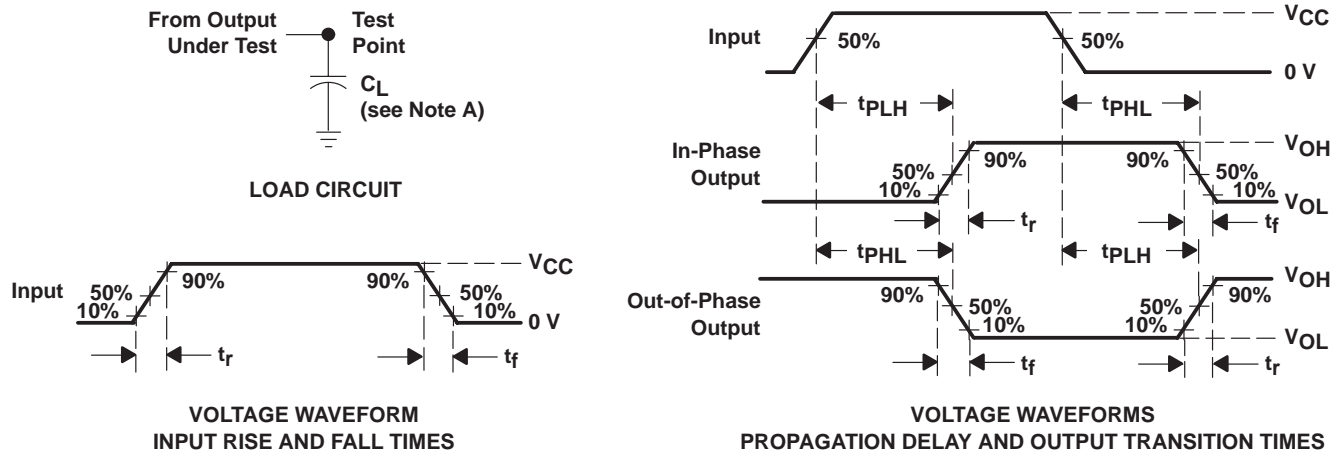
switching characteristics over recommended operating free-air temperature range,  $C_L = 150$  pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC}$	$T_A = 25^\circ\text{C}$			SN54HC158		SN74HC158		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$t_{pd}$	A or B	Y	2 V		81	190		290		235	ns
			4.5 V		23	38		58		47	
			6 V		18	33		49		41	
	$\bar{A}/B$	Y	2 V		81	210		320		260	
			4.5 V		23	42		64		52	
			6 V		18	36		54		45	
	$\bar{C}$	Y	2 V		91	190		290		235	
			4.5 V		24	38		58		47	
			6 V		18	33		49		41	
$t_t$		Y	2 V		45	210		315		265	ns
			4.5 V		17	42		63		53	
			6 V		13	36		53		45	

operating characteristics,  $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	TYP	UNIT
$C_{pd}$ Power dissipation capacitance	No load	40	pF

## PARAMETER MEASUREMENT INFORMATION



- NOTES: A.  $C_L$  includes probe and test-fixture capacitance.  
 B. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1$  MHz,  $Z_O = 50 \Omega$ ,  $t_r = 6$  ns,  $t_f = 6$  ns.  
 C. The outputs are measured one at a time with one input transition per measurement.  
 D.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .

**Figure 1. Load Circuit and Voltage Waveforms**

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## SN74HC158, Quadruple 2-Line To 1-Line Data Selectors/Multiplexers

DEVICE STATUS: **ACTIVE**

PARAMETER NAME	SN74HC158
Voltage Nodes (V)	6, 5, 2
Vcc range (V)	2.0 to 6.0
Input Level	CMOS
Output Level	CMOS
Output Drive (mA)	-6/6
Output	2S
From	2
To	1

### FEATURES

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- Package Options Include Plastic Small-Outline (D), Thin Shrink Small-Outline (PW), and Ceramic Flat (W) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) DIPs

### DESCRIPTION

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The SN54HC158 is characterized for operation over the full military temperature range of -55°C to 125°C. The SN74HC158 is characterized for operation from -40°C to 85°C.

### TECHNICAL DOCUMENTS

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### DATASHEET

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Full datasheet in Acrobat PDF: [sn74hc158.pdf](#) (101 KB, Rev.B) (Updated: 06/26/2000)

### APPLICATION NOTES

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- [CMOS Power Consumption and CPD Calculation \(Rev. B\)](#) (SCAA035B - Updated: 06/01/1997)
- [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)
- [Implications of Slow or Floating CMOS Inputs \(Rev. C\)](#) (SCBA004C - Updated: 02/01/1998)
- [Input and Output Characteristics of Digital Integrated Circuits](#) (SDYA010 - Updated: 10/01/1996)
- [Live Insertion](#) (SDYA012 - Updated: 10/01/1996)

- [SN54/74HCT CMOS Logic Family Applications and Restrictions](#) (SCLA011 - Updated: 05/01/1996)
- [Selecting the Right Texas Instruments Signal Switch](#) (SZZA030 - Updated: 09/07/2001)
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- [Logic Reference Guide](#) (SCYB004, 1032 KB - Updated: 10/23/2001)
- [Logic Selection Guide Second Half 2002 \(Rev. R\)](#) (SDYU001R, 4274 KB - Updated: 07/19/2002)
- [Military Semiconductors Selection Guide 2002 \(Rev. B\)](#) (SGYC003B, 1648 KB - Updated: 04/22/2002)

**PRICING/AVAILABILITY/PKG**

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DEVICE INFORMATION							TI INVENTORY STATUS AS OF 3:00 PM GMT, 26 Sep 2002			REPORTED DISTRIBUTOR INVENTORY AS OF 3:00 PM GMT, 26 Sep 2002		
ORDERABLE DEVICE	STATUS	PACKAGE TYPE PINS	TEMP (°C)	PRODUCT CONTENT	BUDGETARY PRICING QTY   \$US	STD PACK QTY	IN STOCK	IN PROGRESS QTY DATE	LEAD TIME	DISTRIBUTOR COMPANY REGION	IN STOCK	PURCHASE
SN74HC158D	ACTIVE	<a href="#">SOP (D)</a>   16	-40 TO 85	<a href="#">View Contents</a>	1KU   0.29	40	<a href="#">N/A*</a>	400   03 Oct	2 WKS			
								> 10k   10 Oct				
								> 10k   17 Oct				
SN74HC158DR	ACTIVE	<a href="#">SOP (D)</a>   16	-40 TO 85	<a href="#">View Contents</a>	1KU   0.29	2500	> 10k	> 10k   10 Oct	2 WKS			
								> 10k   17 Oct				
SN74HC158N	ACTIVE	<a href="#">PDIP (N)</a>   16	-40 TO 85	<a href="#">View Contents</a>	1KU   0.29	25	<a href="#">N/A*</a>	1   27 Sep	2 WKS			
								199   30 Sep				
								2900   02 Oct				
								> 10k   04 Oct				
								> 10k   11 Oct				
SN74HC158NSR	ACTIVE	<a href="#">SOP (NS)</a>   16		<a href="#">View Contents</a>	1KU   0.56	2000	<a href="#">N/A*</a>	> 10k   04 Oct	2 WKS			
								2302   11 Oct				
								> 10k   18 Oct				
SN74HC158PWR	ACTIVE	<a href="#">TSSOP (PW)</a>   16	-40 TO 85	<a href="#">View Contents</a>	1KU   0.29	2000	<a href="#">N/A*</a>	> 10k   03 Oct	2 WKS			
								> 10k   10 Oct				

Table Data Updated on: 9/26/2002



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