

# SN54AHCT258, SN74AHCT258 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

SCLS344C – MAY 1996 – REVISED JUNE 1997

- Inputs Are TTL-Voltage Compatible
- **EPIC™** (Enhanced-Performance Implanted CMOS) Process
- Package Options Include Plastic Small-Outline (D), Shrink Small-Outline (DB), Thin Shrink Small-Outline (PW), and Ceramic Flat (W) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

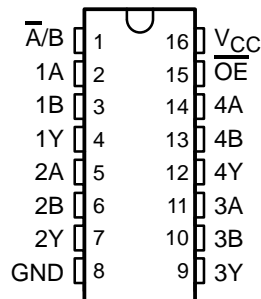
## description

These quadruple 2-line to 1-line data selectors/multiplexers are designed for 4.5-V to 5.5-V  $V_{CC}$  operation.

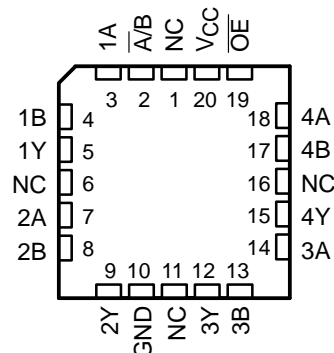
The 'AHCT258 are designed to multiplex signals from 4-bit data sources to 4-output data lines in bus-organized systems. The 3-state outputs do not load the data lines when the output-enable ( $\overline{OE}$ ) input is at the high logic level.

The SN54AHCT258 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74AHCT258 is characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

SN54AHCT258 . . . J OR W PACKAGE  
SN74AHCT258 . . . D, DB, N, OR PW PACKAGE  
(TOP VIEW)



SN54AHCT258 . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection

FUNCTION TABLE

INPUTS				OUTPUT Y
$\overline{OE}$	$\overline{A/B}$	A	B	
H	X	X	X	Z
L	L	L	X	H
L	L	H	X	L
L	H	X	L	H
L	H	X	H	L



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PRODUCT PREVIEW

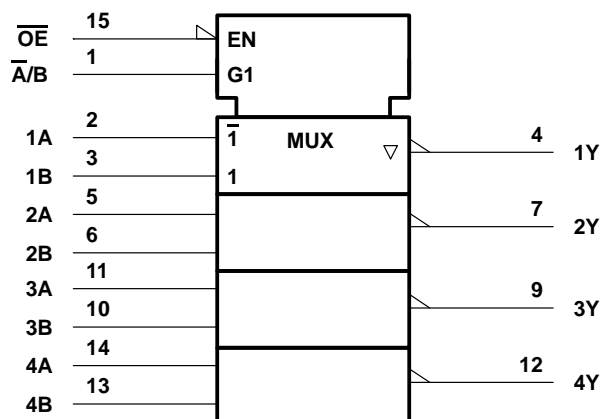
# SN54AHCT258, SN74AHCT258

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

### WITH 3-STATE OUTPUTS

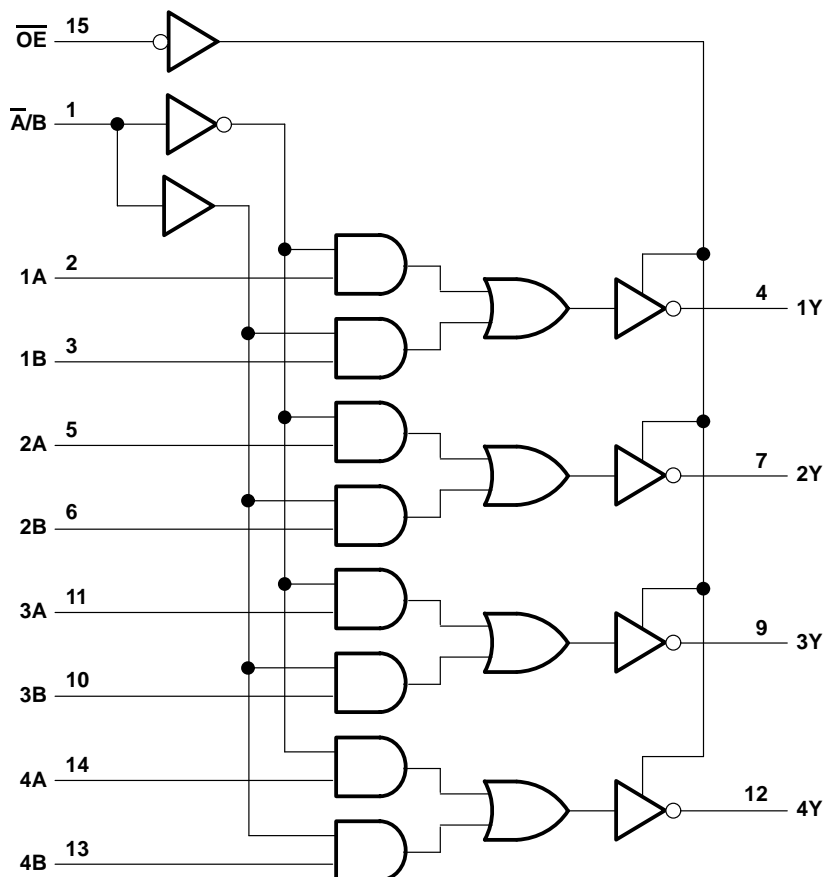
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#### logic symbol†



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

#### logic diagram (positive logic)



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

PRODUCT PREVIEW



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

### WITH 3-STATE OUTPUTS

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#### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

Supply voltage range, $V_{CC}$	–0.5 V to 7 V
Input voltage range, $V_I$ (see Note 1)	–0.5 V to 7 V
Output voltage range, $V_O$ (see Note 1)	–0.5 V to $V_{CC} + 0.5$ V
Input clamp current, $I_{IK}$ ( $V_I < 0$ )	–20 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ )	±20 mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ )	±25 mA
Continuous current through $V_{CC}$ or GND	±50 mA
Package thermal impedance, $\theta_{JA}$ (see Note 2): D package	113°C/W
DB package	131°C/W
N package	78°C/W
PW package	149°C/W
Storage temperature range, $T_{stg}$	–65°C to 150°C

<sup>†</sup> 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 JEDEC 51, except for through-hole packages, which use a trace length of zero.

#### recommended operating conditions (see Note 3)

		SN54AHCT258		SN74AHCT258		UNIT
		MIN	MAX	MIN	MAX	
$V_{CC}$	Supply voltage	4.5	5.5	4.5	5.5	V
$V_{IH}$	High-level input voltage	2		2		V
$V_{IL}$	Low-level input voltage		0.8		0.8	V
$V_I$	Input voltage	0	5.5	0	5.5	V
$V_O$	Output voltage	0	$V_{CC}$	0	$V_{CC}$	V
$I_{OH}$	High-level output current		–8		–8	mA
$I_{OL}$	Low-level output current		8		8	mA
$\Delta t/\Delta v$	Input transition rise or fall time		20		20	ns/V
$T_A$	Operating free-air temperature	–55	125	–40	85	°C

NOTE 3: Unused inputs must be held high or low to prevent them from floating.

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

PARAMETER	TEST CONDITIONS	$V_{CC}$	$T_A = 25^\circ\text{C}$			SN54AHCT258		SN74AHCT258		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$V_{OH}$	$I_{OH} = -50 \mu\text{A}$	4.5 V	4.4	4.5		4.4		4.4		V
	$I_{OH} = -8 \text{ mA}$		3.94			3.8		3.8		
$V_{OL}$	$I_{OL} = 50 \mu\text{A}$	4.5 V			0.1		0.1		0.1	V
	$I_{OL} = 8 \text{ mA}$				0.36		0.44		0.44	
$I_I$	$V_I = V_{CC}$ or GND	5.5 V			±0.1		±1		±1	μA
$I_{CC}$	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			4		40		40	μA
$\Delta I_{CC}^\ddagger$	One input at 3.4 V, Other inputs at $V_{CC}$ or GND	5.5 V			1.35		1.5		1.5	mA
$I_{OZ}$	$V_O = V_{CC}$ or GND	5.5 V			±0.25		±2.5		±2.5	μA
$C_i$	$V_I = V_{CC}$ or GND	5 V		2	10				10	pF

<sup>‡</sup> This is the increase in supply current for each input at one of the specified TTL voltage levels rather than 0 V or  $V_{CC}$ .



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

### WITH 3-STATE OUTPUTS

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switching characteristics over recommended operating free-air temperature range,  
 $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$  (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	SN54AHCT258				UNIT
				$T_A = 25^\circ\text{C}$			MIN	MAX
				MIN	TYP	MAX		
$t_{PLH}^*$	A or B	Y	$C_L = 15\text{ pF}$	4.1	6.4	1	7.5	ns
$t_{PHL}^*$				4.1	6.4	1	7.5	
$t_{PLH}^*$	$\bar{A}/B$	Y	$C_L = 15\text{ pF}$	5.3	8.1	1	9.5	ns
$t_{PHL}^*$				5.3	8.1	1	9.5	
$t_{PZH}^*$	$\overline{OE}$	Y	$C_L = 15\text{ pF}$	5.6	8.6	1	10	ns
$t_{PZL}^*$				5.6	8.6	1	10	
$t_{PHZ}^*$	$\overline{OE}$	Y	$C_L = 15\text{ pF}$					ns
$t_{PLZ}^*$								
$t_{PLH}$	A or B	Y	$C_L = 50\text{ pF}$	5.6	8.4	1	9.5	ns
$t_{PHL}$				5.6	8.4	1	9.5	
$t_{PLH}$	$\bar{A}/B$	Y	$C_L = 50\text{ pF}$	6.8	10.1	1	11.5	ns
$t_{PLH}$				6.8	10.1	1	11.5	
$t_{PZH}$	$\overline{OE}$	Y	$C_L = 50\text{ pF}$	7.1	10.6	1	12	ns
$t_{PZL}$				7.1	10.6	1	12	
$t_{PHZ}$	$\overline{OE}$	Y	$C_L = 50\text{ pF}$					ns
$t_{PLZ}$								

\* On products compliant to MIL-PRF-38535, this parameter is ensured but not production tested.

switching characteristics over recommended operating free-air temperature range,  
 $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$  (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	SN74AHCT258				UNIT
				$T_A = 25^\circ\text{C}$			MIN	MAX
				MIN	TYP	MAX		
$t_{PLH}$	A or B	Y	$C_L = 15\text{ pF}$	4.1	6.4	1	7.5	ns
$t_{PHL}$				4.1	6.4	1	7.5	
$t_{PLH}$	$\bar{A}/B$	Y	$C_L = 15\text{ pF}$	5.3	8.1	1	9.5	ns
$t_{PHL}$				5.3	8.1	1	9.5	
$t_{PZH}$	$\overline{OE}$	Y	$C_L = 15\text{ pF}$	5.6	8.6	1	10	ns
$t_{PZL}$				5.6	8.6	1	10	
$t_{PHZ}$	$\overline{OE}$	Y	$C_L = 15\text{ pF}$					ns
$t_{PLZ}$								
$t_{PLH}$	A or B	Y	$C_L = 50\text{ pF}$	5.6	8.4	1	9.5	ns
$t_{PHL}$				5.6	8.4	1	9.5	
$t_{PLH}$	$\bar{A}/B$	Y	$C_L = 50\text{ pF}$	6.8	10.1	1	11.5	ns
$t_{PLH}$				6.8	10.1	1	11.5	
$t_{PZH}$	$\overline{OE}$	Y	$C_L = 50\text{ pF}$	7.1	10.6	1	12	ns
$t_{PZL}$				7.1	10.6	1	12	
$t_{PHZ}$	$\overline{OE}$	Y	$C_L = 50\text{ pF}$					ns
$t_{PLZ}$								



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

### WITH 3-STATE OUTPUTS

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noise characteristics  $V_{CC} = 5\text{ V}$ ,  $C_L = 50\text{ pF}$ ,  $T_A = 25^\circ\text{C}$  (see Note 4)

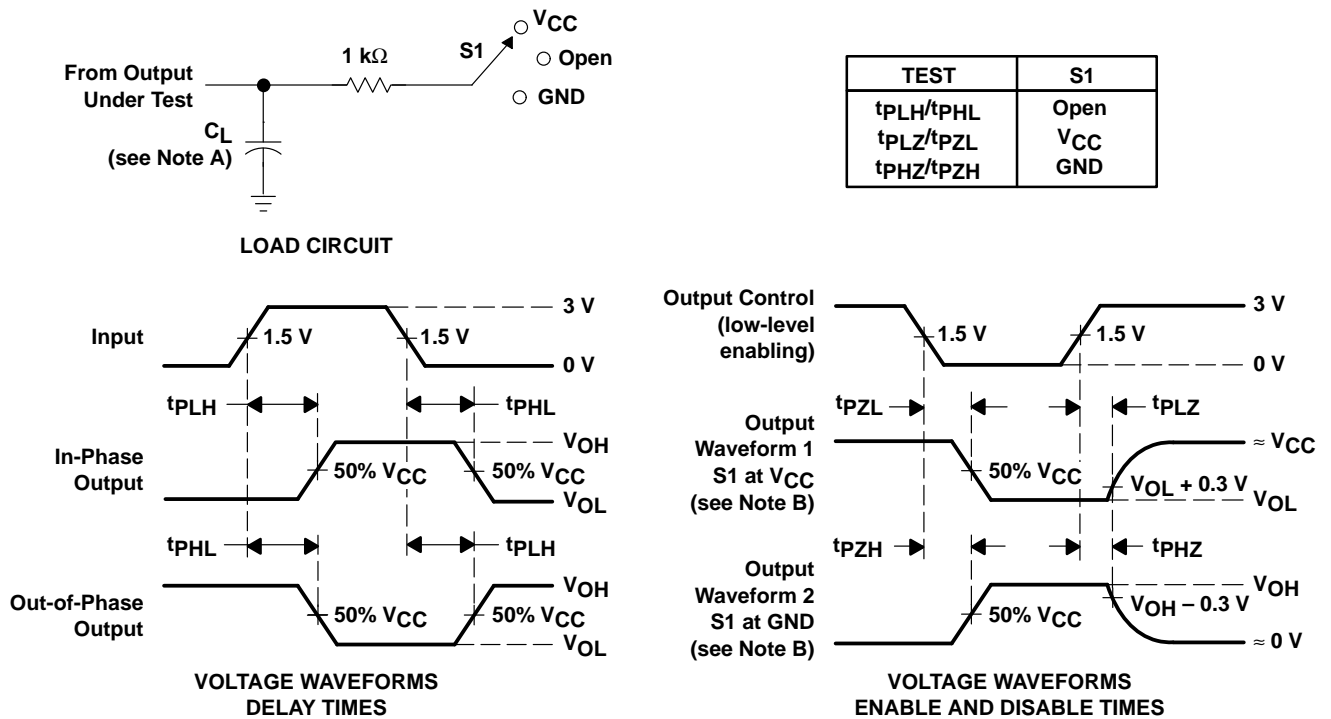
PARAMETER	SN74AHCT258		UNIT
	MIN	MAX	
$V_{OL(P)}$ Quiet output, maximum dynamic $V_{OL}$		0.8	V
$V_{OL(V)}$ Quiet output, minimum dynamic $V_{OL}$		-0.8	V
$V_{OH(V)}$ Quiet output, minimum dynamic $V_{OH}$			V
$V_{IH(D)}$ High-level dynamic input voltage	2		V
$V_{IL(D)}$ Low-level dynamic input voltage		0.8	V

NOTE 4: Characteristics are determined during product characterization and ensured by design for surface-mount packages only.

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

PARAMETER	TEST CONDITIONS	TYP	UNIT
$C_{pd}$ Power dissipation capacitance	No load, $f = 1\text{ MHz}$	20	pF

#### PARAMETER MEASUREMENT INFORMATION



NOTES: A.  $C_L$  includes probe and jig capacitance.

B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control.

Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.

C. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1\text{ MHz}$ ,  $Z_O = 50\ \Omega$ ,  $t_r = 3\text{ ns}$ ,  $t_f = 3\text{ ns}$ .

D. The outputs are measured one at a time with one input transition per measurement.

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

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