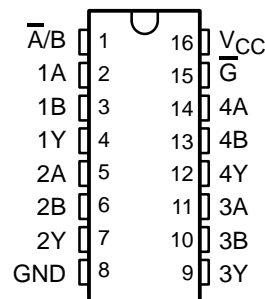


# CD54HCT258, CD74HCT258 QUADRUPLE 2-LINE TO 1-LINE SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

SCHS276A – MAY 2003

- 4.5-V to 5.5-V  $V_{CC}$  Operation
- Wide Operating Temperature Range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$
- Balanced Propagation Delays and Transition Times
- Standard Outputs Drive Up To 10 LS-TTL Loads
- Significant Power Reduction Compared to LS-TTL Logic ICs
- Inputs Are TTL-Voltage Compatible

CD54HCT258 . . . F PACKAGE  
CD74HCT258 . . . E PACKAGE  
(TOP VIEW)



## description/ordering information

These devices 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 ( $\overline{G}$ ) input is at a high logic level.

To ensure the high-impedance state during power up or power down,  $\overline{G}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

## ORDERING INFORMATION

T <sub>A</sub>	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
$-55^{\circ}\text{C}$ to $125^{\circ}\text{C}$	PDIP – E	Tube	CD74HCT258E	CD74HCT258E
	CDIP – F	Tube	CD54HCT258F3A	CD54HCT258F3A

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).

## FUNCTION TABLE

INPUTS				OUTPUT Y
$\overline{G}$	$\overline{A/B}$	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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**TEXAS  
INSTRUMENTS**

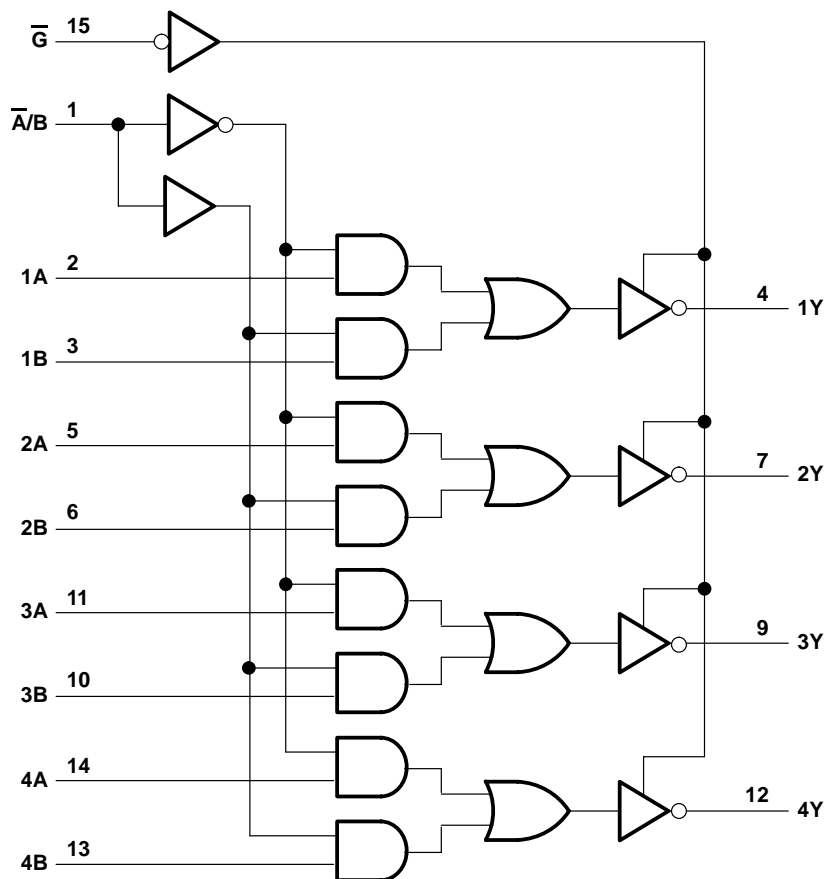
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**CD54HCT258, CD74HCT258**  
**QUADRUPLE 2-LINE TO 1-LINE SELECTORS/MULTIPLEXERS**  
**WITH 3-STATE OUTPUTS**

SCHS276A – MAY 2003

**logic diagram (positive logic)**



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

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) .....	$\pm 20$ mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) (see Note 1) .....	$\pm 20$ mA
Continuous output drain current per output, $I_O$ ( $V_O = 0$ to $V_{CC}$ ) .....	$\pm 35$ mA
Continuous output source or sink current per output, $I_O$ ( $V_O = 0$ to $V_{CC}$ ) .....	$\pm 25$ mA
Continuous current through $V_{CC}$ or GND .....	$\pm 50$ mA
Package thermal impedance, $\theta_{JA}$ (see Note 2): E package .....	69°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 51-7.



# CD54HCT258, CD74HCT258 QUADRUPLE 2-LINE TO 1-LINE SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

SCHS276A – MAY 2003

## recommended operating conditions (see Note 3)

	MIN	MAX	UNIT
V <sub>CC</sub> Supply voltage	4.5	5.5	V
V <sub>IH</sub> High-level input voltage	2		V
V <sub>IL</sub> Low-level input voltage		0.8	V
V <sub>I</sub> Input voltage		V <sub>CC</sub>	V
V <sub>O</sub> Output voltage		V <sub>CC</sub>	V
Δt/Δv Input transition rise or fall rate		500	ns
T <sub>A</sub> Operating free-air temperature	-55	125	°C

NOTE 3: All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

## 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		T <sub>A</sub> = -55°C TO 125°C		T <sub>A</sub> = -40°C TO 85°C		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
V <sub>OH</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	4.5 V	I <sub>OH</sub> = -20 μA		4.4	4.4	4.4	V	
			I <sub>OH</sub> = -6 mA		3.98	3.7	3.84		
V <sub>OL</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	4.5 V	I <sub>OL</sub> = 20 μA		0.1	0.1	0.1	V	
			I <sub>OL</sub> = 6 mA		0.26	0.4	0.33		
I <sub>I</sub>	V <sub>I</sub> = V <sub>CC</sub> or 0	5.5 V	±0.1		±1	±1	μA		
I <sub>OZ</sub>	V <sub>O</sub> = V <sub>CC</sub> or 0	5.5 V	±0.5		±10	±5	μA		
I <sub>CC</sub>	V <sub>I</sub> = V <sub>CC</sub> or 0, I <sub>O</sub> = 0	5.5 V	8		160	80	μA		
ΔI <sub>CC</sub> †	One input at V <sub>CC</sub> - 2.1 V, Other inputs at 0 or V <sub>CC</sub>	4.5 V to 5.5 V	100	360	490	450	μA		
C <sub>i</sub>			10		10	10	pF		
C <sub>o</sub>			20		20	20	pF		

† Additional quiescent supply current per input pin, TTL inputs high, 1 unit load. For dual-supply systems, theoretical worst-case (V<sub>I</sub> = 2.4 V, V<sub>CC</sub> = 5.5 V) specification is 1.8 mA.

**HCT INPUT LOADING TABLE**

INPUT	UNIT LOAD
$\overline{G}$	1.5
A or B	0.5
$\overline{A/B}$	1.5

Unit Load is ΔI<sub>CC</sub> limit specified in electrical characteristics table (e.g., 360 μA max at 25°C).

**CD54HCT258, CD74HCT258**  
**QUADRUPLE 2-LINE TO 1-LINE SELECTORS/MULTIPLEXERS**  
**WITH 3-STATE OUTPUTS**

SCHS276A – MAY 2003

switching characteristics over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	V <sub>CC</sub>	T <sub>A</sub> = 25°C			T <sub>A</sub> = -55°C TO 125°C		T <sub>A</sub> = -40°C TO 85°C		UNIT
					MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A or B	Any Y	C <sub>L</sub> = 50 pF	4.5 V			27		41		34	ns
			C <sub>L</sub> = 15 pF	5 V			11					
	$\bar{A}/B$	Any Y	C <sub>L</sub> = 50 pF	4.5 V			34		51		43	
			C <sub>L</sub> = 15 pF	5 V			14					
t <sub>en</sub>	$\bar{G}$	Any Y	C <sub>L</sub> = 50 pF	4.5 V			28		42		35	ns
			C <sub>L</sub> = 15 pF	5 V			11					
t <sub>dis</sub>	$\bar{G}$	Any Y	C <sub>L</sub> = 50 pF	4.5 V			30		45		38	ns
			C <sub>L</sub> = 15 pF	5 V			12					
t <sub>t</sub>		Any Y	C <sub>L</sub> = 50 pF				12		18		15	ns

**operating characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C**

PARAMETER	TYP	UNIT
C <sub>pd</sub> Power dissipation capacitance per multiplexer†	49	pF

† C<sub>pd</sub> is used to determine the dynamic power consumption per multiplexer.

$$P_D = V_{CC}^2 f_i (C_{pd} + C_L)$$

where: P<sub>D</sub> = dynamic power dissipation

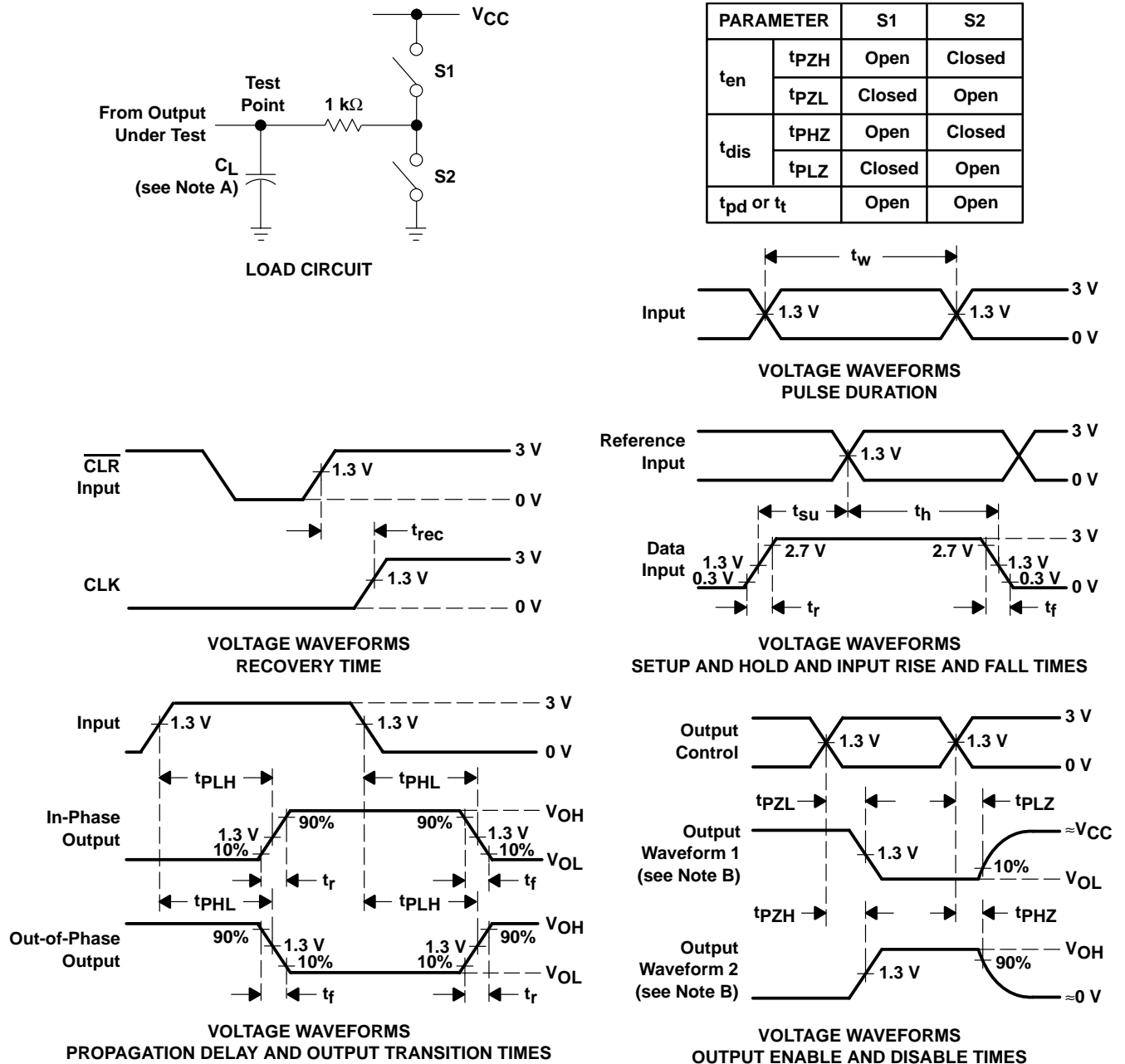
f<sub>i</sub> = input frequency

C<sub>L</sub> = output load capacitance

V<sub>CC</sub> = supply voltage



**PARAMETER MEASUREMENT INFORMATION**



- NOTES:
- A.  $C_L$  includes probe and test-fixture 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. 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.
  - D. For clock inputs,  $f_{max}$  is measured with the input duty cycle at 50%.
  - E. The outputs are measured one at a time with one input transition per measurement.
  - F.  $t_{pLZ}$  and  $t_{pHZ}$  are the same as  $t_{dis}$ .
  - G.  $t_{pZL}$  and  $t_{pZH}$  are the same as  $t_{en}$ .
  - H.  $t_{pLH}$  and  $t_{pHL}$  are the same as  $t_{pd}$ .

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

**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
5962-8970801EA	ACTIVE	CDIP	J	16	1	None	Call TI	Level-NC-NC-NC
CD54HCT258F3A	ACTIVE	CDIP	J	16	1	None	Call TI	Level-NC-NC-NC
CD74HCT258E	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSELETE:** TI has discontinued the production of the device.

<sup>(2)</sup> Eco Plan - May not be currently available - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**None:** Not yet available Lead (Pb-Free).

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean "Pb-Free" and in addition, uses package materials that do not contain halogens, including bromine (Br) or antimony (Sb) above 0.1% of total product weight.

<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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# J (R-GDIP-T\*\*)

14 LEADS SHOWN

# CERAMIC DUAL IN-LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package is hermetically sealed with a ceramic lid using glass frit.
  - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
  - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  - The 20 pin end lead shoulder width is a vendor option, either half or full width.



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