

SN54HCT257, SN74HCT257 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

SCLS072B – NOVEMBER 1988 – REVISED MAY 1997

- Inputs Are TTL-Voltage Compatible
- Provide Bus Interface From Multiple Sources in High-Performance Systems
- High-Current 3-State Outputs Interface Directly With System Bus
- Buffered Inputs and Outputs
- Package Options Include Ceramic Chip Carriers (FK) and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

description

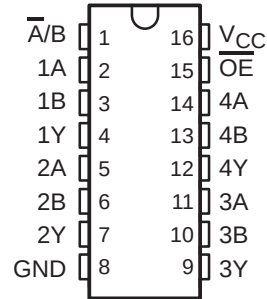
The 'HCT257 are designed to multiplex signals from 4-bit data sources to 4-output data lines in bus-organized systems. The 3-state outputs do not load the data lines when the output-enable ($\overline{OE}$) input is at the high logic level.

The SN54HCT257 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74HCT257 is characterized for operation from -40°C to 85°C .

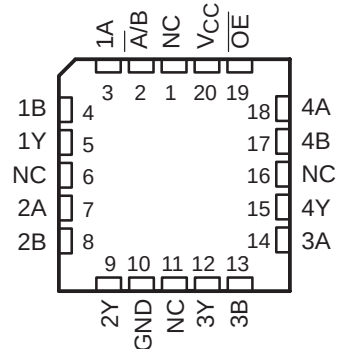
FUNCTION TABLE

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

SN54HCT257 . . . J PACKAGE
SN74HCT257 . . . N PACKAGE
(TOP VIEW)



SN54HCT257 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection



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**TEXAS
INSTRUMENTS**

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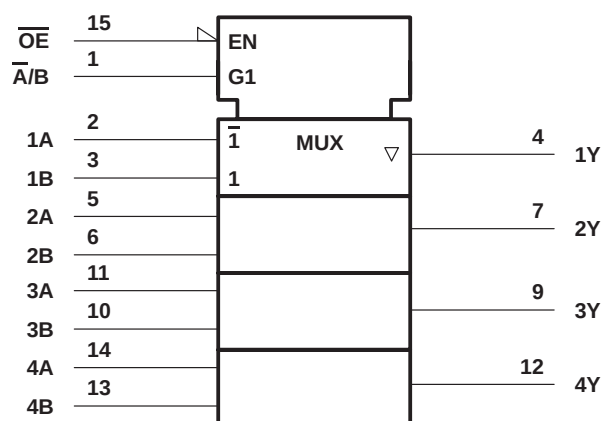
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WITH 3-STATE OUTPUTS

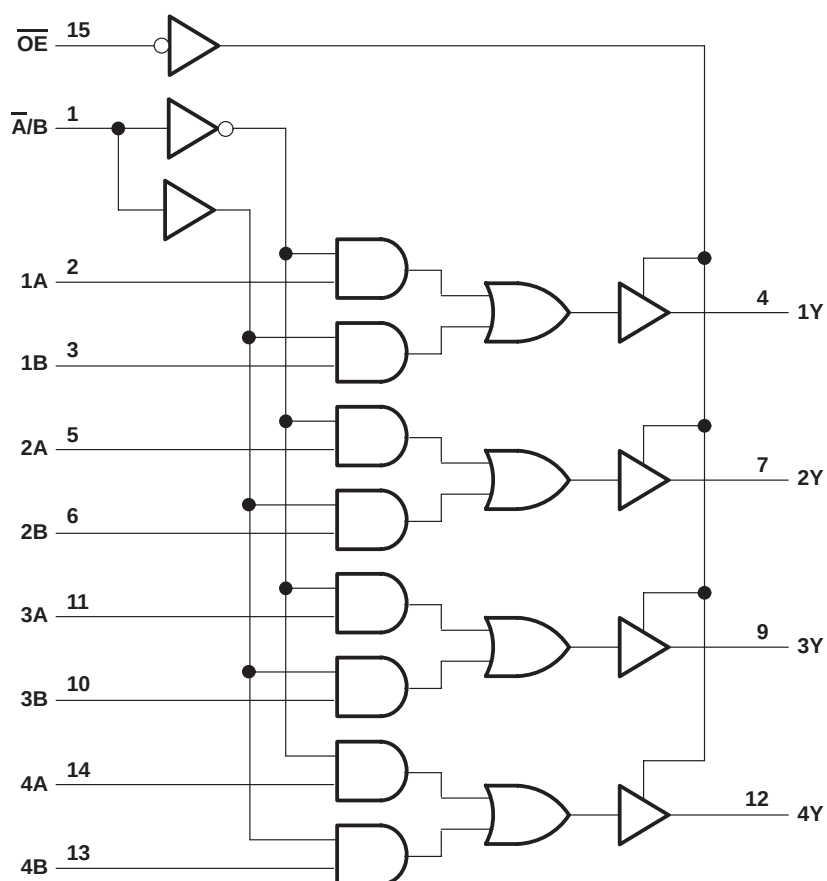
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logic symbol†



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

logic diagram (positive logic)



Pin numbers shown are for the J and N packages.

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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, θ_{JA} (see Note 2): N package	78°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 JE5D 51, except for through-hole packages, which use a trace length of zero.

recommended operating conditions

		SN54HCT257			SN74HCT257			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$			2			V
V_{IL}	Low-level input voltage	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$			0			V
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	0		500	0		500	ns
T_A	Operating free-air temperature	–55		125	–40		85	°C

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

PARAMETER	TEST CONDITIONS		V_{CC}	$T_A = 25^\circ\text{C}$			SN54HCT257		SN74HCT257		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V_{OH}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_{OH} = -20 \mu\text{A}$	4.5 V	4.4	4.499		4.4		4.4		V
		$I_{OH} = -6 \text{ mA}$		3.98	4.3		3.7		3.84		
V_{OL}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_{OL} = 20 \mu\text{A}$	4.5 V		0.001	0.1		0.1		0.1	V
		$I_{OL} = 6 \text{ mA}$			0.17	0.26		0.4		0.33	
I_I	$V_I = V_{CC} \text{ or } 0$		5.5 V	±0.1	±100		±1000		±1000		nA
I_{OZ}	$V_O = V_{CC} \text{ or } 0, V_I = V_{IH} \text{ or } V_{IL}$		5.5 V	±0.01	±0.5		±10		±5		μA
I_{CC}	$V_I = V_{CC} \text{ or } 0, I_O = 0$		5.5 V			8		160		80	μA
$\Delta I_{CC}^\ddagger$	One input at 0.5 V or 2.4 V, Other inputs at 0 or V_{CC}		5.5 V		1.4	2.4		3		2.9	mA
C_i			4.5 V to 5.5 V		3	10		10*		10	pF

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

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

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switching characteristics over recommended operating free-air temperature range, $C_L = 50$ pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	$T_A = 25^\circ\text{C}$			SN54HCT257		SN74HCT257		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	A or B	Y	4.5 V		20	30		45		38	ns
			5.5 V		17	27		40		34	
	$\bar{A}/B$	Y	4.5 V		20	30		45		38	
			5.5 V		17	27		40		34	
t_{en}	$\overline{OE}$	Y	4.5 V		20	30		45		38	ns
			5.5 V		17	27		40		34	
t_{dis}	$\overline{OE}$	Y	4.5 V		20	30		45		38	ns
			5.5 V		17	27		40		34	
t_t		Any	4.5 V		8	15		22		19	ns
			5.5 V		7	14		21		17	

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}	$T_A = 25^\circ\text{C}$			SN54HCT257		SN74HCT257		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	A or B	Y	4.5 V		22	38		57		48	ns
			5.5 V		19	35		53		44	
	$\bar{A}/B$	Y	4.5 V		22	38		57		48	
			5.5 V		19	35		53		44	
t_{en}	$\overline{OE}$	Y	4.5 V		23	40		60		50	ns
			5.5 V		20	38		57		48	
t_t		Any	4.5 V		17	42		63		53	ns
			5.5 V		14	38		57		48	

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

PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance	No load	13	pF

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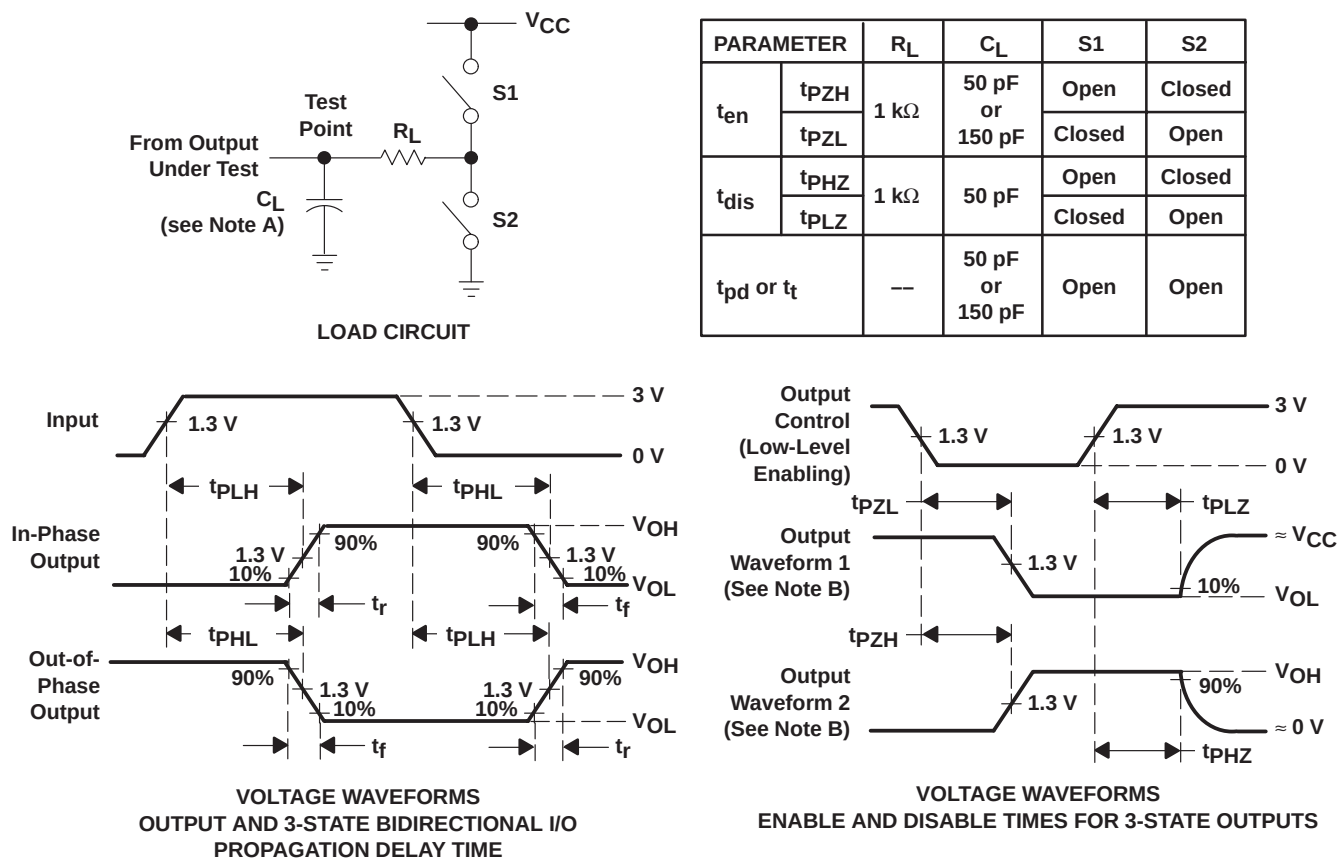
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PARAMETER MEASUREMENT INFORMATION



- 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. The outputs are measured one at a time with one input transition per measurement.
 - E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 - F. t_{PZL} and t_{PZH} are the same as t_{en} .
 - G. t_{PLH} and t_{PHL} are the same as t_{pd} .

Figure 1. Load Circuit and Voltage Waveforms

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