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

SCLS113B – DECEMBER 1982 – REVISED MAY 1997

- **Package Options Include Plastic Small-Outline (D) and Ceramic Flat (W) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs**

description

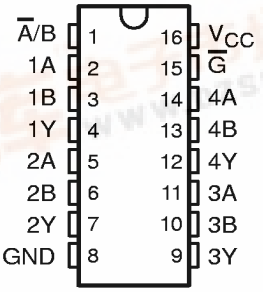
These monolithic data selectors/multiplexers contain inverters and drivers to supply full data selection to the four output gates. A separate strobe ($\overline{G}$) input is provided. A 4-bit word is selected from one of two sources and is routed to the four outputs. The 'HC157 present true data.

The SN54HC157 is characterized for operation over the full military temperature range of –55°C to 125°C. The SN74HC157 is characterized for operation from –40°C to 85°C.

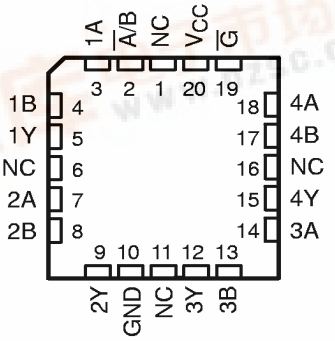
FUNCTION TABLE

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

SN54HC157 . . . J OR W PACKAGE
SN74HC157 . . . D OR N PACKAGE
(TOP VIEW)

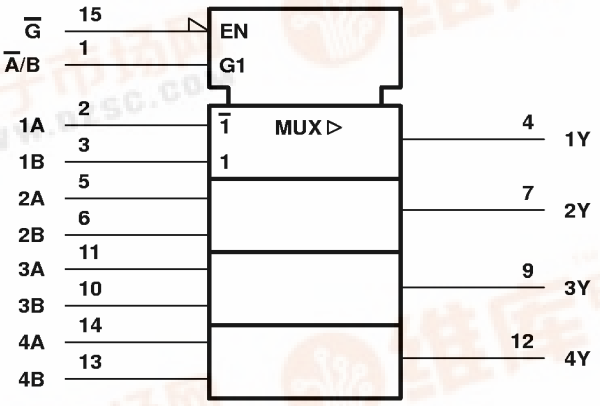


SN54HC157 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

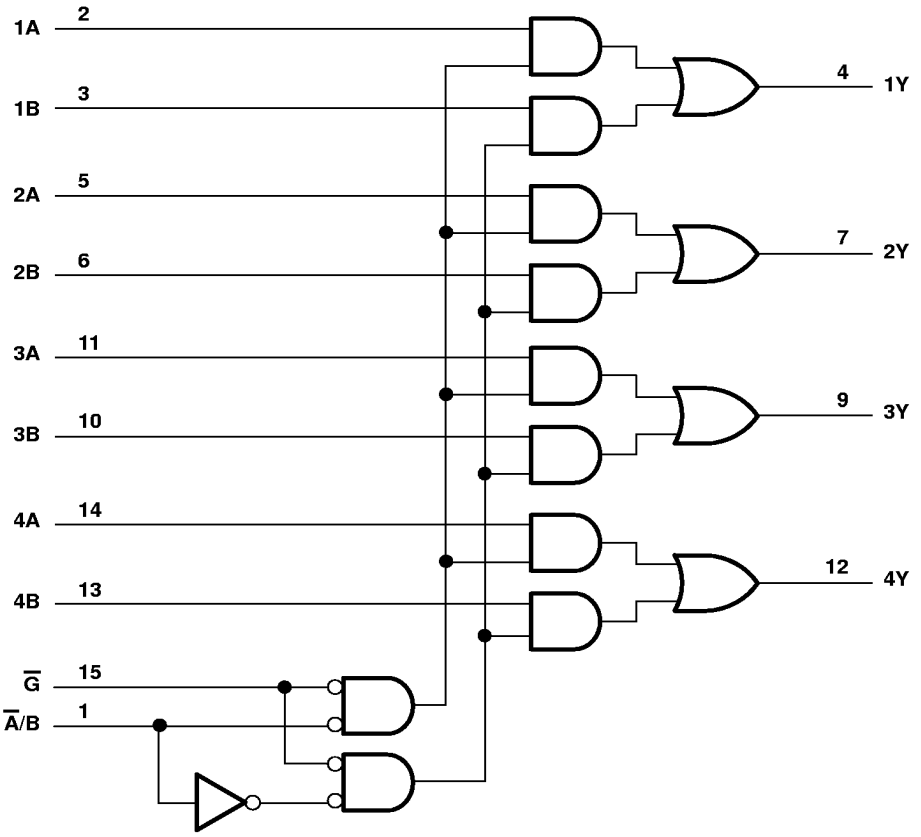
logic symbol†



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

Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

logic diagram (positive logic)



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

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): D package	113°C/W
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 JESD 51, except for through-hole packages, which use a trace length of zero.

recommended operating conditions

			SN54HC157			SN74HC157			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			1.5			V
		V_{CC} = 4.5 V	3.15			3.15			
		V_{CC} = 6 V	4.2			4.2			
V_{IL}	Low-level input voltage	V_{CC} = 2 V	0		0.5	0		0.5	V
		V_{CC} = 4.5 V	0		1.35	0		1.35	
		V_{CC} = 6 V	0		1.8	0		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	0		1000	ns
		V_{CC} = 4.5 V	0		500	0		500	
		V_{CC} = 6 V	0		400	0		400	
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°C			SN54HC157		SN74HC157		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V_{OH}	V_I = V_{IH} or V_{IL}	I_{OH} = –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_{OH} = –6 mA	4.5 V	3.98	4.3		3.7		3.84		
		I_{OH} = –7.8 mA	6 V	5.48	5.8		5.2		5.34		
V_{OL}	V_I = V_{IH} or V_{IL}	I_{OL} = 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_{OL} = 6 mA	4.5 V		0.17	0.26		0.4		0.33	
		I_{OL} = 7.8 mA	6 V		0.15	0.26		0.4		0.33	
I_I	V_I = V_{CC} or 0		6 V			±0.1	±100		±1000		±1000	nA
I_{CC}	V_I = V_{CC} or 0,	I_O = 0	6 V			8		160		80	μA
C_i			2 V to 6 V		3	10		10		10	pF

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°C			SN54HC157		SN74HC157		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	A or B	Y	2 V		63	125		190		160	ns
			4.5 V		13	25		38		32	
			6 V		11	21		32		27	
	$\overline{A}$/B	Y	2 V		67	125		190		160	
			4.5 V		18	25		38		31	
			6 V		14	21		32		27	
	$\overline{G}$	Y	2 V		59	115		170		145	
			4.5 V		16	23		34		29	
			6 V		13	20		29		25	
t_t		Y	2 V		28	60		90		75	ns
			4.5 V		8	12		18		15	
			6 V		6	10		15		13	

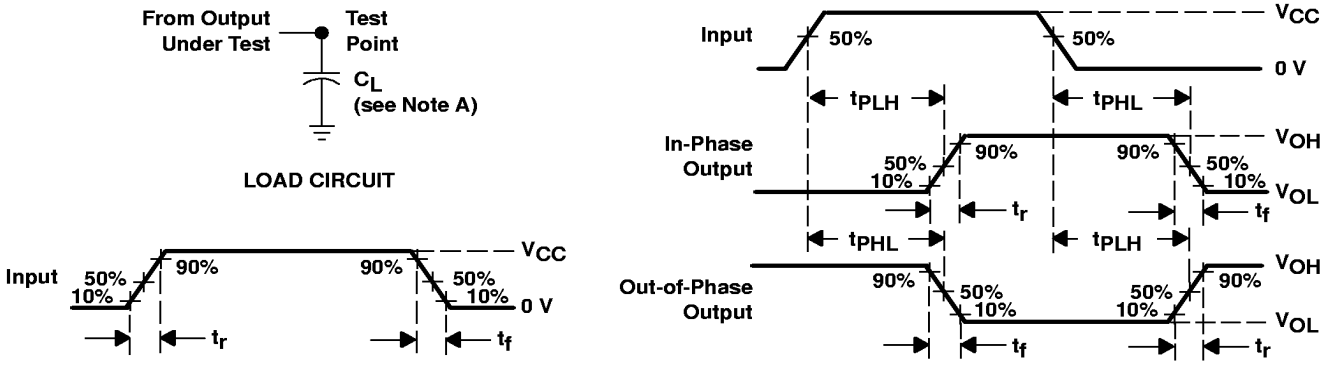
switching characteristics over recommended operating free-air temperature range, C_L = 150 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	T_A = 25°C			SN54HC157		SN74HC157		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	
	$\overline{A}$/B	Y	2 V		81	210		320		260	
			4.5 V		23	42		64		52	
			6 V		18	36		54		45	
	$\overline{G}$	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°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 ≤ 1 MHz, Z_O = 50 Ω, 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