SN54HC157, SN54HC158, SN74HC157, SN74HC158
QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

D2684, DECEMBER 1982—REVISED JUNE 1989

- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs

- Dependable Texas Instruments Quality and Reliability

description

These monolithic data selectors/multiplexers contain inverters and drivers to supply full data selection to the four output gates. A separate strobe input ($\overline{G}$) is provided. A 4-bit word is selected from one of two sources and is routed to the four outputs. The 'HC157 presents true data whereas the 'HC158 presents inverted data.
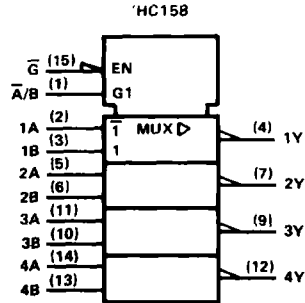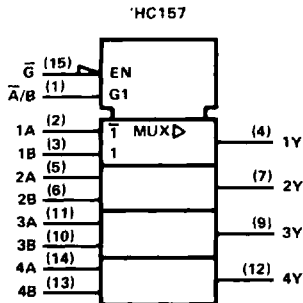
The SN54HC157 and SN54HC158 are characterized for operation over the full military temperature range of −55°C to 125°C. The SN74HC157 and SN74HC158 are characterized for operation from −40°C to 85°C.

SN54HC157, SN54HC158 . . . J PACKAGE
SN74HC157, SN74HC158 . . . D† OR N PACKAGE
(TOP VIEW)

```
  Ā/B  [ 1  U  16 ] VCC
   1A  [ 2     15 ] Ḡ
   1B  [ 3     14 ] 4A
   1Y  [ 4     13 ] 4B
   2A  [ 5     12 ] 4Y
   2B  [ 6     11 ] 3A
   2Y  [ 7     10 ] 3B
  GND  [ 8      9 ] 3Y
```
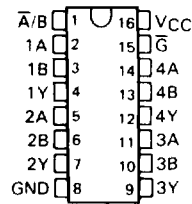
SN54HC157, SN54HC158 . . . FK PACKAGE
(TOP VIEW)

```
            1A Ā/B NC VCC Ḡ
             3  2  1  20 19
    1B [ 4              18 ] 4A
    1Y [ 5              17 ] 4B
    NC [ 6              16 ] NC
    2A [ 7              15 ] 4Y
    2B [ 8              14 ] 3A
             9 10 11 12 13
            2Y GND NC 3Y 3B
```

NC—No internal connection

†Contact the factory for D availability

FUNCTION TABLE

INPUTS				OUTPUT Y	
STROBE	SELECT	DATA		'HC157	'HC158
$\overline{G}$	$\overline{A}$/B	A	B		
H	X	X	X	L	H
L	L	L	X	L	H
L	L	H	X	H	L
L	H	X	L	L	H
L	H	X	H	H	L

H = high level, L = low level, X = irrelevant

logic symbols‡

'HC157

```
 Ḡ  (15) ─▷ EN
Ā/B (1) ──── G1

1A (2) ──── ¯1  MUX▷ ──(4)── 1Y
1B (3) ────     1
2A (5) ────        ──(7)── 2Y
2B (6) ────
3A (11) ───        ──(9)── 3Y
3B (10) ───
4A (14) ───        ──(12)── 4Y
4B (13) ───
```

'HC158

```
 Ḡ  (15) ─▷ EN
Ā/B (1) ──── G1

1A (2) ──── ¯1  MUX▷ ──(4)── 1Y
1B (3) ────     1
2A (5) ────        ──(7)── 2Y
2B (6) ────
3A (11) ───        ──(9)── 3Y
3B (10) ───
4A (14) ───        ──(12)── 4Y
4B (13) ───
```
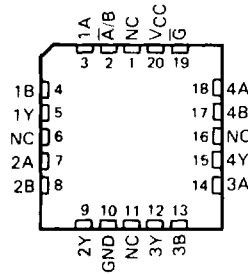
†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for D, J, and N packages.

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logic diagrams (positive logic)
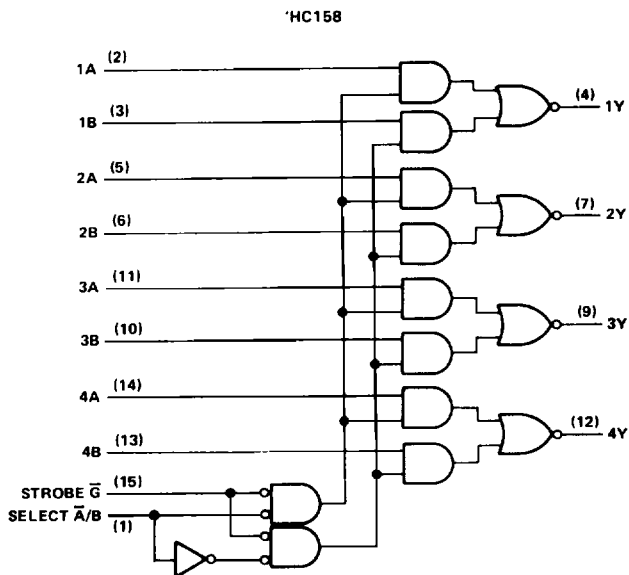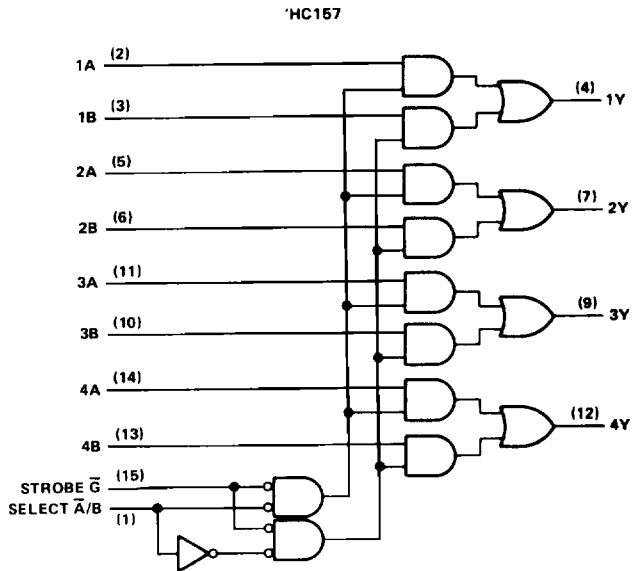
'HC157

'HC158

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

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absolute maximum ratings over operating free-air temperature range[†]

Supply voltage, V_{CC} . . . . −0.5 V to 7 V
Input clamp current, I_{IK} (V_I < 0 or V_I > V_{CC}) . . . . ±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 pins . . . . ±50 mA
Lead temperature 1,6 mm (1/16 in) from case for 60 s: FK or J package . . . . 300°C
Lead temperature 1,6 mm (1/16 in) from case for 10 s: D or N package . . . . 260°C
Storage temperature range . . . . −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.

recommended operating conditions

			SN54HC157 SN54HC158			SN74HC157 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			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		0.3	0		0.3	V
		$V_{CC} = 4.5$ V	0		0.9	0		0.9	
		$V_{CC} = 6$ V	0		1.2	0		1.2	
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) times	$V_{CC} = 2$ 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 SN54HC158		SN74HC157 SN74HC158		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		
	$V_I = V_{IH}$ or V_{IL}, $I_{OH} = -6$ mA	4.5 V	3.98	4.30		3.7		3.84		
	$V_I = V_{IH}$ or V_{IL}, $I_{OH} = -7.8$ mA	6 V	5.48	5.80		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	
	$V_I = V_{IH}$ or V_{IL}, $I_{OL} = 6$ mA	4.5 V		0.17	0.26		0.4		0.33	
	$V_I = V_{IH}$ or V_{IL}, $I_{OL} = 7.8$ 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 to 6 V		3	10		10		10	pF

HCMOS Devices

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	T_A = 25°C			SN54HC157 SN54HC158		SN74HC157 SN74HC158		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	
t_{pd}	$\overline{A}$/B	Y	2 V		67	125		190		160	ns
			4.5 V		18	25		38		31	
			6 V		14	21		32		27	
t_{pd}	$\overline{G}$	Y	2 V		59	115		170		145	ns
			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	

C_{pd}	Power dissipation capacitance	No load, T_A = 25°C	40 pF typ

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	T_A = 25°C			SN54HC157 SN54HC158		SN74HC157 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	
t_{pd}	$\overline{A}$/B	Y	2 V		81	210		320		260	ns
			4.5 V		23	42		64		52	
			6 V		18	36		54		45	
t_{pd}	$\overline{G}$	Y	2 V		91	190		290		235	ns
			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	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1.