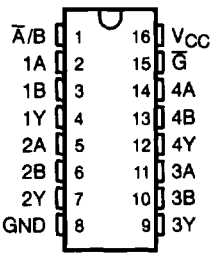
- **Buffered Inputs and Outputs**
- **Package Options Include Plastic Small-Outline (D) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs**

description

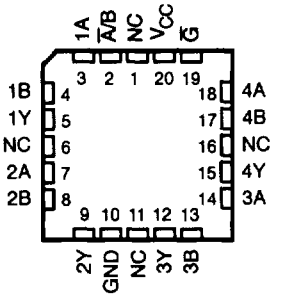
These data selectors/multiplexers contain inverters and drivers to supply full data selection to the four output gates. A separate strobe ($\overline{G}$) input is provided. A 4-bit word is selected from one of two sources and is routed to the four outputs. The 'ALS157A and SN74AS157 present true data. The 'ALS158 and SN74AS158 present inverted data to minimize propagation delay time.

The SN54ALS157A and SN54ALS158 are characterized for operation over the full military temperature range of −55°C to 125°C. The SN74ALS157A, SN74ALS158, SN74AS157, and SN74AS158 are characterized for operation from 0°C to 70°C.

SN54ALS157A, SN54ALS158 . . . J PACKAGE
SN74ALS157A, SN74ALS158,
SN74AS157, SN74AS158 . . . D OR N PACKAGE
(TOP VIEW)



SN54ALS157A, SN54ALS158 . . . FK PACKAGE
(TOP VIEW)



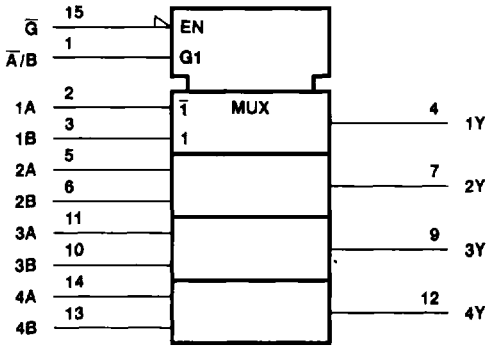
NC – No internal connection

FUNCTION TABLE

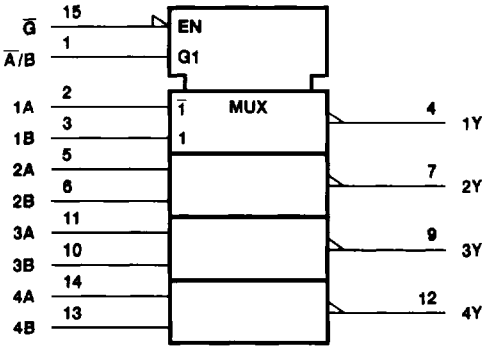
INPUTS				OUTPUT Y	
$\overline{G}$	$\overline{A}$/B	DATA A	DATA B	'ALS157A SN74AS157	'ALS158 SN74AS158
H	X	X	X	L	H
L	L	L	X	L	H
L	L	H	X	H	L
L	H	X	L	L	H
L	H	X	H	H	L

logic symbols†

'ALS157A, SN74AS157



'ALS158, SN74AS158



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

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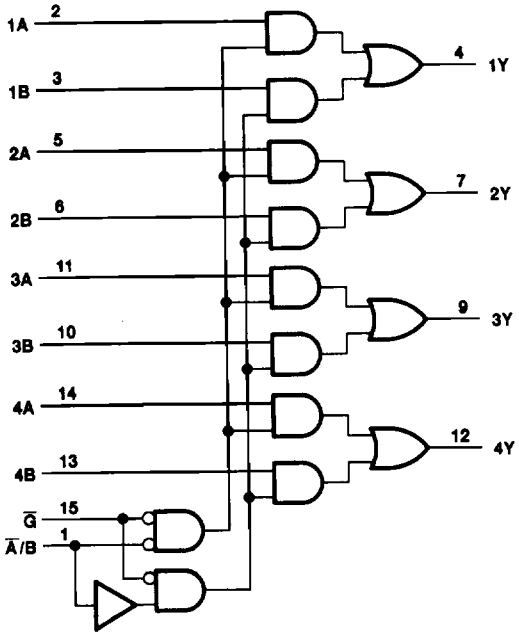
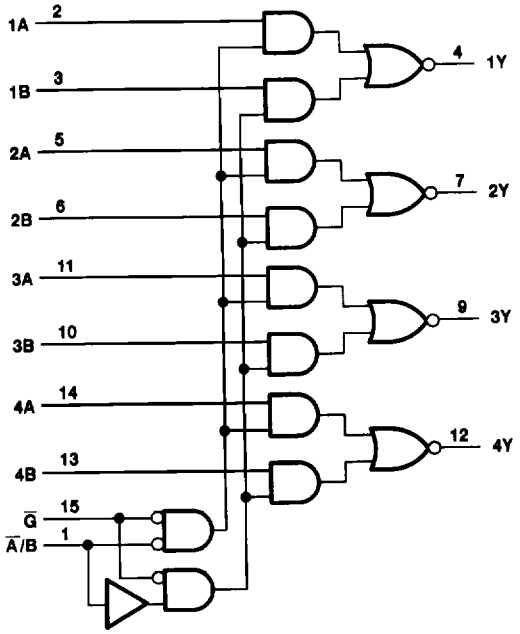
logic diagrams (positive logic)

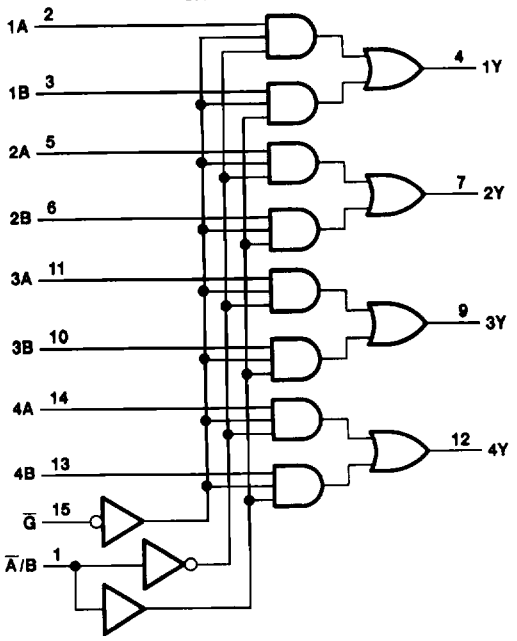
'ALS157A



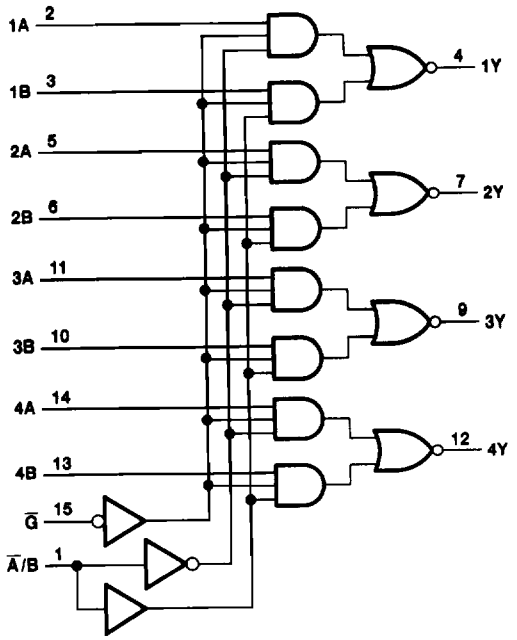
'ALS158



SN74AS157



SN74AS158



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

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

Supply voltage, V_{CC} ..... 7 V
Input voltage, V_I ..... 7 V
Operating free-air temperature range, T_A: SN54ALS157A, SN54ALS158 ..... −55°C to 125°C
SN74ALS157A, SN74ALS158 ..... 0°C to 70°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

		SN54ALS157A SN54ALS158			SN74ALS157A SN74ALS158			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	2			2			V
V_{IL}	Low-level input voltage			0.7			0.8	V
I_{OH}	High-level output current			−0.4			−0.4	mA
I_{OL}	Low-level output current			4			8	mA
T_A	Operating free-air temperature	−55		125	0		70	°C

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

PARAMETER		TEST CONDITIONS		SN54ALS157A SN54ALS158			SN74ALS157A SN74ALS158			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = −18 mA			−1.2			−1.2	V
V_{OH}		V_{CC} = 4.5 V to 5.5 V,	I_{OH} = −0.4 mA	V_{CC} −2			V_{CC} −2			V
V_{OL}		V_{CC} = 4.5 V	I_{OL} = 4 mA		0.25	0.4		0.25	0.4	V
			I_{OL} = 8 mA					0.35	0.5	
I_I		V_{CC} = 5.5 V,	V_I = 7 V			0.1			0.1	mA
I_{IH}		V_{CC} = 5.5 V,	V_I = 2.7 V			20			20	µA
I_{IL}		V_{CC} = 5.5 V,	V_I = 0.4 V			−0.1			−0.1	mA
I_O§		V_{CC} = 5.5 V,	V_O = 2.25 V	−20		−112	−30		−112	mA
I_{CC}	'ALS157A	V_{CC} = 5.5 V,	See Note 1		6	11		6	11	mA
	'ALS158				5	10		5	10	

‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.
§ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}.
NOTE 1: I_{CC} is measured with 4.5 V applied to all inputs and all outputs open.

switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 50 pF, R_L = 500 Ω, T_A = 25°C	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R_L = 500 Ω, T_A = MIN to MAX†				UNIT
			'ALS157A	SN54ALS157A		SN74ALS157A		
			TYP	MIN	MAX	MIN	MAX	
t_{PLH}	A or B	Y	9	4	17	4	14	ns
t_{PHL}			6	2	15	2	12	
t_{PLH}	$\overline{A}$/B	Y	15	7	28	7	24	ns
t_{PHL}			9	4	20	4	17	
t_{PLH}	$\overline{G}$	Y	14	7	25	7	20	ns
t_{PHL}			10	4	18	4	13	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 50 pF, R_L = 500 Ω, T_A = 25°C	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R_L = 500 Ω, T_A = MIN to MAX†				UNIT
			'ALS158	SN54ALS158		SN74ALS158		
			TYP	MIN	MAX	MIN	MAX	
t_{PLH}	A or B	Y	9	4	18	4	15	ns
t_{PHL}			5	2	12	2	8	
t_{PLH}	$\overline{A}$/B	Y	13	5	22	5	18	ns
t_{PHL}			13	5	22	5	18	
t_{PLH}	$\overline{G}$	Y	13	5	22	5	18	ns
t_{PHL}			13	5	22	5	18	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

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

Supply voltage, V_{CC} ..... 7 V
Input voltage, V_I ..... 7 V
Operating free-air temperature range, T_A: SN74AS157, SN74AS158 ..... 0°C to 70°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

		SN74AS157 SN74AS158			UNIT
		MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			V
V_{IL}	Low-level input voltage			0.8	V
I_{OH}	High-level output current			−2	mA
I_{OL}	Low-level output current			20	mA
T_A	Operating free-air temperature	0		70	°C

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

PARAMETER		TEST CONDITIONS		SN74AS157 SN74AS158			UNIT
				MIN	TYP‡	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = −18 mA			−1.2	V
V_{OH}		V_{CC} = 4.5 V to 5.5 V,	I_{OH} = −2 mA	V_{CC} −2			V
V_{OL}		V_{CC} = 4.5 V,	I_{OL} = 20 mA		0.35	0.5	V
I_I	$\overline{A}$/B	V_{CC} = 5.5 V,	V_I = 7 V			0.2	mA
	A, B, or $\overline{G}$					0.1	
I_{IH}	$\overline{A}$/B	V_{CC} = 5.5 V,	V_I = 2.7 V			40	µA
	A, B, or $\overline{G}$					20	
I_{IL}	$\overline{A}$/B	V_{CC} = 5.5 V,	V_I = 0.4 V			−1	mA
	A, B, or $\overline{G}$					−0.5	
I_O§		V_{CC} = 5.5 V,	V_O = 2.25 V	−30		−112	mA
I_{CC}	SN74AS157	V_{CC} = 5.5 V			17.5	28	mA
	SN74AS158				15.6	22.5	

‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.
§ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}.

switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R_L = 500 Ω, T_A = MIN to MAX†		UNIT
			SN74AS157		
			MIN	MAX	
t_{PLH}	A or B	Y	1	6	ns
t_{PHL}			1	5.5	
t_{PLH}	$\overline{A}$/B	Y	2	11	ns
t_{PHL}			2	10	
t_{PLH}	$\overline{G}$	Y	2	10.5	ns
t_{PHL}			2	7.5	

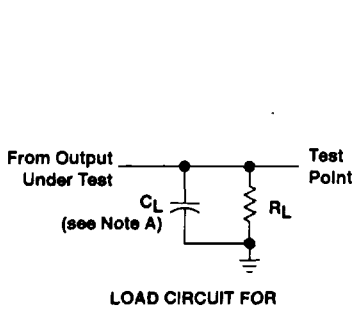
† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

switching characteristics (see Figure 1)

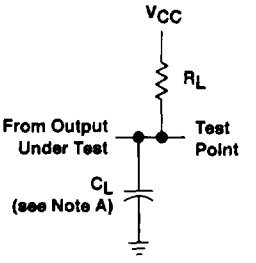
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R_L = 500 Ω, T_A = MIN to MAX†		UNIT
			SN74AS158		
			MIN	MAX	
t_{PLH}	A or B	Y	1	5	ns
t_{PHL}			1	4.5	
t_{PLH}	$\overline{A}$/B	Y	2	9.5	ns
t_{PHL}			2	10.5	
t_{PLH}	$\overline{G}$	Y	2	6.5	ns
t_{PHL}			2	10	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

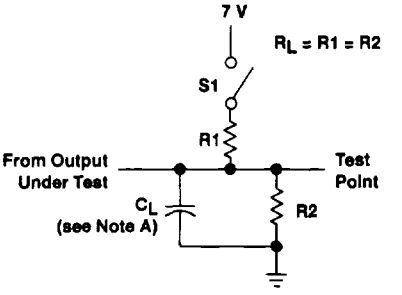
PARAMETER MEASUREMENT INFORMATION
SERIES 54ALS/74ALS AND 54AS/74AS DEVICES



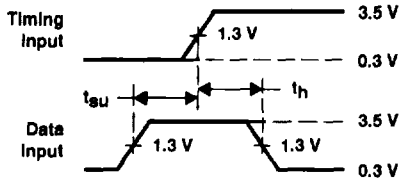
LOAD CIRCUIT FOR BI-STATE TOTEM-POLE OUTPUTS



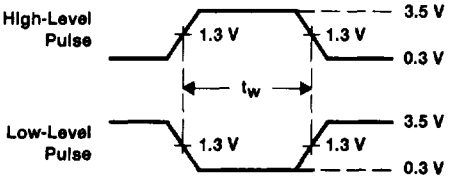
LOAD CIRCUIT FOR OPEN-COLLECTOR OUTPUTS



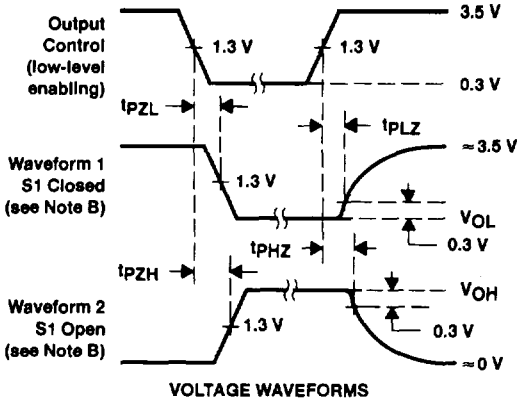
LOAD CIRCUIT FOR 3-STATE OUTPUTS



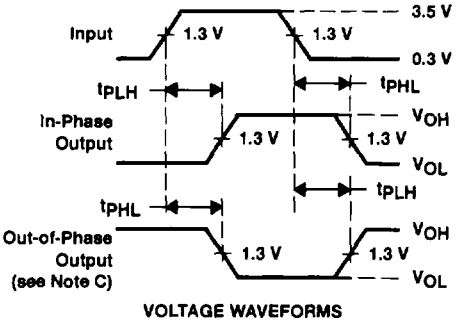
VOLTAGE WAVEFORMS SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS PULSE DURATIONS



VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES, 3-STATE OUTPUTS



VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES

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. When measuring propagation delay items of 3-state outputs, switch S1 is open.
D. All input pulses have the following characteristics: PRR ≤ 1 MHz, $t_r = t_f = 2$ ns, duty cycle = 50%.
E. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms