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

TEXAS INSTR (LOGIC) 25E D

D2661, APRIL 1982—REVISED APRIL 1987

- **Three-State Outputs Interface Directly with System Bus**
- **Provides Bus Interface from Multiple Sources in High-Performance Systems**
- **Package Options Include Both Plastic and Ceramic Chip Carriers in Addition to Plastic and Ceramic DIPs**
- **Dependable Texas Instruments Quality and Reliability**

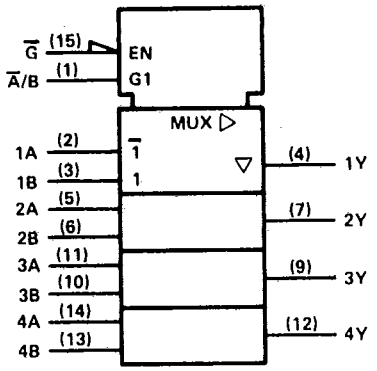
description

These devices are designed to multiplex signals from four-bit data sources to four-output data lines in bus-organized systems. The 3-state outputs will not load the data lines when the output control pin (G) is at a high-logic level.

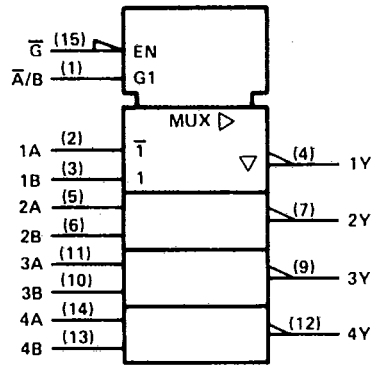
The SN54' family is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74' family is characterized for operation from 0°C to 70°C.

logic symbol†

'ALS257, 'AS257



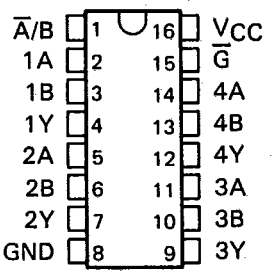
'ALS258, 'AS258



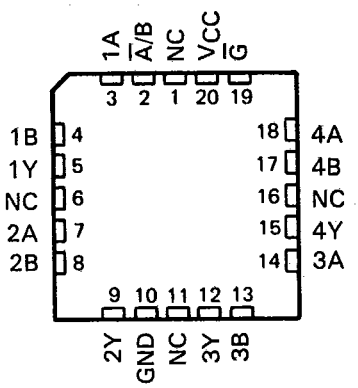
† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

SN54ALS', SN54AS' . . . J PACKAGE
SN74ALS', SN74AS' . . . D OR N PACKAGE
(TOP VIEW)



SN54ALS', SN54AS' . . . FK PACKAGE
(TOP VIEW)



NC—No internal connection

FUNCTION TABLE

INPUTS				OUTPUT Y	
OUTPUT CONTROL $\overline{G}$	SELECT $\overline{A}/B$	DATA A	DATA B	'ALS257 'AS257	'ALS258 'AS258
H	X	X	X	Z	Z
L	L	L	X	L	H
L	L	H	X	H	L
L	H	X	L	L	H
L	H	X	H	H	L

NOTICE

SEE ORDER OF DATA FOR ERRATA INFORMATION

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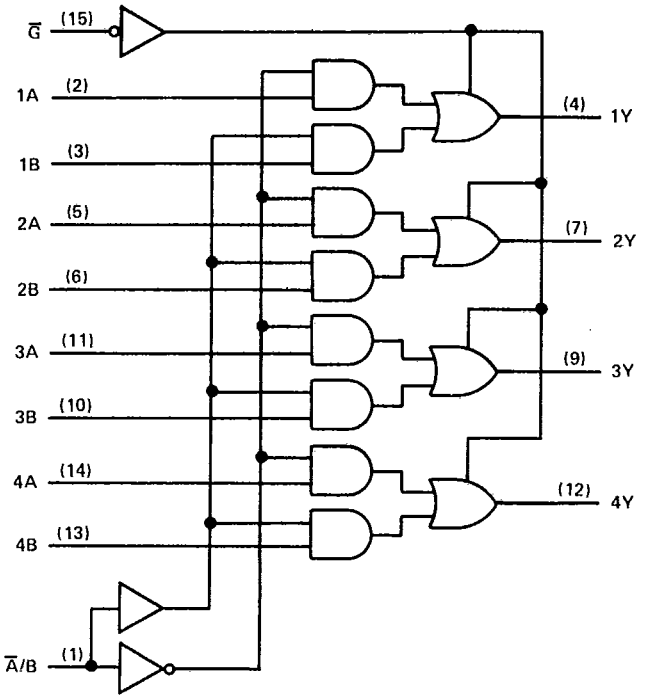
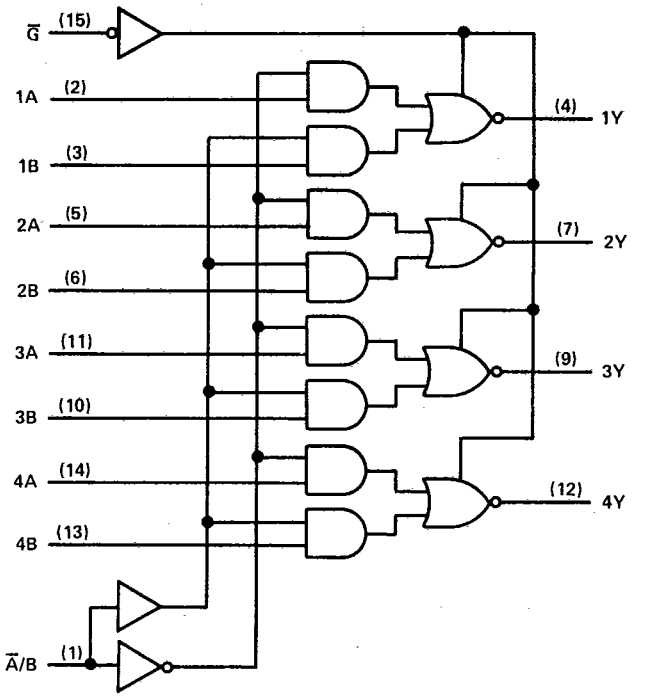
logic diagram (positive logic)

'ALS257, 'AS257



'ALS258, 'AS258



Pin numbers shown are for 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	7 V
Voltage applied to a disabled 3-state output	5.5 V
Operating free-air temperature range: SN54ALS', SN54AS	−55°C to 125°C
SN74ALS', SN74AS'	0°C to 70°
Storage temperature range	−65°C to 150°C

recommended operating conditions

		SN54ALS257 SN54ALS258			SN74ALS257 SN74ALS258			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			−1			−2.6	mA
I_{OL}	Low-level output current			12			24	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		SN54ALS257 SN54ALS258			SN74ALS257 SN74ALS258			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = −18 mA			−1.5			−1.5	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_{CC} = 4.5 V,	I_{OH} = −1 mA	2.4	3.3					
		V_{CC} = 4.5 V,	I_{OH} = −2.6 mA				2.4	3.2		
V_{OL}		V_{CC} = 4.5 V,	I_{OL} = 12 mA		0.25	0.4		0.25	0.4	V
		V_{CC} = 4.5 V,	I_{OL} = 24 mA					0.35	0.5	
I_{OZH}		V_{CC} = 5.5 V,	V_O = 2.7 V			20			20	μA
I_{OZL}		V_{CC} = 5.5 V,	V_O = 0.4 V			−20			−20	μA
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	−30		−112	−30		−112	mA
I_{CC}	'ALS257	V_{CC} = 5.5 V	Outputs high		3	6		3	6	mA
			Outputs low		8	12		8	12	
			Outputs disabled		9	14		9	14	
	'ALS258	V_{CC} = 5.5 V	Outputs high		2.5	4		2.5	4	
			Outputs low		7	11		7	11	
			Outputs disabled		8	13		8	13	

†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}.

'ALS257 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX				UNIT
			SN54ALS257		SN74ALS257		
			MIN	MAX	MIN	MAX	
t_{PLH}	A or B	Any Y	2	12	2	10	ns
t_{PHL}			2	14	2	12	
t_{PLH}	$\overline{A}$/B	Any Y	7	21	7	18	ns
t_{PHL}			6	25	6	22	
t_{PZH}	$\overline{G}$	Any Y	4	20	4	16	ns
t_{PZL}			5	22	5	18	
t_{PHZ}	$\overline{G}$	Any Y	2	12	2	10	ns
t_{PLZ}			4	35	3	15	

'ALS258 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX				UNIT
			SN54ALS258		SN74ALS258		
			MIN	MAX	MIN	MAX	
t_{PLH}	A or B	Any Y	1	12	2	8	ns
t_{PHL}			2	9	2	7	
t_{PLH}	$\overline{A}$/B	Any Y	5	28	8	20	ns
t_{PHL}			8	25	5	25	
t_{PZH}	$\overline{G}$	Any Y	5	20	5	18	ns
t_{PZL}			5	21	5	18	
t_{PHZ}	$\overline{G}$	Any Y	2	12	2	10	ns
t_{PLZ}			5	37	4	18	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1 of *ALS/AS Logic Data Book, 1986.*

recommended operating conditions

		SN54AS257 SN54AS258			SN74AS257 SN74AS258			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			0.8			0.8	V
I_{OH}	High-level output current			−12			−15	mA
I_{OL}	Low-level output current			32			48	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		SN54AS257 SN54AS258			SN74AS257 SN74AS258			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} = −2 mA	V_{CC}−2			V_{CC}−2			V
		V_{CC} = 4.5 V,	I_{OH} = −12 mA	2.4	3.3					
		V_{CC} = 4.5 V,	I_{OH} = −15 mA				2.4	3.2		
V_{OL}		V_{CC} = 4.5 V,	I_{OL} = 32 mA		0.25	0.5				V
		V_{CC} = 4.5 V,	I_{OL} = 48 mA					0.35	0.5	
I_{OZH}		V_{CC} = 5.5 V,	V_O = 2.7 V			50			50	μA
I_{OZL}		V_{CC} = 5.5 V,	V_O = 0.4 V			−50			−50	μA
I_I	A, B or $\overline{G}$	V_{CC} = 5.5 V,	V_I = 7 V			0.1			0.1	mA
	$\overline{A}$/B					0.2			0.2	
I_{IH}	A, B, or $\overline{G}$	V_{CC} = 5.5 V,	V_I = 2.7 V			20			20	μA
	$\overline{A}$/B					40			40	
I_{IL}	A, B, or $\overline{G}$	V_{CC} = 5.5 V,	V_I = 0.4 V			−0.5			−0.5	mA
	$\overline{A}$/B					−1			−1	
I_O‡		V_{CC} = 5.5 V,	V_O = 2.25 V	−30		−112	−30		−112	mA
I_{CC}	'AS257	V_{CC} = 5.5 V	Outputs high		12.1	19.7		12.1	19.7	mA
			Outputs low		19	30.6		19	30.6	
			Outputs disabled		19.7	31.9		19.7	31.9	
	'AS258	V_{CC} = 5.5 V	Outputs high		8.4	13.5		8.4	13.5	
			Outputs low		15.2	24.6		15.2	24.6	
			Outputs disabled		15.5	25.2		15.5	25.2	

†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}.

'AS257 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX				UNIT
			SN54AS257		SN74AS257		
			MIN	MAX	MIN	MAX	
t_{PLH}	A or B	Any Y	1	6.5	1	5.5	ns
t_{PHL}			1	7	1	6	
t_{PLH}	$\overline{A}$/B	Any Y	2	12	2	11	ns
t_{PHL}			2	10.5	2	10	
t_{PZH}	$\overline{G}$	Any Y	2	8.5	2	7.5	ns
t_{PZL}			2	10.5	2	9.5	
t_{PHZ}	$\overline{G}$	Any Y	1.5	8	1.5	6.5	ns
t_{PLZ}			2	8	2	7	

'AS258 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX				UNIT
			SN54AS258		SN74AS258		
			MIN	MAX	MIN	MAX	
t_{PLH}	A or B	Any Y	1	5.5	1	5	ns
t_{PHL}			1	5	1	4	
t_{PLH}	$\overline{A}$/B	Any Y	2	11	2	9.5	ns
t_{PHL}			2	11	2	10	
t_{PZH}	$\overline{G}$	Any Y	2	8.5	2	8	ns
t_{PZL}			2	11	2	10	
t_{PHZ}	$\overline{G}$	Any Y	1.5	7	1.5	6	ns
t_{PLZ}			2	8.5	2	6.5	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1 of *ALS/AS Logic Data Book, 1986*.