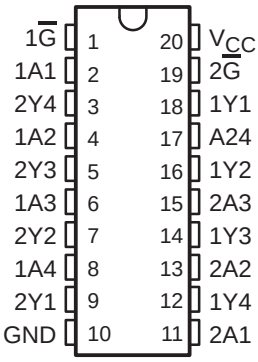
- **3-State Outputs Drive Bus Lines or Buffer Memory Address Registers**
- **PNP Inputs Reduce DC Loading**
- **Package Options include Plastic Small Outline Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs**
- **Dependable Texas instruments Quality and Reliability**

description

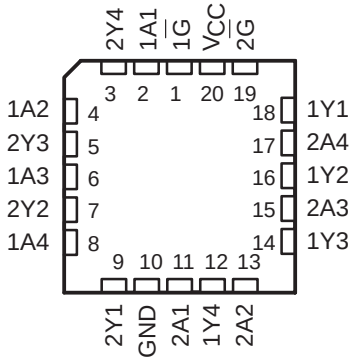
These octal buffers and line drivers are designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. Taken together with the 'ALS241 and 'AS241, the designer has a choice of selected combinations of inverting and noninverting outputs, symmetrically $\overline{G}$ (active-low output control) inputs, and complementary G and $\overline{G}$ inputs. These devices feature high fan-out and improved fan-in.

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.

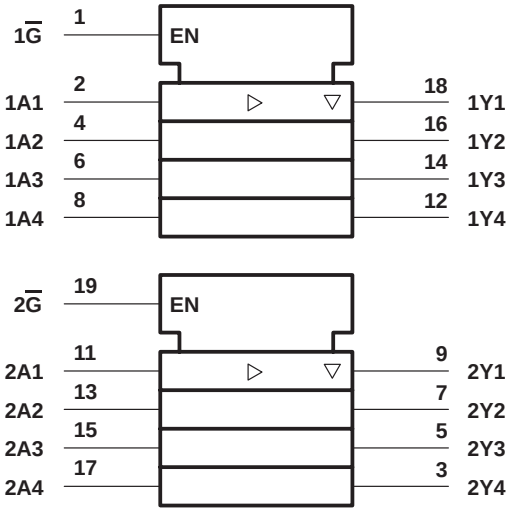
SN54ALS240A, SN54AS240 . . . J PACKAGE
SN74ALS240A, SN74AS240 . . . DW OR N PACKAGE
(TOP VIEW)



SN54ALS240A, SN54AS240 . . . FK PACKAGE
(TOP VIEW)

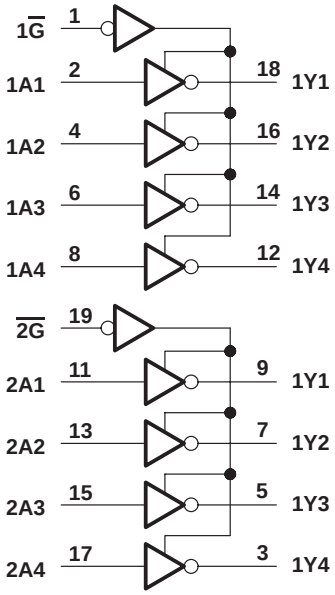


logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



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: SN54ALS240A . . . . . –55°C to 125°C
SN74ALS240A . . . . . 0°C to 70°C
Storage temperature range . . . . . –65°C to 150°C

recommended operating conditions

		SN54ALS240A			SN74ALS240A			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			–12			–15	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		SN54ALS240A			SN74ALS240A			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_{CC} = 4.5 V,	I_{OH} = –3mA	2.4	3.2		2.4	3.2		
	V_{CC} = 4.5 V,	I_{OH} = –12mA	2						
	V_{CC} = 4.5 V,	I_{OH} = –15mA				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	
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}	V_{CC} = 5.5 V	Outputs high		4	11		4	11	mA
		Outputs low		13	23		13	23	
		Outputs disabled		14	25		14	25	

† 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} = 5 V, C_L = 50 pF, R_1 = 500 Ω, R_2 = 500 Ω, T_A = 25°C	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R_1 = 500 Ω, R_2 = 500 Ω, T_A = MIN to MAX†				UNIT
			'ALS240A	SN54ALS240A		SN74ALS240A		
			TYP	MIN	MAX	MIN	MAX	
t_{PLH}	A	Y	6	2	22	2	9	ns
t_{PHL}			5	2	11	2	9	
t_{PZH}	$\overline{G}$	Y	9	4	34	5	13	ns
t_{PZL}			10	5	26	5	18	
t_{PHZ}	$\overline{G}$	Y	6	1	15	2	10	ns
t_{PLZ}			7	3	24	3	12	

† For conditions shown 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 . . . . . 7 V
Voltage applied to a disabled 3-state output . . . . . 5.5 V
Operating free-air temperature range: SN54AS240 . . . . . –55°C to 125°C
SN74AS240 . . . . . 0°C to 70°C
Storage temperature range . . . . . –65°C to 150°C

recommended operating conditions

		SN54AS240			SN74AS240			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			48			64	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		SN54AS240			SN74AS240			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 to 5.5 V,	I_{OH} = –3 mA	2.4	3.4		2.4	3.4		
		V_{CC} = 4.5 V,	I_{OH} = –12 mA	2.4						
		V_{CC} = 4.5 V,	I_{OH} = –15 mA				2.4			
V_{OL}		V_{CC} = 4.5 V,	I_{OL} = 48 mA		0.27	0.55				V
		V_{CC} = 4.75 V,	I_{OL} = 64 mA					0.31	0.55	
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		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}	’AS241A inputs	V_{CC} = 5.5 V,	V_I = 0.4 V			–1			–1	mA
	All others					–0.5			–0.5	
I_O‡		V_{CC} = 5.5 V,	V_O = 2.25 V	–50		–150	–50		–150	mA
I_{CC}		V_{CC} = 5.5 V	Outputs high		11	17		11	17	mA
			Outputs low		51	75		51	75	
			Outputs disabled		24	38		24	38	

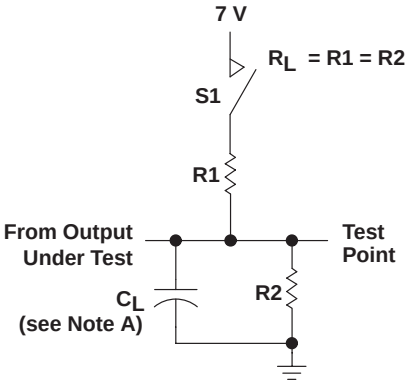
† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}.

switching characteristics (see Figure 1)

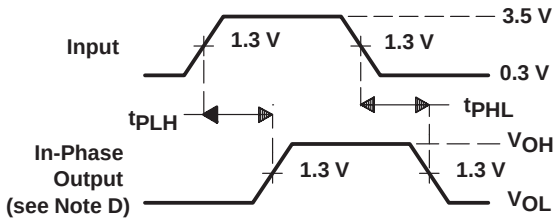
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX†				UNIT
			SN54AS240		SN74AS240		
			MIN	MAX	MIN	MAX	
t_{PLH}	A	Y	2	7	2	6.5	NS
t_{PHL}			2	6	2	5.7	
t_{PZH}	$1\overline{G}$	Y	2	7	2	6.4	NS
t_{PZL}			2	9.5	2	9	
t_{PHZ}	$\overline{G}$	Y	2	5.5	2	5	NS
t_{PLZ}			2	12.5	2	9.5	

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

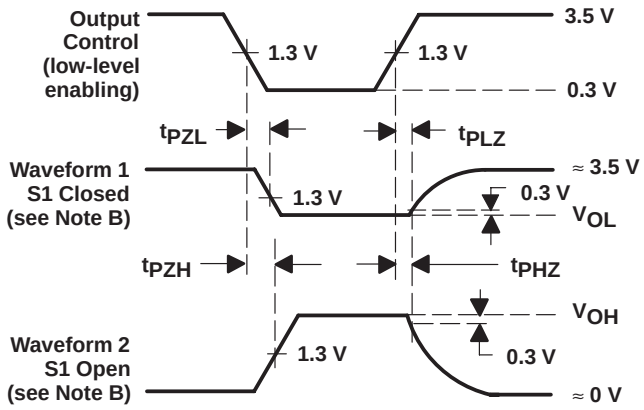
PARAMETER MEASUREMENT INFORMATION



LOAD CIRCUIT FOR
3-STATE OUTPUTS



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES. 3-STATE OUTPUTS

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

Figure 1

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