

SN54ALS1804A, SN54AS1804, SN74ALS1804A, SN74AS1804 HEX 2-INPUT NAND DRIVERS

AUGUST 1984 - REVISED MAY 1986

- High Capacitive Drive Capability
- 'ALS1804A Has Typical Delay Time of 4 ns ($C_L = 50$ pF) and Typical Power Dissipation of 3.4 mW per Gate
- 'AS1804 Has Typical Delay Time of 2.6 ns ($C_L = 50$ pF) and Typical Power Dissipation of Less than 9 mW per Gate
- Center V_{CC} and GND Configuration Provides Minimum Lead Inductance in High Current Switching Applications
- 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 devices contain six independent 2-input NAND drivers. They perform the Boolean functions $Y = \overline{A \cdot B}$ or $Y = \overline{A + B}$ in positive logic.

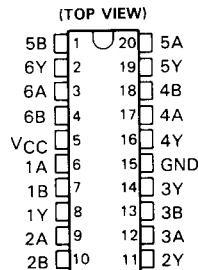
The center pin configuration used in the 'ALS1804A and 'AS1804 provides a reduction of lead inductance when compared to the 'ALS804A and 'AS804B. This reduction of lead inductance will minimize noise generated onto either the V_{CC} or GND bus. This reduction is significant in high current switching applications.

The SN54ALS1804A and SN54AS1804 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS1804A and SN74AS1804 are characterized for operation from 0°C to 70°C .

FUNCTION TABLE (each driver)

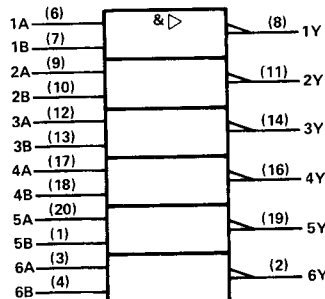
INPUTS		OUTPUT
A	B	Y
H	H	L
L	X	H
X	L	H

SN54ALS1804A, SN54AS1804 . . . J PACKAGE
SN74ALS1804A, SN74AS1804 . . . DW OR N PACKAGE



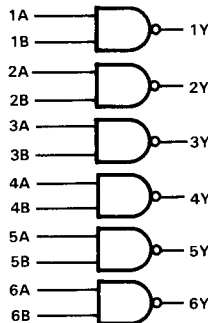
Use 'ALS804A or 'AS804B for chip carrier option.

logic symbol†



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

logic diagram (positive logic)



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SN54ALS1804A, SN74ALS1804A HEX 2-INPUT NAND DRIVERS

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

Supply voltage, V_{CC}	7 V
Input voltage	7 V
Operating free-air temperature range: SN54ALS1804A	-55°C to 125°C
SN74ALS1804A	0°C to 70°C
Storage temperature range	-65°C to 150°C

recommended operating conditions

		SN54ALS1804A			SN74ALS1804A			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	SN54ALS1804A			SN74ALS1804A			UNIT
		MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}	$V_{CC} = 4.5 \text{ V}, I_I = -18 \text{ mA}$			-1.2			-1.2	V
V_{OH}	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}, I_{OH} = -0.4 \text{ mA}$	$V_{CC} - 2$			$V_{CC} - 2$			V
	$V_{CC} = 4.5 \text{ V}, I_{OH} = -3 \text{ mA}$	2.4	3.2		2.4	3.2		
	$V_{CC} = 4.5 \text{ V}, I_{OH} = -12 \text{ mA}$	2						
	$V_{CC} = 4.5 \text{ V}, I_{OH} = -15 \text{ mA}$				2			
V_{OL}	$V_{CC} = 4.5 \text{ V}, I_{OL} = 12 \text{ mA}$	0.25	0.4		0.25	0.4		V
	$V_{CC} = 4.5 \text{ V}, I_{OL} = 24 \text{ mA}$				0.35	0.5		
I_I	$V_{CC} = 5.5 \text{ V}, V_I = 7 \text{ V}$			0.1			0.1	mA
I_{IH}	$V_{CC} = 5.5 \text{ V}, V_I = 2.7 \text{ V}$			20			20	μA
I_{IL}	$V_{CC} = 5.5 \text{ V}, V_I = 0.4 \text{ V}$			-0.1			-0.1	mA
$I_O^{\dagger}$	$V_{CC} = 5.5 \text{ V}, V_O = 2.25$	-30		-112	-30		-112	mA
I_{CCH}	$V_{CC} = 5.5 \text{ V}, V_I = 0 \text{ V}$		0.9	2.5		0.9	2.5	mA
I_{CCL}	$V_{CC} = 5.5 \text{ V}, V_I = 4.5 \text{ V}$		7	12		7	12	mA

† All typical values are at $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$.

‡ 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 Note 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	
			ALS1804A	SN54ALS1804A	SN74ALS1804A			
			TYP	MIN	MAX	MIN		MAX
t _{PLH}	A or B	Y	4	2	9	2	7	ns
t _{PHL}			4	2	9	2	8	

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

SN54AS1804, SN74AS1804 HEX 2-INPUT NAND DRIVERS

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

Supply voltage, V_{CC}	7 V
Input voltage	7 V
Operating free-air temperature range: SN54AS1804	-55°C to 125°C
SN74AS1804	0°C to 70°C
Storage temperature range	-65°C to 150°C

recommended operating conditions

		SN54AS1804			SN74AS1804			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			-40			-48	mA
I_{OL}	Low-level output current			40			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		SN54AS1804			SN74AS1804			UNIT		
			MIN	TYP†	MAX	MIN	TYP†	MAX			
V_{IK}	$V_{CC} = 4.5 \text{ V}$,	$I_I = -18 \text{ mA}$	-1.2			-1.2			V		
V_{OH}	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$,	$I_{OH} = -2 \text{ mA}$	$V_{CC}-2$			$V_{CC}-2$			V		
	$V_{CC} = 4.5 \text{ V}$,	$I_{OH} = -3 \text{ mA}$	2.4	3.2		2.4	3.2				
	$V_{CC} = 4.5 \text{ V}$,	$I_{OH} = -40 \text{ mA}$	2								
	$V_{CC} = 4.5 \text{ V}$,	$I_{OH} = -48 \text{ mA}$				2					
V_{OL}	$V_{CC} = 4.5 \text{ V}$,	$I_{OL} = 40 \text{ mA}$	0.25			0.5	0.35			0.5	V
	$V_{CC} = 4.5 \text{ V}$,	$I_{OL} = 48 \text{ mA}$									
I_I	$V_{CC} = 5.5 \text{ V}$,	$V_I = 7 \text{ V}$				0.1	0.1			mA	
I_{IH}	$V_{CC} = 5.5 \text{ V}$,	$V_I = 2.7 \text{ V}$				20	20			μA	
I_{IL}	$V_{CC} = 5.5 \text{ V}$,	$V_I = 0.4 \text{ V}$				-0.5	-0.5			mA	
$I_{O\ddagger}$	$V_{CC} = 5.5 \text{ V}$,	$V_O = 2.25 \text{ V}$	-50			-200	-50			-200	mA
I_{CCH}	$V_{CC} = 5.5 \text{ V}$,	$V_I = 0 \text{ V}$				3.5	5	3.5		5	mA
I_{CCL}	$V_{CC} = 5.5 \text{ V}$,	$V_I = 4.5 \text{ V}$				16	27	16		27	mA

†All typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$.

‡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 Note 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
			SN54AS1804		SN74AS1804		
			MIN	MAX	MIN	MAX	
t _{PLH}	A or B	Y	1	5	1	4	ns
t _{PHL}			1	5	1	4	

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