

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 VCC 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.

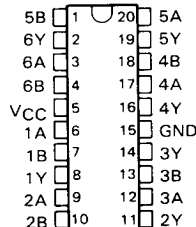
The center pin configuration used in the 'ALS1804A and 'AS1804 provides a reduction of lead inductance when compared to the 'ALS804A and 'AS804B. This reduction of lead inductance will minimize noise generated onto either the VCC or GND bus. This reduction is significant in high current switching applications.

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)

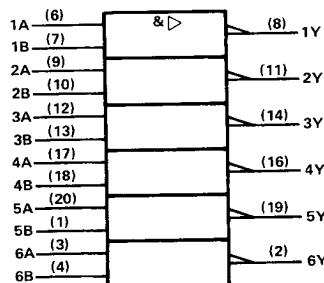
INPUTS		OUTPUT
A	B	Y
H	H	L
L	X	H
X	L	H

SN54ALS1804A, SN54AS1804 . . . J PACKAGE
SN74ALS1804A, SN74AS1804 . . . DW OR N PACKAGE
(TOP VIEW)



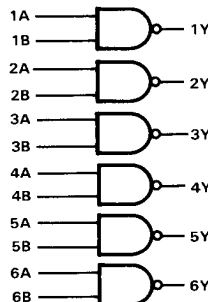
Use 'ALS804A or 'AS804B for chip carrier option.

logic symbol†



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

logic diagram (positive logic)



PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

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INSTRUMENTS

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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}	$V_{CC} = 4.5$ 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, $I_{OH} = -3$ mA	2.4	3.2		2.4	3.2		
	$V_{CC} = 4.5$ V, $I_{OH} = -12$ mA	2						
	$V_{CC} = 4.5$ V, $I_{OH} = -15$ mA				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_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, $V_O = 2.25$	-30		-112	-30		-112	mA
I_{CCH}	$V_{CC} = 5.5$ V, $V_I = 0$ V		0.9	2.5		0.9	2.5	mA
I_{CCL}	$V_{CC} = 5.5$ V, $V_I = 4.5$ V		7	12		7	12	mA

† 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 Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5\text{ V},$ $C_L = 50\text{ pF},$ $R_L = 500\ \Omega,$ $T_A = 25^\circ\text{C}$	$V_{CC} = 4.5\text{ V to }5.5\text{ V},$ $C_L = 50\text{ pF},$ $R_L = 500\ \Omega$ $T_A = \text{MIN to MAX}$			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.

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					V
	$V_{CC} = 4.5 \text{ V}$, $I_{OL} = 48 \text{ mA}$					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}	$V_{CC} = 5.5 \text{ V}$, $V_I = 0.4 \text{ V}$				-0.5			-0.5	mA
I_{O+}	$V_{CC} = 5.5 \text{ V}$, $V_O = 2.25 \text{ V}$		-50		-200	-50		-200	mA
I_{CCH}	$V_{CC} = 5.5 \text{ V}$, $V_I = 0 \text{ V}$				3.5			3.5	5 mA
I_{CCL}	$V_{CC} = 5.5 \text{ V}$, $V_I = 4.5 \text{ V}$				16			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.