

**SN54ALS04B, SN54AS04, SN74ALS04B, SN74AS04
HEX INVERTERS**

D2661, APRIL 1982—REVISED MAY 1986

- 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

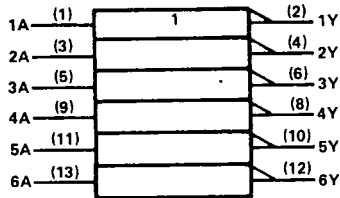
These devices contain six independent inverters. They perform the Boolean function $Y = \bar{A}$.

The SN54ALS04B and SN54AS04 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS04B and SN74AS04 are characterized for operation from 0°C to 70°C .

FUNCTION TABLE
(each inverter)

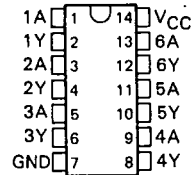
INPUT A	OUTPUT Y
H	L
L	H

logic symbol†



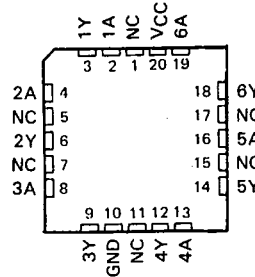
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12. Pin numbers shown are for D, J, and N packages.

SN54ALS04B, SN54AS04 . . . J PACKAGE
SN74ALS04B, SN74AS04 . . . D OR N PACKAGE
(TOP VIEW)



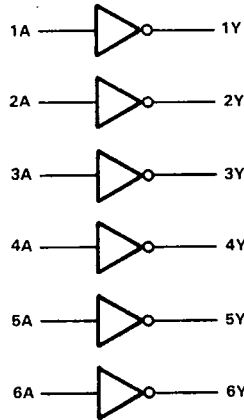
T-43-15

SN54ALS04B, SN54AS04 . . . FK PACKAGE
(TOP VIEW)



NC—No internal connection

logic diagram (positive logic)



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**SN54ALS04B, SN74ALS04B
HEX INVERTERS**

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

Supply voltage, VCC	7 V
Input voltage	7 V
Operating free-air temperature range: SN54ALS04B	-55°C to 125°C
SN74ALS04B	0°C to 70°C
Storage temperature range	-65°C to 150°C

recommended operating conditions

	SN54ALS04B			SN74ALS04B			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
VCC 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	-65	125		0	70		°C

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

PARAMETER	TEST CONDITIONS	SN54ALS04B			SN74ALS04B			UNIT
		MIN	TYP†	MAX	MIN	TYP†	MAX	
V _{IK}	VCC = 4.5 V, I _I = -18 mA			-1.2			V	
V _{OH}	VCC = 4.5 V to 5.5 V, I _{OH} = -0.4 mA	VCC-2			VCC-2			V
V _{OL}	VCC = 4.5 V, I _{OL} = 4 mA	0.25	0.4		0.25	0.4	V	
	VCC = 4.5 V, I _{OL} = 8 mA				0.35	0.5		
I _I	VCC = 5.5 V, V _I = 7 V		0.1			0.1	mA	
I _{IH}	VCC = 5.5 V, V _I = 2.7 V		20			20	µA	
I _{IL}	VCC = 5.5 V, V _I = 0.4 V		-0.1			-0.1	mA	
I _O ‡	VCC = 5.5 V, V _O = 2.25 V	-30	-112	-30	-112		mA	
I _{CCH}	VCC = 5.5 V, V _I = 0 V		0.65	1.1		0.65	1.1	mA
I _{CCL}	VCC = 5.5 V, V _I = 4.5 V		2.9	4.2		2.9	4.2	mA

†All typical values are at VCC = 5 V, TA = 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)	VCC = 4.5 V to 5.5 V, CL = 50 pF, RL = 500 Ω, TA = MIN to MAX				UNIT
			SN54ALS04B		SN74ALS04B		
			MIN	MAX	MIN	MAX	
t _{PLH}	A	Y	3	14	3	11	ns
t _{PHL}	A	Y	2	12	2	8	ns

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

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ALS and AS Circuits

SN54AS04, SN74AS04
HEX INVERTERS

T-43-15

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: SN54AS04	-55°C to 125°C
SN74AS04	0°C to 70°C
Storage temperature range	-65°C to 150°C

recommended operating conditions

		SN54AS04			SN74AS04			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			-2			-2	mA
I_{OL}	Low-level output current			20			20	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	SN54AS04			SN74AS04			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}	$V_{CC} = 4.5 V \text{ to } 5.5 V, I_{OH} = -2 mA$	$V_{CC}-2$			$V_{CC}-2$			V
V_{OL}	$V_{CC} = 4.5 V, I_{OL} = 20 mA$		0.35	0.5		0.35	0.5	V
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}	$V_{CC} = 5.5 V, V_I = 0.4 V$			-0.5			-0.5	mA
$I_{O†}$	$V_{CC} = 5.5 V, V_O = 2.25 V$	-30		-112	-30		-112	mA
I_{CCH}	$V_{CC} = 5.5 V, V_I = 0 V$		3	4.8		3	4.8	mA
I_{CCL}	$V_{CC} = 5.5 V, V_I = 4.5 V$		14	26.3		14	26.3	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)	$V_{CC} = 4.5 V \text{ to } 5.5 V,$ $C_L = 50 pF,$ $R_L = 500 \Omega,$ $T_A = \text{MIN to MAX}$				UNIT
			SN54AS04		SN74AS04		
			MIN	MAX	MIN	MAX	
t_{PLH}	A	Y	1	6	1	5	ns
t_{PHL}	A	Y	1	4.5	1	4	ns

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

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ALS and AS Circuits

