

TYPES SN54ALS04A, SN54AS04, SN74ALS04A, SN74AS04 HEX INVERTERS

D2661, APRIL 1982—REVISED DECEMBER 1983

- Package Options Include Both Plastic and Ceramic Chip Carriers in Addition to Plastic and Ceramic DIPs
- Dependable Texas Instruments Quality and Reliability

description

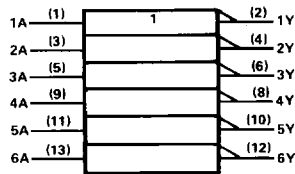
These devices contain six independent inverters. They perform the Boolean function $Y = \bar{A}$.

The SN54ALS04A and SN54AS04 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS04A and SN74AS04 are characterized for operation from 0°C to 70°C .

FUNCTION TABLE
(each inverter)

INPUT		OUTPUT	
A	Y	A	Y
H	L	L	H
L	H	H	L

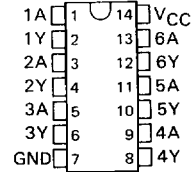
logic symbol



Pin numbers shown are for J and N packages.

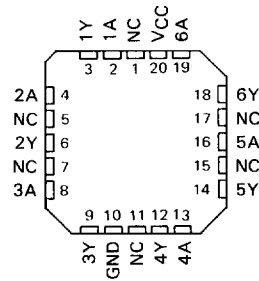
SN54ALS04A, SN54AS04 . . . J PACKAGE SN74ALS04A, SN74AS04 . . . N PACKAGE

(TOP VIEW)



SN54ALS04A, SN54AS04 . . . FH PACKAGE SN74ALS04A, SN74AS04 . . . FN PACKAGE

(TOP VIEW)



NC--No internal connection

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ALS AND AS CIRCUITS

TYPES SN54ALS04A, SN74ALS04A HEX INVERTERS

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: SN54ALS04A	-55 °C to 125 °C
SN74ALS04A	0 °C to 70 °C
Storage temperature range	-65 °C to 150 °C

recommended operating conditions

		SN54ALS04A			SN74ALS04A			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			-0.4			-0.4	mA
I_{OL}	Low-level output current			4			8	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	SN54ALS04A		SN74ALS04A		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_{OL}	$V_{CC} = 4.5$ V, $I_{OL} = 4$ mA	0.25	0.4		0.25	0.4	V	
	$V_{CC} = 4.5$ V, $I_{OL} = 8$ 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}^{\ddagger}	$V_{CC} = 5.5$ V, $V_O = 2.25$ V	-15	-70		-15	-70	mA	
I_{CCH}	$V_{CC} = 5.5$ V, $V_I = 0$ V		0.65	1.1		0.65	1.1	mA
I_{CCL}	$V_{CC} = 5.5$ V, $V_I = 4.5$ V		2.9	4.2		2.9	4.2	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 to 5.5 V, $C_L = 50$ pF, $R_L = 500$ Ω, $T_A = \text{MIN to MAX}$				UNIT
			SN54ALS04A		SN74ALS04A		
			MIN	MAX	MIN	MAX	
t_{PLH}	A	Y	3	14	3	11	ns
t_{PHL}	A	Y	2	12	2	8	ns

NOTE 1: For load circuit and voltage waveforms, see page 1-12.

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**TYPES SN54AS04, SN74AS04
HEX INVERTERS**

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	
$I_{O\ddagger}$	$V_{CC} = 5.5 V, V_O = 2.25 V$	-30		-112	-30		-112	mA	
I_{CCH}	$V_{CC} = 5.5 V, V_I = 0 V$			3			3	4.8	mA
I_{CCL}	$V_{CC} = 5.5 V, V_I = 4.5 V$			14			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: For load circuit and voltage waveforms, see page 1-12.

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ALS AND AS CIRCUITS**