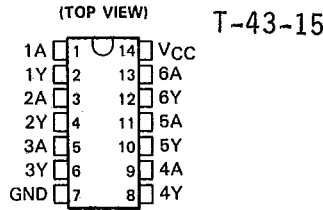


**SN54ALS1004, SN54AS1004A, SN74ALS1004, SN74AS1004A  
HEX INVERTING DRIVERS**

D2661, APRIL 1982 — REVISED MAY 1986

- 'AS1004A Offers High Capacitive-Drive Capability
- Driver Version of 'ALS04 and 'AS04
- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

SN54ALS1004, SN54AS1004A . . . J PACKAGE  
SN74ALS1004, SN74AS1004A . . . D OR N PACKAGE



**description**

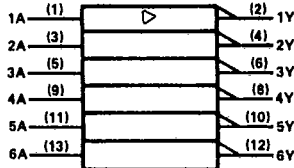
These devices contain six independent inverting drivers. They perform the Boolean function  $Y = \bar{A}$ .

The SN54ALS1004 and SN54AS1004A are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS1004 and SN74AS1004A are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

**FUNCTION TABLE**  
(each inverter)

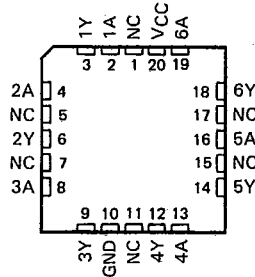
INPUT A	OUTPUT Y
H	L
L	H

**logic symbol†**



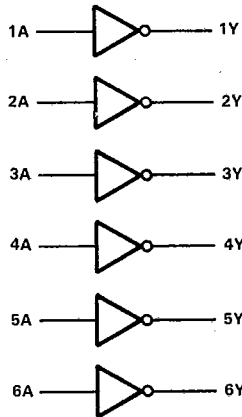
†This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12. Pin numbers shown are for D, J, and N packages.

SN54ALS1004, SN54AS1004A . . . FK PACKAGE  
(TOP VIEW)



NC—No internal connection

**logic diagram (positive logic)**



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ALS and AS Circuits

**PRODUCTION DATA**  
This document contains 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.



**SN54ALS1004, SN74ALS1004  
HEX INVERTING DRIVERS**

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: SN54ALS1004 .....	-55°C to 125°C
SN74ALS1004 .....	0°C to 70°C
Storage temperature range .....	-65°C to 150°C

**recommended operating conditions**

	SN54ALS1004			SN74ALS1004			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	SN54ALS1004		SN74ALS1004		UNIT	
		MIN	TYP†	MAX	MIN		TYP†
$V_{IK}$	$V_{CC} = 4.5 V, I_I = -18 mA$			-1.5		-1.5	V
$V_{OH}$	$V_{CC} = 4.5 \text{ to } 5.5 V, I_{OH} = -0.4 mA$	$V_{CC} - 2$		$V_{CC} - 2$		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	
$I_O^{\ddagger}$	$V_{CC} = 6.5 V, V_O = 2.25 V$	-30	-112	-30	-112	mA	
$I_{CCH}$	$V_{CC} = 5.5 V, V_I = 0 V$		0.84	3	0.84	3	mA
$I_{CCL}$	$V_{CC} = 5.5 V, V_I = 4.5 V$		7	12	7	12	mA

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

‡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
			SN54ALS1004		SN74ALS1004		
			MIN	MAX	MIN	MAX	
$t_{PLH}$	A	Y	1	9	1	7	ns
$t_{PHL}$			1	8	1	6	

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

**SN54AS1004A, SN74AS1004A  
HEX INVERTING DRIVERS**

T-43-15

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

Supply voltage, V <sub>CC</sub> .....	7 V
Input voltage .....	7 V
Operating free-air temperature range: SN54AS1004A .....	-55°C to 125°C
SN74AS1004A .....	0°C to 70°C
Storage temperature range .....	-65°C to 150°C

**recommended operating conditions**

	SN54AS1004A			SN74AS1004A			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub> Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V <sub>IH</sub> High-level input voltage	2			2			V
V <sub>IL</sub> Low-level input voltage			0.8			0.8	V
I <sub>OH</sub> High-level output current			-40			-48	mA
I <sub>OL</sub> Low-level output current			40			48	mA
T <sub>A</sub> Operating free-air temperature	-55	125		0	70		°C

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

PARAMETER	TEST CONDITIONS	SN54AS1004A			SN74AS1004A			UNIT
		MIN	TYP <sup>†</sup>	MAX	MIN	TYP <sup>†</sup>	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = 4.5 V, I <sub>I</sub> = -18 mA			-1.2			-1.2	V
V <sub>OH</sub>	V <sub>CC</sub> = 4.5 to 5.5 V, I <sub>OH</sub> = -2 mA	V <sub>CC</sub> - 2			V <sub>CC</sub> - 2			V
	V <sub>CC</sub> = 4.5 V, I <sub>OH</sub> = -3 mA	2.4	3.2		2.4	3.2		
	V <sub>CC</sub> = 4.5 V, I <sub>OH</sub> = -40 mA	2						
	V <sub>CC</sub> = 4.5 V, I <sub>OH</sub> = -48 mA				2			
V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 40 mA		0.25	0.5				V
	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 48 mA				0.35	0.5		
I <sub>I</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 7 V			0.1			0.1	mA
I <sub>IH</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 2.7 V			20			20	μA
I <sub>IL</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0.4 V			-0.5			-0.5	mA
I <sub>O</sub> <sup>‡</sup>	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 2.25 V	-50		-200	-50		-200	mA
I <sub>CCH</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0 V		3.5	5	3.5	5		mA
I <sub>CCL</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 4.5 V		16	27	16	27		mA

<sup>†</sup>All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C

<sup>‡</sup>The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I<sub>OS</sub>.

**switching characteristics (see note 1)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 4.5 V to 5.5 V, C <sub>L</sub> = 50 pF, R <sub>L</sub> = 500 Ω, T <sub>A</sub> = MIN to MAX				UNIT
			SN54AS1004A		SN74AS1004A		
			MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A or B	Y	1	5	1	4	ns
t <sub>PHL</sub>			1	5	1	4	

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

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