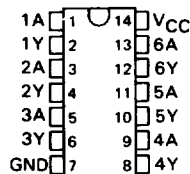


# TYPES SN54ALS1004, SN54AS1004, SN74ALS1004, SN74AS1004 HEX INVERTING DRIVERS

D2661, APRIL 1982—REVISED DECEMBER 1983

- 'AS1004 Offers High Capacitive-Drive Capability
- Driver Version of 'ALS04 and 'AS04
- Package Options Include Both Plastic and Ceramic Chip Carriers in Addition to Plastic and Ceramic DIPs
- Dependable Texas Instruments Quality and Reliability

SN54ALS1004, SN54AS1004 . . . J PACKAGE  
SN74ALS1004, SN74AS1004 . . . N PACKAGE  
(TOP VIEW)



## description

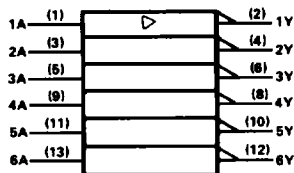
These devices contain six independent inverting drivers. They perform the Boolean function  $Y = \bar{A}$ .

The SN54ALS1004 and SN54AS1004 are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS1004 and SN74AS1004 are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

FUNCTION TABLE  
(each inverter)

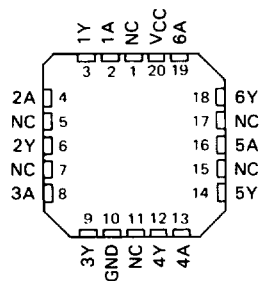
INPUT A	OUTPUT Y
H	L
L	H

## logic symbol



Pin numbers shown are for J and N packages.

SN54ALS1004, SN54AS1004 . . . FH PACKAGE  
SN74ALS1004, SN74AS1004 . . . FN PACKAGE  
(TOP VIEW)



NC—No internal connection

2  
ALS AND AS CIRCUITS

# TYPES SN54ALS1004, SN74ALS1004 HEX INVERTING 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: 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			0.8			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†	MAX	
$V_{IK}$	$V_{CC} = 4.5 \text{ V}$ , $I_I = -18 \text{ mA}$			-1.5			-1.5	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
$I_{O\ddagger}$	$V_{CC} = 5.5 \text{ V}$ , $V_O = 2.25 \text{ V}$	-30		-112	-30		-112	mA
$I_{CCH}$	$V_{CC} = 5.5 \text{ V}$ , $V_I = 0 \text{ V}$		0.84	3		0.84	3	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  $V_{CC} = 5 \text{ V}$ ,  $T_A = 25 \text{ °C}$ .

‡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)	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$ , $C_L = 50 \text{ pF}$ , $R_L = 500 \Omega$ , $T_A = \text{MIN to MAX}$				UNIT
			SN54ALS1004		SN74ALS1004		
			MIN	MAX	MIN	MAX	
$t_{PLH}$	A	Y	1	9	1	7	ns
$t_{PHL}$			1	8	1	6	

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

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ALS AND AS CIRCUITS

# TYPES SN54AS1004, SN74AS1004 HEX INVERTING 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: SN54AS1004 .....	-55°C to 125°C
SN74AS1004 .....	0°C to 70°C
Storage temperature range .....	-65°C to 150°C

## recommended operating conditions

		SN54AS1004			SN74AS1004			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			V
$I_{OH}$	High-level output current				-40			mA
$I_{OL}$	Low-level output current				40			mA
$T_A$	Operating free-air temperature	-55			125			°C

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

PARAMETER	TEST CONDITIONS	SN54AS1004			SN74AS1004			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, $I_{OH} = -2$ 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, $I_{OH} = -40$ mA	2						
	$V_{CC} = 4.5$ V, $I_{OH} = -48$ mA				2			
$V_{OL}$	$V_{CC} = 4.5$ V, $I_{OL} = 40$ mA	0.25			0.5			V
	$V_{CC} = 4.5$ V, $I_{OL} = 48$ mA				0.35			
$I_I$	$V_{CC} = 5.5$ 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	-135			-135			mA
$I_{CCH}$	$V_{CC} = 5.5$ V, $V_I = 0$ V	3.2			5			mA
$I_{CCL}$	$V_{CC} = 5.5$ V, $V_I = 4.5$ V	17.2			28			mA

†All typical values are at  $V_{CC} = 5$  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, $R_L = 500 \Omega$ , $T_A = \text{MIN to MAX}$				UNIT
			SN54AS1004		SN74AS1004		
			MIN	MAX	MIN	MAX	
$t_{PLH}$	A or B	Y	1	4.5	1	3.5	ns
$t_{PHL}$			1	4.5	1	3.5	

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

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ALS AND AS CIRCUITS