INTEGRATED CIRCUITS

DATA SHEET

74LVT04 3.3V Hex inverter

Product specification

1996 Aug 28

IC24 Data Handbook



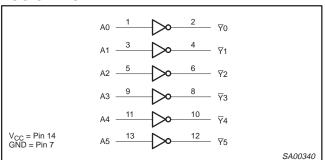


3.3V Hex inverter 74LVT04

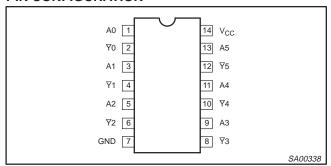
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS $T_{amb} = 25^{\circ}C;$ $GND = 0V$	TYPICAL	UNIT	
t _{PLH}	Propagation delay An to Yn	C _L = 50pF; V _{CC} = 3.3V	2.6 2.5	ns	
C _{IN}	Input capacitance	V _I = 0V or 3.0V	3	pF	
I _{CCL}	Total supply current	Outputs Low; V _{CC} = 3.6V	1.5	mA	

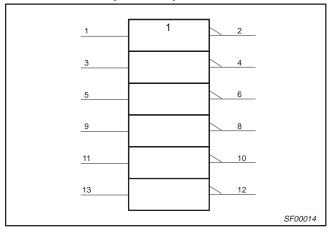
LOGIC DIAGRAM



PIN CONFIGURATION



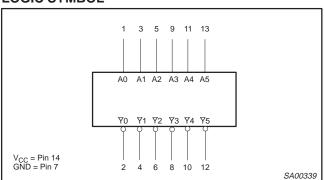
LOGIC SYMBOL (IEEE/IEC)



PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
1, 3, 5, 9, 11, 13	An	Data inputs
2, 4, 6, 8, 10, 12	₹n	Data outputs
7	GND	Ground (0V)
14	V _{CC}	Positive supply voltage

LOGIC SYMBOL



FUNCTION TABLE

INPUTS	OUTPUT
An	₹n
L	Н
Н	L

NOTES:

H = High voltage levelL = Low voltage level

ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	OUTSIDE NORTH AMERICA	NORTH AMERICA	DWG NUMBER
14-Pin Plastic SO	-40°C to +85°C	74LVT04 D	74LVT04 D	SOT108-1
14-Pin Plastic SSOP	-40°C to +85°C	74LVT04 DB	74LVT04 DB	SOT337-1
14-Pin Plastic TSSOP	-40°C to +85°C	74LVT04 PW	74LVT04PW DH	SOT402-1

3.3V Hex inverter 74LVT04

ABSOLUTE MAXIMUM RATINGS^{1, 2}

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
V _{CC}	DC supply voltage		-0.5 to +4.6	V
I _{IK}	DC input diode current	V ₁ < 0	-50	mA
VI	DC input voltage ³		-0.5 to +7.0	V
lok	DC output diode current	V _O < 0	-50	mA
V _{OUT}	DC output voltage ³	Output in Off or High state	-0.5 to +7.0	V
	DC output outroot	Output in High state	-32	A
Гоит	DC output current	Output in Low state	64	mA
T _{stg}	Storage temperature range		-65 to 150	°C

NOTES:

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIM	UNIT	
STWIBOL	FARAWEIER	MIN	MAX	UNIT
V _{CC}	DC supply voltage	2.7	3.6	V
VI	Input voltage	0	5.5	V
V _{IH}	High-level input voltage	2.0		V
V _{IL}	Low-level Input voltage		0.8	V
Іон	High-level output current		-20	mA
I _{OL}	Low-level output current		32	mA
Δt/Δν	Input transition rise or fall rate; Outputs enabled		10	ns/V
T _{amb}	Operating free-air temperature range	-40	+85	°C

1996 Aug 28

^{1.} Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability. The maximum junction temperature of this integrated circuit should not exceed 150°C.

3. The input and output negative voltage ratings may be exceeded if the input and output clamp current ratings are observed.

3.3V Hex inverter 74LVT04

DC ELECTRICAL CHARACTERISTICS

Over recommended operating conditions Voltages are referenced to GND (ground = 0V)

			ı	IMITS		
SYMBOL	PARAMETER	TEST CONDITIONS	Temp = -	UNIT		
			MIN	TYP ¹	MAX	1
V _{IK}	Input clamp voltage	V _{CC} = 2.7V; I _{IK} = -18mA			-1.2	V
		$V_{CC} = 2.7 \text{ to } 3.6 \text{V}; I_{OH} = -100 \mu\text{A}$	V _{CC} -0.2			
V _{OH}	High-level output voltage	V _{CC} = 2.7V; I _{OH} = -6mA	2.4			٧
		V _{CC} = 3.0V; I _{OH} = -20mA	2.0			1
		V _{CC} = 2.7V; I _{OL} = 100μA			0.2	
V _{OL}	Low-level output voltage	V _{CC} = 2.7V; I _{OL} = 24mA			0.5	V
		V _{CC} = 3.0V; I _{OL} = 32mA			0.5	
	Input looke as augrent	$V_{CC} = 0 \text{ or } 3.6V; V_I = 5.5V$			10	
II	Input leakage current	$V_{CC} = 3.6V$; $V_I = V_{CC}$ or GND			±1	μΑ
I _{OFF}	Output off current	$V_{CC} = 0V; V_{I} \text{ or } V_{O} = 0 \text{ to } 4.5V$			±100	μΑ
I _{CCH}	Quiescent aupply aurrent	V_{CC} = 3.6V; Outputs High, V_{I} = GND or V_{CC} , I_{O} = 0			0.02	
I _{CCL}	Quiescent supply current	V_{CC} = 3.6V; Outputs Low, V_{I} = GND or V_{CC} , I_{O} = 0	1.5		3	mA
Δl _{CC}	Additional supply current per input pin ²	V_{CC} = 3V to 3.6V; One input at V_{CC} –0.6V, Other inputs at V_{CC} or GND			0.2	μА
C _I	Input capacitance	V _I = 3V or 0		3		pF

- All typical values are at V_{CC} = 3.3V and T_{amb} = 25°C.
 This is the increase in supply current for each input at the specificed voltage level other than V_{CC} or GND.

AC CHARACTERISTICS

GND = 0V; $t_R = t_F = 2.5 \text{ns}$; $C_L = 50 \text{pF}$, $R_L = 500 \Omega$; $T_{amb} = -40 ^{\circ} \text{C}$ to $+85 ^{\circ} \text{C}$.

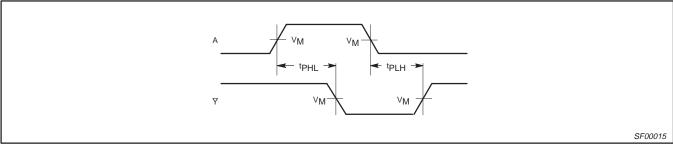
SYMBOL	PARAMETER	WAVEFORM	Vcc	$= 3.3 V \pm 0$	V _{CC} = 2.7V	UNIT	
			MIN	TYP ¹	MAX	MAX	
t _{PLH} t _{PHL}	Propagation delay An to Yn	1	1.0 1.0	2.6 2.5	3.9 3.5	4.7 3.2	ns

NOTE:

1. All typical values are at V_{CC} = 3.3V and T_{amb} = 25°C.

AC WAVEFORMS

 $V_M = 1.5V$, $V_{IN} = GND$ to 2.7V

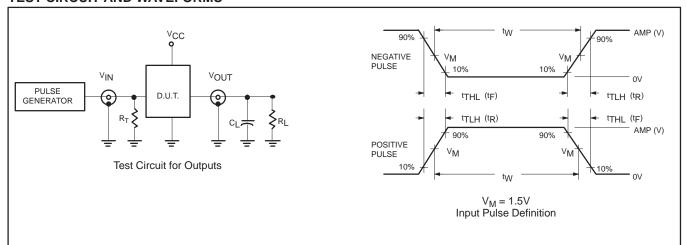


Waveform 1. Propagation delay for inverting outputs

1996 Aug 28

3.3V Hex inverter 74LVT04

TEST CIRCUIT AND WAVEFORMS



DEFINITIONS

R_L = Load resistor; see AC CHARACTERISTICS for value.

 $C_L = Load$ capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.

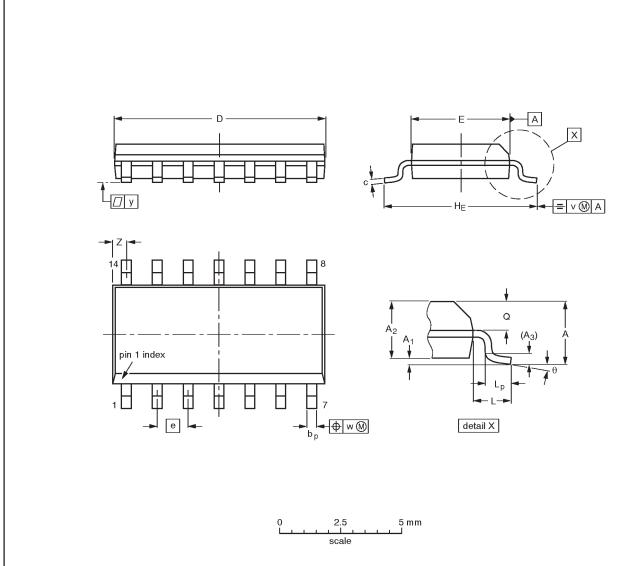
FAMILY	INPUT PULSE REQUIREMENTS											
FAMILI	Amplitude	Amplitude Rep. Rate		t _R	t _F							
74LVT	2.7V	≤10MHz	500ns	≤2.5ns	≤2.5ns							

SV00022

3.3V Hex inverter 74LVT04

SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	Α1	A ₂	A ₃	bp	С	D ⁽¹⁾	E ⁽¹⁾	е	HE	L	Lp	Q	v	w	у	Z ⁽¹⁾	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	8.75 8.55	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8°
inches	1 // //60	0.0098 0.0039		0.01		0.0098 0.0075	0.35 0.34	0.16 0.15	0.050	0.24 0.23	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	0°

Note

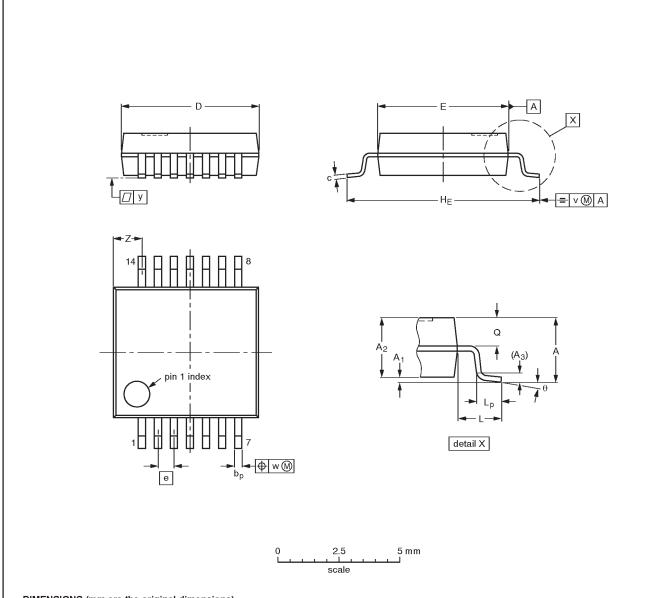
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE		REFER	EUROPEAN	ISSUE DATE	ı		
VERSION	IEC	JEDEC	EIAJ		PROJECTION	ISSUE DATE	
SOT108-1	076E06\$	MS-012AB				91-08-13 95-01-23	

3.3V Hex inverter 74LVT04

SSOP14: plastic shrink small outline package; 14 leads; body width 5.3 mm

SOT337-1



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A ₁	A ₂	A ₃	bp	c	D ⁽¹⁾	E ⁽¹⁾	е	HE	L	Lp	Ø	٧	w	у	Z ⁽¹⁾	θ
mm	2.0	0.21 0.05	1.80 1.65	0.25	0.38 0.25	0.20 0.09	6.4 6.0	5.4 5.2	0.65	7.9 7.6	1.25	1.03 0.63	0.9 0.7	0.2	0.13	0.1	1.4 0.9	8° 0°

Note

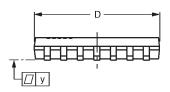
1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

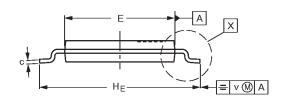
OUTLINE		REFER	EUROPEAN	ISSUE DATE			
VERSION	IEC	JEDEC	EIAJ		PROJECTION	ISSUE DATE	
SOT337-1		MO-150AB				-95-02-04 96-01-18	

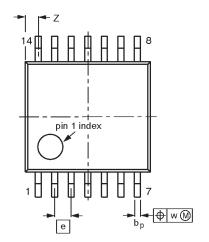
3.3V Hex inverter 74LVT04

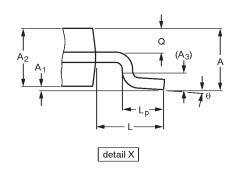
TSSOP14: plastic thin shrink small outline package; 14 leads; body width 4.4 mm

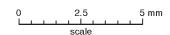
SOT402-1











DIMENSIONS (mm are the original dimensions)

UNIT	A max.	Α1	A ₂	A ₃	bр	c	D ⁽¹⁾	E ⁽²⁾	е	HE	L	Lp	Ø	v	w	у	Z ⁽¹⁾	θ
mm	1.10	0.15 0.05	0.95 0.80	0.25	0.30 0.19	0.2 0.1	5.1 4.9	4.5 4.3	0.65	6.6 6.2	1.0	0.75 0.50	0.4 0.3	0.2	0.13	0.1	0.72 0.38	8° 0°

Notes

- 1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
- 2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

OUTLINE		REFER	EUROPEAN	ISSUE DATE			
VERSION	IEC	JEDEC	EIAJ		PROJECTION	ISSUE DATE	
SOT402-1		MO-153				94-07-12 95-04-04	

3.3V Hex inverter 74LVT04

NOTES

1996 Aug 28

9

3.3V Hex inverter 74LVT04

DEFINITIONS							
Data Sheet Identification	Product Status	Definition					
Objective Specification	Formative or in Design	This data sheet contains the design target or goal specifications for product development. Specifications may change in any manner without notice.					
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