

# DATA SHEET

**74LV11**

Triple 3-input AND gate

Product data  
Supersedes data of 1998 Apr 20

2003 Mar 04

## Triple 3-input AND gate

74LV11

## FEATURES

- Optimized for Low Voltage applications: 1.0 V to 3.6 V
- Accepts TTL input levels between  $V_{CC} = 2.7$  V and  $V_{CC} = 3.6$  V
- Typical  $V_{OLP}$  (output ground bounce) < 0.8 V at  $V_{CC} = 3.3$  V,  $T_{amb} = 25$  °C
- Typical  $V_{OHV}$  (output  $V_{OH}$  undershoot) > 2 V at  $V_{CC} = 3.3$  V,  $T_{amb} = 25$  °C
- Output capability: standard
- $I_{CC}$  category: SSI

## DESCRIPTION

The 74LV11 is a low-voltage Si-gate CMOS device and is pin and function compatible with 74HC/HCT11.

The 74LV11 provides the 3-input AND function.

## QUICK REFERENCE DATA

GND = 0 V;  $T_{amb} = 25$  °C;  $t_r = t_f \leq 2.5$  ns

SYMBOL	PARAMETER	CONDITIONS	TYPICAL	UNIT
$t_{PHL}/t_{PLH}$	Propagation delay nA, nB, nC to nY	$C_L = 15$ pF; $V_{CC} = 3.3$ V	10	ns
$C_I$	Input capacitance		3.5	pF
$C_{PD}$	Power dissipation capacitance per gate	See Notes 1 and 2	18	pF

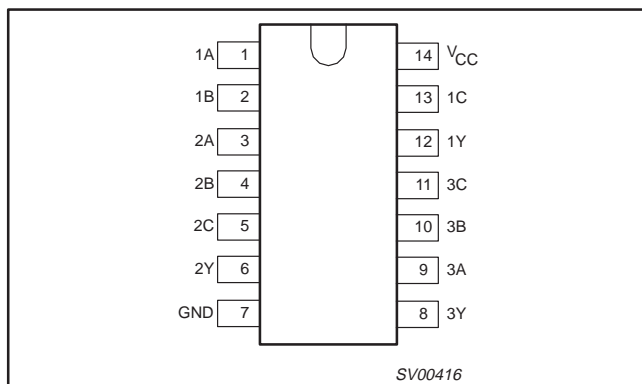
## NOTES:

1.  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu$ W)  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma (C_L \times V_{CC}^2 \times f_o)$  where:  
 $N$  = number of outputs switching;  
 $f_i$  = input frequency in MHz;  $C_L$  = output load capacitance in pF;  
 $f_o$  = output frequency in MHz;  $V_{CC}$  = supply voltage in V;  
 $\Sigma (C_L \times V_{CC}^2 \times f_o)$  = sum of the outputs.
2. The condition is  $V_I = GND$  to  $V_{CC}$ .

## ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	ORDER CODE	PKG. DWG. #
14-Pin Plastic SO	-40 °C to +125 °C	74LV11D	SOT108-1

## PIN CONFIGURATION



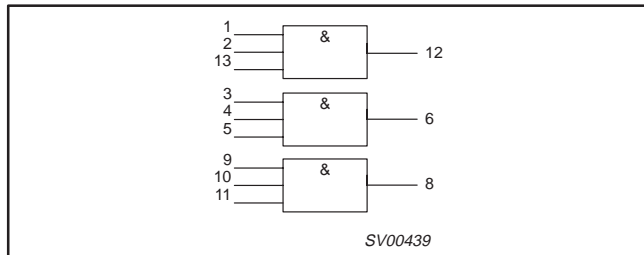
## PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
1, 3, 9	1A – 3A	Data inputs
2, 4, 10	1B – 3B	Data inputs
7	GND	Ground (0 V)
12, 6, 8	1Y – 3Y	Data outputs
13, 5, 11	1C – 3C	Data inputs
14	$V_{CC}$	Positive supply voltage

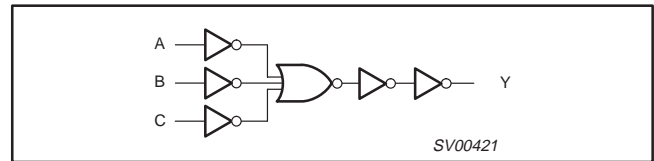
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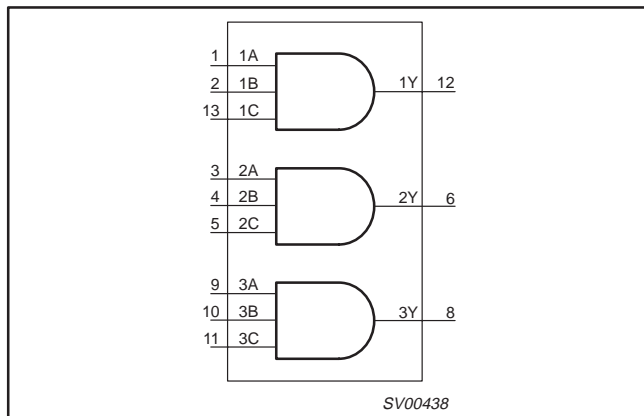
## LOGIC SYMBOL (IEEE/IEC)



## LOGIC DIAGRAM (ONE GATE)



## LOGIC SYMBOL



## FUNCTION TABLE

INPUTS			OUTPUT
nA	nB	nC	nY
L	L	L	L
L	L	H	L
L	H	L	L
L	H	H	L
H	L	L	L
H	L	H	L
H	H	L	L
H	H	H	H

### NOTES:

H = HIGH voltage level  
L = LOW voltage level

## RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
$V_{CC}$	DC supply voltage	See Note 1	1.0	3.3	3.6	V
$V_I$	Input voltage		0	–	$V_{CC}$	V
$V_O$	Output voltage		0	–	$V_{CC}$	V
$T_{amb}$	Operating ambient temperature range in free air	See DC and AC characteristics	–40 –40		+85 +125	°C
$t_r, t_f$	Input rise and fall times	$V_{CC} = 1.0V$ to $2.0V$	–	–	500	ns/V
		$V_{CC} = 2.0V$ to $2.7V$	–	–	200	ns/V
		$V_{CC} = 2.7V$ to $3.6V$	–	–	100	ns/V

### NOTE:

1. The LV is guaranteed to function down to  $V_{CC} = 1.0$  V (input levels GND or  $V_{CC}$ ); DC characteristics are guaranteed from  $V_{CC} = 1.2$  V to  $V_{CC} = 3.6$  V.

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**ABSOLUTE MAXIMUM RATINGS<sup>1, 2</sup>**

In accordance with the Absolute Maximum Rating System (IEC 134). Voltages are referenced to GND (ground = 0 V).

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
$V_{CC}$	DC supply voltage		-0.5 to +4.6	V
$\pm I_{IK}$	DC input diode current	$V_I < -0.5$ or $V_I > V_{CC} + 0.5$ V	20	mA
$\pm I_{OK}$	DC output diode current	$V_O < -0.5$ or $V_O > V_{CC} + 0.5$ V	50	mA
$\pm I_O$	DC output source or sink current (standard outputs)	$-0.5V < V_O < V_{CC} + 0.5$ V	25	mA
$\pm I_{GND}$ , $\pm I_{CC}$	DC $V_{CC}$ or GND current for types with standard outputs		50	mA
$T_{stg}$	Storage temperature range		-65 to +150	°C
$P_{TOT}$	Power dissipation per package – plastic mini-pack (SO)	for temperature range: -40 °C to +125 °C above +70 °C derate linearly with 8 mW/K	500	mW

**NOTES:**

- 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 input and output voltage ratings may be exceeded if the input and output current ratings are observed.

**DC CHARACTERISTICS**

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

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS					UNIT
			-40 °C to +85 °C			-40 °C to +125 °C		
			MIN	TYP <sup>1</sup>	MAX	MIN	MAX	
$V_{IH}$	HIGH level Input voltage	$V_{CC} = 1.2$ V	0.9			0.9		V
		$V_{CC} = 2.0$ V	1.4			1.4		
		$V_{CC} = 2.7$ V to 3.6 V	2.0			2.0		
$V_{IL}$	LOW level Input voltage	$V_{CC} = 1.2$ V			0.3		0.3	V
		$V_{CC} = 2.0$ V			0.6		0.6	
		$V_{CC} = 2.7$ V to 3.6 V			0.8		0.8	
$V_{OH}$	HIGH level output voltage; all outputs	$V_{CC} = 1.2$ V; $V_I = V_{IH}$ or $V_{IL}$ ; $-I_O = 100$ $\mu$ A		1.2				V
		$V_{CC} = 2.0$ V; $V_I = V_{IH}$ or $V_{IL}$ ; $-I_O = 100$ $\mu$ A	1.8	2.0		1.8		
		$V_{CC} = 2.7$ V; $V_I = V_{IH}$ or $V_{IL}$ ; $-I_O = 100$ $\mu$ A	2.5	2.7		2.5		
		$V_{CC} = 3.0$ V; $V_I = V_{IH}$ or $V_{IL}$ ; $-I_O = 100$ $\mu$ A	2.8	3.0		2.8		
$V_{OH}$	HIGH level output voltage; STANDARD outputs	$V_{CC} = 3.0$ V; $V_I = V_{IH}$ or $V_{IL}$ ; $-I_O = 6$ mA	2.40	2.82		2.20		V
$V_{OL}$	LOW level output voltage; all outputs	$V_{CC} = 1.2$ V; $V_I = V_{IH}$ or $V_{IL}$ ; $I_O = 100$ $\mu$ A		0				V
		$V_{CC} = 2.0$ V; $V_I = V_{IH}$ or $V_{IL}$ ; $I_O = 100$ $\mu$ A		0	0.2		0.2	
		$V_{CC} = 2.7$ V; $V_I = V_{IH}$ or $V_{IL}$ ; $I_O = 100$ $\mu$ A		0	0.2		0.2	
		$V_{CC} = 3.0$ V; $V_I = V_{IH}$ or $V_{IL}$ ; $I_O = 100$ $\mu$ A		0	0.2		0.2	
$V_{OL}$	LOW level output voltage; STANDARD outputs	$V_{CC} = 3.0$ V; $V_I = V_{IH}$ or $V_{IL}$ ; $I_O = 6$ mA		0.25	0.40		0.50	V
$I_I$	Input leakage current	$V_{CC} = 3.6$ V; $V_I = V_{CC}$ or GND			1.0		1.0	$\mu$ A
$I_{CC}$	Quiescent supply current; SSI	$V_{CC} = 3.6$ V; $V_I = V_{CC}$ or GND; $I_O = 0$			20.0		40	$\mu$ A
$\Delta I_{CC}$	Additional quiescent supply current per input	$V_{CC} = 2.7$ V to 3.6 V; $V_I = V_{CC} - 0.6$ V			500		850	$\mu$ A

**NOTE:**

- All typical values are measured at  $T_{amb} = 25$  °C.

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## AC CHARACTERISTICS

GND = 0V;  $t_r = t_f \leq 2.5\text{ns}$ ;  $C_L = 50\text{pF}$ ;  $R_L = 1\text{K}\Omega$

SYMBOL	PARAMETER	WAVEFORM	CONDITION	LIMITS					UNIT
				-40 °C to +85 °C			-40 °C to +125 °C		
				$V_{CC}(\text{V})$	MIN	TYP <sup>1</sup>	MAX	MIN	
$t_{PHL/PLH}$	Propagation delay nA, nB, nC to nY	Figures 1, 2	1.2		60				ns
			2.0		20	39		46	
			2.7		15	29		34	
			3.0 to 3.6		11 <sup>2</sup>	23		27	

**NOTES:**

1. Unless otherwise stated, all typical values are measured at  $T_{amb} = 25^\circ\text{C}$ .
2. Typical values are measured at  $V_{CC} = 3.3\text{V}$ .

## AC WAVEFORMS

$V_M = 1.5\text{V}$  at  $V_{CC} \geq 2.7\text{V}$

$V_M = 0.5 \times V_{CC}$  at  $V_{CC} < 2.7\text{V}$

$V_{OL}$  and  $V_{OH}$  are the typical output voltage drop that occur with the output load.

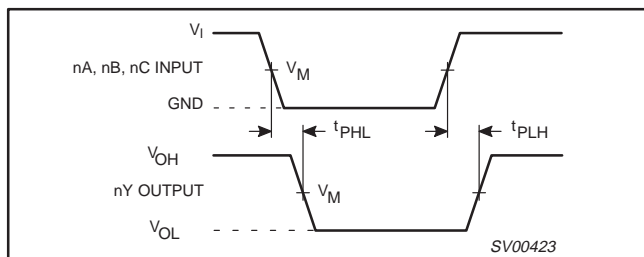


Figure 1. Input (nA, nB, nC) to output (nY) propagation delays.

## TEST CIRCUIT

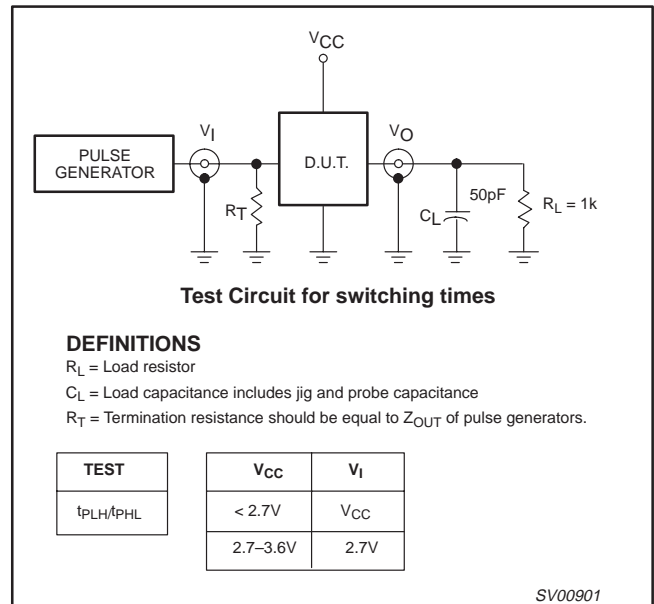


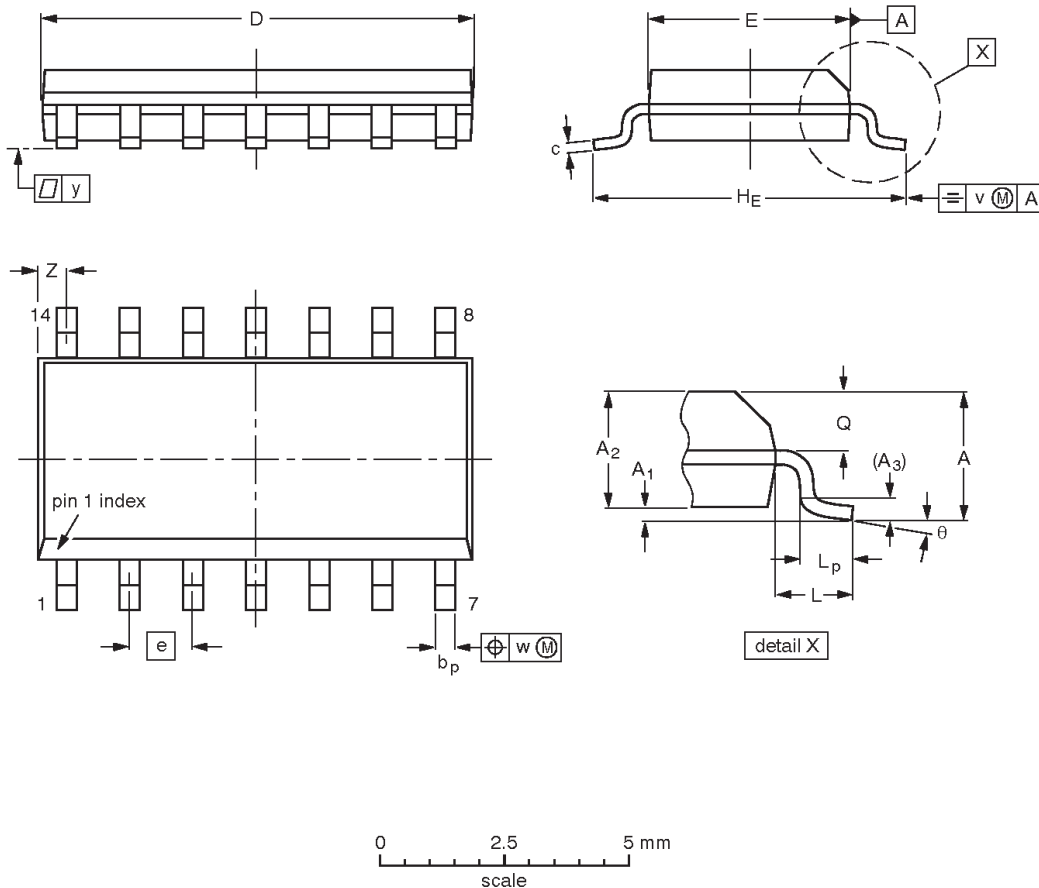
Figure 2. Load circuitry for switching times.

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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.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	HE	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	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° 0°
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.35 0.34	0.16 0.15	0.050	0.244 0.228	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	

**Note**

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

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT108-1	076E06	MS-012				97-05-22 99-12-27

## Triple 3-input AND gate

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## REVISION HISTORY

Rev	Date	Description
_3	20030304	<b>Product data (9397 750 11194). ECN 853-1894 29487 of 07 February 2003. Supersedes data of 1998 Apr 20 (9397 750 04408).</b> Modifications: <ul style="list-style-type: none"> <li>• Delete DIL, SSOP and TSSOP package ordering and package outlines (discontinued options).</li> <li>• Correct power dissipation formula.</li> </ul>
_2	19980420	<b>Product specification (9397 750 04408). ECN 853-1894 19256 of 20 April 1998. Supersedes data of 1997 Feb 03.</b>

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Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2] [3]</sup>	Definitions
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