Product data sheet

1 General description

The 74LVC11 provides three 3-input AND functions.

2 Features and benefits

- Wide supply voltage range from 1.2 V to 3.6 V
- Inputs accept voltages up to 5.5 V
- CMOS low power consumption
- · Direct interface with TTL levels
- Complies with JEDEC standard:
 - **–** JESD8-7A (1.65 V to 1.95 V)
 - JESD8-5A (2.3 V to 2.7 V)
 - JESD8-C/JESD36 (2.7 V to 3.6 V)
- ESD protection:
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-B exceeds 200 V
 - CDM JESD22-C101E exceeds 1000 V
- Specified from -40 °C to +85 °C and -40 °C to +125 °C



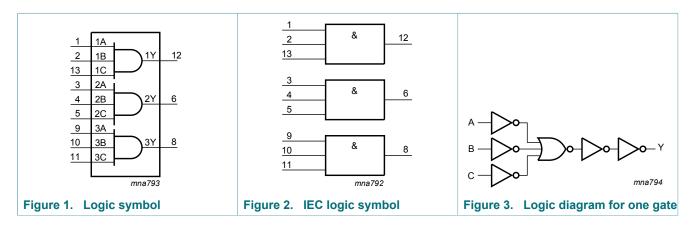
Triple 3-input AND gate

3 Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74LVC11D	-40 °C to +125 °C	SO14	plastic small outline package; 14 leads; body width 3.9 mm	SOT108-1
74LVC11DB	-40 °C to +125 °C	SSOP14	plastic shrink small outline package; 14 leads; body width 5.3 mm	SOT337-1
74LVC11PW	-40 °C to +125 °C	TSSOP14	plastic thin shrink small outline package; 14 leads; body width 4.4 mm	SOT402-1
74LVC11BQ	-40 °C to +125 °C	DHVQFN14	plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 14 terminals; body 2.5 x 3 x 0.85 mm	SOT762-1

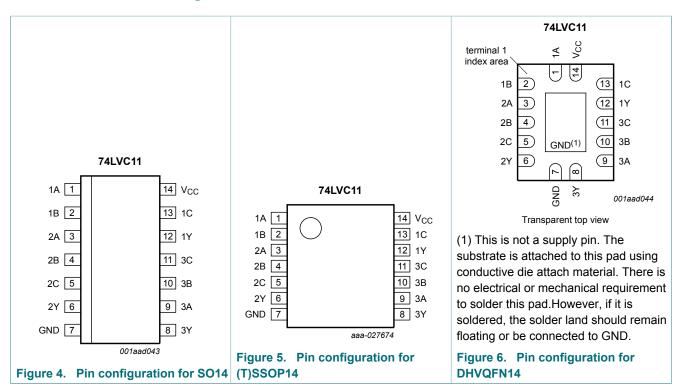
4 Functional diagram



Triple 3-input AND gate

5 Pinning information

5.1 Pinning



5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
1A, 2A, 3A	1, 3, 9	data input
1B, 2B, 3B	2, 4, 10	data input
1C, 2C, 3C	13, 5, 11	data input
1Y, 2Y, 3Y	12, 6, 8	data output
GND	7	ground (0 V)
V _{CC}	14	supply voltage

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Functional description

Table 3. Function selection

 $H = HIGH \ voltage \ level; \ L = LOW \ voltage \ level; \ X = don't \ care$

Input	Output		
nA	nB	nC	nY
L	X	X	L
X	L	X	L
X	X	L	L
Н	Н	Н	Н

Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions		Min	Max	Unit
V _{CC}	supply voltage			-0.5	+6.5	V
I _{IK}	input clamping current	V _I < 0 V		-50	-	mA
VI	input voltage		[1]	-0.5	+6.5	V
I _{OK}	output clamping current	$V_O > V_{CC}$ or $V_O < 0 V$		-	±50	mA
Vo	output voltage		[2]	-0.5	V _{CC} + 0.5	V
Io	output current	$V_O = 0 V \text{ to } V_{CC}$		-	±50	mA
Icc	supply current			-	100	mA
I _{GND}	ground current			-100	-	mA
P _{tot}	total power dissipation	T _{amb} = -40 °C to +125 °C	[3]	-	500	mW
T _{stg}	storage temperature			-65	+150	°C

 ^[1] The minimum input voltage ratings may be exceeded if the input current ratings are observed.
 [2] The output voltage ratings may be exceeded if the output current ratings are observed.
 [3] For SO14 packages: above 70 °C the value of P_D derates linearly with 8 mW/K. For (T)SSOP14 packages: above 60 °C the value of P_D derates linearly with 5.5 mW/K. For DHVQFN14 packages: above 60 °C the value of P_D derates linearly with 4.5 mW/K.

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8 Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V_{CC}	supply voltage		1.65	-	3.6	V
		functional	1.2	-	-	V
VI	input voltage		0	-	5.5	V
V _O	output voltage		0	-	V _{CC}	V
T _{amb}	ambient temperature		-40	-	+125	°C
Δt/ΔV	input transition rise and fall	V _{CC} = 1.65 V to 2.7 V	0	-	20	ns/V
	rate	V _{CC} = 2.7 V to 3.6 V	0	-	10	ns/V

9 Static characteristics

Table 6. Static characteristics

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

Symbol	Parameter	Conditions	-40 °	°C to +8	5 °C	-40 °C to	Unit	
			Min	Typ ^[1]	Max	Min	Max	
V_{IH}	HIGH-level	V _{CC} = 1.2 V	1.08	-	-	1.08	-	V
	input voltage	V _{CC} = 1.65 V to 1.95 V	0.65xV _{CC}	-	-	0.65xV _{CC}	-	٧
		V _{CC} = 2.3 V to 2.7 V	1.7	-	-	1.7	-	V
		V _{CC} = 2.7 V to 3.6 V	2.0	-	-	2.0	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 1.2 V		-	0.12	-	0.12	V
		V _{CC} = 1.65 V to 1.95 V	-	-	0.35xV _{CC}	-	0.35xV _{CC}	V
		V _{CC} = 2.3 V to 2.7 V	-	-	0.7	-	0.7	V
		V _{CC} = 2.7 V to 3.6 V	-	-	0.8	-	0.8	V
V_{OH}	HIGH-level	$V_I = V_{IH}$ or V_{IL}						
	output voltage	I_{O} = -100 μ A; V_{CC} = 1.65 V to 3.6 V	V _{CC} -0.2	-	-	V _{CC} -0.3	-	V
		I _O = -4 mA; V _{CC} = 1.65 V	1.2	-	-	1.05	-	V
		I _O = -8 mA; V _{CC} = 2.3 V	1.8	-	-	1.65	-	V
		I _O = -12 mA; V _{CC} = 2.7 V	2.2	-	-	2.05	-	V
		I _O = -18 mA; V _{CC} = 3.0 V	2.4	-	-	2.25	-	٧
		I _O = -24 mA; V _{CC} = 3.0 V	2.2	-	-	2.0	-	V

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Symbol	Parameter	Conditions	-40	°C to +8	5 °C	-40 °C to	+125 °C	Unit
			Min	Typ ^[1]	Max	Min	Max	
V _{OL}	LOW-level	$V_I = V_{IH}$ or V_{IL}						
	output voltage	I _O = 100 μA; V _{CC} = 1.65 V to 3.6 V	-	-	0.2	-	0.3	V
		I _O = 4 mA; V _{CC} = 1.65 V	-	-	0.45	-	0.65	V
		I _O = 8 mA; V _{CC} = 2.3 V	-	-	0.6	-	0.8	V
		I _O = 12 mA; V _{CC} = 2.7 V	-	-	0.4	-	0.6	V
		I _O = 24 mA; V _{CC} = 3.0 V	-	-	0.55	-	0.8	V
l _l	input leakage current	V _{CC} = 3.6 V; V _I = 5.5 V or GND	-	±0.1	±5	-	±20	μΑ
I _{CC}	supply current	V_{CC} = 3.6 V; V_I = V_{CC} or GND; I_O = 0 A	-	0.1	10	-	40	μΑ
ΔI _{CC}	additional supply current	per input pin; $V_{CC} = 2.7 \text{ V to } 3.6 \text{ V};$ $V_I = V_{CC} - 0.6 \text{ V};$ $I_O = 0 \text{ A}$	-	5	500	-	5000	μΑ
Cı	input capacitance	V_{CC} = 0 V to 3.6 V; V_I = GND to V_{CC}	-	5.0	-	-	-	pF

^[1] All typical values are measured at V_{CC} = 3.3 V (unless stated otherwise) and T_{amb} = 25 °C.

10 Dynamic characteristics

Table 7. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V). For test circuit see Figure 8.

Symbol	Parameter	Conditions	-40	-40 °C to +85 °C			-40 °C to +125 °C	
1			Min	Typ ^[1]	Max	Min	Max	
t _{pd}	propagation delay	nA, nB, nC to nY; see Figure 7 [2]						
,		V _{CC} = 1.2 V	-	14.0	-	-	-	ns
		V _{CC} = 1.65 V to 1.95 V	1.0	4.7	12.2	1.0	14.1	ns
		V _{CC} = 2.3 V to 2.7 V	1.5	2.8	6.9	1.5	8.0	ns
		V _{CC} = 2.7 V	1.5	2.9	7.0	1.5	8.1	ns
		V _{CC} = 3.0 V to 3.6 V	1.5	2.5	6.2	1.5	7.2	ns
C _{PD}	power dissipation	per gate; $V_I = GND$ to V_{CC} [3]						
	capacitance	V _{CC} = 1.65 V to 1.95 V	-	3.1	-	-	-	pF
		V _{CC} = 2.3 V to 2.7 V	-	6.2	-	-	-	pF
		V _{CC} = 3.0 V to 3.6 V	-	9.0	-	-	-	pF

^[1] Typical values are measured at T_{amb} = 25 °C and V_{CC} = 1.2 V, 1.8 V, 2.5 V, 2.7 V, and 3.3 V respectively.

 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma (C_L \times V_{CC}^2 \times f_o)$ where:

 f_i = input frequency in MHz; f_o = output frequency in MHz

C_L = output load capacitance in pF

V_{CC} = supply voltage in Volts

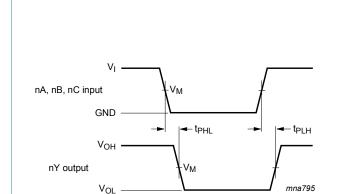
N = number of inputs switching

 $\Sigma(C_L \times V_{CC}^2 \times f_0)$ = sum of the outputs

 ^[2] t_{pd} is the same as t_{PLH} and t_{PHL}.
 [3] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

Triple 3-input AND gate

10.1 Waveforms and test circuit

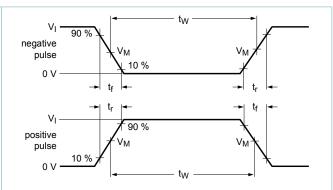


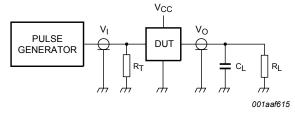
 $V_M = 1.5 \text{ V at } V_{CC} \ge 2.7 \text{ V}.$

 V_{M} = 0.5 x V_{CC} at V_{CC} < 2.7 V.

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

Figure 7. Input (nA, nB and nC) to output (nY) propagation delays





Test data is given in Table 8.

Definitions for test circuit: R_L = Load resistance.

C_L = Load capacitance including jig and probe capacitance.

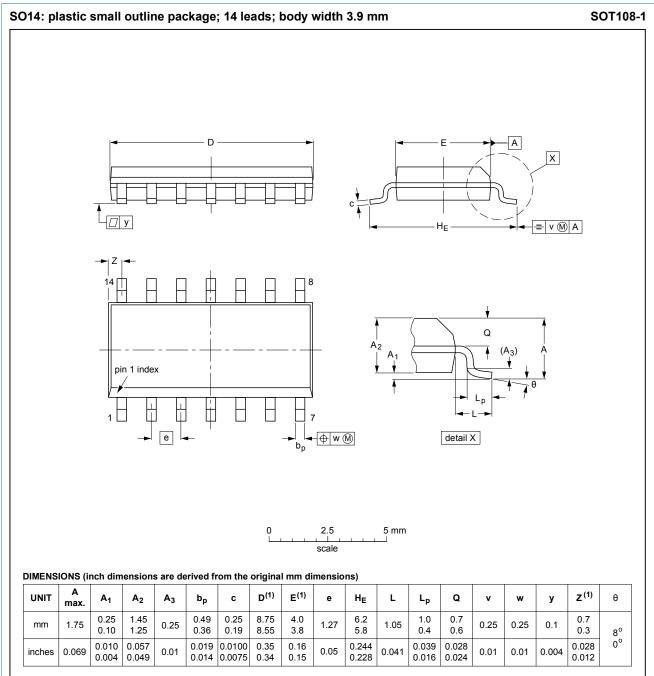
 R_T = Termination resistance should be equal to output impedance Z_0 of the pulse generator.

Figure 8. Test circuit for measuring switching times

Table 8. Test data

Supply voltage	Input		Load		
V_l t_r ,		t _r , t _f	C _L	R _L	
1.2 V	V _{CC}	≤ 2 ns	30 pF	1 kΩ	
1.65 V to 1.95 V	V _{CC}	≤ 2 ns	30 pF	1 kΩ	
2.3 V to 2.7 V	V _{CC}	≤ 2 ns	30 pF	500 Ω	
2.7 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	
3.0 V to 3.6 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	

11 Package outline



Note

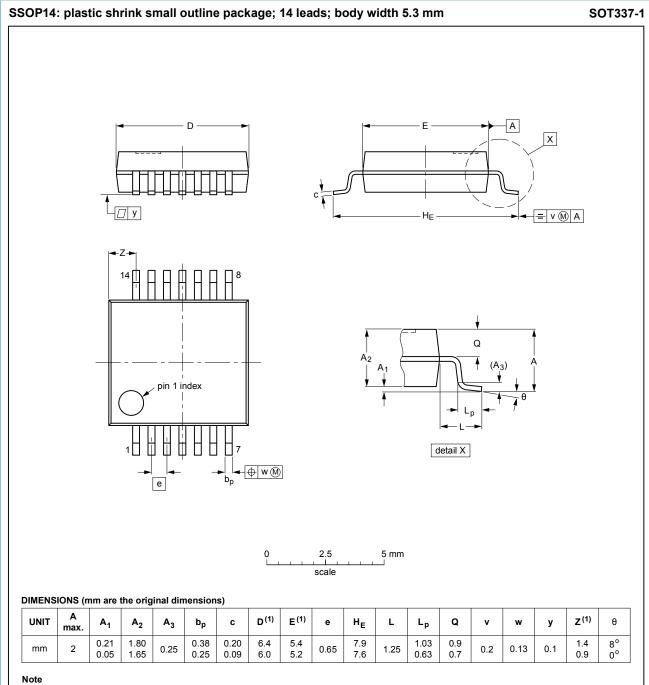
1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

OUTLINE VERSION		REFER	ENCES	EUROPEAN		
	IEC	JEDEC	JEITA	PROJECTION	ISSUE DATE	
SOT108-1	076E06	MS-012			99-12-27 03-02-19	

Figure 9. Package outline SOT108-1 (SO14)

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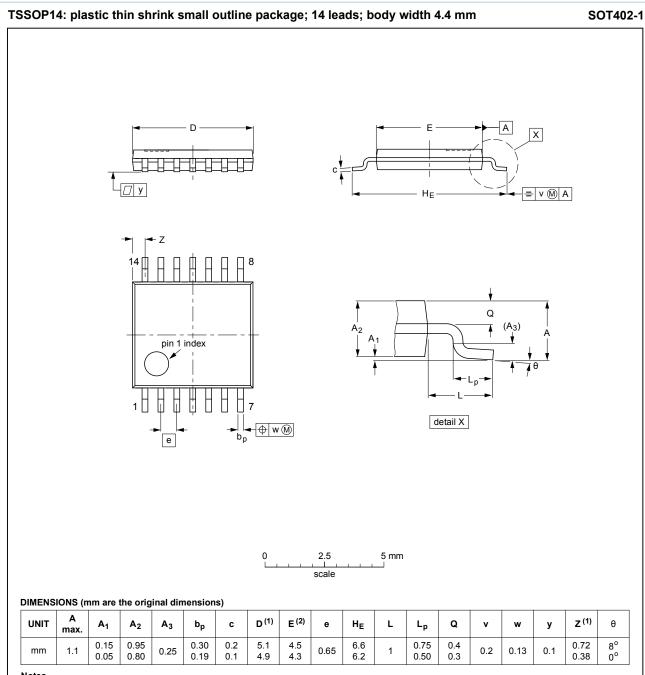


1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE		REFER	ENCES	EUROPEAN	ISSUE DATE
VERSION	IEC	JEDEC	JEITA	PROJECTION	ISSUE DATE
SOT337-1		MO-150			-99-12-27 03-02-19

Figure 10. Package outline SOT337-1 (SSOP14)

Triple 3-input AND gate



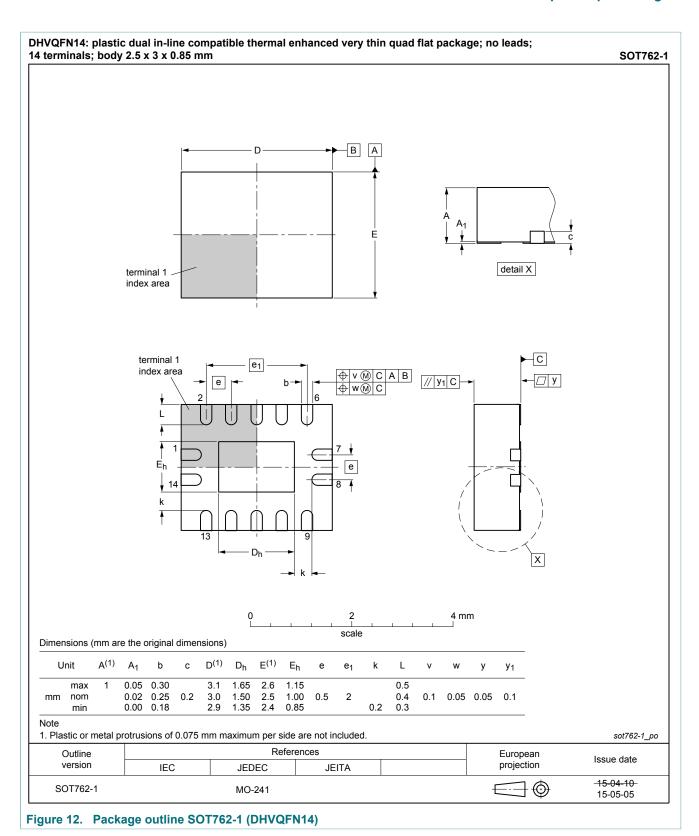
Notes

- 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	ENCES	EUROPEAN	ISSUE DATE
VERSION	IEC	JEDEC	JEITA	PROJECTION	ISSUE DATE
SOT402-1		MO-153			99-12-27 03-02-18

Figure 11. Package outline SOT402-1 (TSSOP14)

Triple 3-input AND gate



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12 Abbreviations

Table 9. Abbreviations

Acronym	Description
CDM	Charged Device Model
DUT	Device Under Test
ESD	ElectroStatic Discharge
НВМ	Human Body Model
MM	Machine Model
TTL	Transistor-Transistor Logic

13 Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes			
74LVC11 v.7	20171110	Product data sheet	-	74LVC11 v.6			
Modifications:	Nexperia.	 The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. 					
74LVC11 v.6	20111117	Product data sheet	-	74LVC11 v.5			
Modifications:		 Legal pages updated. Table 6, bodyrow ΔI_{CC}: condition V_{CC} changed. 					
74LVC11 v.5	20111025	Product data sheet	-	74LVC11 v.4			
74LVC11 v.4	20040113	Product specification	-	74LVC11 v.3			
74LVC11 v.3	19980428	Product specification	-	74LVC11 v.2			
74LVC11 v.2	19980428	Product specification	-	74LVC11 v.1			
74LVC11 v.1	-	-	-	-			

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14 Legal information

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Document status ^{[1][2]}	Product status ^[3]	Definition
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Triple 3-input AND gate

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