



74AHC30-Q100; 74AHCT30-Q100

8-input NAND gate

Rev. 4 — 7 March 2024

Product data sheet

1. General description

The 74AHC30-Q100; 74AHCT30-Q100 is a high-speed Si-gate CMOS device and is pin compatible with Low-power Schottky TTL (LSTTL). It is specified in compliance with JEDEC standard No. 7-A.

The 74AHC30-Q100; 74AHCT30-Q100 provides an 8-input NAND function.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
 - Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- Balanced propagation delays
- All inputs have Schmitt-trigger actions
- Inputs accept voltages higher than V_{CC}
- Input levels:
 - For 74AHC30-Q100: CMOS level
 - For 74AHCT30-Q100: TTL level
- ESD protection:
 - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
 - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Multiple package options
- DHVQFN package with Side-Wettable Flanks enabling Automatic Optical Inspection (AOI) of solder joints

3. Ordering information

Table 1. Ordering information

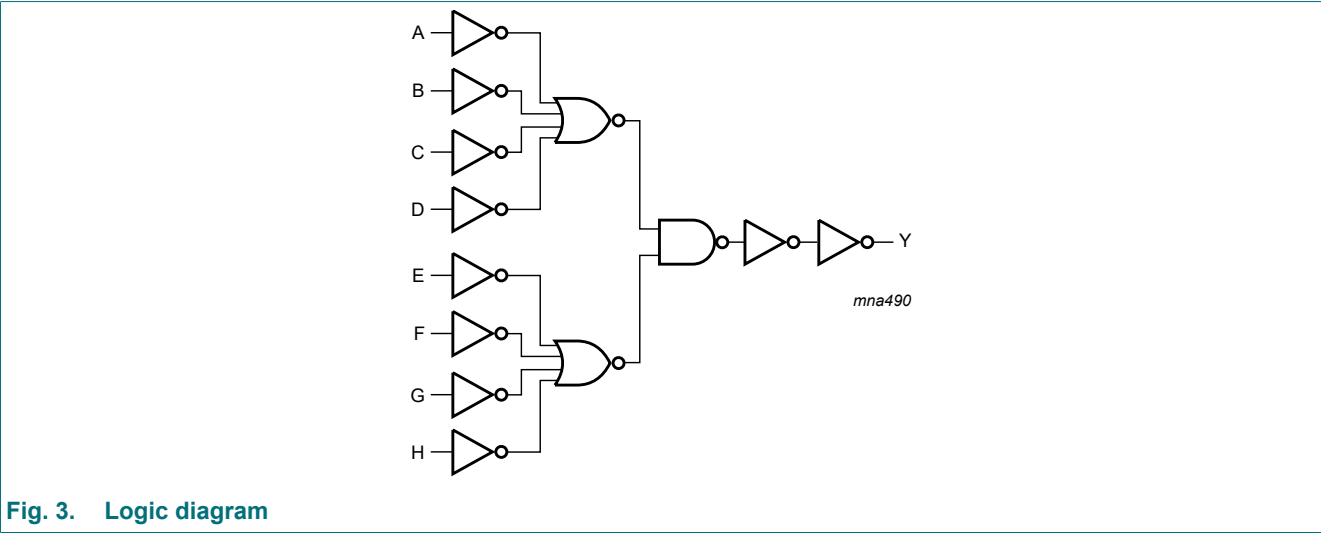
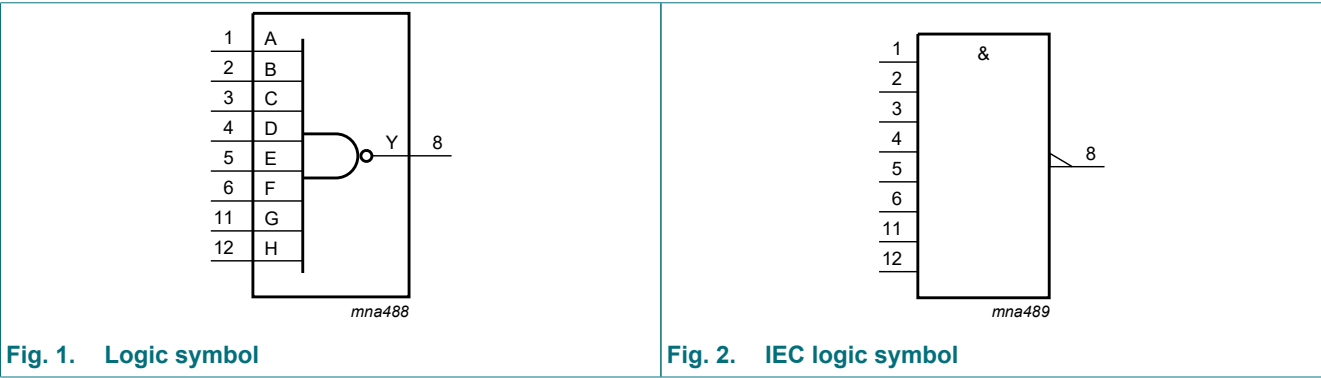
Type number	Package			
	Temperature range	Name	Description	Version
74AHC30D-Q100 74AHCT30D-Q100	-40 °C to +125 °C	SO14	plastic small outline package; 14 leads; body width 3.9 mm	SOT108-1
74AHC30PW-Q100 74AHCT30PW-Q100	-40 °C to +125 °C	TSSOP14	plastic thin shrink small outline package; 14 leads; body width 4.4 mm	SOT402-1
74AHC30BQ-Q100 74AHCT30BQ-Q100	-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 × 3 × 0.85 mm	SOT762-1

4. Marking

Table 2. Marking codes

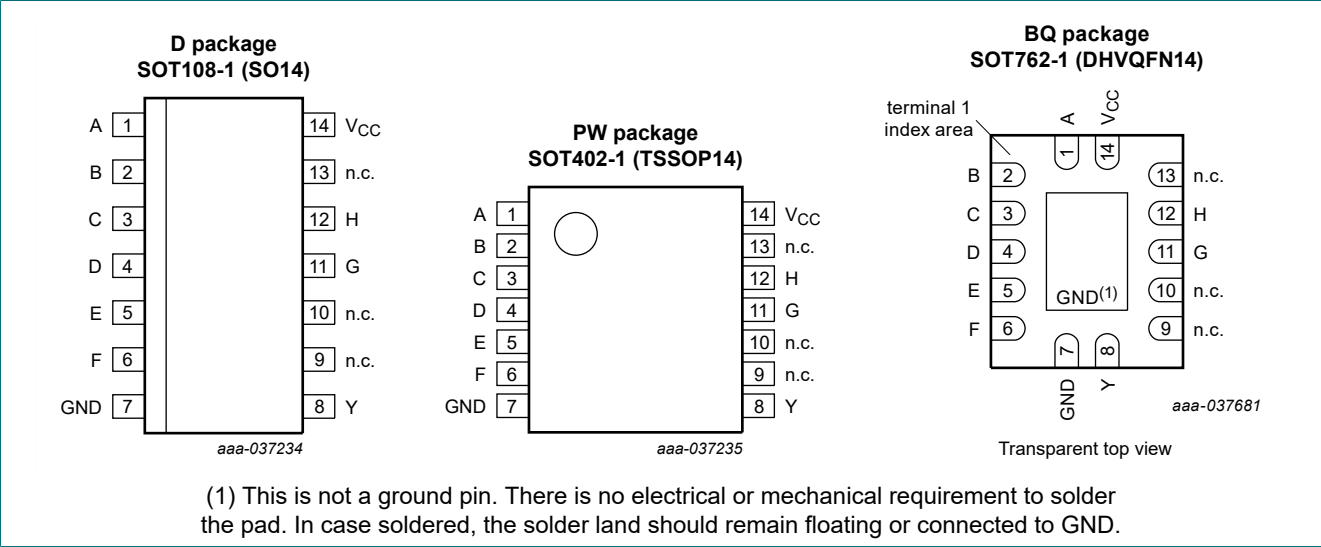
Type number	Marking
74AHC30D-Q100	74AHC30D
74AHCT30D-Q100	74AHCT30D
74AHC30PW-Q100	AHC30
74AHCT30PW-Q100	AHCT30
74AHC30BQ-Q100	AHC30
74AHCT30BQ-Q100	AHT30

5. Functional diagram



6. Pinning information

6.1. Pinning



6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
A	1	data input
B	2	data input
C	3	data input
D	4	data input
E	5	data input
F	6	data input
GND	7	ground (0 V)
Y	8	data output
n.c.	9	not connected
n.c.	10	not connected
G	11	data input
H	12	data input
n.c.	13	not connected
V _{CC}	14	supply voltage

7. Functional description

Table 4. Function table

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

Input								Output
A	B	C	D	E	F	G	H	Y
L	X	X	X	X	X	X	X	H
X	L	X	X	X	X	X	X	H
X	X	L	X	X	X	X	X	H
X	X	X	L	X	X	X	X	H
X	X	X	X	L	X	X	X	H
X	X	X	X	X	L	X	X	H
X	X	X	X	X	X	L	X	H
X	X	X	X	X	X	X	L	H
H	H	H	H	H	H	H	H	L

8. Limiting values

Table 5. 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	+7.0	V
V _I	input voltage		-0.5	+7.0	V
I _{IK}	input clamping current	V _I < -0.5 V [1]	-20	-	mA
I _{OK}	output clamping current	V _O < -0.5 V or V _O > V _{CC} + 0.5 V [1]	-20	+20	mA
I _O	output current	V _O = -0.5 V to (V _{CC} + 0.5 V)	-25	+25	mA
I _{CC}	supply current		-	+75	mA
I _{GND}	ground current		-75	-	mA
T _{stg}	storage temperature		-65	+150	°C
P _{tot}	total power dissipation	T _{amb} = -40 °C to +125 °C			
		SOT108-1 (SO14) SOT402-1 (TSSOP14) SOT762-1 (DHVQFN14) [2]	-	500	mW

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For SOT108-1 (SO14) package: P_{tot} derates linearly with 10.1 mW/K above 100 °C.

For SOT402-1 (TSSOP14) package: P_{tot} derates linearly with 7.3 mW/K above 81 °C.

For SOT762-1 (DHVQFN14) package: P_{tot} derates linearly with 9.6 mW/K above 98 °C.

9. Recommended operating conditions

Table 6. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	74AHC30-Q100			74AHCT30-Q100			Unit
			Min	Typ	Max	Min	Typ	Max	
V _{CC}	supply voltage		2.0	5.0	5.5	4.5	5.0	5.5	V
V _I	input voltage		0	-	5.5	0	-	5.5	V
V _O	output voltage		0	-	V _{CC}	0	-	V _{CC}	V
T _{amb}	ambient temperature		-40	+25	+125	-40	+25	+125	°C
Δt/ΔV	input transition rise and fall rate	V _{CC} = 3.3 V ± 0.3 V	-	-	100	-	-	-	ns/V
		V _{CC} = 5.0 V ± 0.5 V	-	-	20	-	-	20	ns/V

10. Static characteristics

Table 7. Static characteristics

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

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
74AHC30-Q100										
V _{IH}	HIGH-level input voltage	V _{CC} = 2.0 V	1.5	-	-	1.5	-	1.5	-	V
		V _{CC} = 3.0 V	2.1	-	-	2.1	-	2.1	-	V
		V _{CC} = 5.5 V	3.85	-	-	3.85	-	3.85	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 2.0 V	-	-	0.5	-	0.5	-	0.5	V
		V _{CC} = 3.0 V	-	-	0.9	-	0.9	-	0.9	V
		V _{CC} = 5.5 V	-	-	1.65	-	1.65	-	1.65	V
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL}								
		I _O = -50 µA; V _{CC} = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
		I _O = -50 µA; V _{CC} = 3.0 V	2.9	3.0	-	2.9	-	2.9	-	V
		I _O = -50 µA; V _{CC} = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	V
		I _O = -4.0 mA; V _{CC} = 3.0 V	2.58	-	-	2.48	-	2.40	-	V
		I _O = -8.0 mA; V _{CC} = 4.5 V	3.94	-	-	3.80	-	3.70	-	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL}								
		I _O = 50 µA; V _{CC} = 2.0 V	-	0	0.1	-	0.1	-	0.1	V
		I _O = 50 µA; V _{CC} = 3.0 V	-	0	0.1	-	0.1	-	0.1	V
		I _O = 50 µA; V _{CC} = 4.5 V	-	0	0.1	-	0.1	-	0.1	V
		I _O = 4.0 mA; V _{CC} = 3.0 V	-	-	0.36	-	0.44	-	0.55	V
		I _O = 8.0 mA; V _{CC} = 4.5 V	-	-	0.36	-	0.44	-	0.55	V
I _I	input leakage current	V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V	-	-	0.1	-	1.0	-	2.0	µA
I _{CC}	supply current	V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V	-	-	2.0	-	20	-	40	µA
C _I	input capacitance	V _I = V _{CC} or GND	-	3	10	-	10	-	10	pF
C _O	output capacitance		-	4	-	-	-	-	-	pF

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
74AHCT30-Q100										
V _{IH}	HIGH-level input voltage	V _{CC} = 4.5 V to 5.5 V	2.0	-	-	2.0	-	2.0	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 4.5 V to 5.5 V	-	-	0.8	-	0.8	-	0.8	V
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL} ; V _{CC} = 4.5 V								
		I _O = -50 µA	4.4	4.5	-	4.4	-	4.4	-	V
		I _O = -8.0 mA	3.94	-	-	3.80	-	3.70	-	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL} ; V _{CC} = 4.5 V								
		I _O = 50 µA	-	0	0.1	-	0.1	-	0.1	V
		I _O = 8.0 mA	-	-	0.36	-	0.44	-	0.55	V
I _I	input leakage current	V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V	-	-	0.1	-	1.0	-	2.0	µA
I _{CC}	supply current	V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V	-	-	2.0	-	20	-	40	µA
ΔI _{CC}	additional supply current	per input pin; V _I = V _{CC} - 2.1 V; other pins at V _{CC} or GND; I _O = 0 A; V _{CC} = 4.5 V to 5.5 V	-	-	1.35	-	1.5	-	1.5	mA
C _I	input capacitance	V _I = V _{CC} or GND	-	3	10	-	10	-	10	pF
C _O	output capacitance		-	4	-	-	-	-	-	pF

11. Dynamic characteristics

Table 8. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 5.

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
74AHC30-Q100										
t _{pd}	propagation delay	A, B, C, D, E, F, G, H to Y; see Fig. 4 and Fig. 5 [2]								
		V _{CC} = 3.0 V to 3.6 V								
		C _L = 15 pF	-	5.0	9.5	1.0	11.0	1.0	12.0	ns
		C _L = 50 pF	-	6.7	12.0	1.0	14.5	1.0	15.5	ns
		V _{CC} = 4.5 V to 5.5 V								
		C _L = 15 pF	-	3.6	6.5	1.0	7.5	1.0	8.0	ns
		C _L = 50 pF	-	4.9	8.0	1.0	9.5	1.0	10.5	ns
C _{PD}	power dissipation capacitance	f _i = 1 MHz; V _I = GND to V _{CC} [3]	-	10	-	-	-	-	-	pF
74AHCT30-Q100; V _{CC} = 4.5 V to 5.5 V										
t _{pd}	propagation delay	A, B, C, D, E, F, G, H to Y; see Fig. 4 and Fig. 5 [2]								
		C _L = 15 pF	-	3.3	6.5	1.0	7.5	1.0	8.0	ns
		C _L = 50 pF	-	4.7	8.5	1.0	9.5	1.0	10.5	ns
C _{PD}	power dissipation capacitance	f _i = 1 MHz; V _I = GND to V _{CC} [3]	-	12	-	-	-	-	-	pF

[1] Typical values are measured at nominal supply voltage (V_{CC} = 3.3 V and V_{CC} = 5.0 V).

[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).

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

N = number of inputs switching;

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

11.1. Waveforms

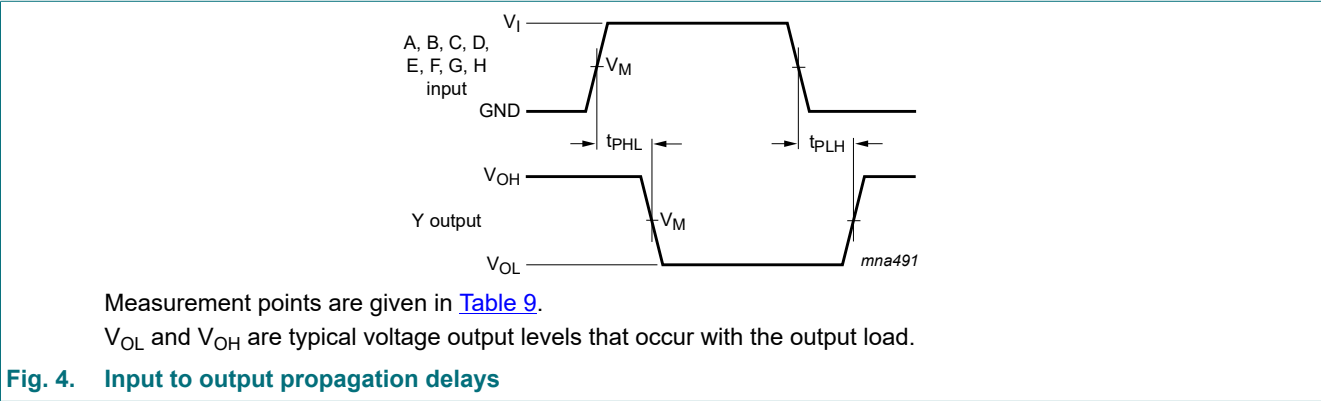


Table 9. Measurement points

Type	Input		Output
	V_M		V_M
74AHC30-Q100	$0.5 \times V_{CC}$		$0.5 \times V_{CC}$
74AHCT30-Q100	1.5 V		$0.5 \times V_{CC}$

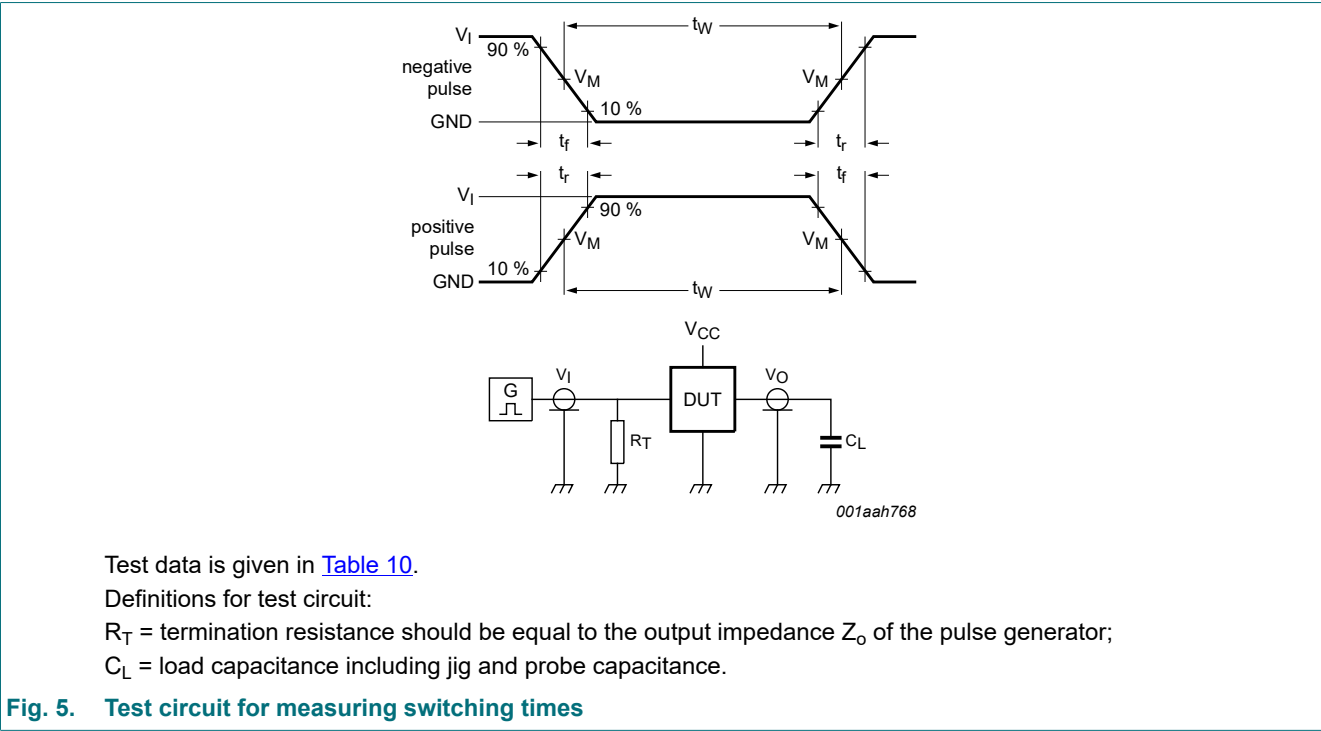


Table 10. Test data

Type	Input		Load	Test
	V_I	t_r, t_f	C_L	
74AHC30-Q100	V_{CC}	$\leq 3.0 \text{ ns}$	15 pF, 50 pF	t_{PLH}, t_{PHL}
74AHCT30-Q100	3.0 V	$\leq 3.0 \text{ ns}$	15 pF, 50 pF	t_{PLH}, t_{PHL}

12. Package outline

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

SOT108-1

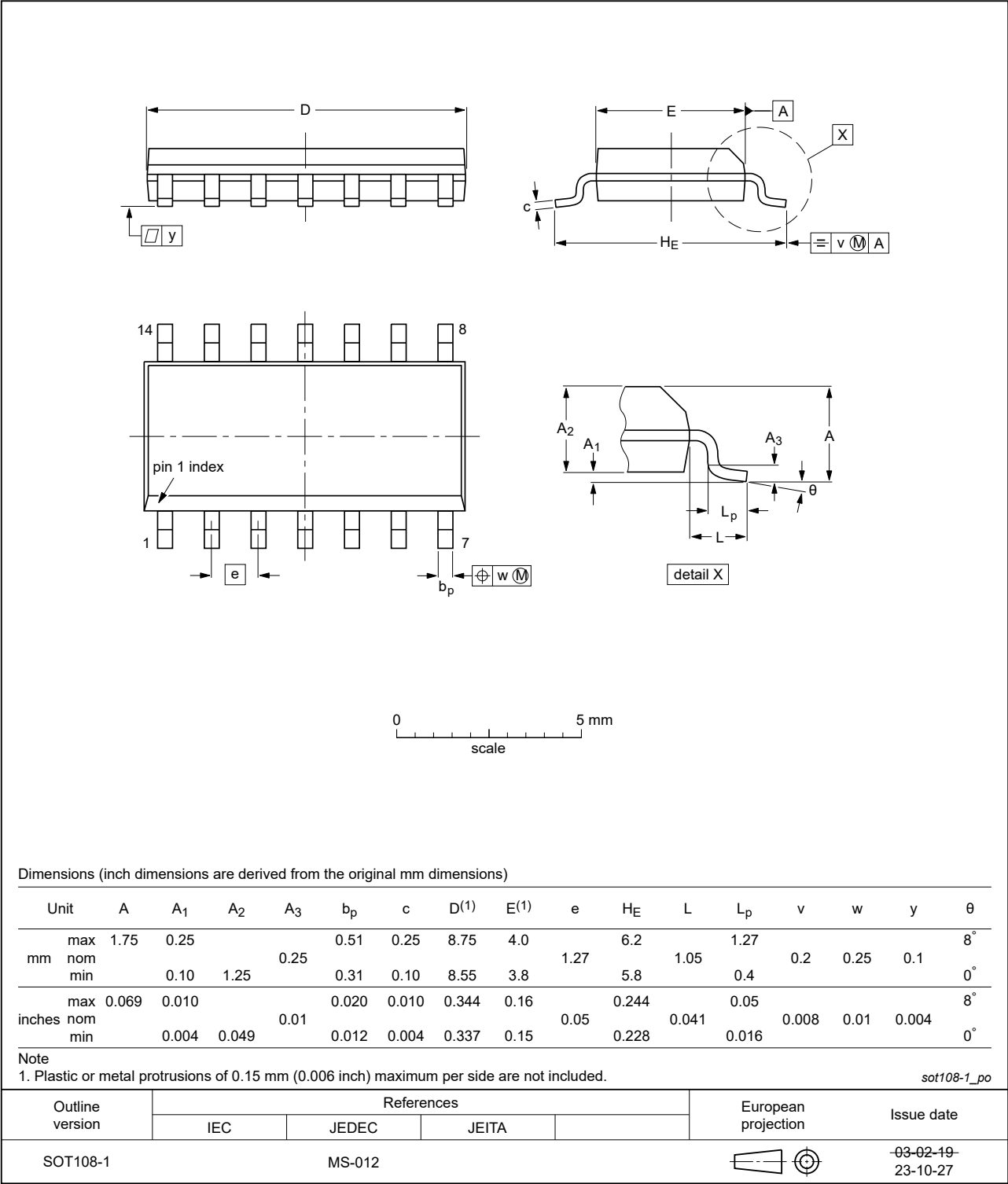


Fig. 6. Package outline SOT108-1 (SO14)

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

SOT402-1

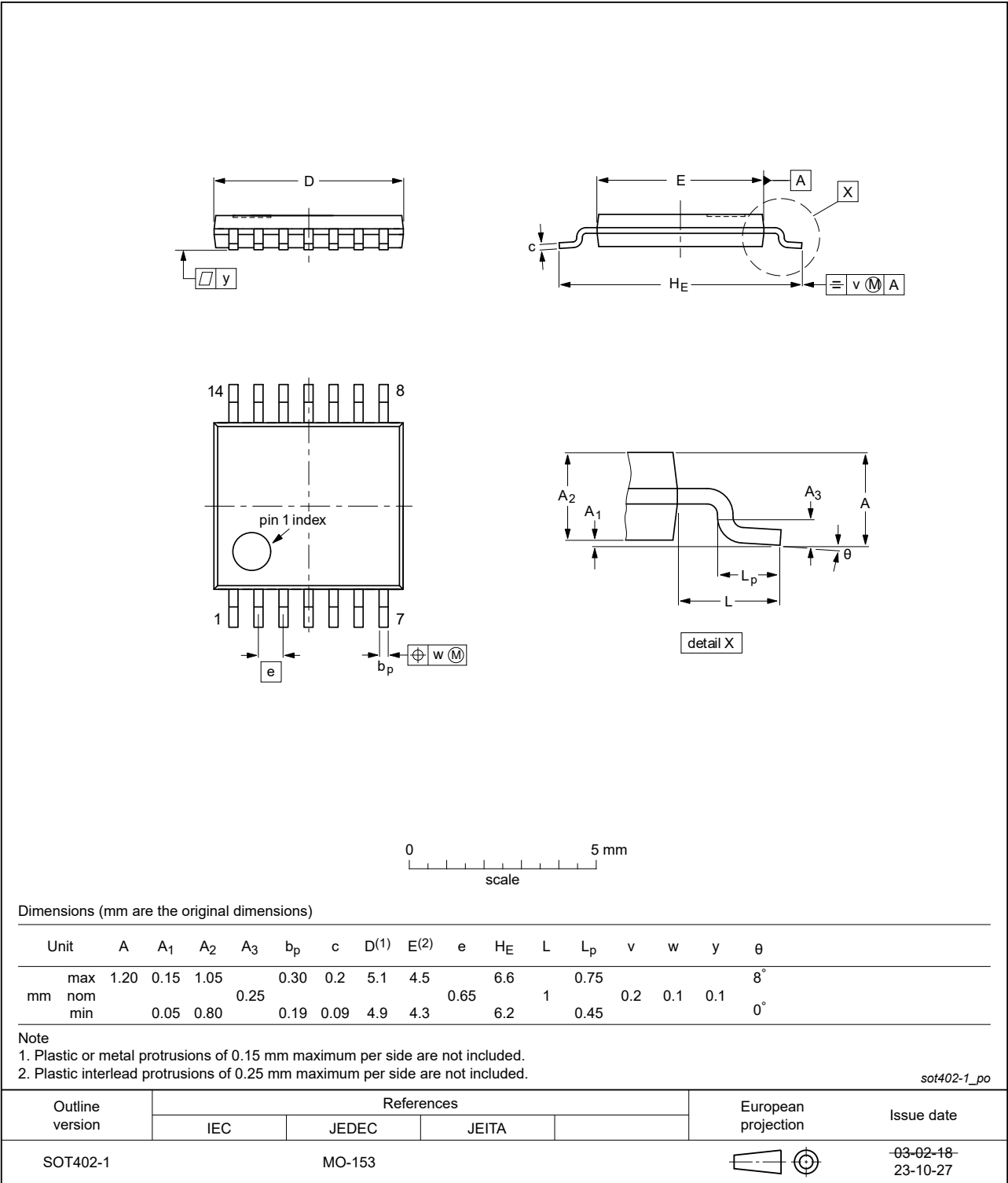


Fig. 7. Package outline SOT402-1 (TSSOP14)

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



Fig. 8. Package outline SOT762-1 (DHVQFN14)

13. Abbreviations

Table 11. Abbreviations

Acronym	Description
CDM	Charged Device Model
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
LSTTL	Low-power Schottky Transistor-Transistor Logic

14. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AHC_AHCT30_Q100 v.4	20240307	Product data sheet	-	74AHC_AHCT30_Q100 v.3
Modifications:	Fig. 6, Fig. 7: Aligned SO and TSSOP package outline drawings to JEDEC MS-012 and MO-153.			
74AHC_AHCT30_Q100 v.3	20231009	Product data sheet	-	74AHC_AHCT30_Q100 v.2
Modifications:	Section 2: ESD specification updated according to the latest JEDEC standard.			
74AHC_AHCT30_Q100 v.2	20200506	Product data sheet	-	74AHC_AHCT30_Q100 v.1
Modifications:	- 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. Table 5: Derating values for P_{tot} total power dissipation have been updated. - Package outline drawing of SOT762-1 (Fig. 8) updated.			
74AHC_AHCT30_Q100 v.1	20131120	Product data sheet	-	-

15. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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