

74AHC1G07-Q100

Buffer with open-drain output

Rev. 3 — 25 February 2019

Product data sheet

1. General description

74AHC1G07-Q100 is a high-speed Si-gate CMOS device. The 74AHC1G07-Q100 provides a non-inverting buffer.

The output of this device is open-drain and can be connected to other open-drain outputs to implement active-LOW wired-OR or active-HIGH wired-AND functions. For digital operation, this device must have a pull-up resistor to establish a logic HIGH-level.

The AHC device has CMOS input switching levels and supply voltage range 2 V to 5.5 V.

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
- High noise immunity
- Low power dissipation
- ESD protection:
 - MIL-STD-883, method 3015 exceeds 2000 V
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V (C = 200 pF, R = 0 Ω)

3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74AHC1G07GW-Q100	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74AHC1G07GV-Q100	-40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753

4. Marking

Table 2. Marking codes

Type number	Marking [1]
74AHC1G07GW-Q100	AS
74AHC1G07GV-Q100	A07

[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5. Functional diagram

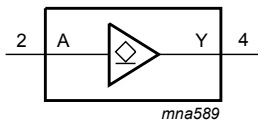


Fig. 1. Logic symbol

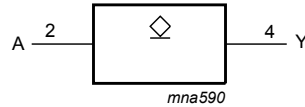


Fig. 2. IEC logic symbol

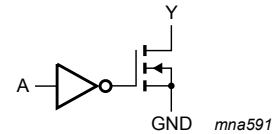


Fig. 3. Logic diagram

6. Pinning information

6.1. Pinning

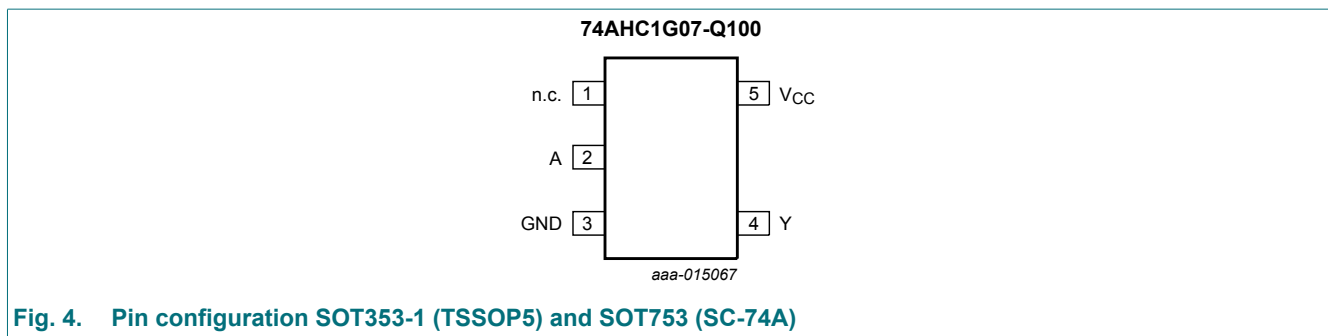


Fig. 4. Pin configuration SOT353-1 (TSSOP5) and SOT753 (SC-74A)

6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
n.c.	1	not connected
A	2	data input
GND	3	ground (0 V)
Y	4	data output
V _{CC}	5	supply voltage

7. Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level; Z = high-impedance OFF-state

Input	Output
A	Y
L	L
H	Z

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

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	-20	-	mA
I _{OK}	output clamping current	V _O < -0.5 V [1]	-	±20	mA
I _O	output current	V _O > -0.5 V	-	±25	mA
V _O	output voltage	active mode [1]	-0.5	+7.0	V
		high-impedance mode [1]	-0.5	+7.0	V
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 [2]	-	250	mW

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

[2] For both TSSOP5 and SC-74A packages: above 87.5 °C the value of P_{tot} derates linearly with 4.0 mW/K.

9. Recommended operating conditions

Table 6. Recommended operating conditions

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{CC}	supply voltage		2.0	5.0	5.5	V
V _I	input voltage		0	-	5.5	V
V _O	output voltage	active mode	0	-	V _{CC}	V
		high-impedance mode	0	-	6.0	V
T _{amb}	ambient temperature		-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	ns/V

10. Static characteristics

Table 7. Static characteristics

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	
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

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
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 _{OZ}	OFF-state output current	V _I = V _{IH} or V _{IL} ; V _O = V _{CC} or GND; V _{CC} = 5.5 V	-	-	±0.25		±2.5		±10.0	μA
I _{CC}	supply current	V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V	-	-	1.0	-	10	-	20	μA
C _I	input capacitance		-	1.5	10	-	10	-	10	pF

11. Dynamic characteristics

Table 8. Dynamic characteristics

GND = 0 V; t_r = t_f = ≤ 3.0 ns. For test circuit see Fig. 6.

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
t _{PZL}	OFF-state to LOW propagation delay	A to Y; see Fig. 5								
		V _{CC} = 3.0 V to 3.6 V; C _L = 15 pF [1]	-	3.5	5.6	1.0	6.3	1.0	7.0	ns
		V _{CC} = 3.0 V to 3.6 V; C _L = 50 pF [1]	-	5.0	8.0	1.0	9.0	1.0	10.0	ns
		V _{CC} = 4.5 V to 5.5 V; C _L = 15 pF [2]	-	2.5	3.9	1.0	4.6	1.0	4.9	ns
V _{CC} = 4.5 V to 5.5 V; C _L = 50 pF [2]	-	3.6	5.5	1.0	6.5	1.0	7.0	ns		
t _{PLZ}	LOW to OFF-state propagation delay	A to Y; see Fig. 5								
		V _{CC} = 3.0 V to 3.6 V; C _L = 15 pF [1]	-	5.8	7.9	1.0	8.4	1.0	8.9	ns
		V _{CC} = 3.0 V to 3.6 V; C _L = 50 pF [1]	-	8.3	11.5	1.0	12.0	1.0	12.5	ns
		V _{CC} = 4.5 V to 5.5 V; C _L = 15 pF [2]	-	4.2	5.1	1.0	5.6	1.0	6.1	ns
V _{CC} = 4.5 V to 5.5 V; C _L = 50 pF [2]	-	6.0	7.5	1.0	8.0	1.0	8.5	ns		
C _{PD}	power dissipation capacitance	per buffer; C _L = 50 pF; f = 1 MHz; V _I = GND to V _{CC} [3]	-	5	-	-	-	-	-	pF

[1] Typical values are measured at V_{CC} = 3.3 V.

[2] Typical values are measured at V_{CC} = 5.0 V.

[3] C_{PD} is used to determine the dynamic power dissipation P_D (μW).

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

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

11.1. Waveforms and test circuit

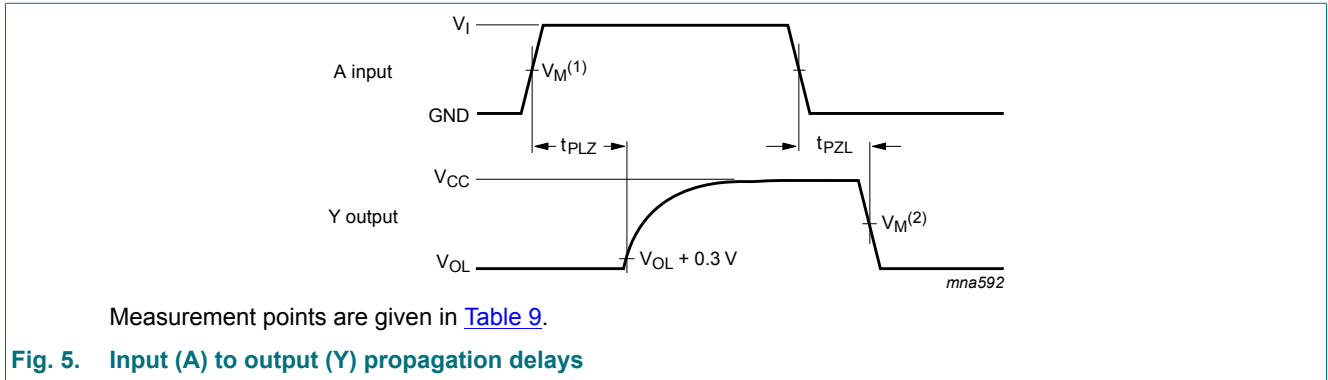
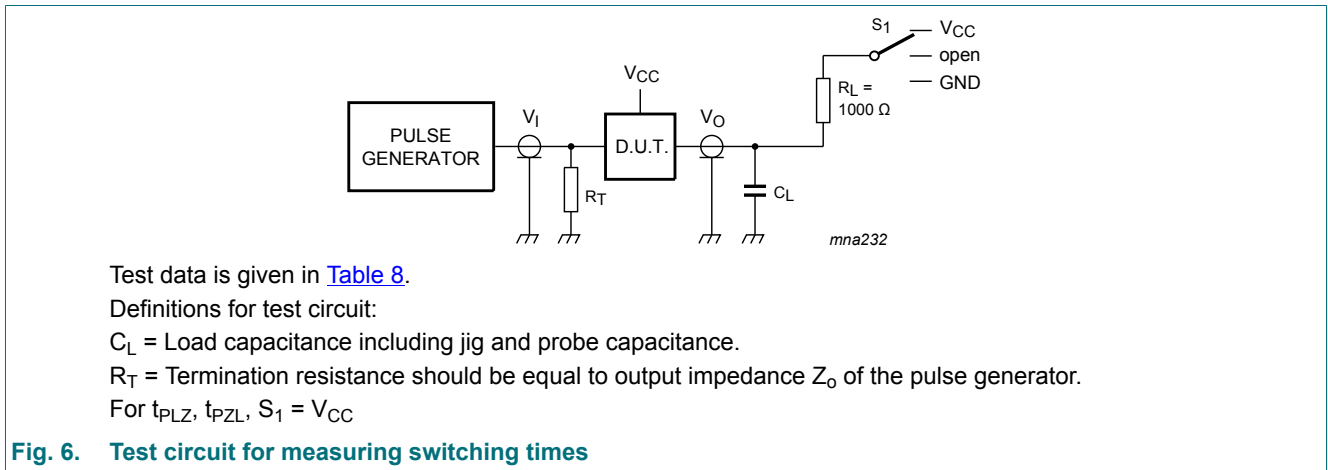


Table 9. Measurement point

Input		Output
V_I	$V_M^{(1)}$	$V_M^{(2)}$
GND to V_{CC}	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$



12. Package outline

TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mm

SOT353-1

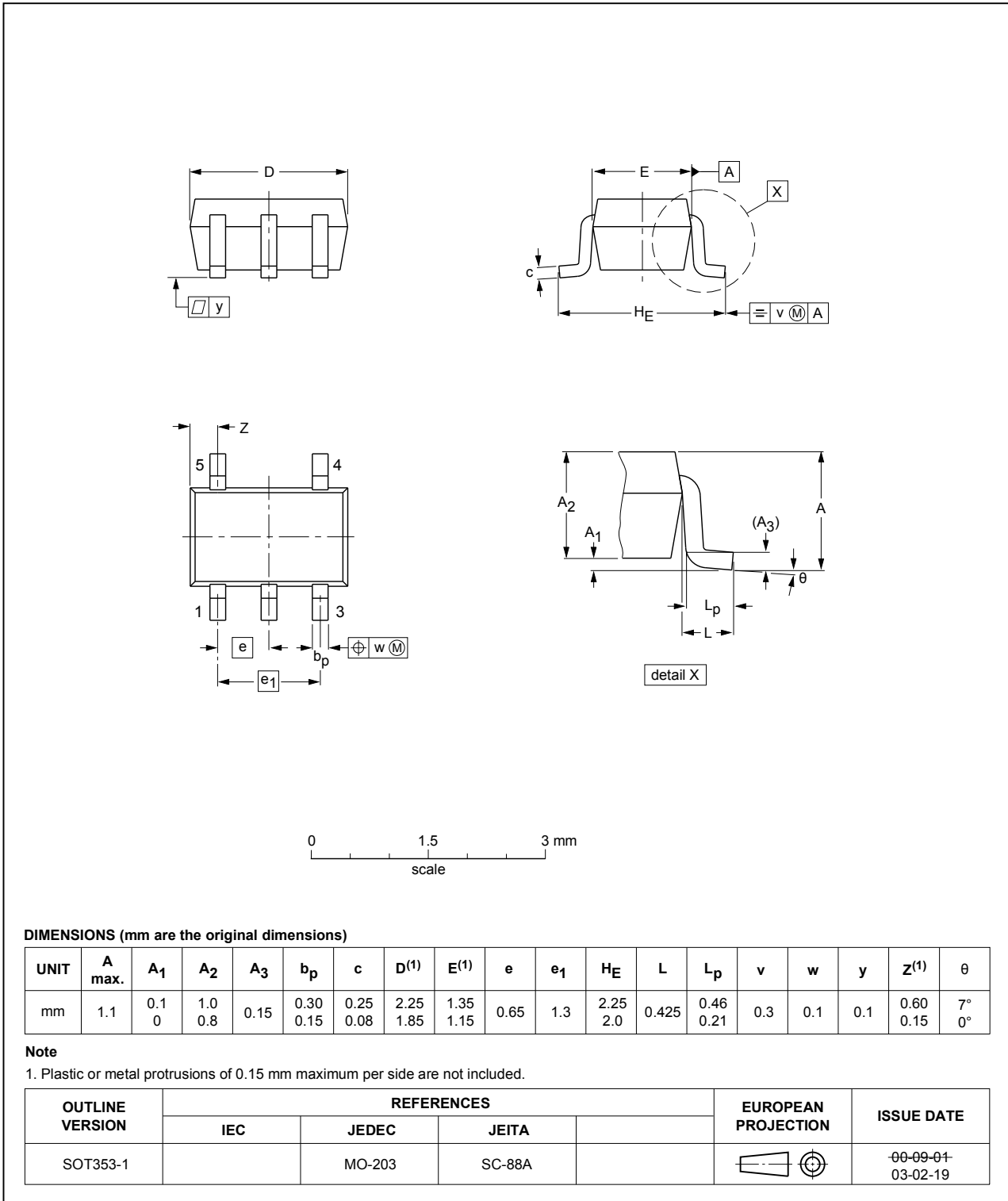


Fig. 7. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads

SOT753

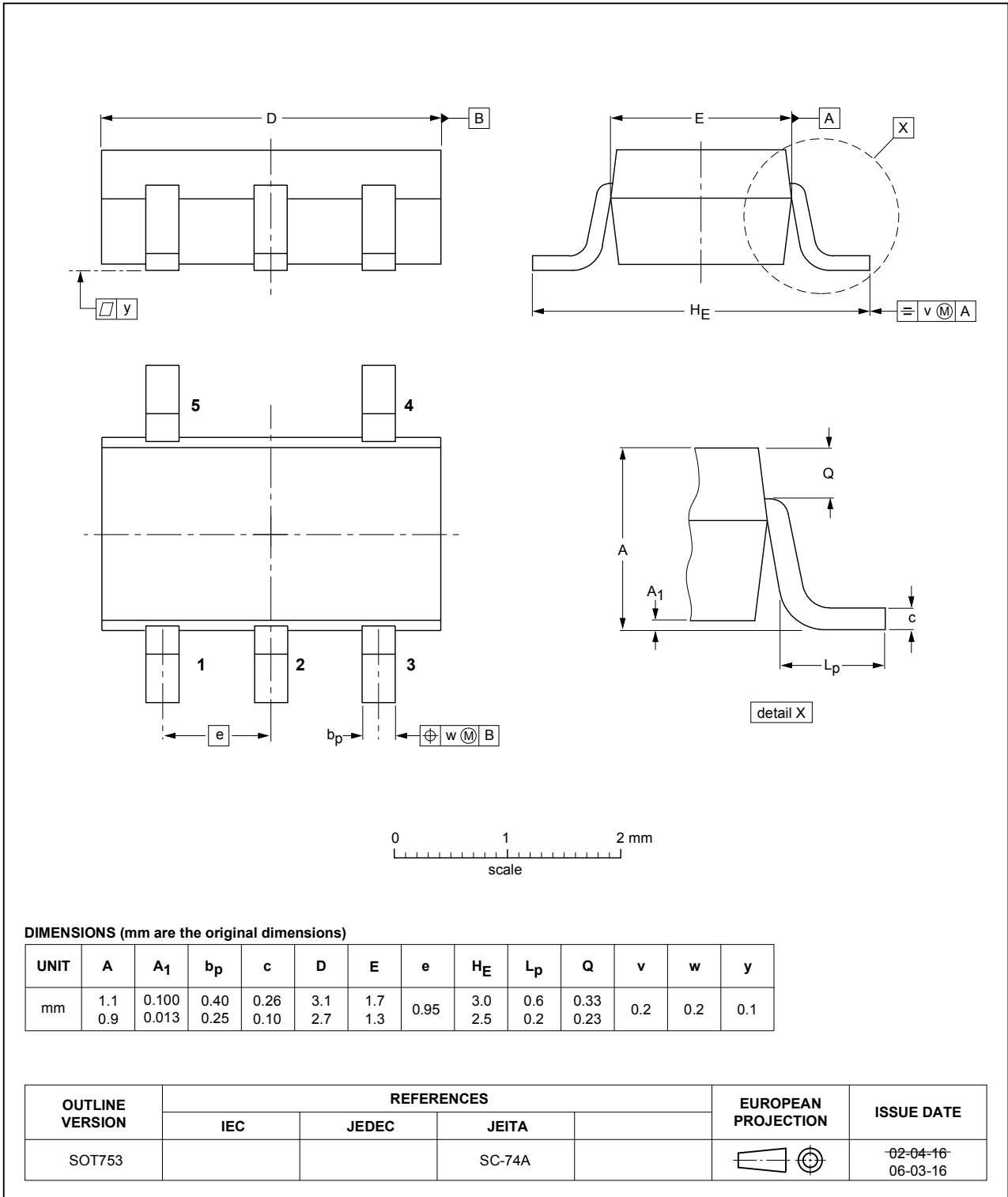


Fig. 8. Package outline SOT753 (SC-74A)

13. Abbreviations

Table 10. Abbreviations

Acronym	Description
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MIL	Military
MM	Machine Model

14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AHC1G07_Q100 v.3	20190225	Product data sheet	-	74AHC_AHCT1G07_Q100 v.2
Modifications:	<ul style="list-style-type: none"> 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. Type numbers 74AHCT1G07GW-Q100 (SOT353-1) and 74AHCT1G07GV-Q100 (SOT753) removed. 			
74AHC_AHCT1G07_Q100 v.2	20141118	Product data sheet	-	74AHC_AHCT1G07_Q100 v.1
Modifications:	<ul style="list-style-type: none"> Section 4: table note added. 			
74AHC_AHCT1G07_Q100 v.1	20141020	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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Contents

1. General description	1
2. Features and benefits	1
3. Ordering information	1
4. Marking	1
5. Functional diagram	2
6. Pinning information	2
6.1. Pinning.....	2
6.2. Pin description.....	2
7. Functional description	2
8. Limiting values	3
9. Recommended operating conditions	3
10. Static characteristics	3
11. Dynamic characteristics	4
11.1. Waveforms and test circuit.....	5
12. Package outline	6
13. Abbreviations	8
14. Revision history	8
15. Legal information	9

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