

74AHC1G07

Buffer with open-drain output

Rev. 9 — 11 January 2022

Product data sheet

1. General description

The 74AHC1G07 is a single buffer with open-drain output. Inputs are overvoltage tolerant. This feature allows the use of these devices as translators in mixed voltage environments.

2. Features and benefits

- Wide supply voltage range from 2.0 to 5.5 V
- Overvoltage tolerant inputs to 5.5 V
- High noise immunity
- CMOS low power dissipation
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level A
- ESD protection:
 - HBM JESD22-A114E: exceeds 2000 V
 - MM JESD22-A115-A: exceeds 200 V
 - CDM JESD22-C101C: exceeds 1000 V
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

3. Ordering information

Table 1. Ordering information

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

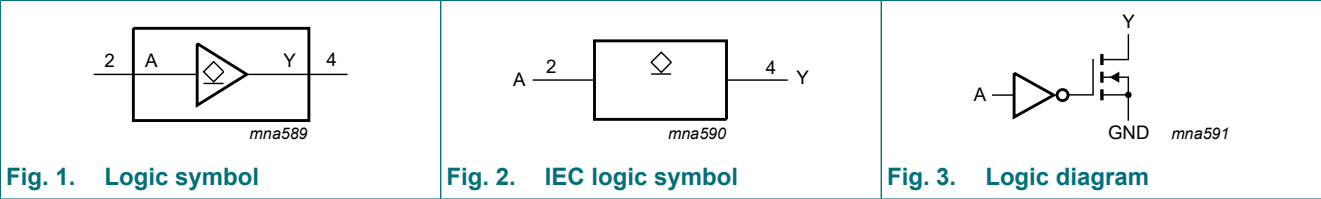
4. Marking

Table 2. Marking codes

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

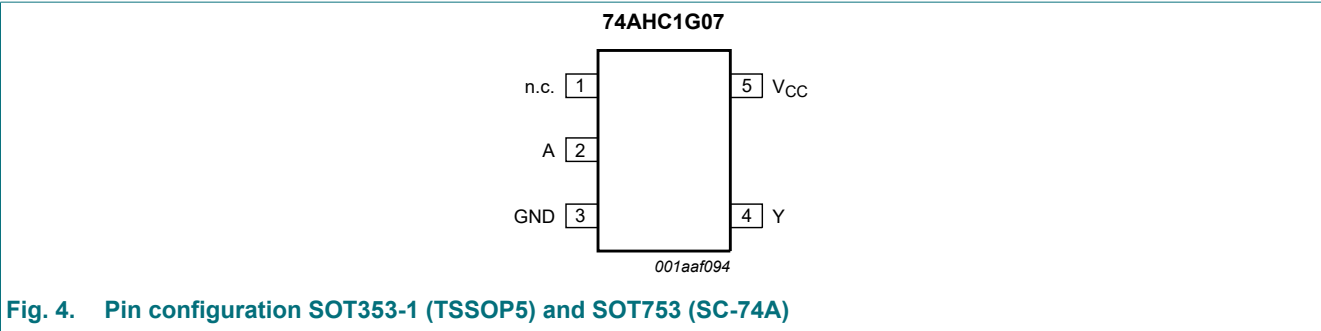
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5. Functional diagram



6. Pinning information

6.1. Pinning



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 SOT353-1 (TSSOP5) package: P_{tot} derates linearly with 3.3 mW/K above 74 °C.

For SOT753 (SC-74A) package: P_{tot} derates linearly with 3.8 mW/K above 85 °C.

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
$\Delta t/\Delta V$	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
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

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
t_{PLZ}	LOW to OFF-state propagation delay	A to Y; see Fig. 5								
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}; C_L = 15\text{ pF}$ [1]	-	5.8	7.9	1.0	8.4	1.0	8.9	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}; C_L = 50\text{ pF}$ [1]	-	8.3	11.5	1.0	12.0	1.0	12.5	ns
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}; C_L = 15\text{ pF}$ [2]	-	4.2	5.1	1.0	5.6	1.0	6.1	ns
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}; C_L = 50\text{ pF}$ [2]	-	6.0	7.5	1.0	8.0	1.0	8.5	ns
C_{PD}	power dissipation capacitance	per buffer; $C_L = 50\text{ pF}; f = 1\text{ MHz}; V_I = \text{GND to }V_{CC}$ [3]	-	5	-	-	-	-	-	pF

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

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

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

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

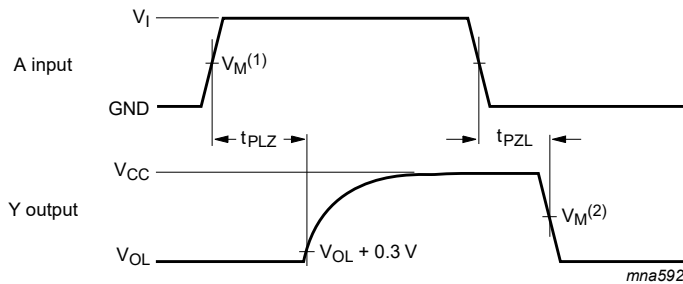
f_i = input frequency in MHz;

f_o = output frequency in MHz;

C_L = output load capacitance in pF;

V_{CC} = supply voltage in Volts

11.1. Waveforms and test circuit

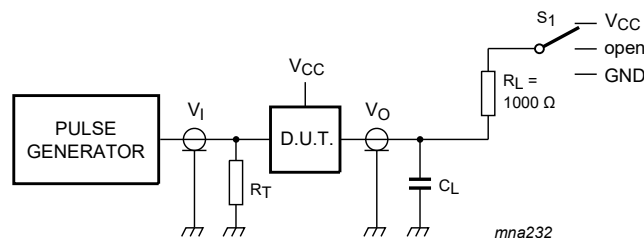


Measurement points are given in Table 9.

Fig. 5. Input (A) to output (Y) propagation delays

Table 9. Measurement point

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



Test data is given in Table 8.

Definitions for test circuit:

C_L = Load capacitance including jig and probe capacitance.

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

For t_{PLZ} , t_{PZL} , $S_1 = V_{CC}$

Fig. 6. Test circuit for measuring switching times

12. Package outline

TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mm SOT353-1

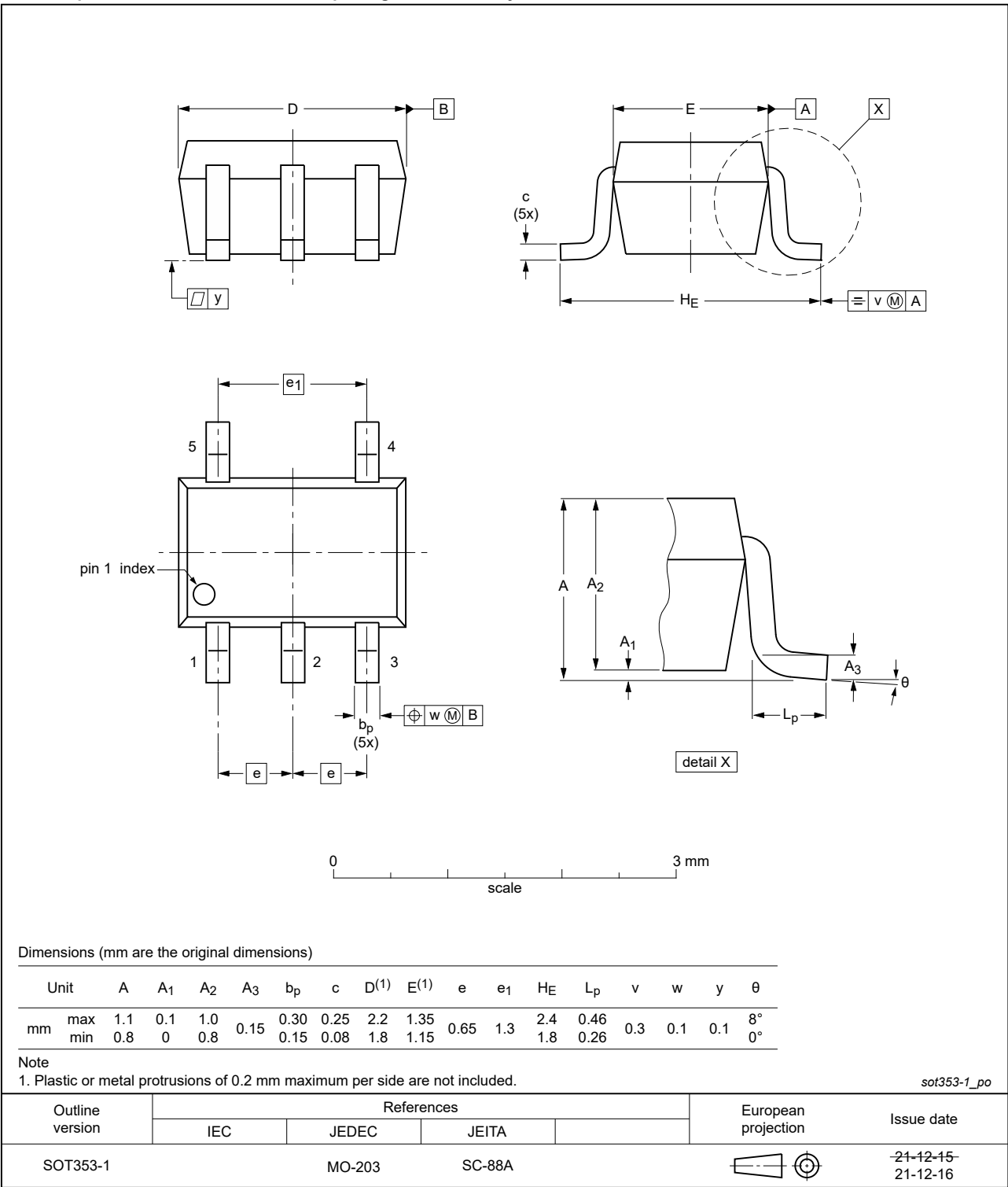


Fig. 7. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads

SOT753

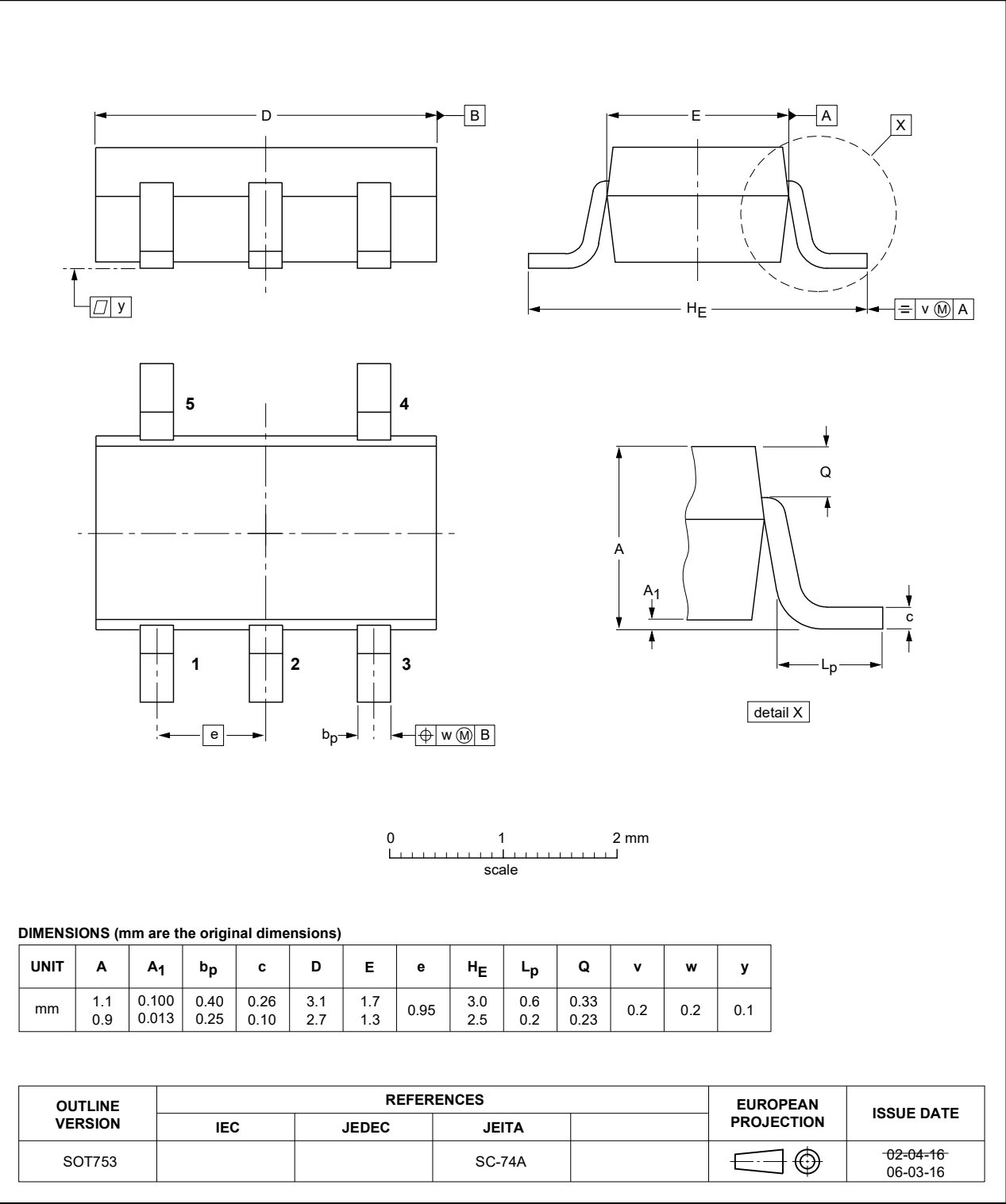


Fig. 8. Package outline SOT753 (SC-74A)

13. Abbreviations

Table 10. Abbreviations

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

14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AHC1G07 v.9	20220111	Product data sheet	-	74AHC1G07 v.8
Modifications:	• Section 1 and Section 2 updated. • Section 8: Derating values for P_{tot} total power dissipation updated. • Fig. 7: Package outline drawing SOT353-1 (TSSOP5) updated.			
74AHC1G07 v.8	20190225	Product data sheet	-	74AHC_AHCT1G07 v.7
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. • Type numbers 74AHCT1G07GW (SOT353-1) and 74AHCT1G07GV (SOT753) removed.			
74AHC_AHCT1G07 v.7	20141118	Product data sheet	-	74AHC_AHCT1G07 v.6
Modifications:	• Section 4: table note added.			
74AHC_AHCT1G07 v.6	20070607	Product data sheet	-	74AHC_AHCT1G07 v.5
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Package SOT353 changed to SOT353-1 in Section 3 and Section 12. • Quick reference data and Soldering sections removed.			
74AHC_AHCT1G07 v.5	20021002	Product specification	-	74AHC_AHCT1G07 v.4
74AHC_AHCT1G07 v.4	20020606	Product specification	-	74AHC_AHCT1G07 v.3
74AHC_AHCT1G07 v.3	20020221	Product specification	-	74AHC_AHCT1G07 v.2
74AHC_AHCT1G07 v.2	20010209	Product specification	-	74AHC_AHCT1G07 v.1
74AHC_AHCT1G07 v.1	20000502	Product specification	-	-

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.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at <https://www.nexperia.com>.

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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.....	4
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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Date of release: 11 January 2022