

74AHC1G79; 74AHCT1G79

Single D-type flip-flop; positive-edge trigger

Rev. 7 — 30 August 2021

Product data sheet

1. General description

The 74AHC1G79; 74AHCT1G79 is a single positive-edge triggered D-type flip-flop. Data at the D-input that meets the set-up and hold time requirements on the LOW-to-HIGH clock transition will be stored in the flip-flop and appear at the Q 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
- Symmetrical output impedance
- Balanced propagation delays
- Input levels:
 - For 74AHC1G79: CMOS level
 - For 74AHCT1G79: TTL level
- ESD protection:
 - HBM JESD22-A114F: exceeds 2000 V
 - MM JESD22-A115-A: exceeds 200 V
 - CDM JESD22-C101C: exceeds 1000 V
- Specified from -40 °C to +125 °C

3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74AHC1G79GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74AHCT1G79GW				
74AHC1G79GV	-40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753
74AHCT1G79GV				

4. Marking

Table 2. Marking codes

Type number	Marking ^[1]
74AHC1G79GW	AP
74AHCT1G79GW	CP
74AHC1G79GV	A79
74AHCT1G79GV	C79

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

5. Functional diagram

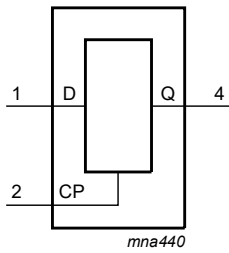


Fig. 1. Logic symbol

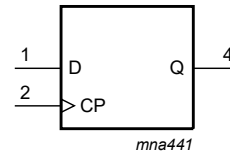


Fig. 2. IEC logic symbol

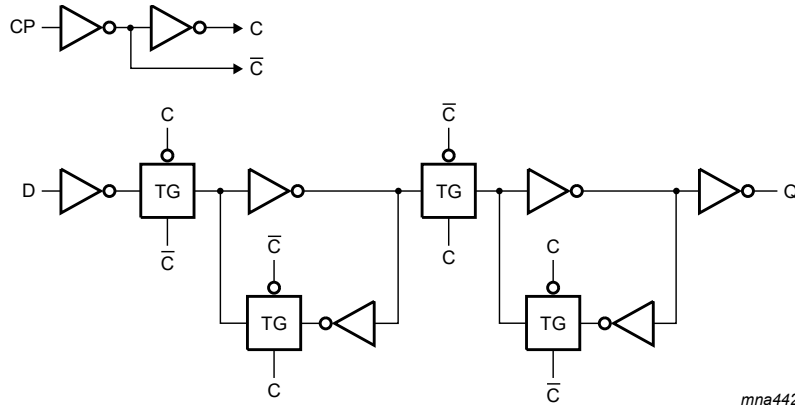
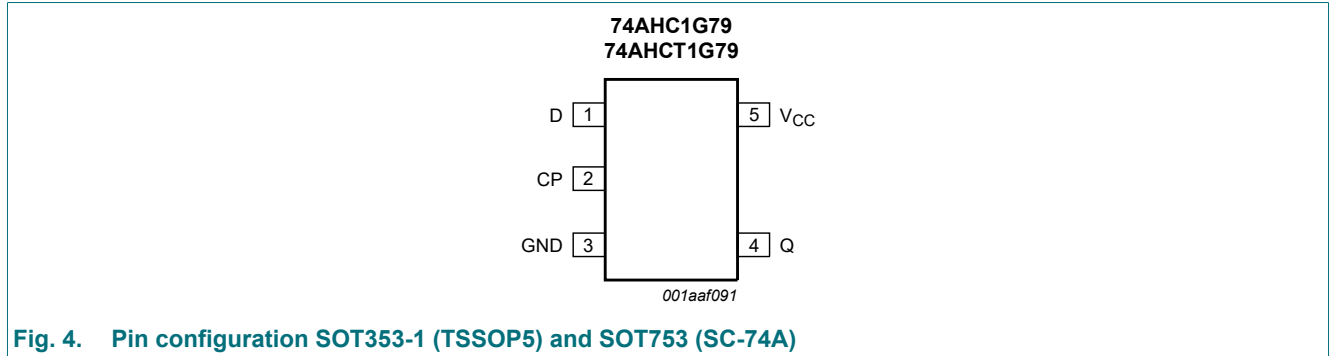


Fig. 3. Logic diagram

6. Pinning information

6.1. Pinning



6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
D	1	data input
CP	2	clock pulse input
GND	3	ground (0 V)
Q	4	data output
V _{CC}	5	supply voltage

7. Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level; ↑ = LOW-to-HIGH CP transition; X = don't care;

Q + 1 = state after the next LOW-to-HIGH CP transition.

Inputs		Output
CP	D	Q + 1
↑	L	L
↑	H	H
L	X	Q

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	-20	-	mA
I_{OK}	output clamping current	$V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V [1]	-	±20	mA
I_O	output current	-0.5 V < V_O < $V_{CC} + 0.5$ V	-	±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 [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	74AHC1G79			74AHCT1G79			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
$\Delta t/\Delta V$	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	-	-	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	
74AHC1G79										
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 _{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	-	-	3.8	-	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	-	-	1.0	-	10	-	40	µA
C _I	input capacitance		-	1.5	10	-	10	-	10	pF
74AHCT1G79										
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	-	-	3.8	-	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	-	-	1.0	-	10	-	40	µA
ΔI _{CC}	additional supply current	per input pin; V _I = 3.4 V; other inputs at V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V	-	-	1.35	-	1.5	-	1.5	mA
C _I	input capacitance		-	1.5	10	-	10	-	10	pF

11. Dynamic characteristics

Table 8. Dynamic characteristics

$GND = 0\text{ V}$; $t_r = t_f = \leq 3.0\text{ ns}$. For test circuit see Fig. 6. For waveform see Fig. 5.

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
74AHC1G79										
t_{pd}	propagation delay	CP to Q [1]								
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$ [2]								
		$C_L = 15\text{ pF}$	-	4.9	8.4	1.0	9.8	1.0	11.5	ns
		$C_L = 50\text{ pF}$	-	6.9	12.0	1.0	14.0	1.0	15.5	ns
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$ [3]								
		$C_L = 15\text{ pF}$	-	3.5	5.6	1.0	7.0	1.0	8.0	ns
		$C_L = 50\text{ pF}$	-	5.1	8.0	1.0	10.0	1.0	11.0	ns
t_{su}	set-up time	D to CP	3.0	1.0	-	3.0	-	4.0	-	ns
t_h	hold time	D to CP	+2.0	-1.0	-	2.0	-	3.0	-	ns
t_W	pulse width	clock HIGH or LOW	3.0	-	-	3.0	-	4.0	-	ns
f_{max}	maximum frequency		90	-	-	90	-	70	-	MHz
C_{PD}	power dissipation capacitance	per buffer; $C_L = 50\text{ pF}$; $f = 1\text{ MHz}$; $V_I = GND\text{ to }V_{CC}$ [4]	-	15	-	-	-	-	-	pF
74AHCT1G79										
t_{pd}	propagation delay	CP to Q [1]								
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$ [3]								
		$C_L = 15\text{ pF}$	-	3.5	5.0	1.0	6.0	1.0	8.0	ns
		$C_L = 50\text{ pF}$	-	5.0	8.0	1.0	10.0	1.0	11.0	ns
t_{su}	set-up time	D to CP	3.0	1.0	-	3.0	-	4.0	-	ns
t_h	hold time	D to CP	+2.0	-1.0	-	2.0	-	3.0	-	ns
t_W	pulse width	clock HIGH or LOW	3.0	-	-	3.0	-	4.0	-	ns
f_{max}	maximum frequency		90	-	-	90	-	70	-	MHz
C_{PD}	power dissipation capacitance	per buffer; $C_L = 50\text{ pF}$; $f = 1\text{ MHz}$; $V_I = GND\text{ to }V_{CC}$ [4]	-	16	-	-	-	-	-	pF

[1] t_{pd} is the same as t_{PLH} and t_{PHL} .

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

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

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

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

f_i = input frequency in MHz;

f_o = output frequency in MHz;

C_L = output load capacitance in pF;

V_{CC} = supply voltage in Volt.

11.1. Waveform and test circuit

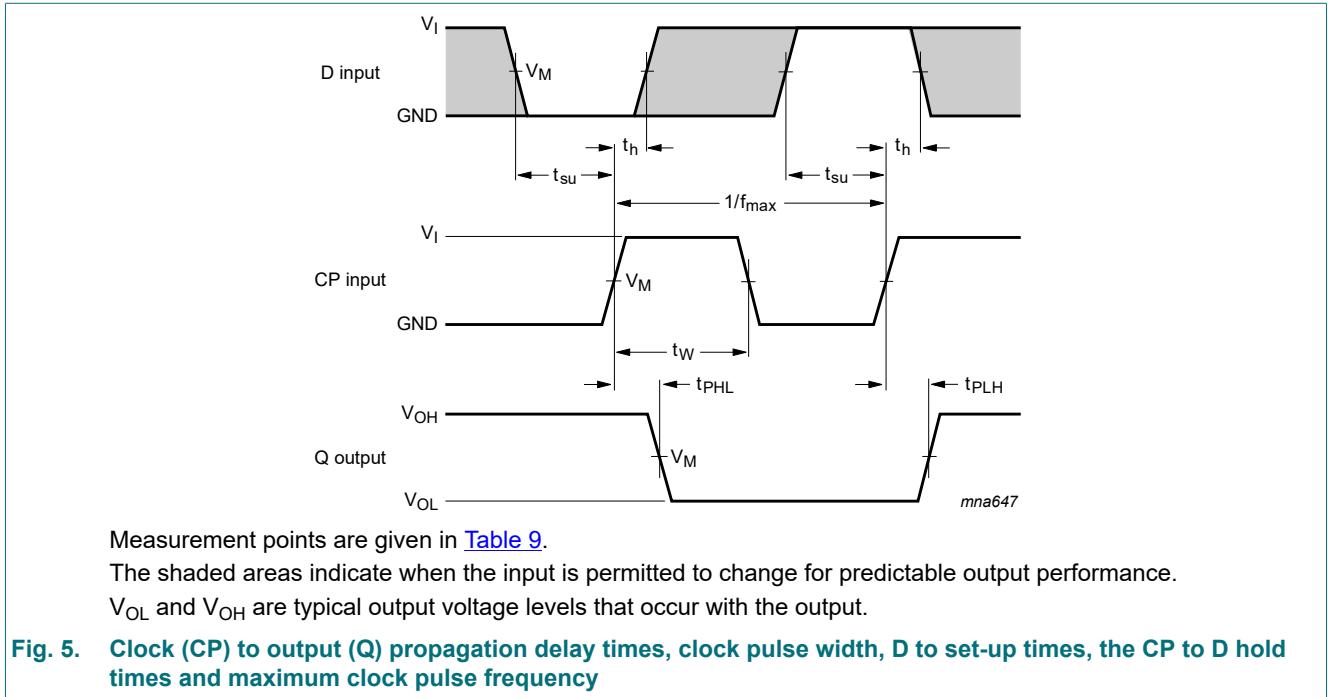
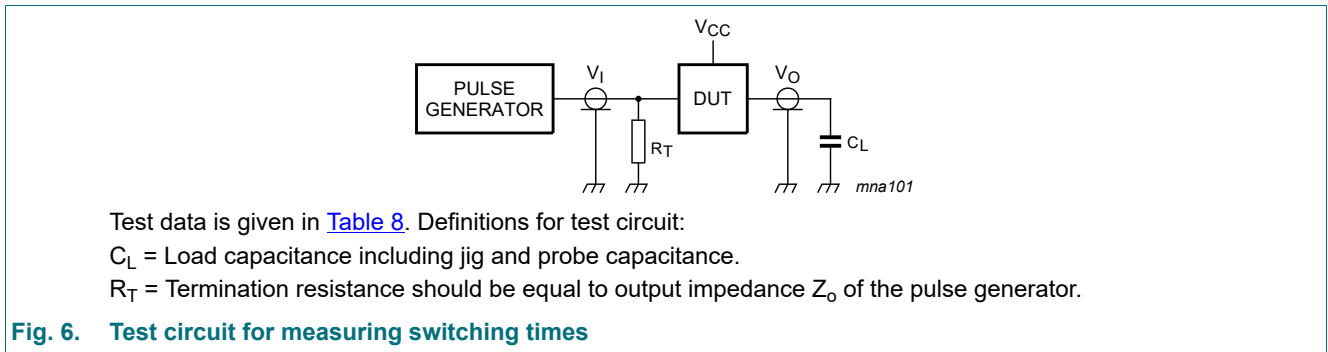


Table 9. Measurement points

Type	Inputs		Output
	V_I	V_M	V_M
74AHC1G79	GND to V_{CC}	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
74AHCT1G79	GND to 3.0 V	1.5 V	$0.5 \times V_{CC}$



12. Package outline

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

SOT353-1

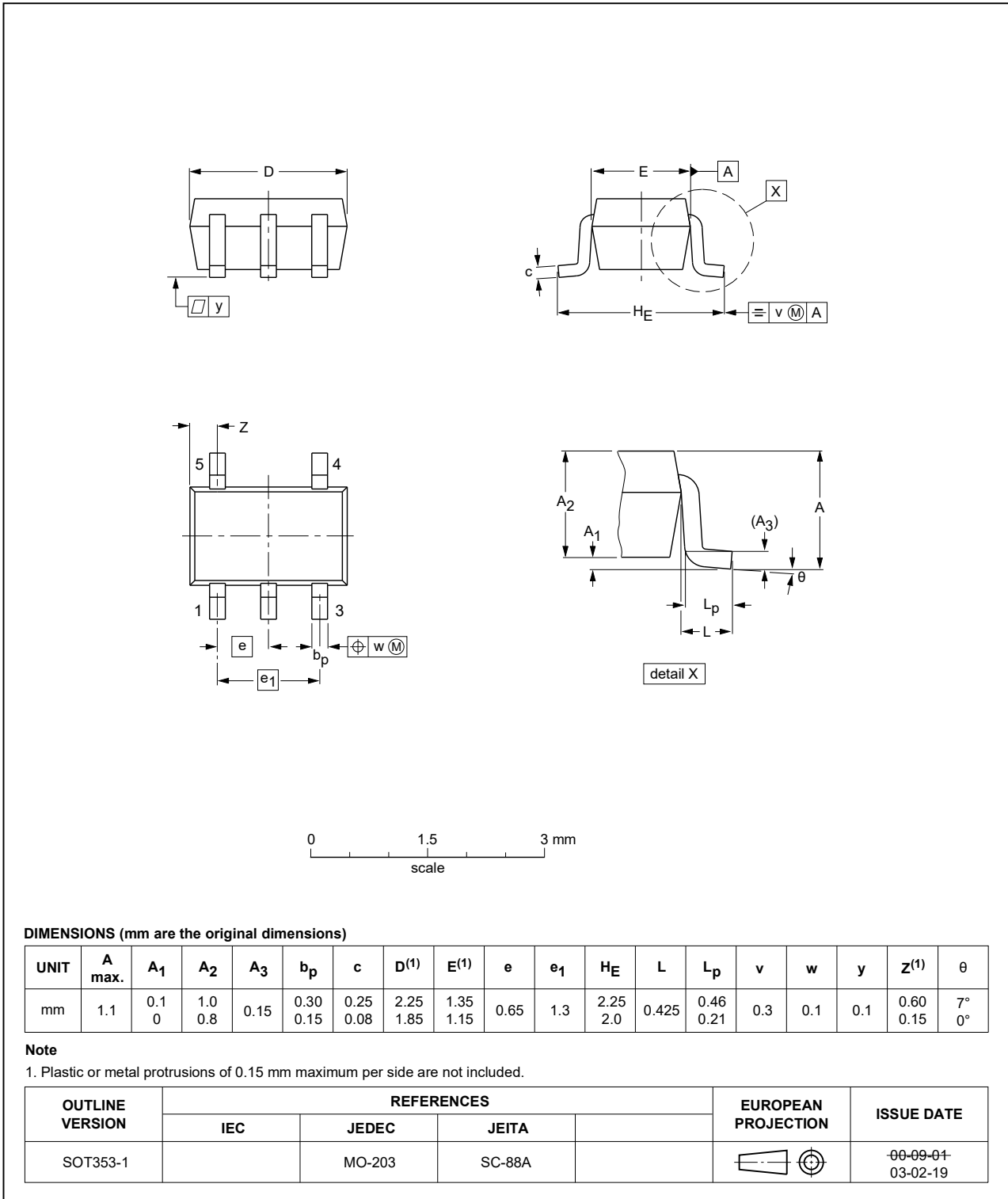


Fig. 7. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads

SOT753

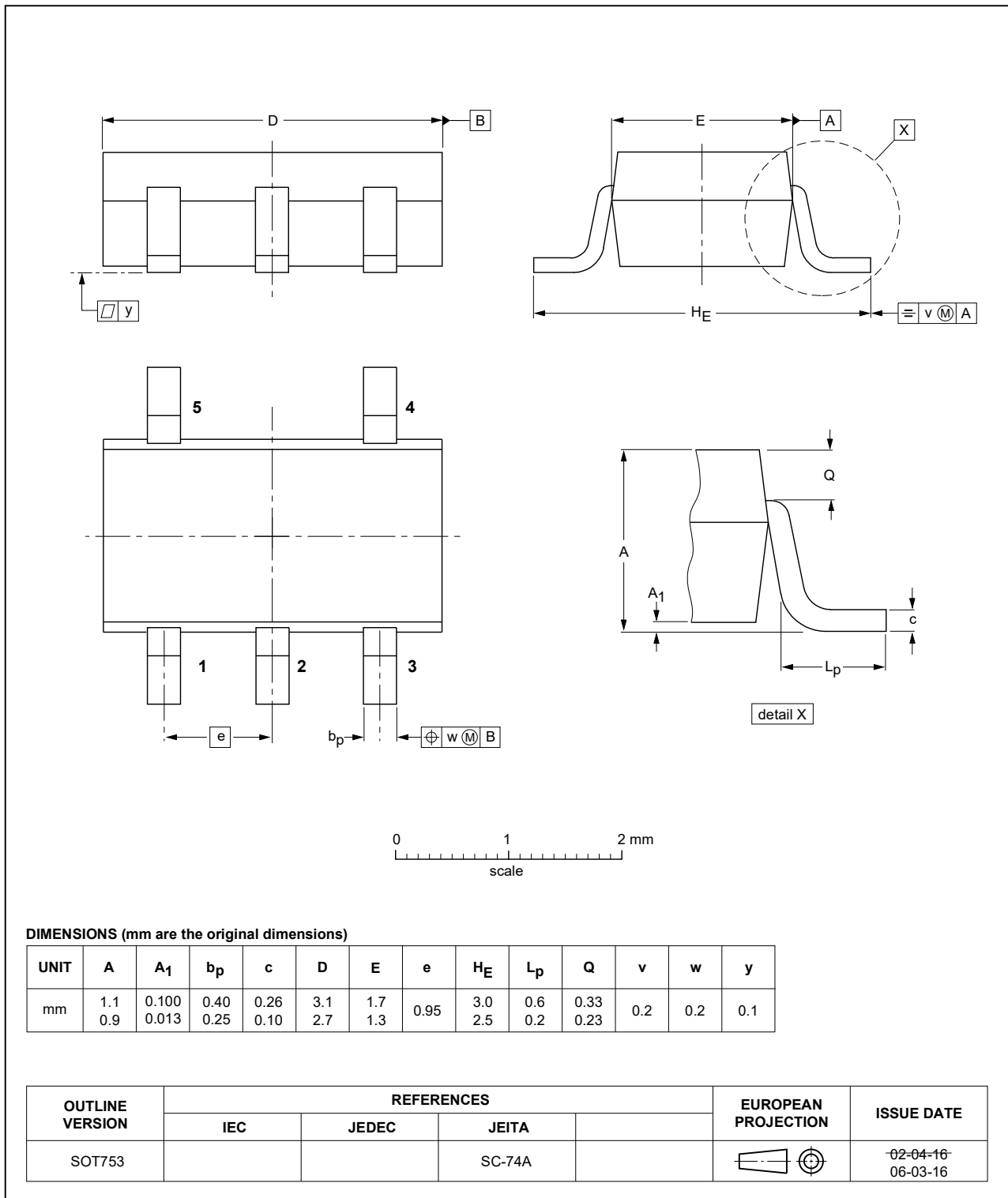


Fig. 8. Package outline SOT753 (SC-74A)

13. Abbreviations

Table 10. Abbreviations

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

14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AHC_AHCT1G79 v.7	20210830	Product data sheet	-	74AHC_AHCT1G79 v.6
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. Section 1 and Section 2 updated. Section 8: Derating values for P_{tot} total power dissipation updated. 			
74AHC_AHCT1G79 v.6	20140923	Product data sheet	-	74AHC_AHCT1G79 v.5
Modifications:	<ul style="list-style-type: none"> Section 4: table note added. 			
74AHC_AHCT1G79 v.5	20070702	Product data sheet	-	74AHC_AHCT1G79 v.4
74AHC_AHCT1G79 v.4	20020606	Product specification	-	74AHC_AHCT1G79 v.3
74AHC_AHCT1G79 v.3	20020218	Product specification	-	74AHC_AHCT1G79 v.2
74AHC_AHCT1G79 v.2	20010222	Product specification	-	74AHC_AHCT1G79 v.1
74AHC_AHCT1G79 v.1	19990518	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.
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Product [short] data sheet	Production	This document contains the product specification.

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