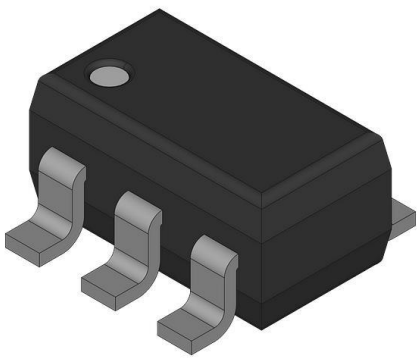


74AHC1G14GV,125 Datasheet

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DiGi Electronics Part Number	74AHC1G14GV,125-DG
Manufacturer	NXP Semiconductors
Manufacturer Product Number	74AHC1G14GV,125
Description	IC INVERT SCHMITT 1CH 1INP SC74A
Detailed Description	Inverter IC 1 Channel Schmitt Trigger SC-74A



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

DiGi is a global authorized distributor of electronic components.

Purchase and inquiry

Manufacturer Product Number:

74AHC1G14GV,125

Series:

74AHC

Logic Type:

Inverter

Number of Inputs:

1

Voltage - Supply:

2V ~ 5.5V

Current - Output High, Low:

8mA, 8mA

Input Logic Level - High:

2.2V ~ 3.85V

Operating Temperature:

-40°C ~ 125°C

Supplier Device Package:

SC-74A

Base Product Number:

74AHC1G14

Manufacturer:

NXP Semiconductors

Product Status:

Active

Number of Circuits:

1

Features:

Schmitt Trigger

Current - Quiescent (Max):

1 μ A

Input Logic Level - Low:

0.9V ~ 1.65V

Max Propagation Delay @ V, Max CL:

10.6ns @ 5V, 50pF

Mounting Type:

Surface Mount

Package / Case:

SC-74A, SOT-753

Environmental & Export classification

Moisture Sensitivity Level (MSL):

1 (Unlimited)

REACH Status:

REACH Unaffected



74AHC1G14; 74AHCT1G14

Inverting Schmitt trigger

Rev. 12 — 12 November 2024

Product data sheet

1. General description

The 74AHC1G14 and 74AHCT1G14 are single inverters with Schmitt-trigger inputs. Inputs are overvoltage tolerant. This feature allows the use of these devices as translators in mixed voltage environments.

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

The AHCT device has TTL input switching levels and supply voltage range 4.5 V to 5.5 V.

2. Features and benefits

- Wide supply voltage range from 2.0 V to 5.5 V
- Overvoltage tolerant inputs to 5.5 V
- CMOS low power dissipation
- Symmetrical output impedance
- High noise immunity
- Latch-up performance exceeds 100 mA per JESD78 Class II Level A
- ESD protection:
 - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
 - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Specified from -40 °C to +125 °C

3. Applications

- Wave and pulse shapers
- Astable multivibrators
- Monostable multivibrators

4. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74AHC1G14GW 74AHCT1G14GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74AHC1G14GV 74AHCT1G14GV	-40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753
74AHC1G14GZ 74AHCT1G14GZ	-40 °C to +125 °C	XSON5	plastic thermal enhanced extremely thin small outline package with side-wettable flanks (SWF); no leads; 5 terminals; body 1.1 × 0.85 × 0.5 mm	SOT8065-1

5. Marking

Table 2. Marking codes

Type number	Marking code ^[1]
74AHC1G14GW	AF
74AHCT1G14GW	CF
74AHC1G14GV	A14
74AHCT1G14GV	C14
74AHC1G14GZ	AF
74AHCT1G14GZ	CF

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

6. Functional diagram

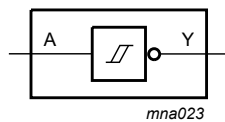


Fig. 1. Logic symbol

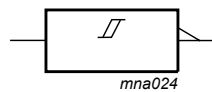


Fig. 2. IEC logic symbol

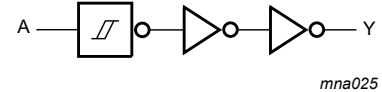
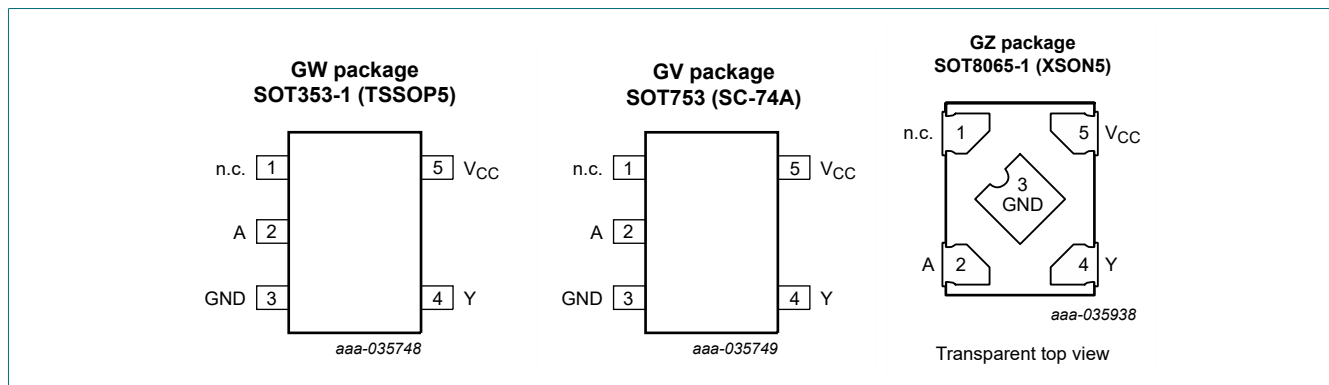


Fig. 3. Logic diagram

7. Pinning information

7.1. Pinning



7.2. 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

8. Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level.

Input	Output
A	Y
L	H
H	L

9. 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 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.

For SOT8065-1 (XSON5) package: P_{tot} derates linearly with 3.2 mW/K above 72 °C.

10. Recommended operating conditions

Table 6. Recommended operating conditions

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

Symbol	Parameter	Conditions	74AHC1G14			74AHCT1G14			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

11. 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	
74AHC1G14										
V _{OH}	HIGH-level output voltage	V _I = V _{T+} or V _{T-}								
		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 _{T+} or V _{T-}								
		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
74AHCT1G14										
V _{OH}	HIGH-level output voltage	V _I = V _{T+} or V _{T-} ; 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 _{T+} or V _{T-} ; 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

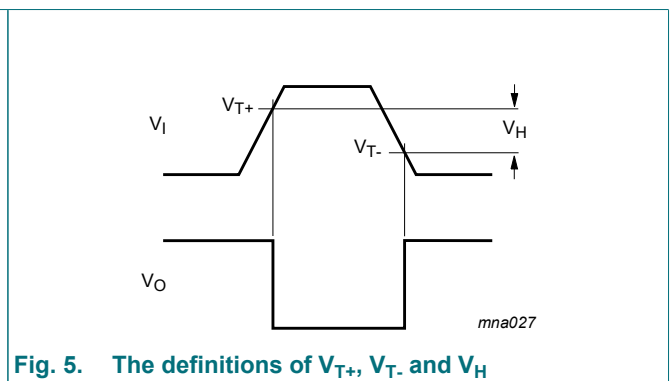
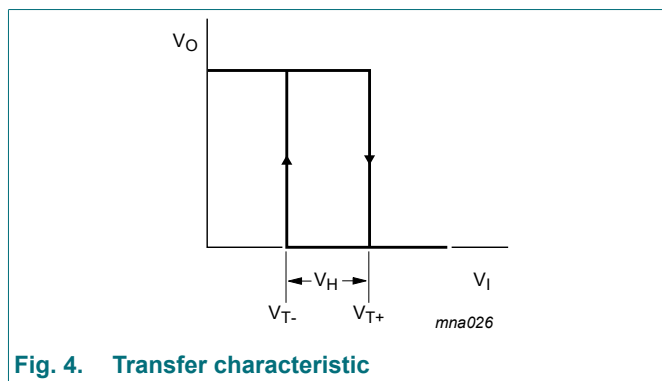
11.1. Transfer characteristics

Table 8. Transfer characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V). See Fig. 4 and 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	
74AHC1G14										
V_{T+}	positive-going threshold voltage	$V_{CC} = 3.0\text{ V}$	-	-	2.2	-	2.2	-	2.2	V
		$V_{CC} = 4.5\text{ V}$	-	-	3.15	-	3.15	-	3.15	V
		$V_{CC} = 5.5\text{ V}$	-	-	3.85	-	3.85	-	3.85	V
V_{T-}	negative-going threshold voltage	$V_{CC} = 3.0\text{ V}$	0.9	-	-	0.9	-	0.9	-	V
		$V_{CC} = 4.5\text{ V}$	1.35	-	-	1.35	-	1.35	-	V
		$V_{CC} = 5.5\text{ V}$	1.65	-	-	1.65	-	1.65	-	V
V_H	hysteresis voltage	$V_{CC} = 3.0\text{ V}$	0.3	-	1.2	0.3	1.2	0.25	1.2	V
		$V_{CC} = 4.5\text{ V}$	0.4	-	1.4	0.4	1.4	0.35	1.4	V
		$V_{CC} = 5.5\text{ V}$	0.5	-	1.6	0.5	1.6	0.45	1.6	V
74AHCT1G14										
V_{T+}	positive-going threshold voltage	$V_{CC} = 4.5\text{ V}$	-	-	2.0	-	2.0	-	2.0	V
		$V_{CC} = 5.5\text{ V}$	-	-	2.0	-	2.0	-	2.0	V
V_{T-}	negative-going threshold voltage	$V_{CC} = 4.5\text{ V}$	0.5	-	-	0.5	-	0.5	-	V
		$V_{CC} = 5.5\text{ V}$	0.6	-	-	0.6	-	0.6	-	V
V_H	hysteresis voltage	$V_{CC} = 4.5\text{ V}$	0.4	-	1.4	0.4	1.4	0.35	1.4	V
		$V_{CC} = 5.5\text{ V}$	0.4	-	1.6	0.4	1.6	0.35	1.6	V

11.2. Transfer characteristic waveforms



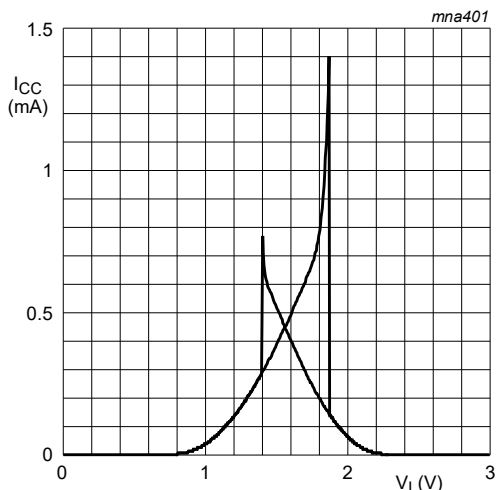


Fig. 6. Typical 74AHC1G14 transfer characteristics;
 $V_{CC} = 3.0\text{ V}$

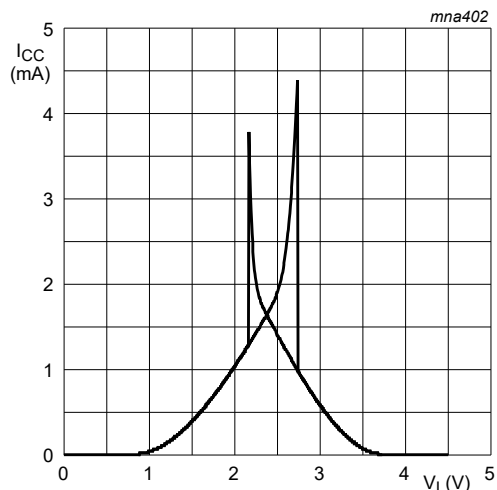


Fig. 7. Typical 74AHC1G14 transfer characteristics;
 $V_{CC} = 4.5\text{ V}$

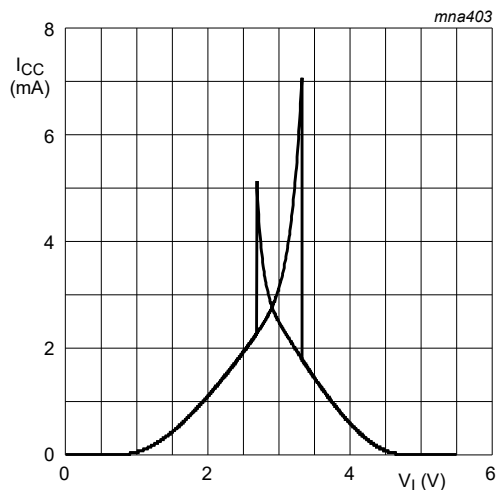


Fig. 8. Typical 74AHC1G14 transfer characteristics; $V_{CC} = 5.5\text{ V}$

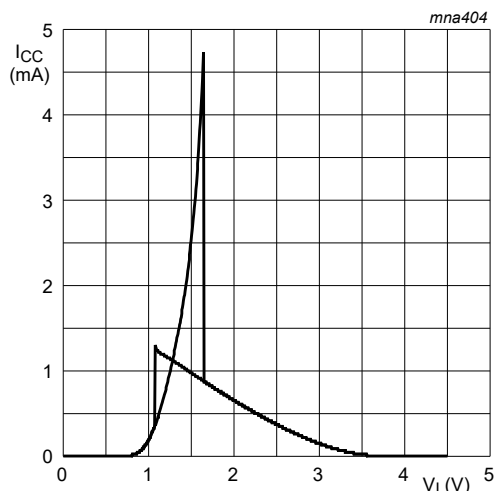


Fig. 9. Typical 74AHCT1G14 transfer characteristics;
 $V_{CC} = 4.5\text{ V}$

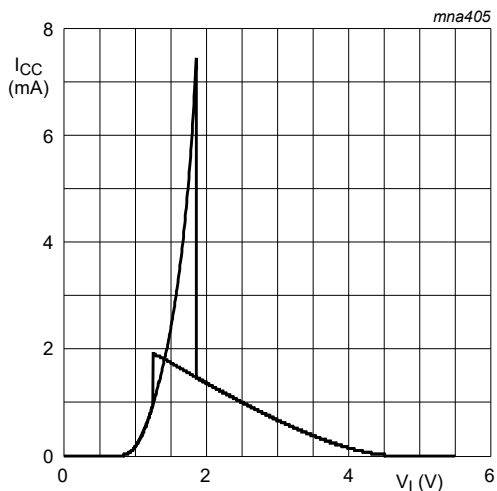


Fig. 10. Typical 74AHCT1G14 transfer characteristics;
 $V_{CC} = 5.5\text{ V}$

12. Dynamic characteristics

Table 9. Dynamic characteristics

$GND = 0\text{ V}$; $t_r = t_f \leq 3.0\text{ ns}$. For waveform see Fig. 11. For test circuit see Fig. 12.

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
74AHC1G14										
t_{pd}	propagation delay	A to Y; [1]								
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$ [2]								
		$C_L = 15\text{ pF}$	-	4.2	12.8	1.0	15.0	1.0	16.5	ns
		$C_L = 50\text{ pF}$	-	6.0	16.3	1.0	18.5	1.0	20.5	ns
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$ [3]								
		$C_L = 15\text{ pF}$	-	3.2	8.6	1.0	10.0	1.0	11.0	ns
C_{PD}	power dissipation capacitance	$C_L = 50\text{ pF}$; [4]	-	12	-	-	-	-	-	pF
		$f = 1\text{ MHz}$; $V_I = GND\text{ to }V_{CC}$								
74AHCT1G14										
t_{pd}	propagation delay	A to Y; [1][3]								
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$								
		$C_L = 15\text{ pF}$	-	4.1	7.0	1.0	8.0	1.0	9.0	ns
C_{PD}	power dissipation capacitance	$C_L = 50\text{ pF}$	-	5.9	8.5	1.0	10.0	1.0	11.0	ns
		per buffer; [4]	-	13	-	-	-	-	-	pF
		$V_I = GND\text{ to }V_{CC}$								

[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).

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

f_i = input frequency in MHz;

f_o = output frequency in MHz;

C_L = output load capacitance in pF;

V_{CC} = supply voltage in V.

12.1. Waveform and test circuit

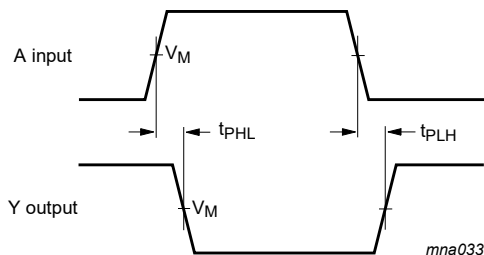
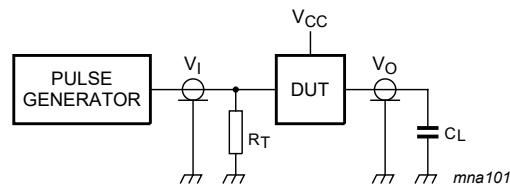


Fig. 11. The input (A) to output (Y) propagation delays



Test data is given in [Table 9](#).

Definitions for test circuit:

C_L = Load capacitance;

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

Fig. 12. Test circuit for measuring switching times

Table 10. Test data

Type number	Input		Output
	V_I	V_M	V_M
74AHC1G14	GND to V_{CC}	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
74AHCT1G14	GND to 3.0 V	1.5 V	$0.5 \times V_{CC}$

13. Application information

The slow input rise and fall times cause additional power dissipation, which can be calculated using the following formula:

$$P_{\text{add}} = f_i \times (t_r \times \Delta I_{CC(AV)} + t_f \times \Delta I_{CC(AV)}) \times V_{CC} \text{ where:}$$

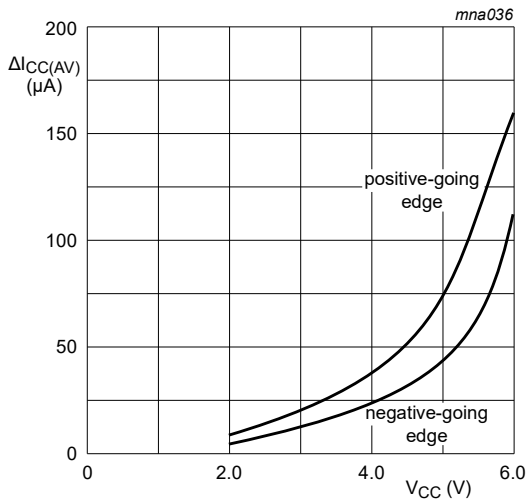
- P_{add} = additional power dissipation (μW);
- f_i = input frequency (MHz);
- t_r = input rise time (ns); 10 % to 90 %;
- t_f = input fall time (ns); 90 % to 10 %;
- $\Delta I_{CC(AV)}$ = average additional supply current (μA).

Average additional I_{CC} differs with positive or negative input transitions, as shown in [Fig. 13](#) and [Fig. 14](#).

For 74AHC1G14 and 74AHCT1G14 used in relaxation oscillator circuit, see [Fig. 15](#).

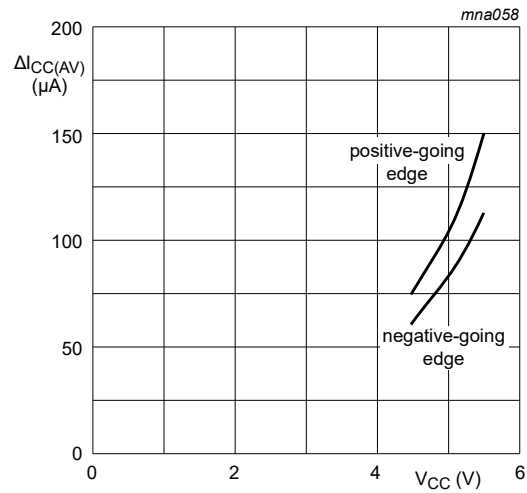
Note to the application information:

- All values given are typical unless otherwise specified.



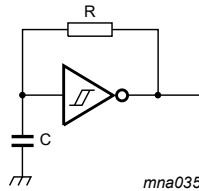
Linear change of V_I between $0.1V_{CC}$ to $0.9V_{CC}$

Fig. 13. Average additional I_{CC} for 74AHC1G14 Schmitt trigger devices



Linear change of V_I between $0.1V_{CC}$ to $0.9V_{CC}$

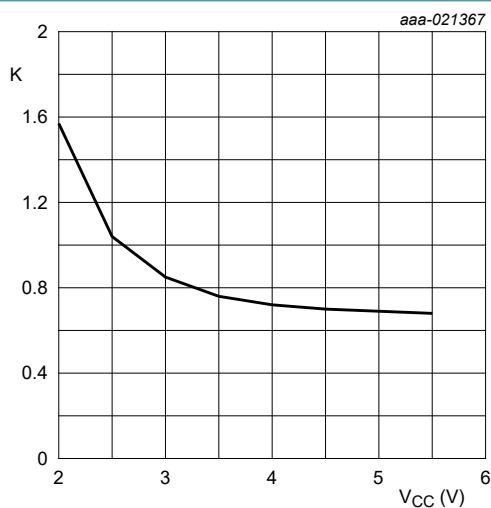
Fig. 14. Average additional I_{CC} for 74AHCT1G14 Schmitt trigger devices



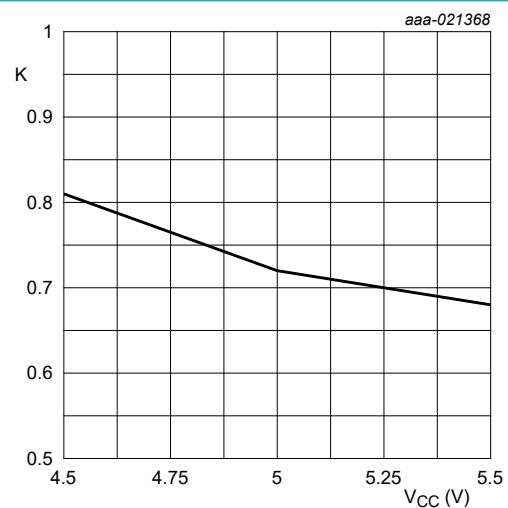
$$f = \frac{1}{T} \approx \frac{1}{K \times RC}$$

For K-factor, see [Fig. 16](#).

Fig. 15. Relaxation oscillator using the 74AHC1G14 and 74AHCT1G14



K-factor for 74AHC1G14



K-factor for 74AHCT1G14

Fig. 16. Typical K-factor for relaxation oscillator

14. Package outline

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

SOT353-1

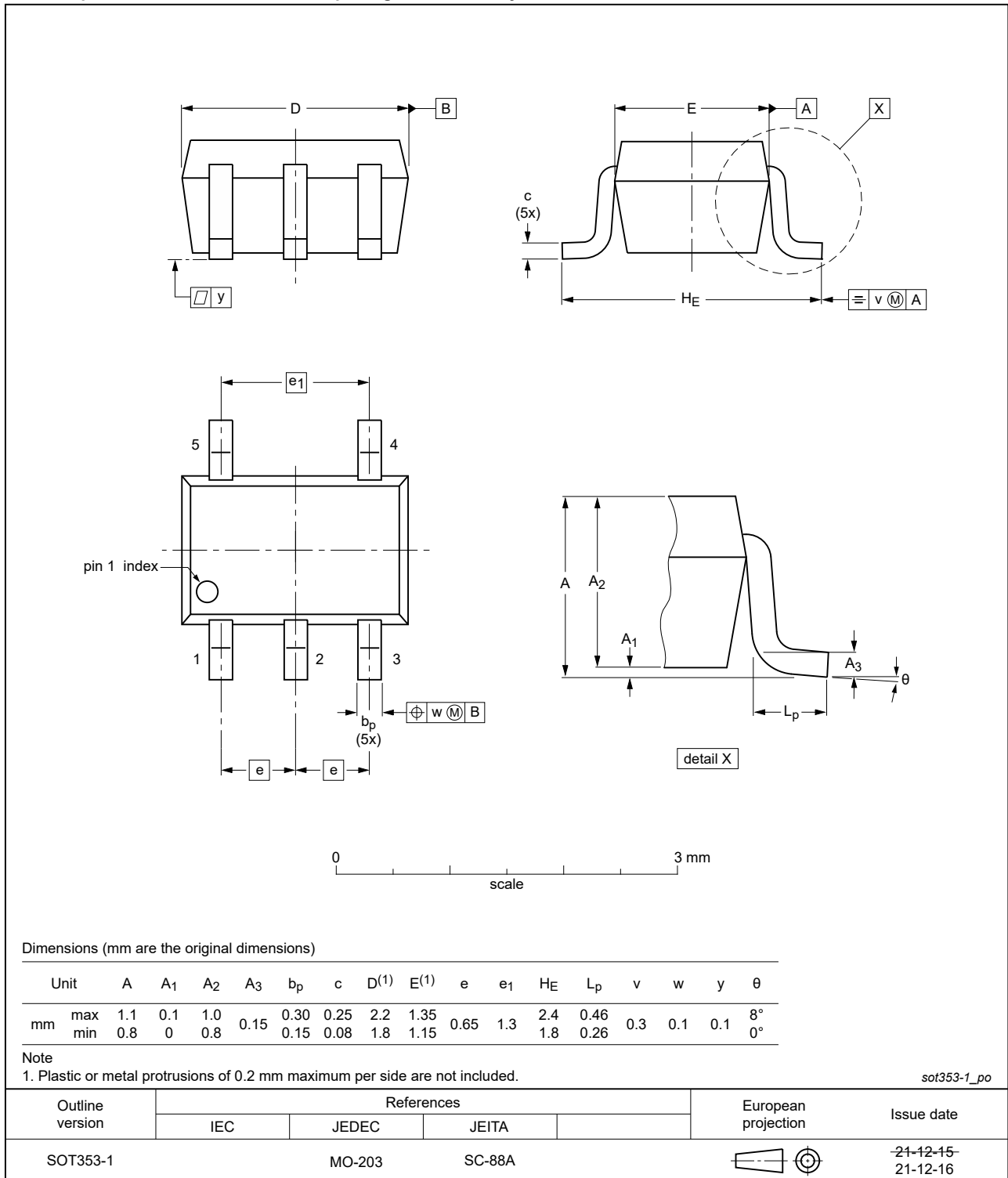


Fig. 17. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads

SOT753

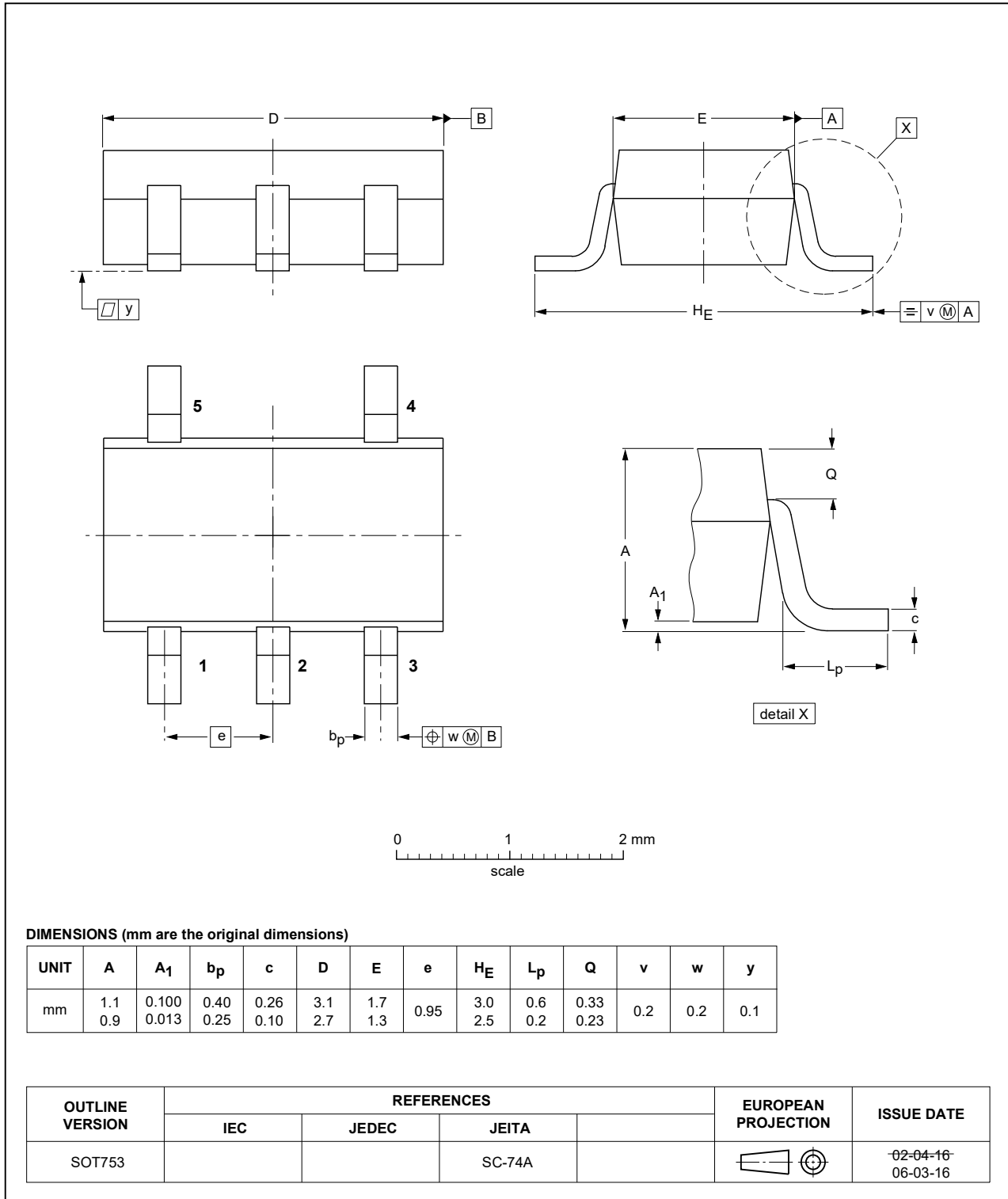


Fig. 18. Package outline SOT753 (SC-74A)

XSON5: Plastic thermal enhanced extremely thin small outline package with side-wettable flanks (SWF); no leads; 5 terminals; body 1.1 × 0.85 × 0.5 mm

SOT8065-1

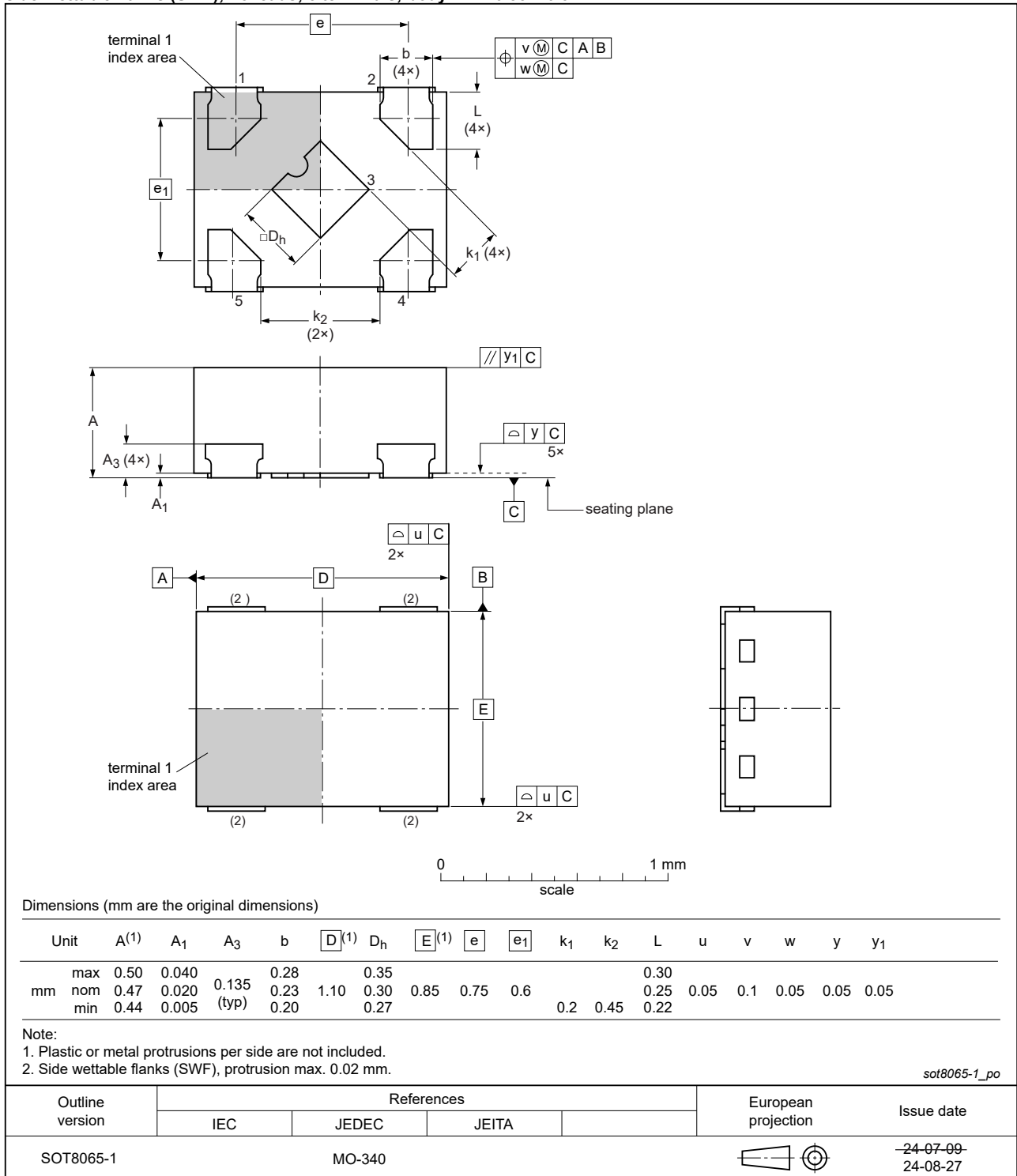


Fig. 19. Package outline SOT8065-1 (XSON5)

15. Abbreviations

Table 11. Abbreviations

Acronym	Description
ANSI	American National Standards Institute
CDM	Charged Device Model
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
ESDA	ElectroStatic Discharge Association
HBM	Human Body Model
JEDEC	Joint Electron Device Engineering Council
TTL	Transistor-Transistor Logic

16. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AHC_AHCT1G14 v.12	20241112	Product data sheet	-	74AHC_AHCT1G14 v.11
Modifications:	<ul style="list-style-type: none"> Type numbers 74AHC1G14GZ and 74AHCT1G14GZ (SOT8065-1/XSON5) added. 			
74AHC_AHCT1G14 v.11	20230912	Product data sheet	-	74AHC_AHCT1G14 v.10
Modifications:	<ul style="list-style-type: none"> Section 2: ESD specification updated according to the latest JEDEC standard. 			
74AHC_AHCT1G14 v.10	20220112	Product data sheet	-	74AHC_AHCT1G14 v.9
Modifications:	<ul style="list-style-type: none"> Section 1 and Section 2 updated. Fig. 17: Package outline drawing for SOT353-1 (TSSOP5) has changed. 			
74AHC_AHCT1G14 v.9	20200403	Product data sheet	-	74AHC_AHCT1G14 v.8
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. Table 5: Derating values for P_{tot} total power dissipation updated. 			
74AHC_AHCT1G14 v.8	20160113	Product data sheet	-	74AHC_AHCT1G14 v.7
Modifications:	<ul style="list-style-type: none"> Fig. 16 added (typical K-factor for relaxation oscillator). 			
74AHC_AHCT1G14 v.7	20141118	Product data sheet	-	74AHC_AHCT1G14 v.6
Modifications:	<ul style="list-style-type: none"> Table 2: table note added. 			
74AHC_AHCT1G14 v.6	20090518	Product data sheet	-	74AHC_AHCT1G14 v.5
Modifications:	<ul style="list-style-type: none"> Table 7: the conditions for HIGH-level output voltage and LOW-level output voltage have been changed. 			
74AHC_AHCT1G14 v.5	20070629	Product data sheet	-	74AHC_AHCT1G14 v.4
74AHC_AHCT1G14 v.4	20020528	Product specification	-	74AHC_AHCT1G14 v.3
74AHC_AHCT1G14 v.3	20020218	Product specification	-	74AHC_AHCT1G14 v.2
74AHC_AHCT1G14 v.2	20010222	Product specification	-	74AHC_AHCT1G14 v.1
74AHC_AHCT1G14 v.1	19990805	Product specification	-	-

17. 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".
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