74AHC1G79; 74AHCT1G79

Single D-type flip-flop; positive-edge trigger Rev. 6-23 September 2014

Product data sheet

1. **General description**

74AHC1G79 and 74AHCT1G79 are high-speed Si-gate CMOS devices. They provide a single positive-edge triggered D-type flip-flop.

Information on the data input is transferred to the Q output on the LOW-to-HIGH transition of the clock pulse. The D input must be stable one set-up time prior to the LOW-to-HIGH clock transition for predictable operation.

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.

Features and benefits 2.

- Symmetrical output impedance
- High noise immunity
- Low power dissipation
- Balanced propagation delays
- SOT353-1 and SOT753 package options
- 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									
	Temperature range	Name	Description	Version						
74AHC1G79GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads;	SOT353-1						
74AHCT1G79GW			body width 1.25 mm							
74AHC1G79GV	−40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753						
74AHCT1G79GV										



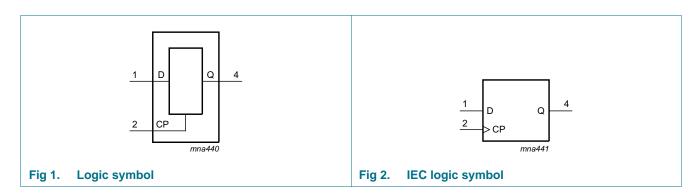
4. Marking

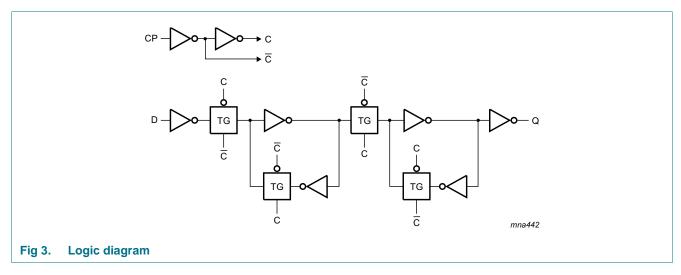
Table 2. Marking codes

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

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

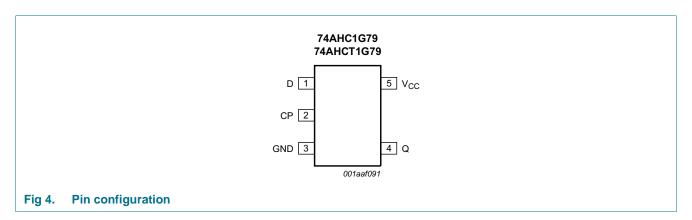
5. Functional diagram





6. Pinning information

6.1 Pinning



6.2 Pin description

Table 3. Pin description

Symbol	Pin	Description
D	1	data input
СР	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 [1]

Inputs CP	Inputs						
СР	D	Q + 1					
\uparrow	L	L					
\uparrow	Н	Н					
L	X	Q					

[1] 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.

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
VI	input voltage		-0.5	+7.0	V
I _{IK}	input clamping current	V _I < -0.5 V	-20	-	mA
I _{OK}	output clamping current	$V_O < -0.5 \text{ V or } V_O > V_{CC} + 0.5 \text{ V}$ [1]	-	±20	mA
Io	output current	$-0.5 \text{ V} < \text{V}_{\text{O}} < \text{V}_{\text{CC}} + 0.5 \text{ V}$	-	±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	$T_{amb} = -40 ^{\circ}\text{C to } +125 ^{\circ}\text{C}$	-	250	mW

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

9. Recommended operating conditions

Table 6. Recommended operating conditions

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

Symbol	Parameter	Conditions	74	AHC1G7	79	74	AHCT1G	79	Unit
			Min	Тур	Max	Min	Тур	Max	
V _{CC}	supply voltage		2.0	5.0	5.5	4.5	5.0	5.5	V
VI	input voltage		0	-	5.5	0	-	5.5	V
Vo	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	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$	-	-	100	-	-	-	ns/V
	and fall rate	$V_{CC} = 5.0 \text{ V} \pm 0.5 \text{ V}$	-	-	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 1	o +85 °C	-40 °C t	o +125 °C	Unit	
			Min	Тур	Max	Min	Max	Min	Max	
For type	74AHC1G79									
V_{IH}	HIGH-level	V _{CC} = 2.0 V	1.5	-	-	1.5	-	1.5	-	V
	input voltage	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	V _{CC} = 2.0 V	-	-	0.5	-	0.5	-	0.5	V
	input voltage	$V_{CC} = 3.0 \text{ V}$	-	-	0.9	-	0.9	-	0.9	V
		$V_{CC} = 5.5 \text{ V}$	-	-	1.65	-	1.65	-	1.65	V

74AHC_AHCT1G79

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

Table 7. Static characteristics ...continued Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions		25 °C		-40 °C	to +85 °C	-40 °C t	o +125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
V _{OH}	HIGH-level	$V_I = V_{IH}$ or V_{IL}								
	output voltage	$I_O = -50 \mu A; V_{CC} = 2.0 \text{ V}$	1.9	2.0	-	1.9	-	1.9	-	V
		$I_O = -50 \mu A; V_{CC} = 3.0 \text{ V}$	2.9	3.0	-	2.9	-	2.9	-	V
		$I_O = -50 \mu A; V_{CC} = 4.5 V$	4.4	4.5	-	4.4	-	4.4	-	V
		$I_{O} = -4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.58	-	-	2.48	-	2.40	-	V
		$I_{O} = -8.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	3.94	-	-	3.8	-	3.70	-	V
V _{OL}	LOW-level	$V_I = V_{IH}$ or V_{IL}								
	output voltage	$I_O = 50 \mu A; V_{CC} = 2.0 V$	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 50 \mu A; V_{CC} = 3.0 V$	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 50 \mu A; V_{CC} = 4.5 V$	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.36	-	0.44	-	0.55	V
		$I_O = 8.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	-	0.36	-	0.44	-	0.55	V
I _I	input leakage current	$V_I = 5.5 \text{ V or GND};$ $V_{CC} = 0 \text{ V to } 5.5 \text{ V}$	-	-	0.1	-	1.0	-	2.0	μΑ
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5 \text{ V}$	-	-	1.0	-	10	-	40	μА
Cı	input capacitance		-	1.5	10	-	10	-	10	pF
For type	74AHCT1G79		-	1				I	1	
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	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5 \text{ V}$								
	output voltage	I _O = -50 μA	4.4	4.5	-	4.4	-	4.4	-	V
		$I_{O} = -8.0 \text{ mA}$	3.94	-	-	3.8	-	3.70	-	V
V _{OL}	LOW-level	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5 \text{ V}$								
	output voltage	Ι _Ο = 50 μΑ	-	0	0.1	-	0.1	-	0.1	V
		I _O = 8.0 mA	-	-	0.36	-	0.44	-	0.55	V
l _l	input leakage current	V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V	-	-	0.1	-	1.0	-	2.0	μΑ
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5 \text{ V}$	-	-	1.0	-	10	-	40	μΑ
Δl _{CC}	additional supply current	per input pin; $V_1 = 3.4 \text{ V}$; other inputs at V_{CC} or GND; $I_O = 0 \text{ A}$; $V_{CC} = 5.5 \text{ V}$	-	-	1.35	-	1.5	-	1.5	mA
Cı	input capacitance		-	1.5	10	-	10	-	10	pF

11. Dynamic characteristics

Table 8. Dynamic characteristics

GND = 0 V; $t_r = t_f = \le 3.0$ ns. For test circuit see Figure 6. For waveforms see Figure 5.

Symbol	Parameter	Conditions			25 °C		-40 °C	to +85 °C	-40 °C t	o +125 °C	Unit
				Min	Тур	Max	Min	Max	Min	Max	
For type	74AHC1G79										
t _{pd}	propagation	CP to Q	<u>[1]</u>								
	delay	V _{CC} = 3.0 V to 3.6 V	[2]								
		C _L = 15 pF		-	4.9	8.4	1.0	9.8	1.0	11.5	ns
		C _L = 50 pF		-	6.9	12.0	1.0	14.0	1.0	15.5	ns
		V _{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	3.5	5.6	1.0	7.0	1.0	8.0	ns
		C _L = 50 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; $C_L = 50 \text{ pF}$; $f = 1 \text{ MHz}$; $V_I = \text{GND to } V_{CC}$	[4]	-	15	-	-	-	-	-	pF
For type	74AHCT1G79	9									
t _{pd}	propagation	CP to Q	<u>[1]</u>								
	delay	V _{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	3.5	5.0	1.0	6.0	1.0	8.0	ns
		C _L = 50 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; $C_L = 50 \text{ pF}$; $f = 1 \text{ MHz}$; $V_I = \text{GND to } V_{CC}$	<u>[4]</u>	-	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).

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

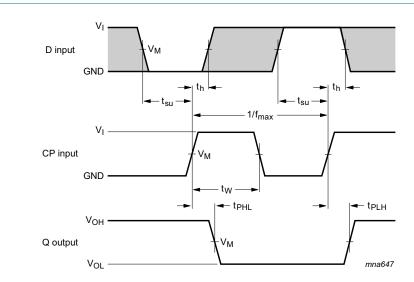
 f_i = input frequency in MHz;

f_o = output frequency in MHz;

C_L = output load capacitance in pF;

V_{CC} = supply voltage in Volts.

12. Waveforms



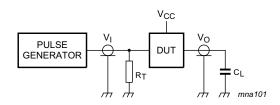
Measurement points are given in Table 9.

V_{OL} and V_{OH} are typical output voltage levels that occur with the output.

Fig 5. Clock (CP) to output (Q) propagation delay times, clock pulse width, D to set-up times, the CP to D hold times and maximum clock pulse frequency

Table 9. Measurement points

Туре	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	$0.5 \times V_{CC}$



Test data is given in <a>Table 8. Definitions for test circuit:

C_L = Load capacitance including jig and probe capacitance.

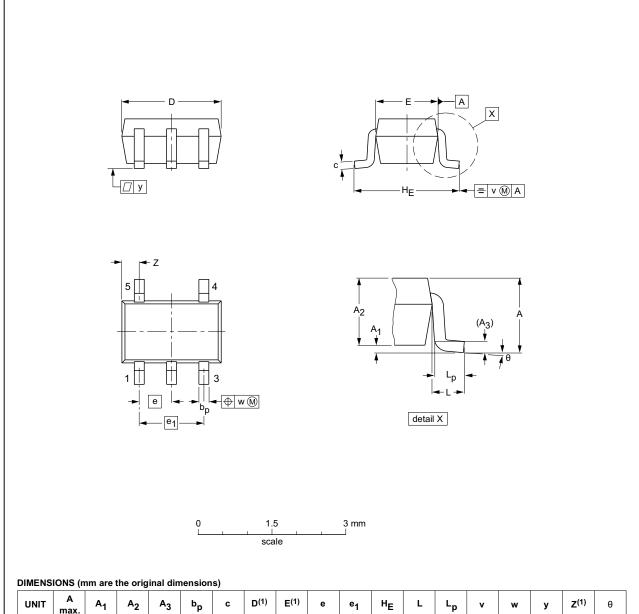
 R_T = Termination resistance should be equal to output impedance Z_o of the pulse generator.

Fig 6. Test circuit for measuring switching times

13. Package outline

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

SOT353-1



	•					•												
UNIT	A max.	A ₁	A ₂	А3	bp	С	D ⁽¹⁾	E ⁽¹⁾	е	e ₁	HE	L	Lp	v	w	у	Z ⁽¹⁾	θ
mm	1.1	0.1 0	1.0 0.8	0.15	0.30 0.15	0.25 0.08	2.25 1.85	1.35 1.15	0.65	1.3	2.25 2.0	0.425	0.46 0.21	0.3	0.1	0.1	0.60 0.15	7° 0°

Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE		REFER	RENCES	EUROPEAN	ISSUE DATE
VERSION	IEC	JEDEC	JEITA	PROJECTION	ISSUE DATE
SOT353-1		MO-203	SC-88A		00-09-01 03-02-19

Fig 7. Package outline SOT353-1 (TSSOP5)

74AHC_AHCT1G79

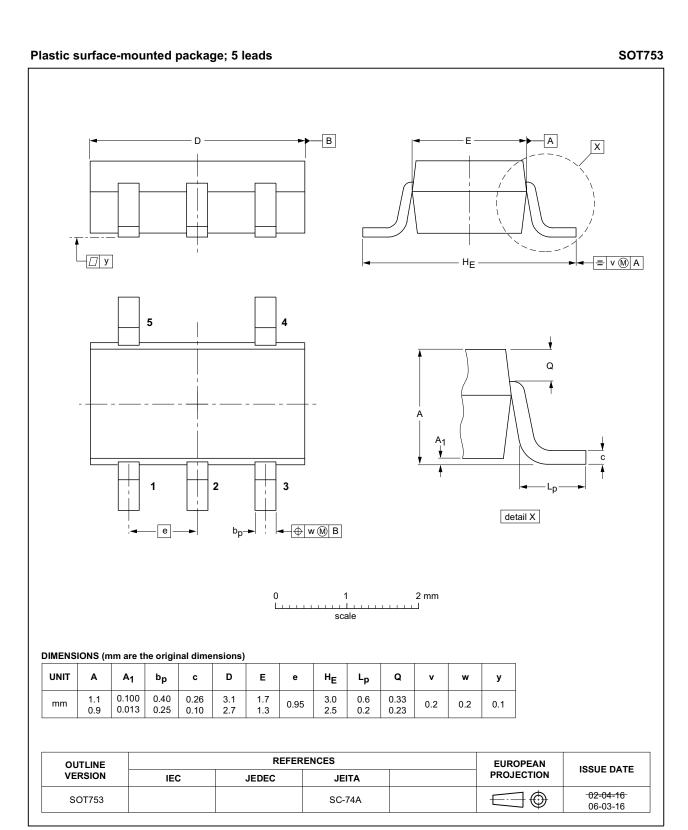


Fig 8. Package outline SOT753 (SC-74A)

74AHC_AHCT1G79

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14. Abbreviations

Table 10. Abbreviations

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

15. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes		
74AHC_AHCT1G79 v.6	20140923	Product data sheet	-	74AHC_AHCT1G79 v.5		
Modifications:	Section 4: ta	ble 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	-	-		

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

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703557B 746431H 5962-90606022A 5962-9060602FA NLV14013BDR2G M38510/30104BDA M38510/07106BFA M38510/06102BFA
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