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

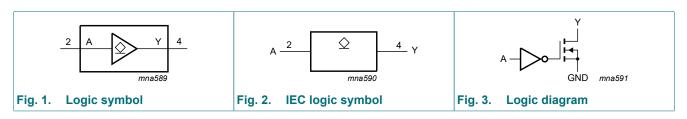
Type number	Marking [1]
74AHC1G07GW	AS
74AHC1G07GV	A07

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

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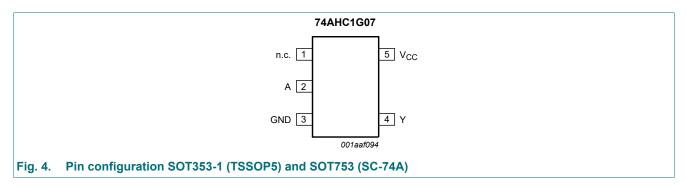
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5. Functional diagram



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
Α	Y
L	L
Н	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
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 V	[1]	-	±20	mA
lo	output current	V _O > -0.5 V		-	±25	mA
Vo	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	Тур	Max	Unit
V _{CC}	supply voltage		2.0	5.0	5.5	V
VI	input voltage		0	-	5.5	V
Vo	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			°C to 5 °C	-40 °C to +125 °C		Unit
			Min	Тур	Мах	Min	Мах	Min	Max	-
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 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
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	μA
I _{OZ}	OFF-state output current	$V_{I} = V_{IH} \text{ or } V_{IL};$ $V_{O} = V_{CC} \text{ or } \text{GND}; V_{CC} = 5.5 \text{ V}$	-	-	±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
CI	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 Fig. 6.

Symbol	Parameter	Conditions		25 °C		-40 °C to +85 °C		-40 °C to +125 °C		Unit	
				Min	Тур	Max	Min	Мах	Min	Мах	
t _{PZL}	OFF-state to LOW	A to Y; see <u>Fig. 5</u>									
	propagation delay	V _{CC} = 3.0 V to 3.6 V; C _L = 15 pF [7]	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 [7	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]	-	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	2]	-	3.6	5.5	1.0	6.5	1.0	7.0	ns

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Symbol	Parameter	Conditions	ions		25 °C		-40 °C to +85 °C		-40 °C to +125 °C		Unit
				Min	Тур	Max	Min	Max	Min	Мах	
t _{PLZ}	LOW to OFF-state	A to Y; see <u>Fig. 5</u>									
	propagation delay	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; [3] 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).
 - $P_D = C_{PD} \times V_{CC}^2 \times f_i + \Sigma (C_L \times V_{CC}^2 \times f_o)$ 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

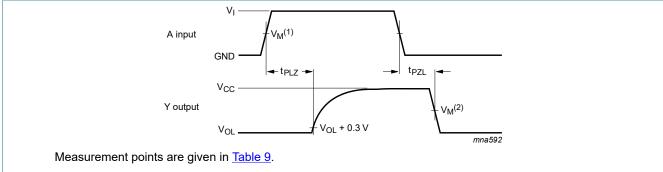
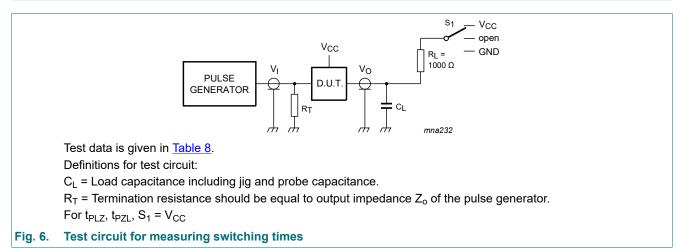


Fig. 5. Input (A) to output (Y) propagation delays

Table 9. Measurement point

Input		Output
Vi	V _M ⁽¹⁾	V _M ⁽²⁾
GND to V _{CC}	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$



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12. Package outline

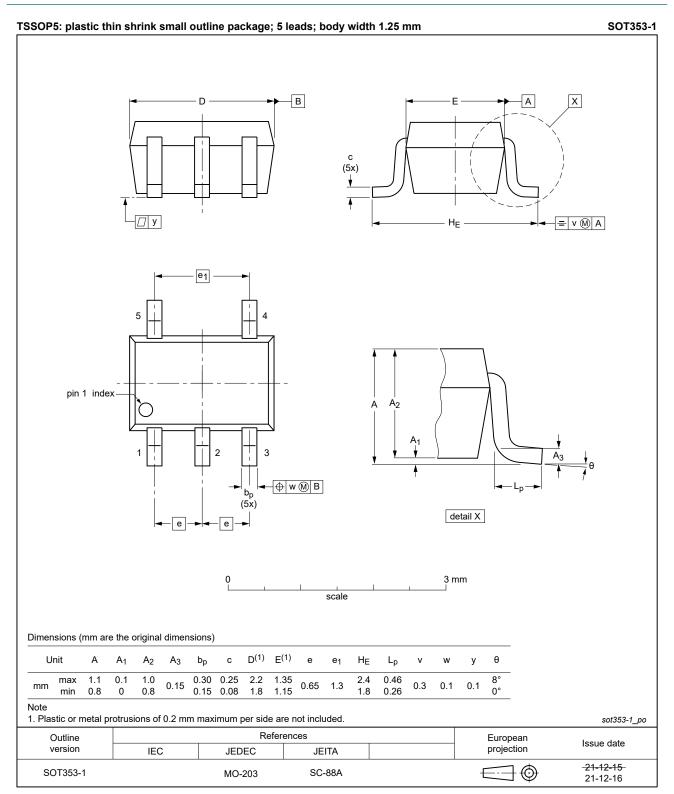


Fig. 7. Package outline SOT353-1 (TSSOP5)

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SOT753

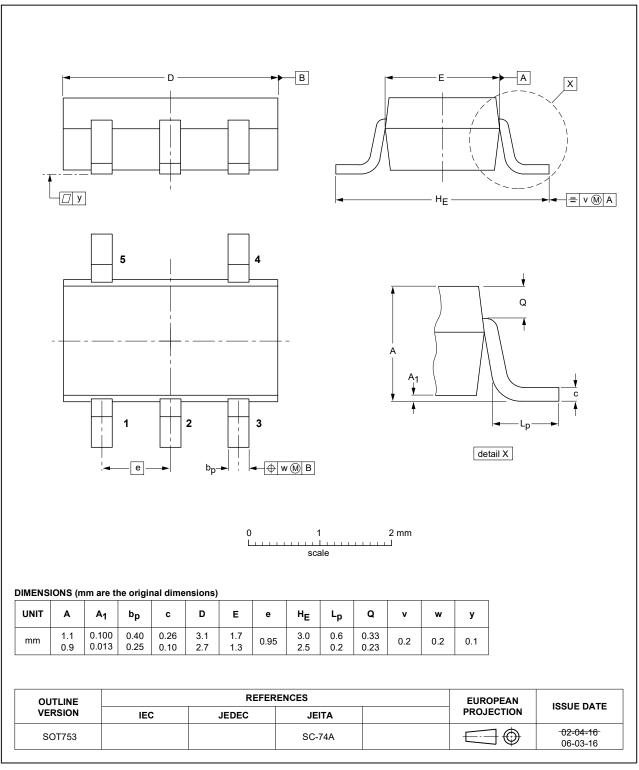


Fig. 8. Package outline SOT753 (SC-74A)

13. Abbreviations

Table 10. Abbreviatio	Table 10. Abbreviations					
Acronym	Description					
CDM	Charged Device Model					
CMOS	Complementary Metal-Oxide Semiconductor					
DUT	Device Under Test					
ESD	ElectroStatic Discharge					
НВМ	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:	 <u>Section 1</u> and <u>Section 2</u> updated. <u>Section 8</u>: Derating values for P_{tot} total power dissipation updated. <u>Fig. 7</u>: 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:	• <u>Section 4</u> : ta	ble note added.						
74AHC_AHCT1G07 v.6	20070607	Product data sheet	-	74AHC_AHCT1G07 v.5				
Modifications:	guidelines o Legal texts I Package SC 	of this data sheet has been f NXP Semiconductors. have been adapted to the ne 0T353 changed to SOT353- nce data and Soldering sec	ew company nam 1 in <u>Section 3</u> and	e where appropriate.				
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	-	-				

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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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