

74AHC1G126-Q100; 74AHCT1G126-Q100

Bus buffer/line driver; 3-state

Rev. 4 — 12 September 2023

Product data sheet

1. General description

The 74AHC1G126-Q100; 74AHCT1G126-Q100 is a single buffer/line driver with 3-state output. Inputs are overvoltage tolerant. This feature allows the use of these devices as translators in mixed voltage environments.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
 - Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- Symmetrical output impedance
- · Balanced propagation delays
- 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
- Input levels:
 - For 74AHC1G126-Q100: CMOS level
 - For 74AHCT1G126-Q100: TTL level
- ESD protection:
 - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
 - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V

3. Ordering information

Table 1. Ordering information

<u> </u>										
Type number	Package									
	Temperature range	Name	Description	Version						
74AHC1G126GW-Q100 74AHCT1G126GW-Q100	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1						
74AHC1G126GV-Q100 74AHCT1G126GV-Q100	-40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753						

4. Marking

Table 2. Marking codes

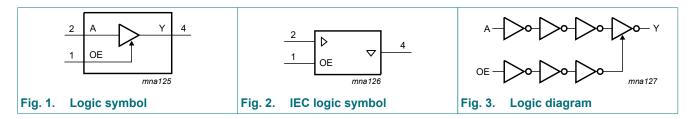
Type number	Marking [1]
74AHC1G126GW-Q100	AN
74AHCT1G126GW-Q100	CN
74AHC1G126GV-Q100	A26



Type number	Marking [1]
74AHCT1G126GV-Q100	C26

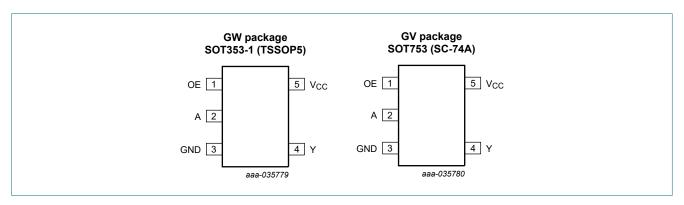
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5. Functional diagram



6. Pinning information

6.1. Pinning



6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
OE	1	output enable input
A	2	data input A
GND	3	ground (0 V)
Υ	4	data output Y
V _{CC}	5	supply voltage

7. Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level; X = don't care; Z = high-impedance OFF-state

Input OE	Output	
OE	Υ	
Н	L	L
Н	Н	Н
L	X	Z

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 [1]	-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 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	$T_{amb} = -40 ^{\circ}\text{C} \text{ to } +125 ^{\circ}\text{C}$ [2]	-	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	74AH	74AHC1G126-Q100			74AHCT1G126-Q100		
			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 and	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$	-	-	100	-	-	-	ns/V
	fall rate	$V_{CC} = 5.0 \text{ V} \pm 0.5 \text{ V}$	-	-	20	-	-	20	ns/V

^[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.

10. Static characteristics

Table 7. Static characteristics

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

Symbol	Parameter	Conditions		25 °C		-40 °C 1	to +85 °C	-40 °C t	o +125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
74AHC1	G126-Q100					'				
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 _{OH}	HIGH-level	V _I = V _{IH} or V _{IL}								
	output voltage	I _O = -50 μA; V _{CC} = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
		$I_O = -50 \mu A; V_{CC} = 3.0 V$	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 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	V _I = V _{IH} or V _{IL}								
	output voltage	I _O = 50 μA; 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 μA; 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
l _{oz}	OFF-state output current	$V_I = V_{IH}$ or V_{IL} ; $V_O = V_{CC}$ or GND; $V_{CC} = 5.5 \text{ V}$	-	-	±0.25	-	±2.5	-	±10	μA
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 _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5 \text{ V}$	-	-	2.0	-	20	-	40	μΑ
C _I	input capacitance		-	3	10	-	10	-	10	pF

Symbol	Parameter	Conditions		25 °C		-40 °C	to +85 °C	-40 °C t	o +125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
74AHCT	1G126-Q100		'							
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} ; $V_{CC} = 4.5 \text{ V}$								
	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} ; $V_{CC} = 4.5 \text{ V}$								
		I _O = 50 μA	-	0	0.1	-	0.1	-	0.1	V
		I _O = 8.0 mA	-	-	0.36	-	0.44	-	0.55	V
l _{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL} ; $V_O = V_{CC}$ or GND; $V_{CC} = 5.5 \text{ V}$	-	-	±0.25	-	±2.5	-	±10	μA
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	μΑ
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5 \text{ V}$	-	-	2.0	-	20	-	40	μΑ
ΔI _{CC}	additional supply current	per input pin; $V_I = V_{CC} - 2.1 \text{ V};$ other inputs at V_{CC} or GND; $I_O = 0 \text{ A}; V_{CC} = 4.5 \text{ V} \text{ to } 5.5 \text{ V}$	-	-	1.35	-	1.5	-	1.5	mA
C _I	input capacitance		-	3	10	-	10	-	10	pF

11. Dynamic characteristics

Table 8. Dynamic characteristics

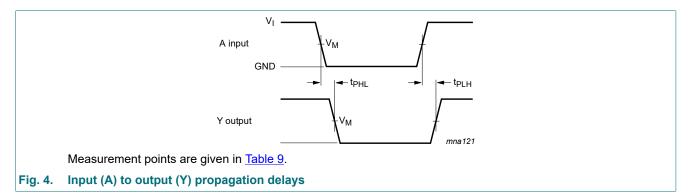
GND = 0 V; for test circuit see Fig. 6.

Symbol	Parameter	Conditions			25 °C		-40 °C	to +85 °C	-40 °C t	o +125 °C	Unit
				Min	Тур	Max	Min	Max	Min	Max	
74AHC1	G126-Q100								·	ı	
t _{pd}	propagation	A to Y; see Fig. 4	[1]								
	delay	V _{CC} = 3.0 V to 3.6 V	[2]								
		C _L = 15 pF		-	4.4	8.0	1.0	9.5	1.0	10.0	ns
		C _L = 50 pF		-	6.3	11.5	1.0	13.0	1.0	14.5	ns
		V _{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	3.4	5.5	1.0	6.5	1.0	7.0	ns
		C _L = 50 pF		-	4.7	7.5	1.0	8.5	1.0	9.5	ns
t _{en}	enable time	OE to Y; see Fig. 5	[1]								
		V _{CC} = 3.0 V to 3.6 V	[2]								
		C _L = 15 pF		-	4.9	8.0	1.0	9.5	1.0	10.0	ns
		C _L = 50 pF		-	7.0	11.5	1.0	13.0	1.0	14.5	ns
		V _{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	3.6	5.6	1.0	6.3	1.0	7.0	ns
		C _L = 50 pF		-	5.4	8.0	1.0	9.0	1.0	9.5	ns
t _{dis}	disable time	OE to Y; see Fig. 5	[1]								
		V _{CC} = 3.0 V to 3.6 V	[2]								
		C _L = 15 pF		-	6.3	9.7	1.0	11.5	1.0	12.5	ns
		C _L = 50 pF		-	9.0	13.2	1.0	15.0	1.0	16.5	ns
		V _{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	4.3	6.8	1.0	8.0	1.0	8.5	ns
		C _L = 50 pF		-	6.1	8.8	1.0	10.0	1.0	11.0	ns
C _{PD}	power dissipation capacitance	per buffer; C _L = 50 pF; f = 1 MHz; V _I = GND to V _{CC}	[4]	-	9	-	-	-	-	-	pF

Symbol	Parameter	Conditions		25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
				Min	Тур	Max	Min	Max	Min	Max	
74AHCT	1G126-Q100										
t _{pd} propagation	A to Y; see Fig. 4	[1]									
	delay	V _{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	3.4	5.5	1.0	6.5	1.0	7.0	ns
		C _L = 50 pF		-	4.7	7.5	1.0	8.5	1.0	9.5	ns
t _{en} enable tii	enable time	OE to Y; see Fig. 5	[1]								
		V _{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	3.4	5.6	1.0	6.3	1.0	6.5	ns
		C _L = 50 pF		-	4.8	8.0	1.0	9.0	1.0	9.0	ns
t _{dis}	disable time	OE to Y; see Fig. 5	[1]								
		V _{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	4.0	6.8	1.0	8.0	1.0	8.5	ns
		C _L = 50 pF		-	5.7	8.8	1.0	10.0	1.0	11.5	ns
C _{PD}	power dissipation capacitance	per buffer; C _L = 50 pF; f = 1 MHz; V _I = GND to V _{CC}	[4]	-	11	-	-	-	-	-	pF

- [1] t_{pd} is the same as t_{PLH} and t_{PHL} .
 - t_{en} is the same as t_{PZL} and $t_{\text{PZH}}.$
- t_{dis} is the same as t_{PLZ} and t_{PHZ} . Typical values are measured at V_{CC} = 3.3 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 (μ W).
 - $P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o)$ 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 V.

11.1. Waveforms and test circuit



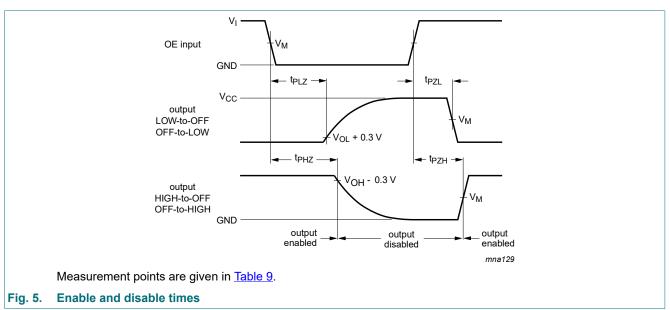
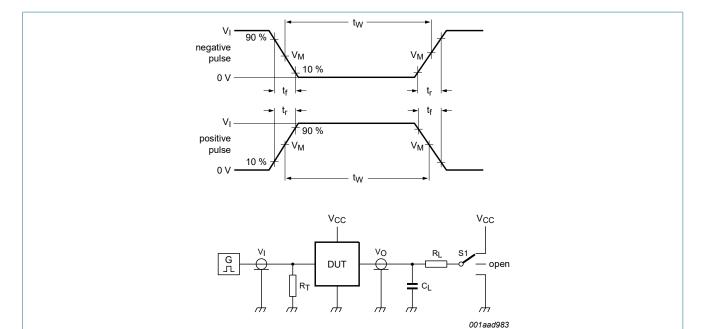


Table 9. Measurement points

Туре	Input	Output		
	V_{M}	V _I	V _M	
74AHC1G126-Q100	0.5 × V _{CC}	GND to V _{CC}	0.5 × V _{CC}	
74AHCT1G126-Q100	1.5 V	GND to 3.0 V	0.5 × V _{CC}	

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Test data is given in Table 10.

Definitions test circuit:

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

C_L = Load capacitance including jig and probe capacitance;

R_L = Load resistance;

S1 = Test selection switch.

Fig. 6. Test circuit for measuring switching times

Table 10. Test data

Туре	Input		Load		S1 position		
	V _I	t _r , t _f	CL	R _L	t _{PHL} , t _{PLH}	t _{PZH} , t _{PHZ}	t _{PZL} , t _{PLZ}
74AHC1G126-Q100	V _{CC}	≤ 3 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}
74AHCT1G126-Q100	3 V	≤ 3 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}

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12. Package outline

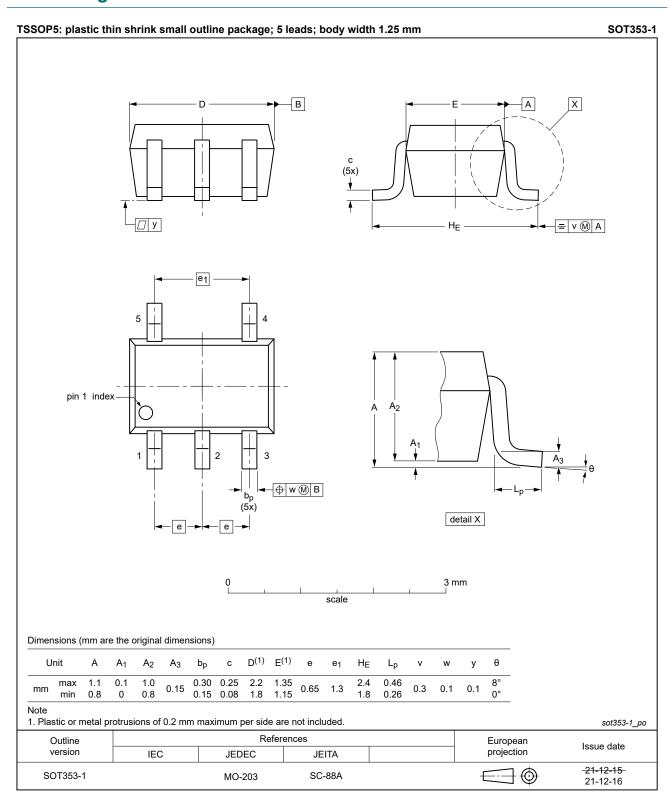


Fig. 7. Package outline SOT353-1 (TSSOP5)

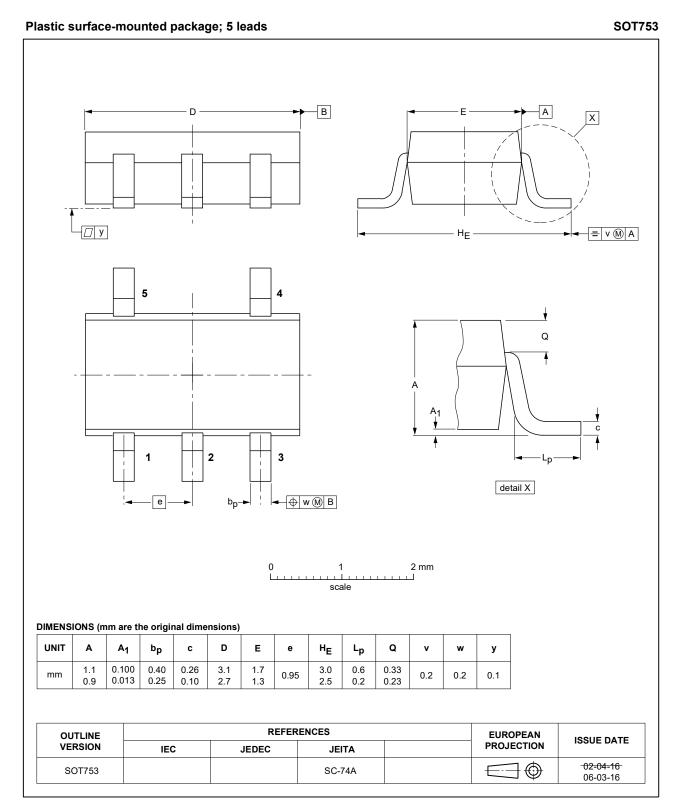


Fig. 8. Package outline SOT753 (SC-74A)

13. Abbreviations

Table 11. Abbreviations

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

14. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes	
74AHC_AHCT1G126_Q100 v.4	202030912	Product data sheet	-	74AHC_AHCT1G126_Q100 v.3	
Modifications:	<u>Section 2</u> : ESD specification updated according to the latest JEDEC standard.				
74AHC_AHCT1G126_Q100 v.3	20220111	Product data sheet	-	74AHC_AHCT1G126_Q100 v.2	
Modifications:	Fig. 7: Package outline drawing for SOT353-1 (TSSOP5) has changed.				
74AHC_AHCT1G126_Q100 v.2	20210518	Product data sheet	-	74AHC_AHCT1G126_Q100 v.1	
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. Section 1 and Section 2 updated. Section 8: Derating values for Ptot total power dissipation updated. 				
74AHC_AHCT1G126_Q100 v.1	20130326	Product data sheet	-	-	

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.

- Please consult the most recently issued document before initiating or completing a design.
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