

20-bit buffer/line driver; non-inverting; with 30 Ω termination resistors; 3-state

Rev. 4 — 25 June 2024

Product data sheet

1. General description

The 74ALVT162827 is a 20-bit buffer/line driver with 30 Ω termination resistors and 3-state outputs.

The device can be used as two 10-bit buffers or one 20-bit buffer. The device features output enable ($\overline{OE}1$ and $\overline{OE}2$) inputs, each controlling 10-bits. A HIGH on either $\overline{OE}1$ or $\overline{OE}2$ causes the outputs to assume a high-impedance OFF-state. Bus hold data inputs eliminate the need for external pull-up resistors to define unused inputs.

2. Features and benefits

- Wide supply voltage range from 2.3 V to 3.6 V
- Overvoltage tolerant inputs to 5.5 V
- BiCMOS high speed and output drive
- Direct interface with TTL levels
- Bus hold on data inputs
- No bus current loading when output is tied to 5 V bus
- Power-up 3-state
- I_{OFF} circuitry provides partial Power-down mode operation
- Latch-up performance exceeds 500 mA per JESD 78 Class II Level B
- 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 85 °C

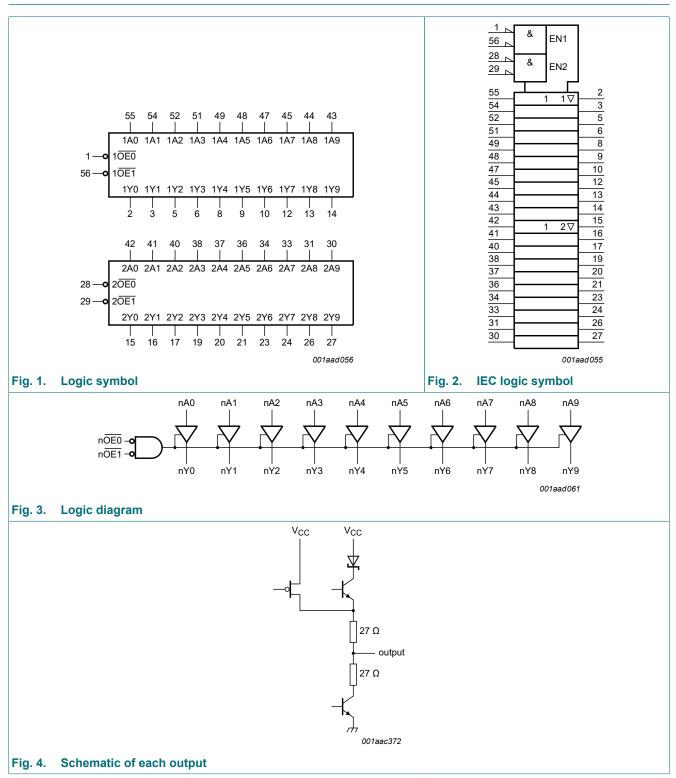
3. Ordering information

Table 1. Ordering information

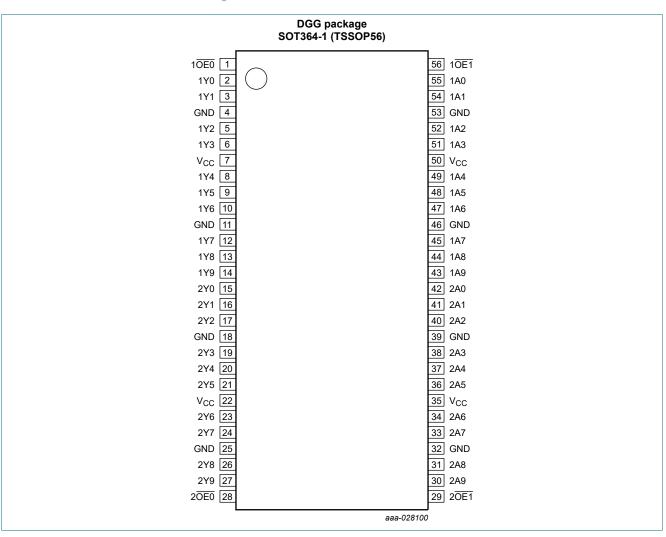
Type number	Package	ackage					
	Temperature range	Name	Description	Version			
74ALVT162827DGG	-40 °C to +85 °C	TSSOP56	plastic thin shrink small outline package; 56 leads; body width 6.1 mm	<u>SOT364-1</u>			

ne<mark>x</mark>peria

4. Functional diagram



5. Pinning information



5.1. Pinning

5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
1A0, 1A1, 1A2, 1A3, 1A4, 1A5, 1A6, 1A7, 1A8, 1A9	55, 54, 52, 51, 49, 48, 47, 45, 44, 43	data input
2A0, 2A1, 2A2, 2A3, 2A4, 2A5, 2A6, 2A7, 2A8, 2A9	42, 41, 40, 38, 37, 36, 34, 33, 31, 30	data input
1Y0, 1Y1, 1Y2, 1Y3, 1Y4, 1Y5, 1Y6, 1Y7, 1Y8, 1Y9	2, 3, 5, 6, 8, 9, 10, 12, 13, 14	data output
2Y0, 2Y1, 2Y2, 2Y3, 2Y4, 2Y5, 2Y6, 2Y7, 2Y8, 2Y9	15, 16, 17, 19, 20, 21, 23, 24, 26, 27	data output
10E0, 10E1, 20E0, 20E1	1, 56, 28, 29	output enable inputs (active-LOW)
GND	4, 11, 18, 25, 32, 39, 46, 53	ground (0 V)
V _{CC}	7, 22, 35, 50	positive voltage supply

6. Functional description

Table 3. Function table

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

Operating mode	Input	Output	
	n <mark>OEn</mark>	nAn	nYn
transparent	L	L	L
transparent	L	Н	Н
High-impedance	Н	Х	Z

7. Limiting values

Table 4. 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	[1]	-1.2	+7.0	V
Vo	output voltage	output in OFF or HIGH-state [1]	-0.5	+5.5	V
I _{IK}	input clamping current	V ₁ < 0 V	-18	-	mA
I _{OK}	output clamping current	V _O < 0 V	-50	-	mA
I _O	output current	output in LOW-state	-	128	mA
Tj	junction temperature	[2]	-	+150	°C
T _{stg}	storage temperature		-65	+150	°C

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

[2] The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability.

8. Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter	Conditions	V_{CC} = 2.5 V ± 0.2 V		V _{CC} = 3.3	Unit	
			Min	Max	Min	Max	
V _{CC}	supply voltage		2.3	2.7	3.0	3.6	V
VI	input voltage		0	5.5	0	5.5	V
I _{OH}	HIGH-level output current		-	-8	-	-12	mA
I _{OL}	LOW-level output current		-	12	-	12	mA
Δt/ΔV	input transition rise and fall rate	outputs enabled	-	10	-	10	ns/V
T _{amb}	ambient temperature	free air	-40	+85	-40	+85	°C

9. Static characteristics

Table 6. Static characteristics

At recommended operating conditions; $T_{amb} = -40$ °C to +85 °C; voltages are referred to GND (ground = 0 V).

Symbol	Parameter	Conditions		Min	Typ[1]	Max	Unit
V _{CC} = 2.	5 V ± 0.2 V	·					
V _{IK}	input clamping voltage	V _{CC} = 2.3 V; I _{IK} = -18 mA		-	-0.85	-1.2	V
V _{IH}	HIGH-level input voltage			1.7	-	-	V
V _{IL}	LOW-level input voltage			-	-	0.7	V
V _{OH}	HIGH-level output voltage	V _{CC} = 2.3 V; I _O = -8 mA		1.7	2.3	-	V
V _{OL}	LOW-level output voltage	V _{CC} = 2.3 V; I _O = 12 mA		-	0.5	0.7	V
lı	input leakage current	control pins					
		V_{CC} = 2.7 V; V_{I} = V_{CC} or GND		-	0.1	±1	μA
		V _{CC} = 0 V or 2.7 V; V _I = 5.5 V		-	0.1	10	μA
		data pins	[2]				
		$V_{CC} = 2.7 \text{ V}; \text{ V}_{I} = V_{CC}$		-	0.1	1	μA
		V _{CC} = 2.7 V; V _I = 0 V		-	0.1	-5	μA
I _{OFF}	power-off leakage current	V_{CC} = 0 V; V _I or V _O = 0 V to 4.5 V		-	0.1	±100	μA
I _{BHL}	bus hold LOW current	V _{CC} = 2.3 V; V _I = 0.7 V	[3]	-	115	-	μA
I _{BHH}	bus hold HIGH current	V _{CC} = 2.3 V; V _I = 1.7 V	[3]	-	-10	-	μA
I _{EX}	external current	output in HIGH-state when $V_0 > V_{CC}$; $V_0 = 5.5 V$; $V_{CC} = 2.3 V$		-	10	125	μA
I _{O(pu/pd)}	power-up/power-down output current	$V_{CC} \le 1.2 \text{ V}; V_0 = 0.5 \text{ V to } V_{CC};$ V _I = GND or V _{CC} ; nOEn = don't care	[4]	-	1	100	μA
l _{oz}	OFF-state output current	V_{CC} = 2.7 V; V_{I} = V_{IL} or V_{IH}					
		output HIGH; V _O = 2.3 V		-	0.5	5	μA
		output LOW; V _O = 0.5 V		-	0.5	-5	μA
I _{CC}	supply current	V_{CC} = 2.7 V; V_{I} = GND or V_{CC} ; I_{O} = 0 A					
		outputs HIGH		-	0.04	0.1	mA
		outputs LOW		-	3.5	5.0	mA
		outputs disabled	[5]	-	0.04	0.1	mA
ΔI _{CC}	additional supply current	per input pin; V_{CC} = 2.3 V to 2.7 V; one input at V_{CC} - 0.6 V; other inputs at V_{CC} or GND	[6]	-	0.04	0.4	mA
CI	input capacitance	V _I = 0 V or V _{CC}		-	3	-	pF
Co	output capacitance	$V_{O} = 0 V \text{ or } V_{CC}$		-	9	-	pF

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Symbol	Parameter	Conditions		Min	Typ[1]	Мах	Unit
V _{CC} = 3.	3 V ± 0.3 V	1					
V _{IK}	input clamping voltage	V _{CC} = 3.0 V; I _{IK} = -18 mA		-	-0.85	-1.2	V
VIH	HIGH-level input voltage			2.0	-	-	V
VIL	LOW-level input voltage			-	-	0.8	V
V _{OH}	HIGH-level output voltage	V _{CC} = 3.0 V; I _O = -12 mA		2.0	2.3	-	V
V _{OL}	LOW-level output voltage	V _{CC} = 3.0 V; I _O = 12 mA		-	0.5	0.8	V
l _l	input leakage current	control pins					
		V_{CC} = 3.6 V; V_{I} = V_{CC} or GND		-	0.1	±1	μA
		V _{CC} = 0 V or 3.6 V; V _I = 5.5 V		-	0.1	10	μA
		data pins	[2]				
		$V_{CC} = 3.6 \text{ V}; \text{ V}_{I} = V_{CC}$		-	0.5	1	μA
		V _{CC} = 3.6 V; V _I = 0 V		-	0.1	-5	μA
I _{OFF}	power-off leakage current	$V_{CC} = 0 V; V_{I} \text{ or } V_{O} = 0 V \text{ to } 4.5 V$		-	0.1	±100	μA
I _{BHL}	bus hold LOW current	data inputs; V _{CC} = 3 V; V _I = 0.8 V		75	130	-	μA
I _{BHH}	bus hold HIGH current	data inputs; V _{CC} = 3 V; V _I = 2.0 V		-75	-140	-	μA
I _{BHLO}	bus hold LOW overdrive current	data inputs; V_{CC} = 3.6 V;V _I = 0 V to 3.6 V	[7]	500	-	-	μA
I _{BHHO}	bus hold HIGH overdrive current	data inputs; V_{CC} = 3.6 V;V _I = 0 V to 3.6 V	[7]	-500	-	-	μA
I _{EX}	external current	output in HIGH-state when $V_O > V_{CC}$; $V_O = 5.5 V$; $V_{CC} = 3.0 V$		-	10	125	μA
I _{O(pu/pd)}	power-up/power-down output current	$V_{CC} \le 1.2 \text{ V}; V_O = 0.5 \text{ V to } V_{CC};$ V _I = GND or V _{CC} ; nOEn = don't care	[8]	-	1	±100	μA
l _{oz}	OFF-state output current	V_{CC} = 3.6 V; V_{I} = V_{IL} or V_{IH}					
		output HIGH; V _O = 3.0 V		-	0.5	5	μA
		output LOW; V _O = 0.5 V		-	0.5	-5	μA
I _{CC}	supply current	V_{CC} = 3.6 V; V _I = GND or V _{CC} ; I _O = 0 A					
		outputs HIGH		-	0.07	0.1	mA
		outputs LOW		-	3.9	5.5	mA
		outputs disabled	[5]	-	0.07	0.1	mA
ΔI _{CC}	additional supply current	per input pin; V_{CC} = 3 V to 3.6 V; one input at V_{CC} - 0.6 V; other inputs at V_{CC} or GND	[6]	-	0.04	0.4	mA
CI	input capacitance	V _I = 0 V or V _{CC}		-	3	-	pF
Co	output capacitance	V _O = 0 V or V _{CC}		-	9	-	pF

20-bit buffer/line driver; non-inverting; with 30 Ω termination resistors; 3-state

[1] All typical values for V_{CC} = 2.5 V \pm 0.2 V are measured at V_{CC} = 2.5 V and T_{amb} = 25 °C.

All typical values for V_{CC} = 3.3 V \pm 0.3 V are measured at V_{CC} = 3.3 V and T_{amb} = 25 °C.

[2] Unused pins at V_{CC} or GND.

[3] Not guaranteed.

[4] This parameter is valid for any V_{CC} between 0 V and 1.2 V with a transition time of up to 10 ms.

From $V_{CC} = 1.2$ V to $V_{CC} = 2.5$ V ± 0.2 V a transition time of 100 µs is permitted. This parameter is valid for $T_{amb} = 25$ °C only. [5] I_{CC} with outputs disabled is measured with outputs pulled to V_{CC} or GND.

[6] This is the increase in supply current for each input at the specified voltage level other than V_{CC} or GND.

[7] This is the bus hold overdrive current required to force the input to the opposite logic state.

[8] This parameter is valid for any V_{CC} between 0 V and 1.2 V with a transition time of up to 10 ms. From $V_{CC} = 1.2$ V to $V_{CC} = 3.3$ V ± 0.3 V a transition time of 100 µs is permitted. This parameter is valid for $T_{amb} = 25$ °C only.

10. Dynamic characteristics

Table 7. Dynamic characteristics

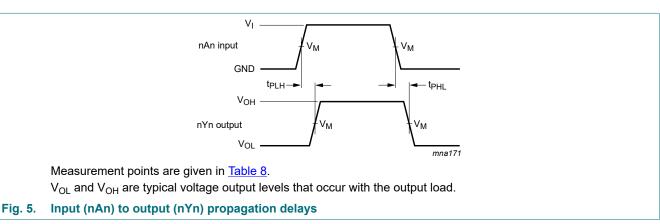
At recommended operating conditions; $T_{amb} = -40$ °C to +85 °C;

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 7.

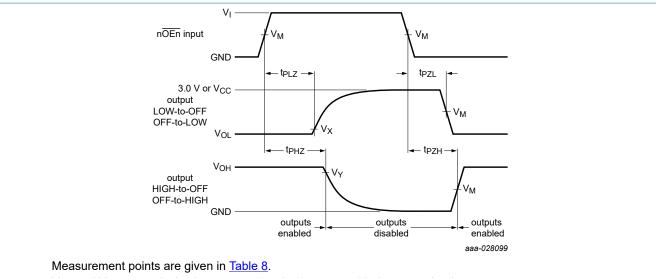
Symbol	Parameter	Conditions	Min	Typ[1]	Мах	Unit			
V _{CC} = 2.	$V_{CC} = 2.5 V \pm 0.2 V$								
t _{PLH}	LOW to HIGH propagation delay	nAn to nYn; see <u>Fig. 5</u>	1.5	2.7	4.5	ns			
t _{PHL}	HIGH to LOW propagation delay	nAn to nYn; see <u>Fig. 5</u>	1.5	2.3	3.5	ns			
t _{PZH}	OFF-state to HIGH propagation delay	n OEn to nYn; see <u>Fig. 6</u>	2.5	4.7	7.5	ns			
t _{PZL}	OFF-state to LOW propagation delay	n OEn to nYn; see <u>Fig. 6</u>	1.5	2.9	4.7	ns			
t _{PHZ}	HIGH to OFF-state propagation delay	n OEn to nYn; see <u>Fig. 6</u>	1.5	3.2	5.2	ns			
t _{PLZ}	LOW to OFF-state propagation delay	n OEn to nYn; see <u>Fig. 6</u>	1.0	2.4	4.0	ns			
V _{CC} = 3.3	3 V ± 0.3 V	·		•					
t _{PLH}	LOW to HIGH propagation delay	nAn to nYn; see <u>Fig. 5</u>	1.0	2.2	3.3	ns			
t _{PHL}	HIGH to LOW propagation delay	nAn to nYn; see <u>Fig. 5</u>	1.0	2.0	3.0	ns			
t _{PZH}	OFF-state to HIGH propagation delay	n OEn to nYn; see <u>Fig. 6</u>	1.5	3.4	5.6	ns			
t _{PZL}	OFF-state to LOW propagation delay	n OEn to nYn; see <u>Fig. 6</u>	1.0	2.4	3.7	ns			
t _{PHZ}	HIGH to OFF-state propagation delay	n OEn to nYn; see <u>Fig. 6</u>	1.5	3.4	5.2	ns			
t _{PLZ}	LOW to OFF-state propagation delay	n OEn to nYn; see <u>Fig. 6</u>	1.0	2.7	4.5	ns			

[1] All typical values for V_{CC} = 2.5 V \pm 0.2 V are measured at V_{CC} = 2.5 V and T_{amb} = 25 °C. All typical values for V_{CC} = 3.3 V \pm 0.3 V are measured at V_{CC} = 3.3 V and T_{amb} = 25 °C.

10.1. Waveforms and test circuit



20-bit buffer/line driver; non-inverting; with 30 Ω termination resistors; 3-state



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

Fig. 6. The 3-state output enable and disable times

Table 8. Measurement points

V _{cc}	Input		Output			
	VI	V _M	V _M	V _X	V _Y	
$V_{CC} \le 2.7 V$	V _{CC}	0.5 × V _{CC}	0.5 × V _{CC}	V _{OL} + 0.15 V	V _{OH} - 0.15 V	
$V_{CC} \ge 3.0 V$	3.0 V	1.5 V	1.5 V	V _{OL} + 0.3 V	V _{OH} - 0.3 V	

20-bit buffer/line driver; non-inverting; with 30 Ω termination resistors; 3-state

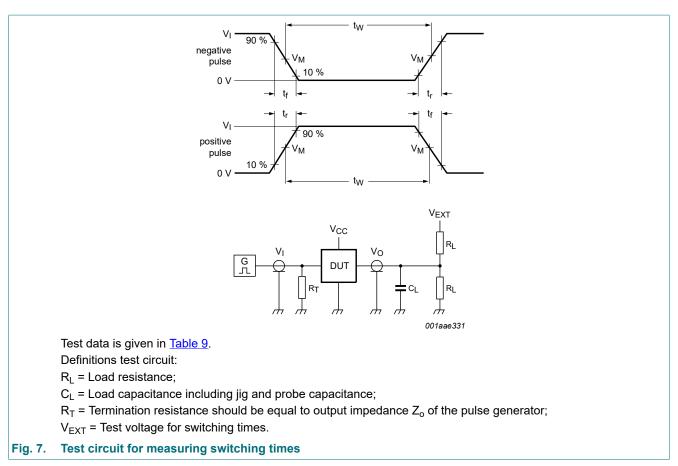


Table 9. Test data

Input			Load		V _{EXT}			
VI	f _i	tw	t _r , t _f	CL	RL	t _{PHZ} , t _{PZH}	t _{PLZ} , t _{PZL}	t _{PLH} , t _{PHL}
3.0 V or V_{CC} whichever is less	≤ 10 MHz	500 ns	≤ 2.5 ns	50 pF	500 Ω	GND	6 V or V _{CC} × 2	open

11. Package outline

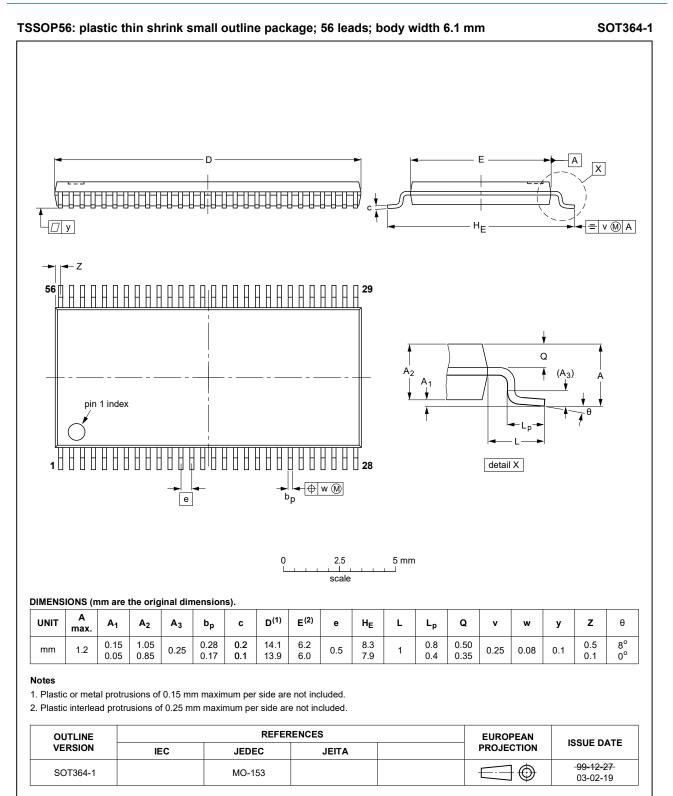


Fig. 8. Package outline SOT364-1 (TSSOP56)

12. Abbreviations

Table 10. Abbreviati	Table 10. Abbreviations					
Acronym	Description					
ANSI	American National Standards Institute					
BiCMOS	Bipolar Complementary Metal Oxide Semiconductor					
CDM	Charged Device Model					
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					

13. Revision history

Table 11. Revision history								
Document ID	Release date	Data sheet status	Change notice	Supersedes				
74ALVT162827 v.4	20240625	Product data sheet	-	74ALVT162827 v.3				
Modifications:	 <u>Section 2</u>: ESD specification updated according to the latest JEDEC standard. <u>Section 1</u> updated. 							
74ALVT162827 v.3	20180124	Product data sheet	-	74ALVT162827 v.2				
Modifications:	guidelines o Legal texts I 	of this data sheet has been f Nexperia. have been adapted to the r er 74ALVT162827DL (SOT	new company nan	ne where appropriate.				
74ALVT162827 v.2	19980213	Product specification	-	74ALVT162827 v.1				
74ALVT162827 v.1	19970501	Product specification	-	-				

14. 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.

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