



**THE DATASHEET OF  
SN74CBTS6800DWE4**



# SN74CBTS6800

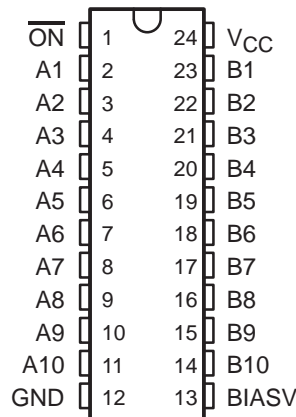
## 10-BIT FET BUS SWITCH

### WITH PRECHARGED OUTPUTS AND SCHOTTKY DIODE CLAMPING

SCDS102C – JUNE 1999 – REVISED OCTOBER 2000

- 5-Ω Switch Connection Between Two Ports
- TTL-Compatible Input Levels
- Outputs Are Precharged by Bias Voltage to Minimize Signal Distortion During Live Insertion
- Schottky Diodes on the I/Os to Clamp Undershoots up to -2 V

DB, DBQ, DGV, DW, OR PW PACKAGE  
(TOP VIEW)



#### description

The SN74CBTS6800 provides ten bits of high-speed TTL-compatible bus switching with Schottky diodes on the I/Os to clamp undershoots.

The low on-state resistance of the switch allows bidirectional connections to be made, while adding near-zero propagation delay. The device also precharges the B port to a user-selectable bias voltage (BIASV) to minimize live-insertion noise.

The SN74CBTS6800 is organized as one 10-bit switch with a single enable ( $\overline{ON}$ ) input. When  $\overline{ON}$  is low, the switch is on, and port A is connected to port B. When  $\overline{ON}$  is high, the switch between port A and port B is open. When  $\overline{ON}$  is high or V<sub>CC</sub> is 0 V, B port is precharged to BIASV through the equivalent of a 10-kΩ resistor.

#### ORDERING INFORMATION

T <sub>A</sub>	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 85°C	SOIC – DW	Tube	SN74CBTS6800DW	CBTS6800
		Tape and reel	SN74CBTS6800DWR	
	SSOP – DB	Tape and reel	SN74CBTS6800DBR	CS6800
	SSOP (QSOP) – DBQ	Tape and reel	SN74CBTS6800DBQR	CBTS6800
	TSSOP – PW	Tape and reel	SN74CBTS6800PWR	CS6800
	TVSOP – DGV	Tape and reel	SN74CBTS6800DGVR	CS6800

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).

#### FUNCTION TABLE

$\overline{ON}$	B1–B10	FUNCTION
L	A1–A10	Connect
H	BIASV	Precharge



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**TEXAS  
INSTRUMENTS**

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**electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)**

PARAMETER		TEST CONDITIONS		MIN	TYP†	MAX	UNIT
V <sub>IK</sub>	A or B inputs	V <sub>CC</sub> = 4.5 V,	I <sub>I</sub> = -18 mA			-0.7	V
	Control inputs					-1.2	
I <sub>IL</sub>		V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = GND			-5	μA
I <sub>IH</sub>		V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = 5.5 V			150	μA
I <sub>O</sub>		V <sub>CC</sub> = 4.5 V,	BIASV = 2.4 V, V <sub>O</sub> = 0	0.25			mA
I <sub>CC</sub>		V <sub>CC</sub> = 5.5 V,	I <sub>O</sub> = 0, V <sub>I</sub> = V <sub>CC</sub> or GND			3	μA
ΔI <sub>CC</sub> ‡	Control inputs	V <sub>CC</sub> = 5.5 V,	One input at 3.4 V, Other inputs at V <sub>CC</sub> or GND			2.5	mA
C <sub>i</sub>	Control inputs	V <sub>I</sub> = 3 V or 0			3.5		pF
C <sub>io(OFF)</sub>		V <sub>O</sub> = 3 V or 0,	$\overline{\text{ON}} = V_{CC}$		4.5		pF
r <sub>on</sub> §		V <sub>CC</sub> = 4 V, TYP at V <sub>CC</sub> = 4 V	V <sub>I</sub> = 2.4 V, I <sub>I</sub> = 15 mA		11	20	Ω
		V <sub>CC</sub> = 4.5 V	V <sub>I</sub> = 0	I <sub>I</sub> = 64 mA	3	7	
				I <sub>I</sub> = 30 mA	3	7	
			V <sub>I</sub> = 2.4 V, I <sub>I</sub> = 15 mA	6	15		

† All typical values are at V<sub>CC</sub> = 5 V (unless otherwise noted), T<sub>A</sub> = 25°C.

‡ This is the increase in supply current for each input that is at the specified TTL voltage level rather than V<sub>CC</sub> or GND.

§ Measured by the voltage drop between the A and B terminals at the indicated current through the switch. On-state resistance is determined by the lower of the voltages of the two (A or B) terminals.

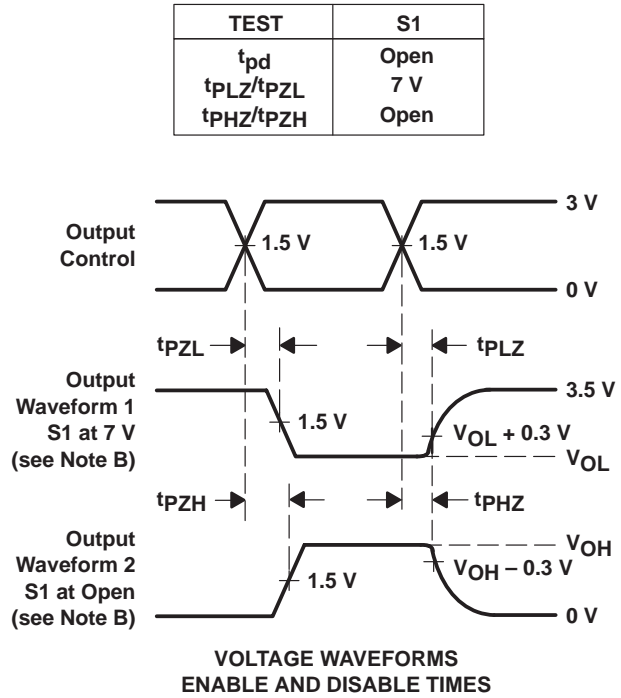
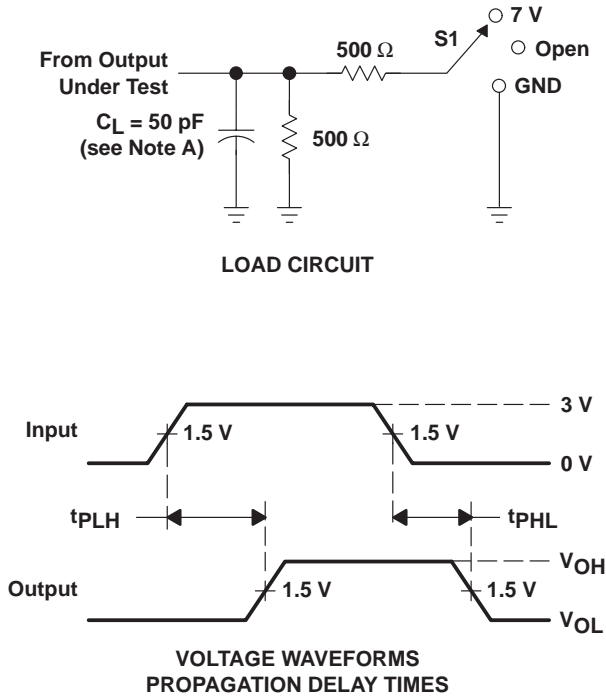
**switching characteristics over recommended operating free-air temperature range, C<sub>L</sub> = 50 pF (unless otherwise noted) (see Figure 1)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	V <sub>CC</sub> = 4 V		V <sub>CC</sub> = 5 V ± 0.5 V		UNIT
				MIN	MAX	MIN	MAX	
t <sub>pd</sub> ¶	A or B	B or A			0.35		0.25	ns
t <sub>PZH</sub>	$\overline{\text{ON}}$	A or B	BIASV = GND		6	2	5.1	ns
t <sub>PZL</sub>			BIASV = 3 V		6	2	5.6	
t <sub>PHZ</sub>	$\overline{\text{ON}}$	A or B	BIASV = GND		5.5	1	5	ns
t <sub>PLZ</sub>			BIASV = 3 V		5.5	2	5.9	

¶ The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

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**PARAMETER MEASUREMENT INFORMATION**



- NOTES: A. C<sub>L</sub> includes probe and jig capacitance.  
 B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.  
 C. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z<sub>O</sub> = 50 Ω, t<sub>r</sub> ≤ 2.5 ns, t<sub>f</sub> ≤ 2.5 ns.  
 D. The outputs are measured one at a time with one transition per measurement.  
 E. t<sub>PLZ</sub> and t<sub>PHZ</sub> are the same as t<sub>dis</sub>.  
 F. t<sub>PZL</sub> and t<sub>PZH</sub> are the same as t<sub>en</sub>.  
 G. t<sub>PLH</sub> and t<sub>PHL</sub> are the same as t<sub>pd</sub>.

**Figure 1. Load Circuit and Voltage Waveforms**

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74CBTS6800DGVR	ACTIVE	TVSOP	DGV	24	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CS6800	<a href="#">Samples</a>
SN74CBTS6800PWR	ACTIVE	TSSOP	PW	24	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CS6800	<a href="#">Samples</a>

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSELETE:** TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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**TAPE AND REEL INFORMATION**

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**


\*All dimensions are nominal

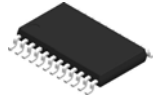
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74CBTS6800DGVR	TVSOP	DGV	24	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74CBTS6800PWR	TSSOP	PW	24	2000	330.0	16.4	6.95	8.3	1.6	8.0	16.0	Q1

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74CBTS6800DGVR	TVSOP	DGV	24	2000	367.0	367.0	35.0
SN74CBTS6800PWR	TSSOP	PW	24	2000	356.0	356.0	35.0

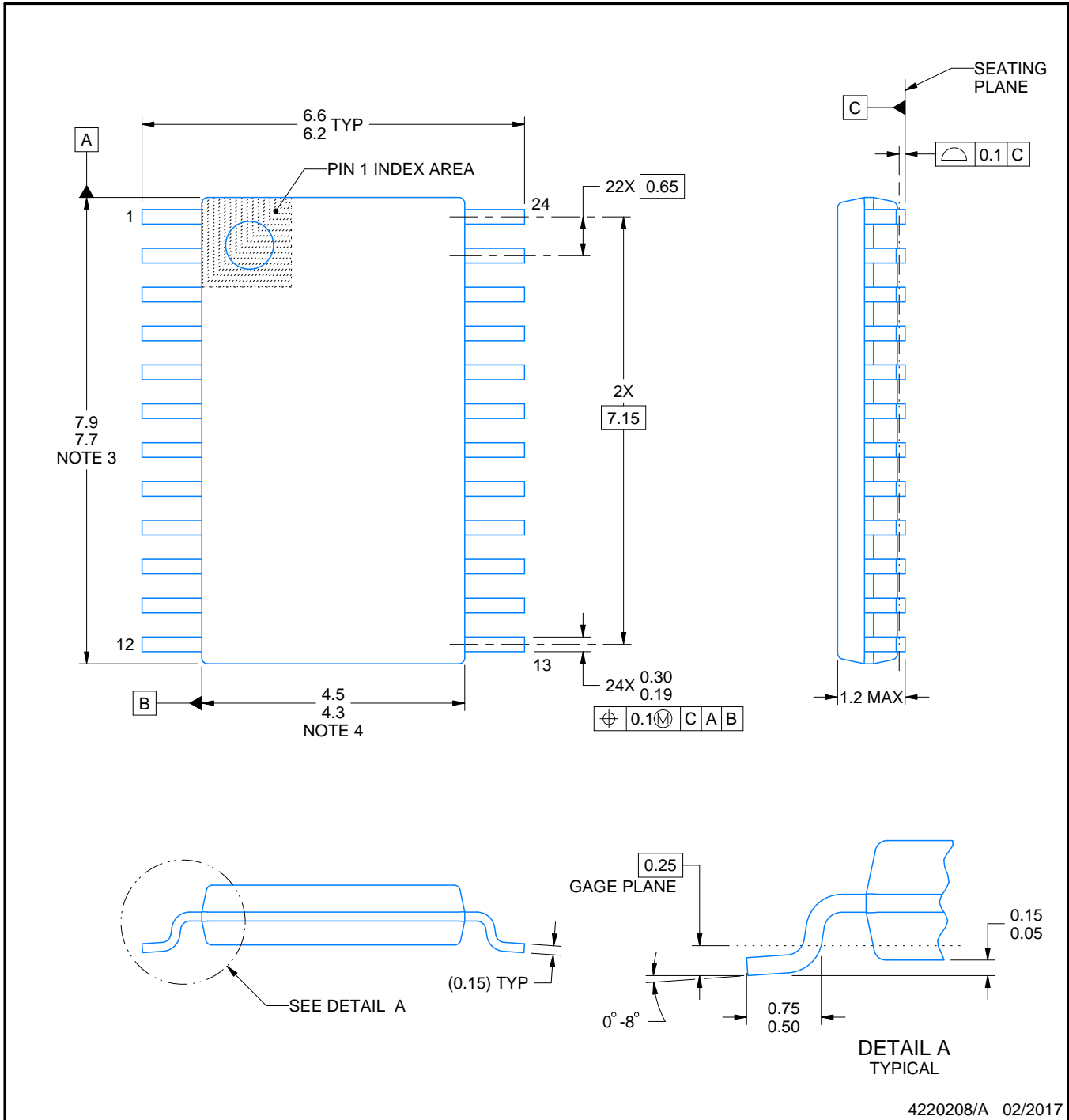
PW0024A



# PACKAGE OUTLINE

## TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



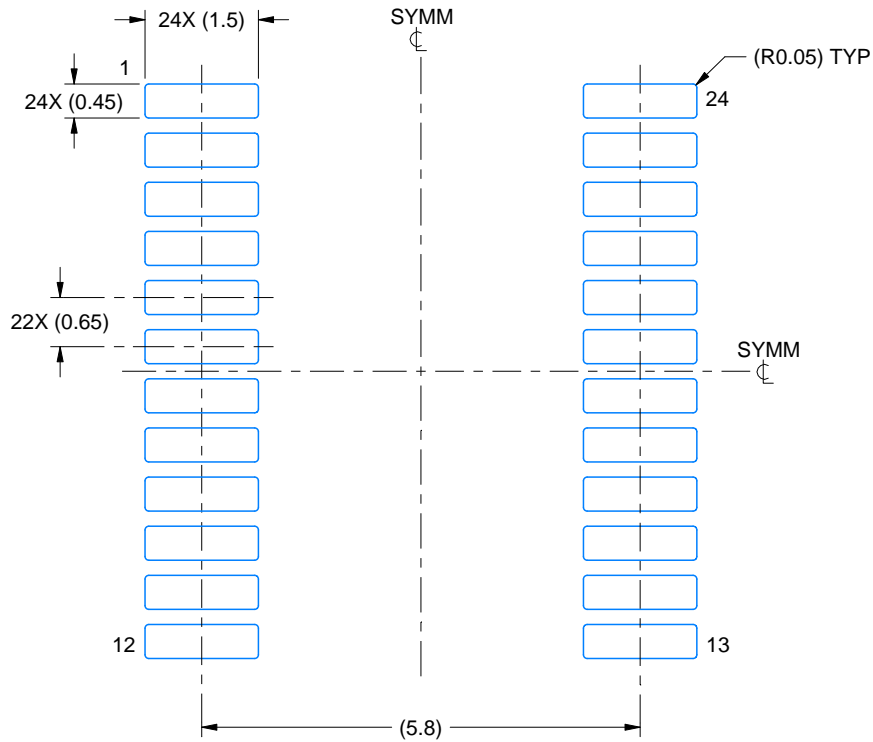
4220208/A 02/2017

# EXAMPLE BOARD LAYOUT

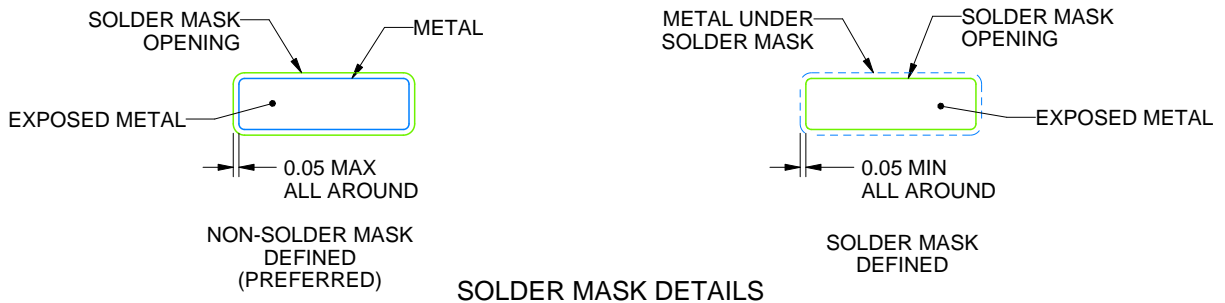
PW0024A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



SOLDER MASK DETAILS

4220208/A 02/2017

NOTES: (continued)

- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

PW0024A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

DGV (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE

24 PINS SHOWN



4073251/E 08/00

- NOTES: A. All linear dimensions are in millimeters.  
 B. This drawing is subject to change without notice.  
 C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15 per side.  
 D. Falls within JEDEC: 24/48 Pins – MO-153  
 14/16/20/56 Pins – MO-194

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