

HD74HCT688

8-bit Magnitude Comparator

REJ03D0673-0200
 (Previous ADE-205-563)
 Rev.2.00
 Mar 30, 2006

Description

The HD74HCT688 compares bit for bit two 8-bit words and indicates whether or not they are equal. The $\overline{P=Q}$ output indicates equality when it is low.

A single active low enable is provided to facilitate cascading of several packages and enable comparison of words greater than 8-bits.

This device is useful in memory block decoding applications, where memory block enable signals must be generated from computer address information.

Features

- LSTTL Output Logic Level Compatibility as well as CMOS Output Compatibility
- High Speed Operation: t_{pd} (Data to $\overline{P=Q}$) = 18 ns typ ($C_L = 50$ pF)
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage: $V_{CC} = 4.5$ to 5.5 V
- Low Input Current: $1 \mu\text{A}$ max
- Low Quiescent Supply Current: I_{CC} (static) = $4 \mu\text{A}$ max ($T_a = 25^\circ\text{C}$)
- Ordering Information

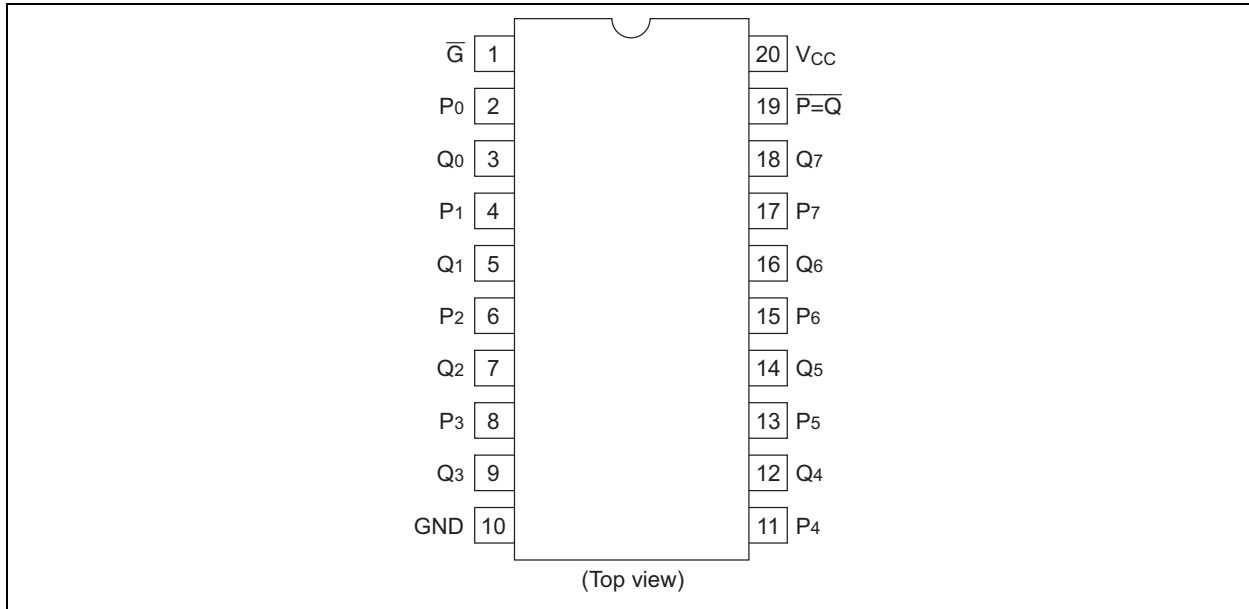
Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74HCT688P	DILP-20 pin (JEDEC)	PRDP0020AC-B (DP-20NEV)	P	—
HD74HCT688FPEL	SOP-20 pin (JEITA)	PRSP0020DD-B (FP-20DAV)	FP	EL (2,000 pcs/reel)
HD74HCT688RPEL	SOP-20 pin (JEDEC)	PRSP0020DC-A (FP-20DBV)	RP	EL (1,000 pcs/reel)

Function Table

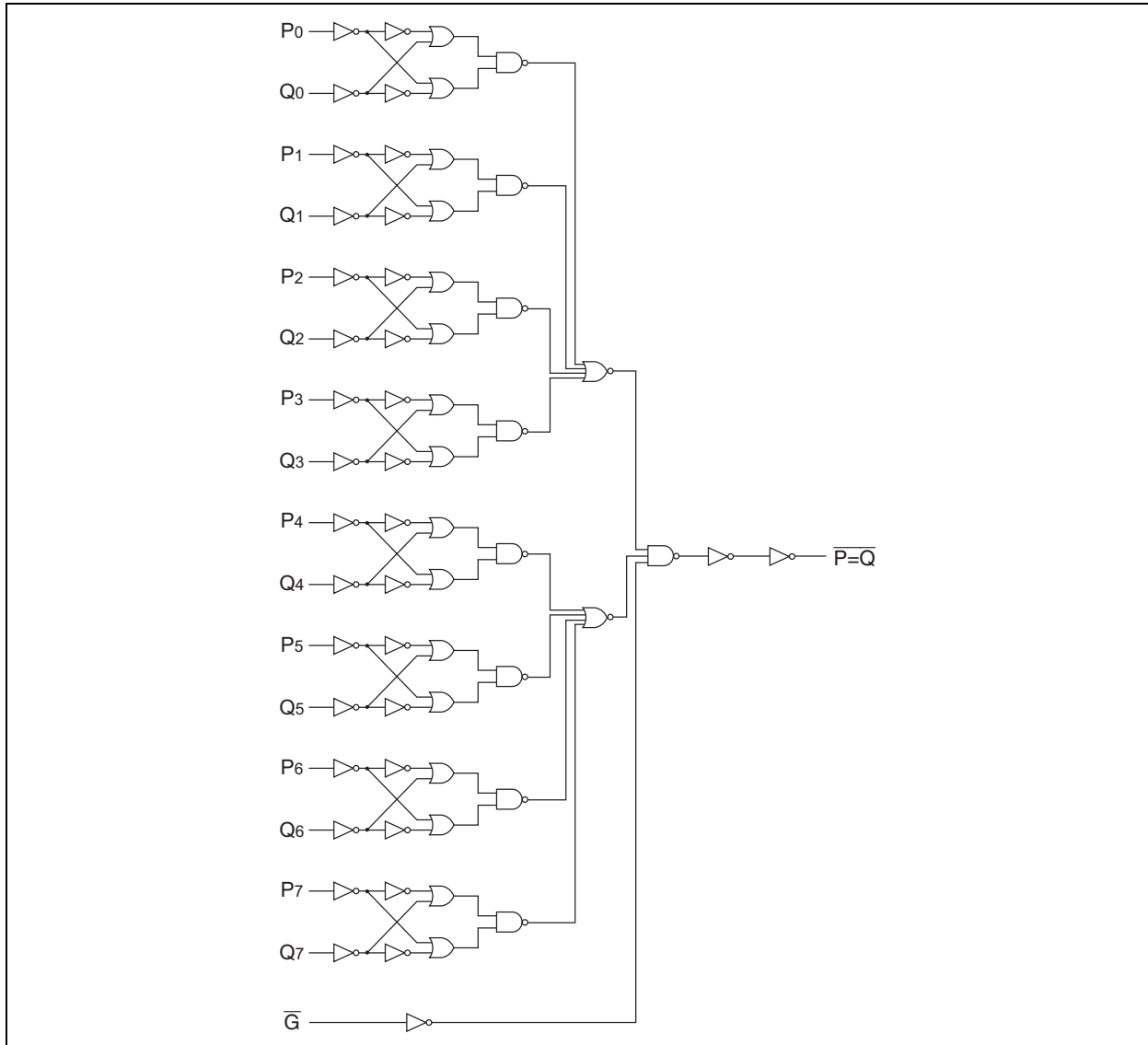
Input		Output $\overline{P=Q}$
Data P, Q	Enable \overline{G}	
P=Q	L	L
P>Q	L	H
P<Q	L	H
X	H	H

H : high level
 L : low level
 X : irrelevant

Pin Arrangement



Logic Diagram



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply voltage range	V_{CC}	-0.5 to 7.0	V
Input / Output voltage	V_{IN}, V_{OUT}	-0.5 to $V_{CC} + 0.5$	V
Input / Output diode current	I_{IK}, I_{OK}	± 20	mA
Output current	I_{OUT}	± 25	mA
V_{CC}, GND current	I_{CC} or I_{GND}	± 50	mA
Power dissipation	P_T	500	mW
Storage temperature	T_{stg}	-65 to +150	$^{\circ}C$

Note: The absolute maximum ratings are values, which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

Recommended Operating Conditions

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V_{CC}	4.5 to 5.5	V	
Input / Output voltage	V_{IN}, V_{OUT}	0 to V_{CC}	V	
Operating temperature	T_a	-40 to 85	°C	
Input rise / fall time ¹	t_r, t_f	0 to 500	ns	$V_{CC} = 4.5$ V

Notes: 1. This item guarantees maximum limit when one input switches.
 Waveform: Refer to test circuit of switching characteristics.

Electrical Characteristics

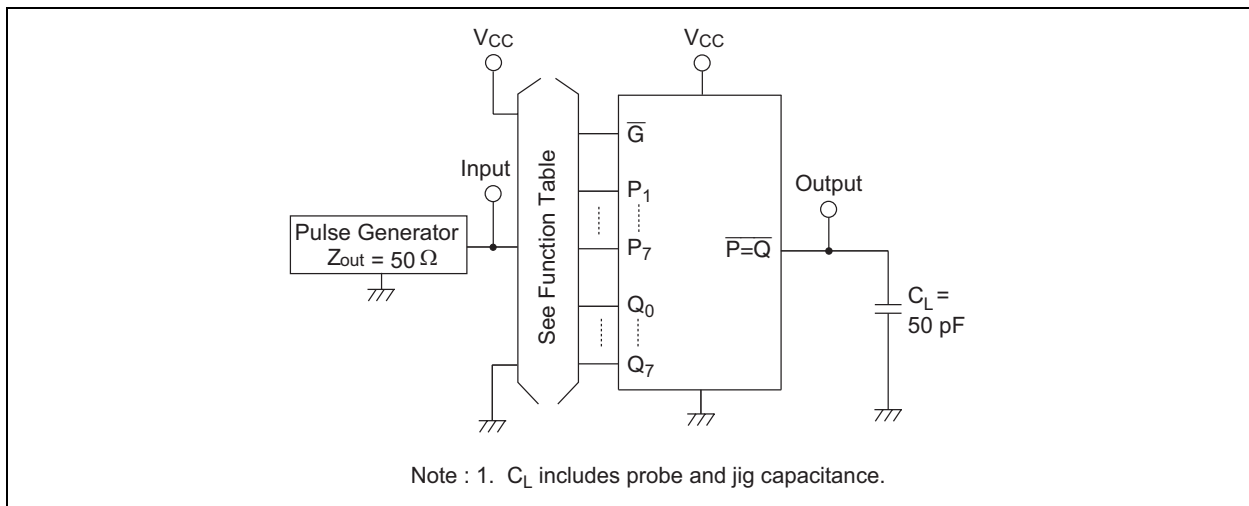
Item	Symbol	V_{CC} (V)	$T_a = 25^\circ\text{C}$			$T_a = -40$ to $+85^\circ\text{C}$		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	V_{IH}	4.5 to 5.5	2.0	—	—	2.0	—	V		
	V_{IL}	4.5 to 5.5	—	—	0.8	—	0.8			
Output voltage	V_{OH}	4.5	4.4	—	—	4.4	—	V	$V_{in} = V_{IH}$ or V_{IL}	$I_{OH} = -20$ μA
		4.5	4.18	—	—	4.13	—			$I_{OH} = -4$ mA
	V_{OL}	4.5	—	—	0.1	—	0.1	V	$V_{in} = V_{IH}$ or V_{IL}	$I_{OL} = 20$ μA
		4.5	—	—	0.26	—	0.33			$I_{OL} = 4$ mA
Input current	I_{in}	5.5	—	—	± 0.1	—	± 1.0	μA	$V_{in} = V_{CC}$ or GND	
Quiescent current	I_{CC}	5.5	—	—	4.0	—	40	μA	$V_{in} = V_{CC}$ or GND, $I_{out} = 0$ μA	

Switching Characteristics

($C_L = 50$ pF, Input $t_r = t_f = 6$ ns)

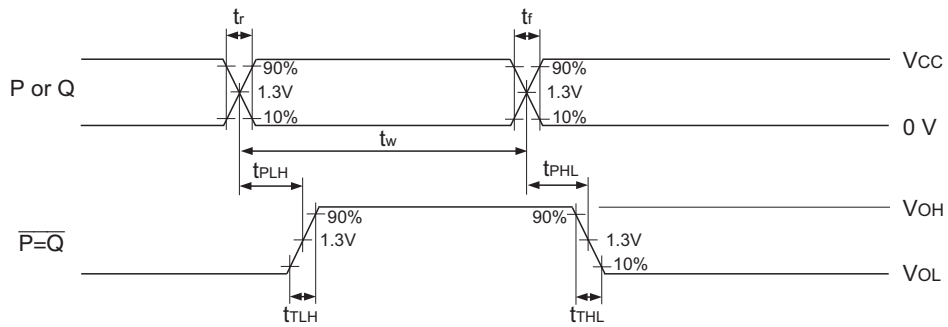
Item	Symbol	V_{CC} (V)	$T_a = 25^\circ\text{C}$			$T_a = -40$ to $+85^\circ\text{C}$		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Propagation delay time	t_{PLH}	4.5	—	17	42	—	53	ns	Por Q to output	
	t_{PHL}	4.5	—	19	42	—	53			
	t_{PLH}	4.5	—	9	24	—	30	ns	Enable to output	
	t_{PHL}	4.5	—	12	24	—	30			
Output rise/fall time	t_{TLH} t_{THL}	4.5	—	5	15	—	19	ns		
Input capacitance	C_{in}	—	—	5	10	—	10	pF		

Test Circuit

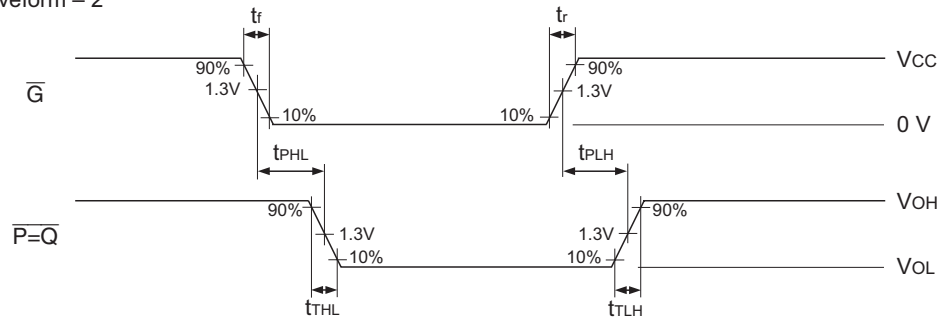


Waveforms

• Waveform – 1

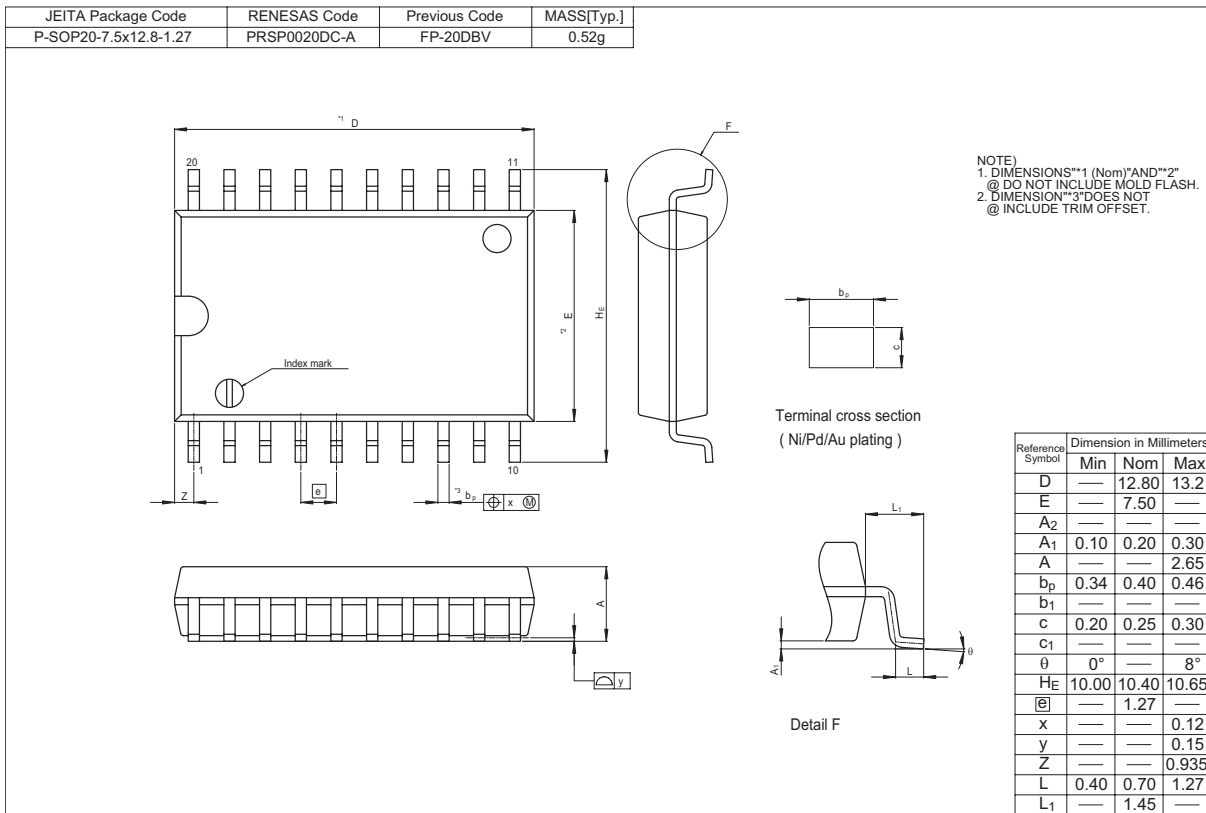
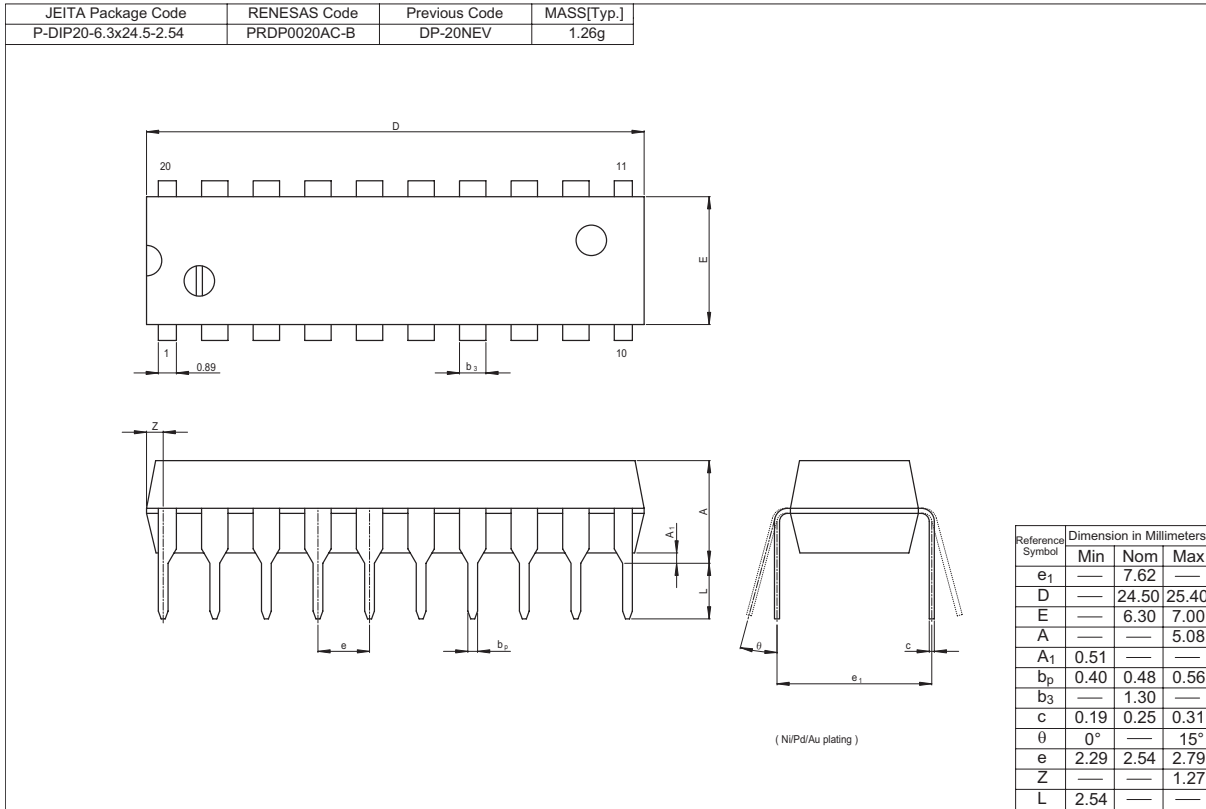


• Waveform – 2



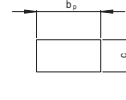
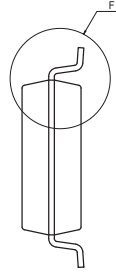
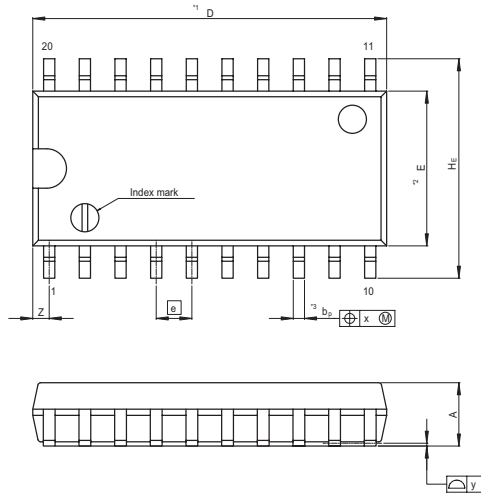
Notes : 1. Input waveform : PRR \leq 1 MHz, duty cycle 50%, $t_r \leq 6\text{ ns}$, $t_f \leq 6\text{ ns}$

Package Dimensions



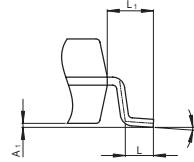
HD74HCT688

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP20-5.5x12.6-1.27	PRSP0020DD-B	FP-20DAV	0.31g



Terminal cross section
(Ni/Pd/Au plating)

NOTE)
1. DIMENSIONS**1 (Nom)**AND**2*
DO NOT INCLUDE MOLD FLASH.
2. DIMENSION**3*DOES NOT
INCLUDE TRIM OFFSET.



Detail F

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	12.60	13.0
E	—	5.50	—
A ₂	—	—	—
A ₁	0.00	0.10	0.20
A	—	—	2.20
b _p	0.34	0.40	0.46
b ₁	—	—	—
c	0.15	0.20	0.25
c ₁	—	—	—
θ	0°	—	8°
H _E	7.50	7.80	8.00
Ⓢ	—	1.27	—
x	—	—	0.12
y	—	—	0.15
Z	—	—	0.80
L	0.50	0.70	0.90
L ₁	—	1.15	—

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