SUPER LOW OPERATING CURRENT
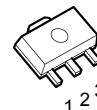## C-MOS 3-TERMINAL VOLTAGE REGULATOR

■ **GENERAL DESCRIPTION**

The **NJU7200 series** is a super low operating current C-MOS 3-terminal positive voltage regulator which contains internal accurate voltage reference, error amplifier, control transistor and output voltage setting resistor.

The regulation voltage is fixed by internal circuits and the following line-up of different output voltage versions are available.

The **NJU7200 series** is suitable for battery operated items and battery back-up systems because of low operating current and low dropout voltage.

■ **FEATURES**

- Super Low Operating Current   (0.9μA typ.@V_{OUT}=1.0V)
- Wide Range of Output Voltage Setting
- Low Dropout Voltage   ($\Delta V_{IO} < 0.18V$, @V_{OUT}=1.0V, I_O = 0.5mA)
- Small Temperature Coefficient of Output Voltage
- Package Outline   (SOT-89)
- C-MOS Technology

■ **PACKAGE OUTLINE**

NJU7200U (SOT-89)

■ **TERMINAL DESCRIPTION**

No.	Description
1	GND
2	Input
3	Output

■ **OUTPUT VOLTAGE LINE-UP**

Output Voltage	SOT-89 Type	Output Voltage	SOT-89 Type
+1.0V	NJU7200U10	+3.2V	NJU7200U32
+1.1V	NJU7200U11	+3.3V	NJU7200U33
+1.2V	NJU7200U12	+3.5V	NJU7200U35
+1.5V	NJU7200U15	+4.0V	NJU7200U40
+2.1V	NJU7200U21*	+4.5V	NJU7200U45*
+2.5V	NJU7200U25	+4.8V	NJU7200U48
+2.6V	NJU7200U26	+5.0V	NJU7200U50
+2.7V	NJU7200U27	+5.2V	NJU7200U52*
+2.9V	NJU7200U29	+5.5V	NJU7200U55
+3.0V	NJU7200U30	+8.0V	NJU7200U80*

Note1) The SOT-89 type name is different from the marking, so it refer to attached paper correspondence table.

Note2) *:Planning Products.

■ **EQUIVALENT CIRCUIT**
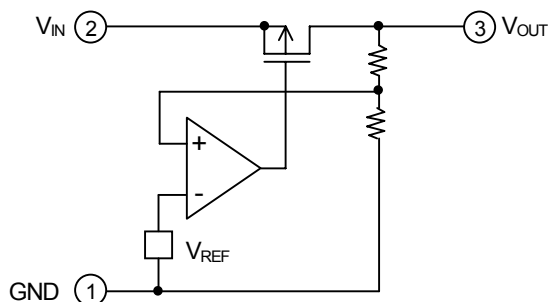
NJU7200 Series

■ ABSOLUTE MAXIMUM RATINGS (T_a = 25ºC)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	14	V
Output Voltage	V_{OUT}	GND-0.3 to V_{IN}+0.3	V
Output Current	I_{OUT}	100	mA
Power Dissipation	P_D	(SOT-89) 300	mW
Operating Temperature	T_{opr}	-25 to + 75	ºC
Storage Temperature	T_{stg}	-40 to +125	ºC

■ ELECTRICAL CHARACTERISTICS

+1.0V Version (C_{IN} = C_o = 0.1µF, T_a = 25°C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN} = 3.0V, I_{OUT} = 5mA	0.95	1.00	1.05	V
Dropout Voltage	ΔV_{IO}	I_{OUT} = 0.5mA	-	0.06	0.18	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	V_{IN} = 3.0V	-	0.90	2.40	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	V_{IN} = 3.0V, I_{OUT} = 1~15mA	-	10	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	V_{IN} = 1.5~12V	-	0.10	-	%/V

+1.1V Version (C_{IN} = C_o = 0.1µF, T_a = 25°C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN} = 3.0V, I_{OUT} = 5mA	1.045	1.100	1.155	V
Dropout Voltage	ΔV_{IO}	I_{OUT} = 0.5mA	-	0.06	0.18	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	V_{IN} = 3.0V	-	0.90	2.40	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	V_{IN} = 3.0V, I_{OUT} = 1~15mA	-	10	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	V_{IN} = 1.5~12V	-	0.10	-	%/V

+1.2V Version (C_{IN} = C_o = 0.1µF, T_a = 25°C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN} = 3.0V, I_{OUT} = 5mA	1.14	1.20	1.26	V
Dropout Voltage	ΔV_{IO}	I_{OUT} = 0.5mA	-	0.06	0.18	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	V_{IN} = 3.0V	-	0.90	2.40	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	V_{IN} = 3.0V, I_{OUT} = 1~15mA	-	10	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	V_{IN} = 1.5~12V	-	0.10	-	%/V

+1.5V Version (C_{IN} = C_o = 0.1µF, T_a = 25°C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN} = 3.0V, I_{OUT} = 5mA	1.425	1.500	1.575	V
Dropout Voltage	ΔV_{IO}	I_{OUT} = 0.5mA	-	0.04	0.12	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	V_{IN} = 3.0V	-	0.90	2.40	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	V_{IN} = 3.0V, I_{OUT} = 1~15mA	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	V_{IN} = 1.8~12V	-	0.10	-	%/V

+2.1V Version

$(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN} = 4.1V, I_{OUT} = 5mA	1.995	2.100	2.205	V
Dropout Voltage	ΔV_{IO}	I_{OUT} = 0.5mA	-	0.04	0.12	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	V_{IN} = 4.1V	-	0.90	2.40	μA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	V_{IN} = 4.1V, I_{OUT} = 1～20mA	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	V_{IN} = 2.5～12V	-	0.10	-	%/V

+2.5V Version

$(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN} = 4.5V, I_{OUT} = 10mA	2.375	2.500	2.625	V
Dropout Voltage	ΔV_{IO}	I_{OUT} = 10mA	-	0.45	1.20	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	V_{IN} = 4.5V	-	1.0	2.4	μA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	V_{IN} = 4.5V, I_{OUT} = 1～20mA	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	V_{IN} = 3.5～12V	-	0.10	-	%/V

+2.6V Version

$(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN} = 4.6V, I_{OUT} = 10mA	2.47	2.60	2.73	V
Dropout Voltage	ΔV_{IO}	I_{OUT} = 10mA	-	0.45	1.20	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	V_{IN} = 4.6V	-	1.0	2.4	μA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	V_{IN} = 4.6V, I_{OUT} = 1～20mA	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	V_{IN} = 3.6～12V	-	0.10	-	%/V

+2.7V Version

$(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN} = 4.7V, I_{OUT} = 10mA	2.565	2.700	2.835	V
Dropout Voltage	ΔV_{IO}	I_{OUT} = 10mA	-	0.4	1.0	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	V_{IN} = 4.7V	-	1.0	2.4	μA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	V_{IN} = 4.7V, I_{OUT} = 1～20mA	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	V_{IN} = 3.7～12V	-	0.10	-	%/V

+2.9V Version

$(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN} = 4.9V, I_{OUT} = 10mA	2.755	2.900	3.045	V
Dropout Voltage	ΔV_{IO}	I_{OUT} = 10mA	-	0.4	1.0	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	V_{IN} = 4.9V	-	1.0	2.4	μA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	V_{IN} = 4.9V, I_{OUT} = 1～20mA	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	V_{IN} = 3.9～12V	-	0.10	-	%/V

NJU7200 Series

+3.0V Version $(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 5.0V$, $I_{OUT} = 10mA$	2.85	3.00	3.15	V
Dropout Voltage	ΔV_{IO}	$I_{OUT} = 10mA$	-	0.36	0.85	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	$V_{IN} = 5.0V$	-	1.0	2.4	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 5.0V, I_{OUT} = 1\sim20mA$	-	15	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 4.0\sim12V$	-	0.10	-	%/V

+3.2V Version $(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 5.2V$, $I_{OUT} = 10mA$	3.04	3.20	3.36	V
Dropout Voltage	ΔV_{IO}	$I_{OUT} = 10mA$	-	0.33	0.80	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	$V_{IN} = 5.2V$	-	1.1	2.4	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 5.2V, I_{OUT} = 1\sim20mA$	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 4.2\sim12V$	-	0.10	-	%/V

+3.3V Version $(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 5.3V$, $I_{OUT} = 10mA$	3.135	3.300	3.465	V
Dropout Voltage	ΔV_{IO}	$I_{OUT} = 10mA$	-	0.33	0.80	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	$V_{IN} = 5.3V$	-	1.1	2.4	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 5.3V, I_{OUT} = 1\sim20mA$	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 4.3\sim12V$	-	0.10	-	%/V

+3.5V Version $(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 5.5V$, $I_{OUT} = 10mA$	3.325	3.500	3.675	V
Dropout Voltage	ΔV_{IO}	$I_{OUT} = 10mA$	-	0.33	0.70	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	$V_{IN} = 5.5V$	-	1.1	2.4	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 5.5V, I_{OUT} = 1\sim20mA$	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 4.5\sim12V$	-	0.10	-	%/V

+4.0V Version $(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 6.0V$, $I_{OUT} = 30mA$	3.80	4.00	4.20	V
Dropout Voltage	ΔV_{IO}	$I_{OUT} = 10mA$	-	0.26	0.60	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	$V_{IN} = 6.0V$	-	1.1	2.4	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 6.0V, I_{OUT} = 1\sim40mA$	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 5.0\sim12V$	-	0.10	-	%/V

+4.5V Version $\quad (C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 6.5V, \quad I_{OUT} = 30mA$	4.275	4.500	4.725	V
Dropout Voltage	ΔV_{IO}	$I_{OUT} = 10mA$	-	0.22	0.50	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	$V_{IN} = 6.5V$	-	1.1	2.4	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 6.5V, I_{OUT} = 1\sim40mA$	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 5.5\sim12V$	-	0.10	-	%/V

+4.8V Version $\quad (C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 6.8V, \quad I_{OUT} = 30mA$	4.56	4.80	5.04	V
Dropout Voltage	ΔV_{IO}	$I_{OUT} = 10mA$	-	0.22	0.50	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	$V_{IN} = 6.8V$	-	1.2	2.4	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 6.8V, I_{OUT} = 1\sim40mA$	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 5.8\sim12V$	-	0.10	-	%/V

+5.0V Version $\quad (C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 7.0V, \quad I_{OUT} = 30mA$	4.75	5.00	5.25	V
Dropout Voltage	ΔV_{IO}	$I_{OUT} = 10mA$	-	0.22	0.45	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	$V_{IN} = 7.0V$	-	1.2	2.4	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 7.0V, I_{OUT} = 1\sim40mA$	-	35	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 6.0\sim12V$	-	0.10	-	%/V

+5.2V Version $\quad (C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

| PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 7.2V, \quad I_{OUT} = 30mA$	4.94	5.20	5.46	V
Dropout Voltage	ΔV_{IO}	$I_{OUT} = 10mA$	-	0.22	0.45	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	$V_{IN} = 7.2V$	-	1.3	2.4	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 7.2V, I_{OUT} = 1\sim40mA$	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 6.2\sim12V$	-	0.10	-	%/V

+5.5V Version $\quad (C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 7.5V, \quad I_{OUT} = 30mA$	5.225	5.500	5.775	V
Dropout Voltage	ΔV_{IO}	$I_{OUT} = 10mA$	-	0.20	0.40	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	$V_{IN} = 7.5V$	-	1.3	2.4	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 7.5V, I_{OUT} = 1\sim40mA$	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 6.5\sim12V$	-	0.10	-	%/V

NJU7200 Series

$(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 10.0V$, $I_{OUT} = 30mA$	7.60	8.00	8.40	V
Dropout Voltage	ΔV_{IO}	$I_{OUT} = 10mA$	-	0.20	0.40	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	$V_{IN} = 10.0V$	-	2.0	4.0	μA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 10.0V, I_{OUT} = 1\sim40mA$	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 9.0\sim12V$	-	0.10	-	%/V

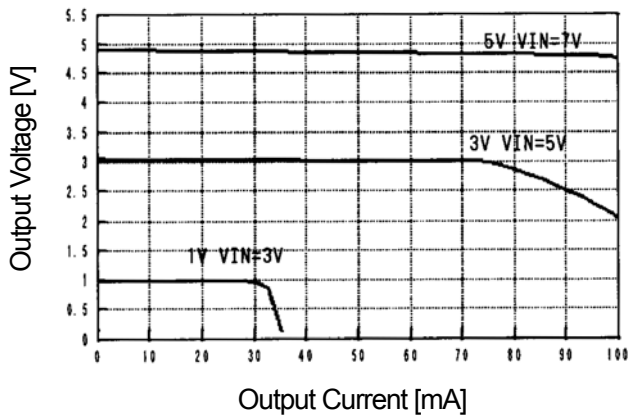■ **MEASUREMENT CIRCUIT**
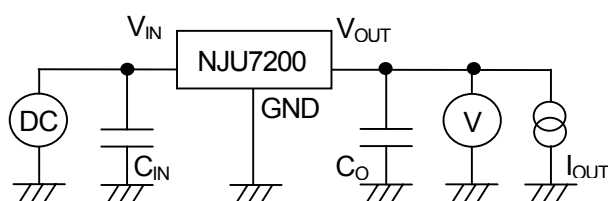
■ TYPICAL CHARACTERISTICS

Output Voltage vs. Input Voltage
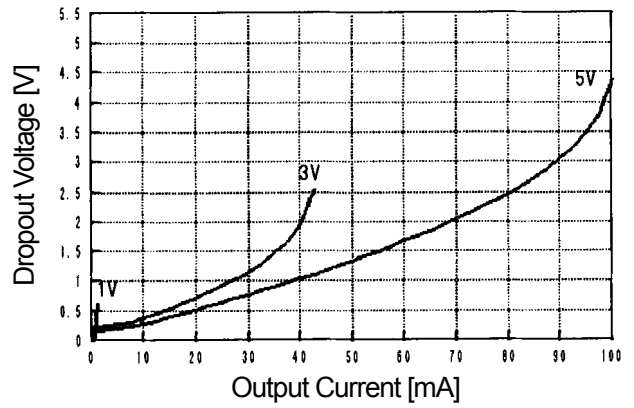
Output Voltage [V] vs Input Voltage [V]

5V IOUT=10mA

3V IOUT=10mA

1V IOUT=0.5mA

Dropout Voltage vs. Output Current

Dropout Voltage [V] vs Output Current [mA]

5V

3V

1V

Output Voltage vs. Output Current

Output Voltage [V] vs Output Current [mA]

5V VIN=7V

3V VIN=5V

1V VIN=3V

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