PRELIMINARY

C-MOS 3-TERMINAL POSITIVE VOLTAGE REGULATOR

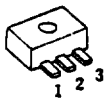
■ GENERAL DESCRIPTION

The NJU7200 series is a low drop out and 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 voltages version are available.

This series is suitable for battery operated items and battery back-up systems because of low current consumption and low dropout voltage.

■ PACKAGE OUTLINE / PIN CONFIGURATION



NJU7200L(TO-92) NJU7200U(SOT-89)

■ FEATURES

- Super Low Current Consumption (0.9μA typ./ V_{OUT}=1.0V)
- Wide Operating Voltage Range
- Low Dropout Voltage (ΔV_{IO}<0.18V, I_O=0.5mA)
- Small Temperature Coefficient of Output Voltage
- Package Outline TO-92/SOT-89
- C-MOS Technology

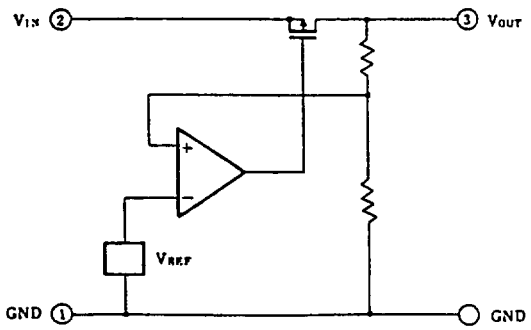
■ TERMINAL DESCRIPTION

NO	DESCRIPTION
1	GND
2	INPUT
3	OUTPUT

■ OUTPUT VOLTAGE LINE-UP

OUTPUT VOLTAGE	TO-92 TYPE	SOT-89 TYPE	OUTPUT VOLTAGE	TO-92 TYPE	SOT-89 TYPE
1.0V	7200L10	7200U10	3.5V	7200L35	7200U35
1.2V	7200L12	7200U12	4.0V	7200L40	7200U40
1.5V	7200L15	7200U15	4.5V	7200L45	7200U45
2.5V	7200L25	7200U25	5.0V	7200L50	7200U50
2.7V	7200L27	7200U27	5.2V	7200L52	7200U52
3.0V	7200L30	7200U30	5.5V	7200L55	7200U55
3.2V	7200L32	7200U32	—	—	—

■ EQUIVALENT CIRCUIT



6

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25℃)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	14	V
Output Voltage	V_{OUT}	GND-0.3～V_{IN}+0.3	V
Output Current	I_{OUT}	100	mA
Power Dissipation	P_D	(TO-92) 500 (SOT-89) 300	mW
Operating Temperature Range	Topr	- 25～+ 75	℃
Storage Temperature Range	Tstg	- 40～+125	℃
Soldering Temperature	Tsold	260	℃
Soldering Time	tsold	10	sec

■ ELECTRICAL CHARACTERISTICS

● +1.0V VERSION

(C_{IN}=C_O=0.1μA, Ta=25℃)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=3.0V, I_{OUT}=5mA	0.95	1.00	1.05	V
Dropout Voltage(NOTE1)	ΔV_{IO}	I_{OUT}=0.5mA		0.06	0.18	V
Input Voltage	V_{IN}				12	V
Current Consumption	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}=1.5V～12V		0.10		%/V

(NOTE1) The voltage V_{OUT1} is defined as the special voltage of V_{OUT} on the condition of V_{IN}=3.0V and I_{OUT}=0.5mA. 98% of the V_{OUT1} is output when the sum voltage $V_{OUT1}+\Delta V_{IO}$ is input to the V_{IN} terminal.

● +1.2V VERSION

(C_{IN}=C_O=0.1μA, Ta=25℃)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=3.0V, I_{OUT}=5mA	1.14	1.20	1.26	V
Dropout Voltage(NOTE2)	ΔV_{IO}	I_{OUT}=0.5mA		0.06	0.18	V
Input Voltage	V_{IN}				12	V
Current Consumption	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}=1.5V～12V		0.10		%/V

(NOTE2) The voltage V_{OUT1} is defined as the special voltage of V_{OUT} on the condition of V_{IN}=3.0V and I_{OUT}=0.5mA. 98% of the V_{OUT1} is output when the sum voltage $V_{OUT1}+\Delta V_{IO}$ is input to the V_{IN} terminal.

● +1.5V VERSION (C_{IN}=C_O=0.1μA, Ta=25℃)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=3.0V, I_{OUT}= 5 mA	1.425	1.500	1.575	V
Dropout Voltage(NOTE3)	ΔV_{IO}	I_{OUT}=0.5mA		0.04	0.12	V
Input Voltage	V_{IN}				12	V
Current Consumption	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}=1.8V～12V		0.10		%/V

(NOTE3) The voltage V_{OUT1} is defined as the special voltage of V_{OUT} on the condition of V_{IN}=3.0V and I_{OUT}=0.5mA. 98% of the V_{OUT1} is output when the sum voltage $V_{OUT1}+\Delta V_{IO}$ is input to the V_{IN} terminal.

● +2.5V VERSION (C_{IN}=C_O=0.1μA, Ta=25℃)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=4.5V, I_{OUT}=10 mA	2.375	2.500	2.625	V
Dropout Voltage(NOTE4)	ΔV_{IO}	I_{OUT}=10mA		0.45	1.20	V
Input Voltage	V_{IN}				12	V
Current Consumption	I_Q	V_{IN}=4.5V		1.00	2.40	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}=3.5V～12V		0.10		%/V

(NOTE4) The voltage V_{OUT1} is defined as the special voltage of V_{OUT} on the condition of V_{IN}=4.5V and I_{OUT}=10mA. 98% of the V_{OUT1} is output when the sum voltage $V_{OUT1}+\Delta V_{IO}$ is input to the V_{IN} terminal.

● +2.7V VERSION (C_{IN}=C_O=0.1μA, Ta=25℃)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=4.7V, I_{OUT}=10 mA	2.565	2.700	2.835	V
Dropout Voltage(NOTE5)	ΔV_{IO}	I_{OUT}=10mA		0.4	1.0	V
Input Voltage	V_{IN}				12	V
Current Consumption	I_Q	V_{IN}=4.7V		1.00	2.40	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}=3.7V～12V		0.10		%/V

(NOTE5) The voltage V_{OUT1} is defined as the special voltage of V_{OUT} on the condition of V_{IN}=4.7V and I_{OUT}=10mA. 98% of the V_{OUT1} is output when the sum voltage $V_{OUT1}+\Delta V_{IO}$ is input to the V_{IN} terminal.

● +3.0V VERSION (C_{IN}=C_O=0.1μA, Ta=25℃)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=5.0V, I_{OUT}=10 mA	2.85	3.00	3.15	V
Dropout Voltage(NOTE6)	ΔV_{IO}	I_{OUT}=10mA		0.36	0.85	V
Input Voltage	V_{IN}				12	V
Current Consumption	I_Q	V_{IN}=5.0V		1.00	2.40	μA
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	V_{IN}=5.0V, I_{OUT}=1～20mA		15	120	mV
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN} \cdot V_{OUT})$	V_{IN}=4.0V～12V		0.10		%/V

(NOTE6) The voltage V_{OUT1} is defined as the special voltage of V_{OUT} on the condition of V_{IN}=5.0V and I_{OUT}=10mA. 98% of the V_{OUT1} is output when the sum voltage $V_{OUT1}+\Delta V_{IO}$ is input to the V_{IN} terminal.

● +3.2V VERSION (C_{IN}=C_O=0.1μA, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=5.2V, I_{OUT}=10 mA	3.04	3.20	3.36	V
Dropout Voltage(NOTE7)	ΔV_{IO}	I_{OUT}=10mA		0.33	0.80	V
Input Voltage	V_{IN}				12	V
Current Consumption	I_Q	V_{IN}=5.2V		1.10	2.40	μA
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	V_{IN}=5.2V, I_{OUT}=1～20mA			120	mV
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	V_{IN}=4.2V～12V		0.10		%/V

(NOTE7) The voltage V_{OUT1} is defined as the special voltage of V_{OUT} on the condition of V_{IN}=5.2V and I_{OUT}=10mA. 98% of the V_{OUT1} is output when the sum voltage $V_{OUT1}+\Delta V_{IO}$ is input to the V_{IN} terminal.

● +3.5V VERSION (C_{IN}=C_O=0.1μA, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=5.5V, I_{OUT}=10 mA	3.325	3.50	3.675	V
Dropout Voltage(NOTE8)	ΔV_{IO}	I_{OUT}=10mA		0.30	0.70	V
Input Voltage	V_{IN}				12	V
Current Consumption	I_Q	V_{IN}=5.5V		1.10	2.40	μA
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	V_{IN}=5.5V, I_{OUT}=1～20mA			120	mV
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	V_{IN}=4.5V～12V		0.10		%/V

(NOTE8) The voltage V_{OUT1} is defined as the special voltage of V_{OUT} on the condition of V_{IN}=5.5V and I_{OUT}=10mA. 98% of the V_{OUT1} is output when the sum voltage $V_{OUT1}+\Delta V_{IO}$ is input to the V_{IN} terminal.

● +4.0V VERSION (C_{IN}=C_O=0.1μA, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=6.0V, I_{OUT}=30 mA	3.80	4.00	4.20	V
Dropout Voltage(NOTE9)	ΔV_{IO}	I_{OUT}=10mA		0.26	0.60	V
Input Voltage	V_{IN}				12	V
Current Consumption	I_Q	V_{IN}=6.0V		1.10	2.40	μA
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	V_{IN}=6.0V, I_{OUT}=1～40mA			120	mV
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	V_{IN}=5.0V～12V		0.10		%/V

(NOTE9) The voltage V_{OUT1} is defined as the special voltage of V_{OUT} on the condition of V_{IN}=6.0V and I_{OUT}=10mA. 98% of the V_{OUT1} is output when the sum voltage $V_{OUT1}+\Delta V_{IO}$ is input to the V_{IN} terminal.

● +4.5V VERSION (C_{IN}=C_O=0.1μA, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=6.5V, I_{OUT}=30 mA	4.275	4.50	4.725	V
Dropout Voltage(NOTE10)	ΔV_{IO}	I_{OUT}=10mA		0.22	0.50	V
Input Voltage	V_{IN}				12	V
Current Consumption	I_Q	V_{IN}=6.5V		1.20	2.40	μA
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	V_{IN}=6.5V, I_{OUT}=1～40mA			120	mV
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	V_{IN}=5.5V～12V		0.10		%/V

(NOTE10)The voltage V_{OUT1} is defined as the special voltage of V_{OUT} on the condition of V_{IN}=6.5V and I_{OUT}=10mA. 98% of the V_{OUT1} is output when the sum voltage $V_{OUT1}+\Delta V_{IO}$ is input to the V_{IN} terminal.

● +5.0V VERSION (C_{IN}=C_O=0.1μA, Ta=25℃)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=7.0V, I_{OUT}=30 mA	4.75	5.00	5.25	V
Dropout Voltage(NOTE11)	ΔV_{IO}	I_{OUT}=10mA		0.22	0.45	V
Input Voltage	V_{IN}				12	V
Current Consumption	I_Q	V_{IN}=7.0V		1.20	2.40	μA
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	V_{IN}=7.0V, I_{OUT}=1～40mA		35	120	mV
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	V_{IN}=6.0V～12V		0.10		%/V

(NOTE11)The voltage V_{OUT1} is defined as the special voltage of V_{OUT} on the condition of V_{IN}=7.0V and I_{OUT}=10mA. 98% of the V_{OUT1} is output when the sum voltage $V_{OUT1}+\Delta V_{IO}$ is input to the V_{IN} terminal.

● +5.2V VERSION (C_{IN}=C_O=0.1μA, Ta=25℃)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=7.2V, I_{OUT}=30 mA	4.94	5.20	5.46	V
Dropout Voltage(NOTE12)	ΔV_{IO}	I_{OUT}=10mA		0.20	0.45	V
Input Voltage	V_{IN}				12	V
Current Consumption	I_Q	V_{IN}=7.2V		1.30	2.40	μA
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	V_{IN}=7.2V, I_{OUT}=1～20mA			120	mV
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	V_{IN}=6.2V～12V		0.10		%/V

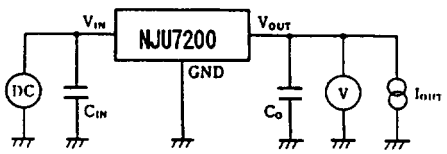
(NOTE12)The voltage V_{OUT1} is defined as the special voltage of V_{OUT} on the condition of V_{IN}=7.2V and I_{OUT}=10mA. 98% of the V_{OUT1} is output when the sum voltage $V_{OUT1}+\Delta V_{IO}$ is input to the V_{IN} terminal.

● +5.5V VERSION (C_{IN}=C_O=0.1μA, Ta=25℃)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	V_{IN}=7.5V, I_{OUT}=30 mA	5.225	5.500	5.775	V
Dropout Voltage(NOTE13)	ΔV_{IO}	I_{OUT}=10mA		0.20	0.40	V
Input Voltage	V_{IN}				12	V
Current Consumption	I_Q	V_{IN}=7.5V		1.30	2.40	μA
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	V_{IN}=7.5V, I_{OUT}=1～40mA			120	mV
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	V_{IN}=6.5V～12V		0.10		%/V

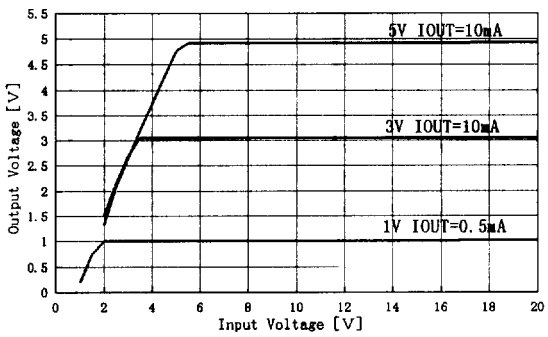
(NOTE13)The voltage V_{OUT1} is defined as the special voltage of V_{OUT} on the condition of V_{IN}=7.5V and I_{OUT}=10mA. 98% of the V_{OUT1} is output when the sum voltage $V_{OUT1}+\Delta V_{IO}$ is input to the V_{IN} terminal.

■ MEASUREMENT CIRCUIT

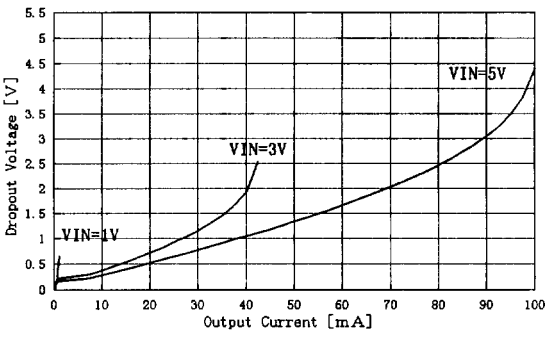


■ TYPICAL CHARACTERISTICS

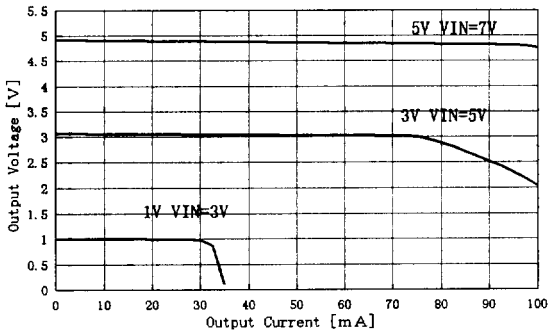
Output Voltage vs. Input Voltage



Dropout Voltage vs. Output Current



Output Voltage vs. Output Current



6