

## C-MOS 3-TERMINAL POSITIVE VOLTAGE REGULATOR

## ■ GENERAL DESCRIPTION

The NJU7201 series is a C-MOS 3-terminal positive voltage regulator which contains internal accurate voltage reference, error amplifier, control transistor and output voltage setting resistor.

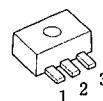
The regulation voltage is fixed by internal circuits and the following line-up of different output voltages version are available.

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

## ■ PACKAGE OUTLINE



NJU7201L(TO-92)



NJU7201U(SOT-89)

## ■ FEATURES

- Low Operating Current (19  $\mu$ A typ)
- Wide Operating Voltage
- Low Dropout Voltage
  - ( $\Delta V_{IO} < 0.3V$  -- 1.2~1.5V output,  $I_{OUT} = 0.5mA$ )
  - ( $\Delta V_{IO} < 0.6V$  -- 2.5~3.5V output,  $I_{OUT} = 20mA$ )
  - ( $\Delta V_{IO} < 0.6V$  -- 4.0~5.5V output,  $I_{OUT} = 40mA$ )
- Small Temperature Coefficient of Output Voltage
- Package Outline TO-92/SOT-89
- C-MOS Technology

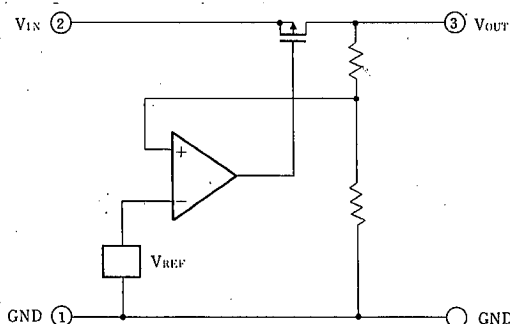
## ■ TERMINAL DESCRIPTION

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-89TYPE
1.2V	7201L12	7201U12	3.5V	7201L35	7201U35
1.5V	7201L15	7201U15	4.0V	7201L40	7201U40
2.5V	7201L25	7201U25	4.5V	7201L45	7201U45
2.7V	7201L27	7201U27	5.0V	7201L50	7201U50
3.0V	7201L30	7201U30	5.2V	7201L52	7201U52
3.2V	7201L32	7201U32	5.5V	7201L55	7201U55

## ■ EQUIVALENT CIRCUIT



## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V <sub>IN</sub>	14	V
Output Voltage	V <sub>OUT</sub>	GND-0.3~V <sub>IN</sub> +0.3	V
Output Current	I <sub>OUT</sub>	100	mA
Power Dissipation	P <sub>D</sub>	(TO-92) 500 (SOT-89) 300	mW
Operating Temperature Range	T <sub>opr</sub>	-25~+75	°C
Storage Temperature Range	T <sub>stg</sub>	-40~+125	°C
Soldering Temperature	T <sub>sold</sub>	260	°C
Soldering Time	t <sub>sold</sub>	10	sec

## ■ ELECTRICAL CHARACTERISTICS

### ● +1.2V VERSION

(C<sub>IN</sub>=C<sub>O</sub>=0.1 μF, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =3.0V, I <sub>OUT</sub> =5mA	1.14	1.20	1.26	V
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>OUT</sub> =0.5mA		0.020	0.30	V
Input Voltage	V <sub>IN</sub>				12	V
Operating Current	I <sub>Q</sub>	V <sub>IN</sub> =3.0V		19	30	μA
Load Regulation	ΔV <sub>OUT</sub> / ΔI <sub>OUT</sub>	V <sub>IN</sub> =3.0V, I <sub>OUT</sub> =1~15mA		10	180	mV
Line Regulation	ΔV <sub>OUT</sub> / (ΔV <sub>IN</sub> · V <sub>OUT</sub> )	V <sub>IN</sub> =1.5V~12V		0.10		%/V

### ● +1.5V VERSION

(C<sub>IN</sub>=C<sub>O</sub>=0.1 μF, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =3.0V, I <sub>OUT</sub> =5mA	1.425	1.500	1.575	V
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>OUT</sub> =0.5mA		0.020	0.30	V
Input Voltage	V <sub>IN</sub>				12	V
Operating Current	I <sub>Q</sub>	V <sub>IN</sub> =3.0V		19	30	μA
Load Regulation	ΔV <sub>OUT</sub> / ΔI <sub>OUT</sub>	V <sub>IN</sub> =3.0V, I <sub>OUT</sub> =1~15mA			180	mV
Line Regulation	ΔV <sub>OUT</sub> / (ΔV <sub>IN</sub> · V <sub>OUT</sub> )	V <sub>IN</sub> =1.8V~12V		0.10		%/V

### ● +2.5V VERSION

(C<sub>IN</sub>=C<sub>O</sub>=0.1 μF, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =4.5V, I <sub>OUT</sub> =10mA	2.375	2.500	2.625	V
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>OUT</sub> =20mA		0.20	0.60	V
Input Voltage	V <sub>IN</sub>				12	V
Operating Current	I <sub>Q</sub>	V <sub>IN</sub> =4.5V		19	30	μA
Load Regulation	ΔV <sub>OUT</sub> / ΔI <sub>OUT</sub>	V <sub>IN</sub> =4.5V, I <sub>OUT</sub> =1~20mA			180	mV
Line Regulation	ΔV <sub>OUT</sub> / (ΔV <sub>IN</sub> · V <sub>OUT</sub> )	V <sub>IN</sub> =3.5V~12V		0.10		%/V

## • +2.7V VERSION

( $C_{IN}=C_O=0.1\ \mu F$ ,  $T_a=25^\circ C$ )

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=4.7V$ , $I_{OUT}=10mA$	2.565	2.700	2.835	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=20mA$		0.20	0.60	V
Input Voltage	$V_{IN}$				12	V
Operating Current	$I_Q$	$V_{IN}=4.7V$		19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN}=4.7V$ , $I_{OUT}=1\sim 20mA$			180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN}=3.7V\sim 12V$		0.10		%/V

## • +3.0V VERSION

( $C_{IN}=C_O=0.1\ \mu F$ ,  $T_a=25^\circ C$ )

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=5.0V$ , $I_{OUT}=10mA$	2.85	3.00	3.15	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=20mA$		0.20	0.60	V
Input Voltage	$V_{IN}$				12	V
Operating Current	$I_Q$	$V_{IN}=5.0V$		19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN}=5.0V$ , $I_{OUT}=1\sim 20mA$		15	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN}=4.0V\sim 12V$		0.10		%/V

## • +3.2V VERSION

( $C_{IN}=C_O=0.1\ \mu F$ ,  $T_a=25^\circ C$ )

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=5.2V$ , $I_{OUT}=10mA$	3.04	3.20	3.36	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=20mA$		0.20	0.60	V
Input Voltage	$V_{IN}$				12	V
Operating Current	$I_Q$	$V_{IN}=5.2V$		19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN}=5.2V$ , $I_{OUT}=1\sim 20mA$			180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN}=4.2V\sim 12V$		0.10		%/V

## • +3.5V VERSION

( $C_{IN}=C_O=0.1\ \mu F$ ,  $T_a=25^\circ C$ )

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=5.5V$ , $I_{OUT}=10mA$	3.325	3.500	3.675	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=20mA$		0.20	0.60	V
Input Voltage	$V_{IN}$				12	V
Operating Current	$I_Q$	$V_{IN}=5.5V$		19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN}=5.5V$ , $I_{OUT}=1\sim 20mA$			180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN}=4.5V\sim 12V$		0.10		%/V

## • +4.0V VERSION

( $C_{IN}=C_O=0.1\ \mu F$ ,  $T_a=25^\circ C$ )

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=6.0V$ , $I_{OUT}=30mA$	3.80	4.00	4.20	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=40mA$		0.30	0.60	V
Input Voltage	$V_{IN}$				12	V
Operating Current	$I_Q$	$V_{IN}=6.0V$		19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN}=6.0V$ , $I_{OUT}=1\sim 40mA$			120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN}=5.0V\sim 12V$		0.10		%/V

## • +4.5V VERSION

( $C_{IN}=C_O=0.1\ \mu F$ ,  $T_a=25^\circ C$ )

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=6.5V$ , $I_{OUT}=30mA$	4.275	4.500	4.725	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=40mA$		0.30	0.60	V
Input Voltage	$V_{IN}$				12	V
Operating Current	$I_Q$	$V_{IN}=6.5V$		19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN}=6.5V$ , $I_{OUT}=1 \sim 40mA$			120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN}=5.5V \sim 12V$		0.10		%/V

## • +5.0V VERSION

( $C_{IN}=C_O=0.1\ \mu F$ ,  $T_a=25^\circ C$ )

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=7.0V$ , $I_{OUT}=30mA$	4.75	5.00	5.25	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=40mA$		0.30	0.60	V
Input Voltage	$V_{IN}$				12	V
Operating Current	$I_Q$	$V_{IN}=7.0V$		19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN}=7.0V$ , $I_{OUT}=1 \sim 40mA$		35	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN}=6.0V \sim 12V$		0.10		%/V

## • +5.2V VERSION

( $C_{IN}=C_O=0.1\ \mu F$ ,  $T_a=25^\circ C$ )

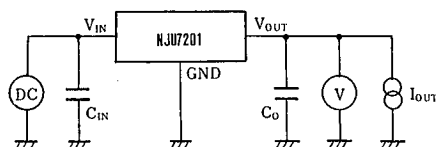
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=7.2V$ , $I_{OUT}=30mA$	4.94	5.20	5.46	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=40mA$		0.30	0.60	V
Input Voltage	$V_{IN}$				12	V
Operating Current	$I_Q$	$V_{IN}=7.2V$		19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN}=7.2V$ , $I_{OUT}=1 \sim 40mA$			120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN}=6.2V \sim 12V$		0.10		%/V

## • +5.5V VERSION

( $C_{IN}=C_O=0.1\ \mu F$ ,  $T_a=25^\circ C$ )

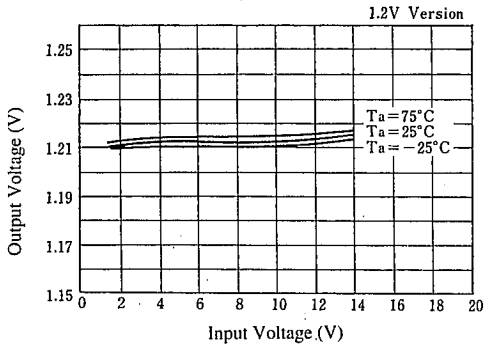
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=7.5V$ , $I_{OUT}=30mA$	5.225	5.500	5.775	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=40mA$		0.30	0.60	V
Input Voltage	$V_{IN}$				12	V
Operating Current	$I_Q$	$V_{IN}=7.5V$		19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN}=7.5V$ , $I_{OUT}=1 \sim 40mA$			120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN}=6.5V \sim 12V$		0.10		%/V

## ■ MEASUREMENT CIRCUIT

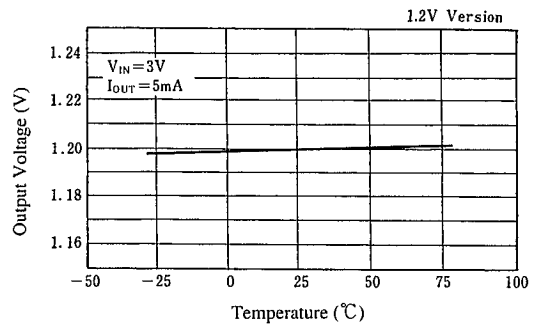


## ■ TYPICAL CHARACTERISTICS (1)

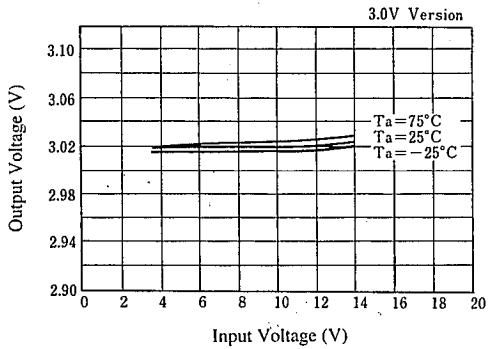
Output Voltage vs. Input Voltage



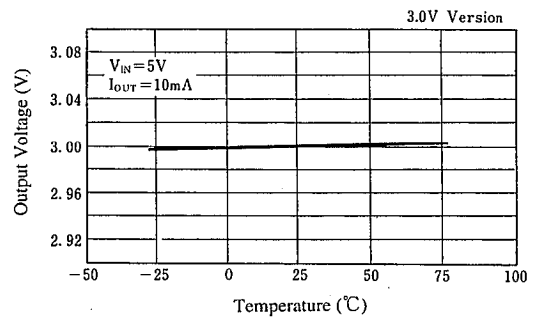
Output Voltage vs. Input Temperature



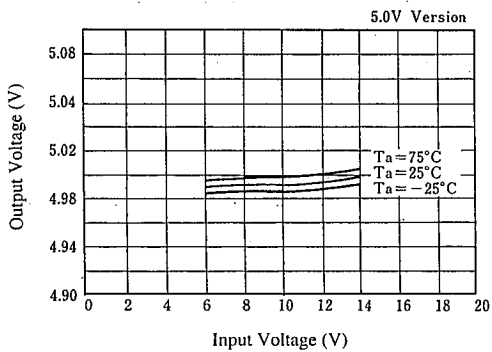
Output Voltage vs. Input Voltage



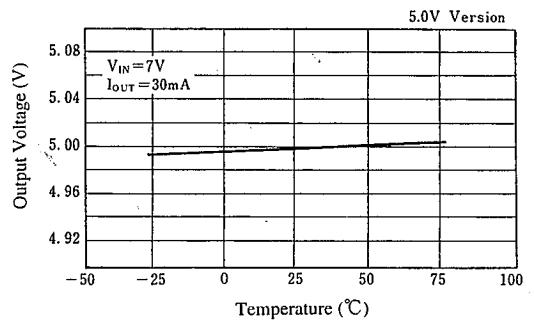
Output Voltage vs. Input Temperature



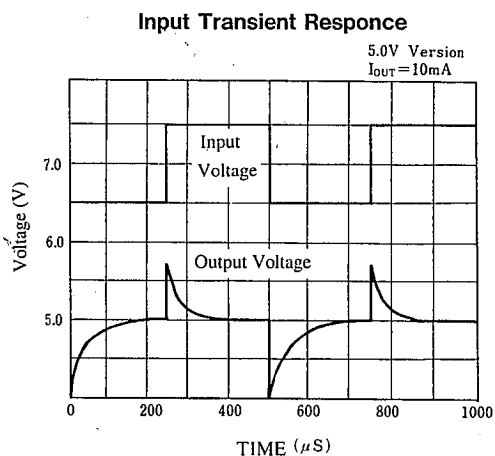
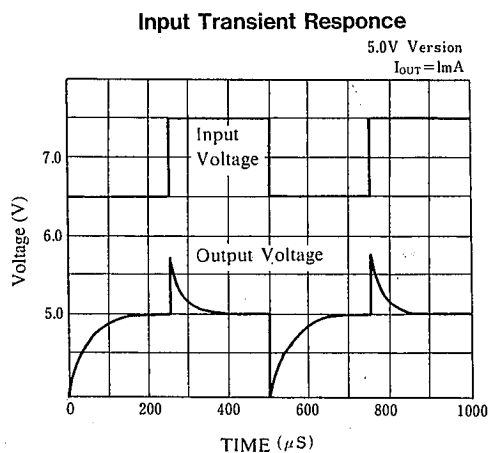
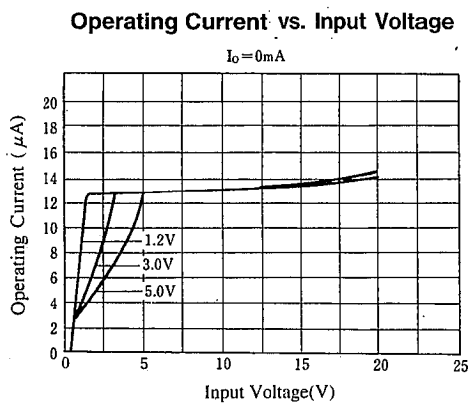
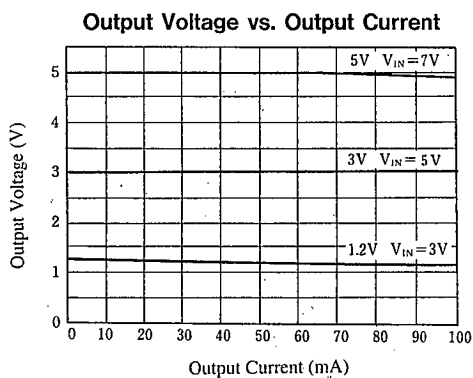
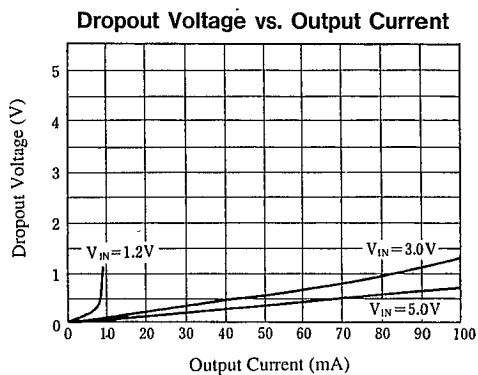
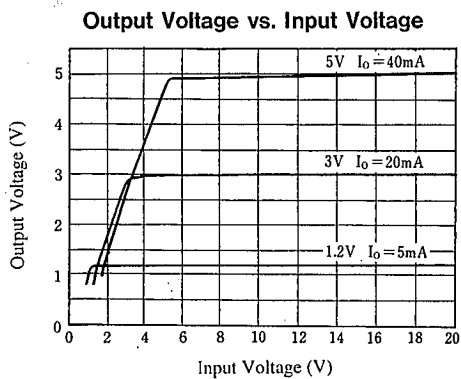
Output Voltage vs. Input Voltage



Output Voltage vs. Input Temperature



## ■ TYPICAL CHARACTERISTICS (2)



## MEMO

**[CAUTION]**

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