

## HIGH PRECISION C-MOS 3-TERMINAL VOLTAGE REGULATOR

### ■ GENERAL DESCRIPTION

The **NJU7221 series** is a high precision output voltage ( $\pm 2\%$ ) 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 **NJU7221 series** is suitable for battery operated items and battery back-up systems because of low operating current and low dropout voltage.

### ■ FEATURES

- High Precision Output Voltage ( $\pm 2\%$ )
- Low Operating Current (19 $\mu$ A typ.)
- Low Dropout Voltage ( $\Delta V_{IO} < 0.6V, I_O = 100mA$ )
- Wide Operating Voltage Range
- Small Temperature Coefficient of Output Voltage
- Package Outline (SOT-89)
- C-MOS Technology

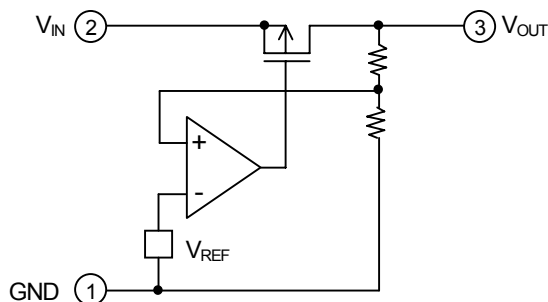
### ■ OUTPUT VOLTAGE LINE-UP

Output Voltage	SOT-89 Type	Output Voltage	SOT-89 Type
+1.2V	NJU7221U12	+3.2V	NJU7221U32
+1.5V	NJU7221U15	+3.5V	NJU7221U35
+1.9V	NJU7221U19	+4.0V	NJU7221U40
+2.0V	NJU7221U20	+5.0V	NJU7221U50
+2.5V	NJU7221U25	+5.2V	NJU7221U52
+2.7V	NJU7221U27*	+5.5V	NJU7221U55
+3.0V	NJU7221U30	-	-

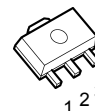
Note1) The SOT-89 type name is different from the marking, so it refer to attached paper correspondence table.

Note2) \*:Planning Products.

### ■ EQUIVALENT CIRCUIT



### ■ PACKAGE OUTLINE



**NJU7221U** (SOT-89)

### ■ TERMINAL DESCRIPTION

No.	Description
1	GND
2	Input
3	Output

# NJU7221 Series

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## ■ ABSOLUTE MAXIMUM RATINGS

( $T_a = 25^\circ\text{C}$ )

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	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-40 to +125	$^\circ\text{C}$

## ■ ELECTRICAL CHARACTERISTICS

+1.2V Version

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 3.0\text{V}$ , $I_{OUT} = 5\text{mA}$	1.176	1.200	1.224	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 0.5\text{mA}$	-	0.02	0.30	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 3.0\text{V}$	-	19	30	$\mu\text{A}$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 3.0\text{V}$ , $I_{OUT} = 1 \sim 15\text{mA}$	-	10	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 1.5 \sim 12\text{V}$	-	0.1	-	%/V

+1.5V Version

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 3.0\text{V}$ , $I_{OUT} = 5\text{mA}$	1.47	1.50	1.53	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 0.5\text{mA}$	-	0.02	0.30	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 3.0\text{V}$	-	19	30	$\mu\text{A}$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 3.0\text{V}$ , $I_{OUT} = 1 \sim 15\text{mA}$	-	10	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 1.8 \sim 12\text{V}$	-	0.1	-	%/V

+1.9V Version

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 3.0\text{V}$ , $I_{OUT} = 5\text{mA}$	1.862	1.900	1.938	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 0.5\text{mA}$	-	0.02	0.30	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 3.0\text{V}$	-	19	30	$\mu\text{A}$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 3.0\text{V}$ , $I_{OUT} = 1 \sim 15\text{mA}$	-	10	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 2.1 \sim 12\text{V}$	-	0.1	-	%/V

+2.0V Version

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 4.0\text{V}$ , $I_{OUT} = 10\text{mA}$	1.96	2.00	2.04	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 20\text{mA}$	-	0.2	0.6	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 4.0\text{V}$	-	19	30	$\mu\text{A}$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 4.0\text{V}$ , $I_{OUT} = 1 \sim 20\text{mA}$	-	15	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 3.0 \sim 12\text{V}$	-	0.1	-	%/V

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## +2.5V Version

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 4.5V$ , $I_{OUT} = 10mA$	2.45	2.50	2.55	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 20mA$	-	0.2	0.6	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 4.5V$	-	19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 4.5V$ , $I_{OUT} = 1\sim 20mA$	-	15	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 3.5\sim 12V$	-	0.1	-	%/V

## +2.7V Version

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 4.7V$ , $I_{OUT} = 10mA$	2.646	2.700	2.754	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 20mA$	-	0.2	0.6	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 4.7V$	-	19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 4.7V$ , $I_{OUT} = 1\sim 20mA$	-	15	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 3.7\sim 12V$	-	0.1	-	%/V

## +3.0V Version

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 5.0V$ , $I_{OUT} = 10mA$	2.94	3.00	3.06	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 20mA$	-	0.2	0.6	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	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 4.0\sim 12V$	-	0.1	-	%/V

## +3.2V Version

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 5.2V$ , $I_{OUT} = 10mA$	3.136	3.200	3.264	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 20mA$	-	0.2	0.6	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 5.2V$	-	19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 5.2V$ , $I_{OUT} = 1\sim 20mA$	-	15	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 4.2\sim 12V$	-	0.1	-	%/V

## +3.5V Version

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 5.5V$ , $I_{OUT} = 10mA$	3.43	3.50	3.57	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 20mA$	-	0.2	0.6	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 5.5V$	-	19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 5.5V$ , $I_{OUT} = 1\sim 20mA$	-	15	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 4.5\sim 12V$	-	0.1	-	%/V

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+4.0V Version

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 6.0V$ , $I_{OUT} = 30mA$	3.92	4.00	4.08	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 40mA$	-	0.3	0.6	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 6.0V$	-	19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 6.0V$ , $I_{OUT} = 1\sim 40mA$	-	35	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 5.0\sim 12V$	-	0.1	-	%/V

+5.0V Version

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 7.0V$ , $I_{OUT} = 30mA$	4.90	5.00	5.10	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 40mA$	-	0.3	0.6	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	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 6.0\sim 12V$	-	0.1	-	%/V

+5.2V Version

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

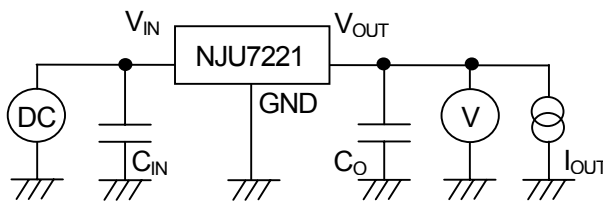
PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 7.2V$ , $I_{OUT} = 30mA$	5.096	5.200	5.304	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 40mA$	-	0.3	0.6	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 7.2V$	-	19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 7.2V$ , $I_{OUT} = 1\sim 40mA$	-	35	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 6.2\sim 12V$	-	0.1	-	%/V

+5.5V Version

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 7.5V$ , $I_{OUT} = 30mA$	5.39	5.50	5.61	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 40mA$	-	0.3	0.6	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 7.5V$	-	19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 7.5V$ , $I_{OUT} = 1\sim 40mA$	-	35	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 6.5\sim 12V$	-	0.1	-	%/V

## MEASUREMENT CIRCUIT



**[CAUTION]**  
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