

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 μ 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 (TO-92/SOT-89)
- C-MOS Technology

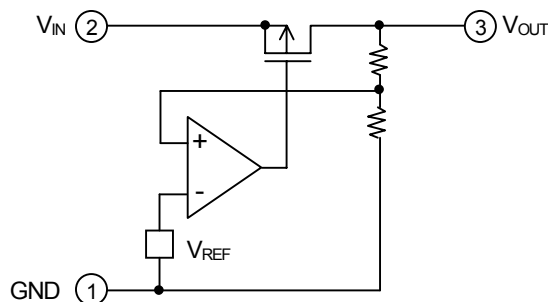
■ OUTPUT VOLTAGE LINE-UP

Output Voltage	TO-92 Type	SOT-89 Type	Output Voltage	TO-92 Type	SOT-89 Type
+1.2V	NJU7221L12	NJU7221U12	+3.2V	NJU7221L32	NJU7221U32
+1.5V	NJU7221L15	NJU7221U15	+3.5V	NJU7221L35	NJU7221U35
+1.9V	NJU7221L19	NJU7221U19	+4.0V	NJU7221L40	NJU7221U40
+2.0V	NJU7221L20	NJU7221U20	+5.0V	NJU7221L50	NJU7221U50
+2.5V	NJU7221L25	NJU7221U25	+5.2V	NJU7221L52	NJU7221U52
+2.7V	NJU7221L27*	NJU7221U27*	+5.5V	NJU7221L55	NJU7221U55
+3.0V	NJU7221L30	NJU7221U30	-	-	-

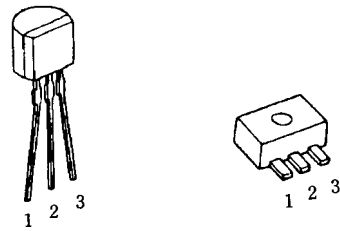
Note1) The SOT-89 type name is different from the marking, so it refer to attached paper correspondence table.

Note2) *:Planning Products.

■ EQUIVALENT CIRCUIT



■ PACKAGE OUTLINE



NJU7221L (TO-92) NJU7221U (SOT-89)

■ TERMINAL DESCRIPTION

No.	Description
1	GND
2	Input
3	Output

NJU7221 Series

■ ABSOLUTE MAXIMUM RATINGS

(T_a = 25°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	(TO-92) 500 (SOT-89) 300	mW
Operating Temperature	T _{opr}	-25 to +75	°C
Storage Temperature	T _{stg}	-40 to +125	°C

■ ELECTRICAL CHARACTERISTICS

+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	1.176	1.200	1.224	V
Dropout Voltage	ΔV _{IO}	I _{OUT} = 0.5mA	-	0.02	0.30	V
Input Voltage	V _{IN}		-	-	12	V
Operating Current	I _Q	V _{IN} = 3.0V	-	19	30	μA
Load Regulation	ΔV _{OUT} / ΔI _{OUT}	V _{IN} = 3.0V, I _{OUT} = 1~15mA	-	10	180	mV
Line Regulation	ΔV _{OUT} / (ΔV _{IN} · V _{OUT})	V _{IN} = 1.5~12V	-	0.1	-	%/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	1.47	1.50	1.53	V
Dropout Voltage	ΔV _{IO}	I _{OUT} = 0.5mA	-	0.02	0.30	V
Input Voltage	V _{IN}		-	-	12	V
Operating Current	I _Q	V _{IN} = 3.0V	-	19	30	μA
Load Regulation	ΔV _{OUT} / ΔI _{OUT}	V _{IN} = 3.0V, I _{OUT} = 1~15mA	-	10	180	mV
Line Regulation	ΔV _{OUT} / (ΔV _{IN} · V _{OUT})	V _{IN} = 1.8~12V	-	0.1	-	%/V

+1.9V 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	1.862	1.900	1.938	V
Dropout Voltage	ΔV _{IO}	I _{OUT} = 0.5mA	-	0.02	0.30	V
Input Voltage	V _{IN}		-	-	12	V
Operating Current	I _Q	V _{IN} = 3.0V	-	19	30	μA
Load Regulation	ΔV _{OUT} / ΔI _{OUT}	V _{IN} = 3.0V, I _{OUT} = 1~15mA	-	10	180	mV
Line Regulation	ΔV _{OUT} / (ΔV _{IN} · V _{OUT})	V _{IN} = 2.1~12V	-	0.1	-	%/V

+2.0V Version

(C_{IN} = C_O = 0.1μF, T_a = 25°C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V _{OUT}	V _{IN} = 4.0V, I _{OUT} = 10mA	1.96	2.00	2.04	V
Dropout Voltage	ΔV _{IO}	I _{OUT} = 20mA	-	0.2	0.6	V
Input Voltage	V _{IN}		-	-	12	V
Operating Current	I _Q	V _{IN} = 4.0V	-	19	30	μA
Load Regulation	ΔV _{OUT} / ΔI _{OUT}	V _{IN} = 4.0V, I _{OUT} = 1~20mA	-	15	180	mV
Line Regulation	ΔV _{OUT} / (ΔV _{IN} · V _{OUT})	V _{IN} = 3.0~12V	-	0.1	-	%/V

NJU7221 Series

+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	ΔV_{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	μA
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	ΔV_{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	μA
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	ΔV_{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	μA
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	ΔV_{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	μA
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	ΔV_{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	μA
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

NJU7221 Series

+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	ΔV_{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	μA
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	ΔV_{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	μA
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

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

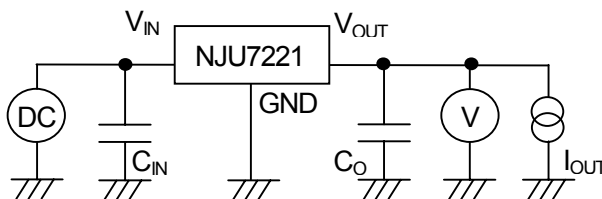
PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 7.2V, I_{OUT} = 30mA$	5.096	5.200	5.304	V
Dropout Voltage	ΔV_{IO}	$I_{OUT} = 40mA$	-	0.3	0.6	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	$V_{IN} = 7.2V$	-	19	30	μA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 7.2V, I_{OUT} = 1\sim 40mA$	-	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	ΔV_{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	μA
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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