

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.

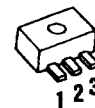
The regulation voltage is fixed by internal circuits and the following line-up of different output voltage versions are available.

The NJU7221 series is suitable for battery operated items and battery back-up systems because of low operating current and low dropout voltage.

■ PACKAGE OUTLINE



NJU7221L



NJU7221U

■ 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

■ TERMINAL DESCRIPTION

No.	Description
1	GND
2	Input
3	Output

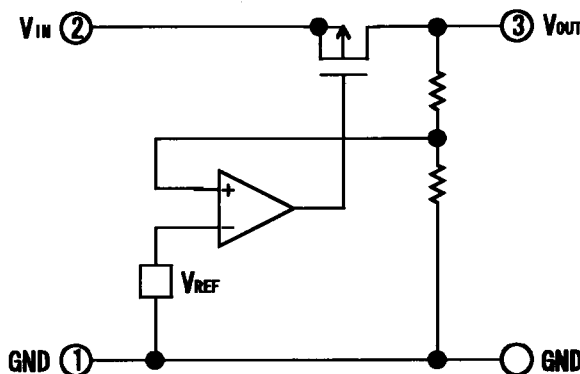
■ OUTPUT VOLTAGE LINE-UP

Output Voltage	TO-92 Type	SOT-89 Type	Output Voltage	TO-92 Type	SOT-89 Type
+1.2V	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



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

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	500 (TO-92) 300 (SOT-89)	mW
Operating Temperature	Topr	- 25 ~ + 75	°C
Storage Temperature	Tstg	- 40 ~ +125	°C

■ ELECTRICAL CHARACTERISTICS

+1.2V Version

(C_{IN}=C_O=0.1uF, Ta=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	uA
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	V _{IN} =3.0V, I _{OUT} =1~15mA	—	10	180	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V _{IN} =1.5~12V	—	0.1	—	%/V

+1.5V Version

(C_{IN}=C_O=0.1uF, Ta=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	uA
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	V _{IN} =3.0V, I _{OUT} =1~15mA	—	10	180	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V _{IN} =1.8~12V	—	0.10	—	%/V

+1.9V Version

(C_{IN}=C_O=0.1uF, Ta=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	uA
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	V _{IN} =3.0V, I _{OUT} =1~15mA	—	10	180	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V _{IN} =2.1~12V	—	0.10	—	%/V

+2.0V Version

(C_{IN}=C_O=0.1μF, Ta=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	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	V _{IN} =4.0V, I _{OUT} =1~20mA	—	15	180	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V _{IN} =3.0~12V	—	0.10	—	%/V

+2.5V Version

(C_{IN}=C_O=0.1μF, Ta=25°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	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	V _{IN} =4.5V, I _{OUT} =1~20mA	—	15	180	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V _{IN} =3.5~12V	—	0.10	—	%/V

+2.7V Version

(C_{IN}=C_O=0.1μF, Ta=25°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	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	V _{IN} =4.7V, I _{OUT} =1~20mA	—	15	180	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V _{IN} =3.7~12V	—	0.10	—	%/V

+3.0V Version

(C_{IN}=C_O=0.1μF, Ta=25°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	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	V _{IN} =5.0V, I _{OUT} =1~20mA	—	15	180	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V _{IN} =4.0~12V	—	0.10	—	%/V

+3.2V Version

(C_{IN}=C_O=0.1μF, Ta=25°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	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	V _{IN} =5.2V, I _{OUT} =1~20mA	—	15	180	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V _{IN} =4.2~12V	—	0.10	—	%/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	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$V_{IN}=5.5V, I_{OUT}=1\sim 20mA$	—	15	180	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{IN}=4.5\sim 12V$	—	0.10	—	%/V

+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	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$V_{IN}=6.0V, I_{OUT}=1\sim 40mA$	—	35	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{IN}=5.0\sim 12V$	—	0.10	—	%/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_{DD1}	$V_{IN}=7.0V, \text{No Load}$	—	19	30	μA
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$V_{IN}=7.0V, I_{OUT}=1\sim 40mA$	—	35	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{IN}=6.0\sim 12V$	—	0.10	—	%/V

+5.2V Version

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

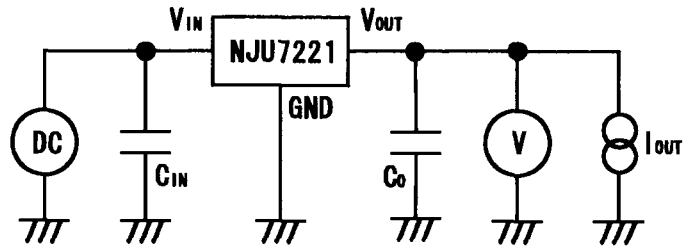
PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$V_{IN}=7.2V, I_{OUT}=30mA$	5.096	5.200	5.304	V
Dropout Voltage	ΔV_{IO}	$I_{OUT}=40mA$	—	0.3	0.6	V
Input Voltage	V_{IN}		—	—	12	V
Operating Current	I_{DD1}	$V_{IN}=7.2V, \text{No Load}$	—	19	30	μA
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$V_{IN}=7.2V, I_{OUT}=1\sim 40mA$	—	35	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{IN}=6.2\sim 12V$	—	0.10	—	%/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_{DD1}	$V_{IN}=7.5V, \text{No Load}$	—	19	30	μA
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$V_{IN}=7.5V, I_{OUT}=1\sim 40mA$	—	35	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{IN}=6.5\sim 12V$	—	0.10	—	%/V

■ MEASUREMENT CIRCUIT



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