

## High Precision C-MOS 3-Terminal Voltage Regulator

### GENERAL DESCRIPTION

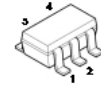
The NJU7231 is high precision output voltage 3-terminal positive voltage regulator.

The NJU7231 is suitable for battery operated items and battery back-up systems, because of low operating current and low dropout voltage.

### PACKAGE OUTLINE



NJU7231U



NJU7231F

### FEATURES

- High Precision Output       $V_o \pm 2\%$
- Low Operating Current      10 $\mu$ A typ.
- Low Dropout Voltage       $\Delta V_{I-O} < 0.6V$  @  $I_o = 40mA$
- Wide Operating Voltage Range
- Package Outline              SOT-89/SOT-23(MTP-5)
- Bipolar Technology

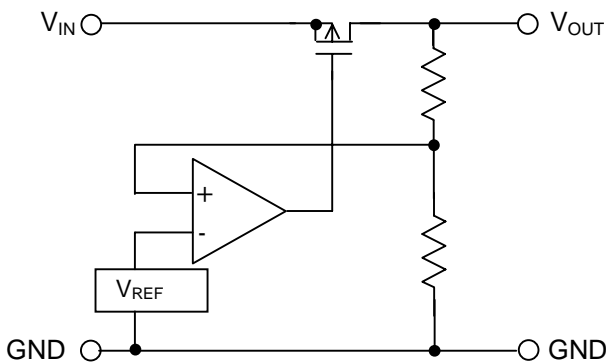
### OUTPUT VOLTAGE RANK LIST

Output Voltage	SOT-89	SOT-23
+1.2V	NJU7231U12	NJU7231F12
+1.5V	NJU7231U15	NJU7231F15
+1.8V	NJU7231U18	NJU7231F18
+2.5V	NJU7231U25	NJU7231F25
+2.6V	NJU7231U26	NJU7231F26
+2.7V	NJU7231U27	NJU7231F27
+2.8V	NJU7231U28	NJU7231F28
+2.9V	NJU7231U29	NJU7231F29
+3.0V	NJU7231U30	NJU7231F30
+3.3V	NJU7231U33	NJU7231F33
+5.0V	NJU7231U50	NJU7231F50
+5.2V	NJU7231U52	NJU7231F52

### TERMINAL DESCRIPTION

No.	Description	
	SOT-89	SOT-23
1	GND	GND
2	INPUT	INPUT
3	OUTPUT	OUTPUT
4	-	NC
5	-	NC

### EQUIVALENT CIRCUIT



**□ ABSOLUTE MAXIMUM RATING**

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V <sub>IN</sub>	18	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>	300 (SOT-89) 200 (MTP-5)	mW
Operating Temperature	Topr	- 40 ~ + 85	°C
Storage Temperature	Tstg	- 55 ~ +125	°C

**□ ELECTRICAL CHARACTERISTICS**

+1.2V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =3.0V, I <sub>OUT</sub> =5mA	1.176	1.200	1.224	V	1
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>OUT</sub> =0.5mA	-	0.02	0.3	V	1
Input Voltage	V <sub>IN</sub>		-	-	15	V	2
Operating Current	I <sub>Q</sub>	V <sub>IN</sub> =3.0V	-	10	20	uA	2
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	3
Line Regulation	ΔV <sub>OUT</sub> /(ΔV <sub>IN</sub> ·V <sub>OUT</sub> )	V <sub>IN</sub> =1.5~12.0V	-	0.1	-	%/V	3

+1.5V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =3.0V, I <sub>OUT</sub> =5mA	1.470	1.500	1.530	V	1
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>OUT</sub> =0.5mA	-	0.02	0.30	V	1
Input Voltage	V <sub>IN</sub>		-	-	15	V	2
Operating Current	I <sub>Q</sub>	V <sub>IN</sub> =3.0V	-	10	20	uA	2
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	3
Line Regulation	ΔV <sub>OUT</sub> /(ΔV <sub>IN</sub> ·V <sub>OUT</sub> )	V <sub>IN</sub> =1.5~12.0V	-	0.1	-	%/V	3

+1.8V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =3.0V, I <sub>OUT</sub> =5mA	1.764	1.800	1.836	V	1
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>OUT</sub> =0.5mA	-	0.02	0.30	V	1
Input Voltage	V <sub>IN</sub>		-	-	15	V	2
Operating Current	I <sub>Q</sub>	V <sub>IN</sub> =3.0V	-	10	20	uA	2
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	3
Line Regulation	ΔV <sub>OUT</sub> /(ΔV <sub>IN</sub> ·V <sub>OUT</sub> )	V <sub>IN</sub> =2.1~12.0V	-	0.1	-	%/V	3

**+2.5V Version**

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =4.5V, I <sub>OUT</sub> =10mA	2.45	2.50	2.55	V	1
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>OUT</sub> =20mA	-	0.2	0.6	V	1
Input Voltage	V <sub>IN</sub>		-	-	15	V	2
Operating Current	I <sub>Q</sub>	V <sub>IN</sub> =4.5V	-	10	20	μA	2
Load Regulation	ΔV <sub>OUT</sub> /ΔI <sub>OUT</sub>	V <sub>IN</sub> =4.5V, I <sub>OUT</sub> =1~20mA	-	15	180	mV	3
Line Regulation	ΔV <sub>OUT</sub> /(ΔV <sub>IN</sub> ·V <sub>OUT</sub> )	V <sub>IN</sub> =3.5~12.0V	-	0.1	-	%/V	3

**+2.6V Version**

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =4.6V, I <sub>OUT</sub> =10mA	2.548	2.600	2.652	V	1
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>OUT</sub> =20mA	-	0.2	0.6	V	1
Input Voltage	V <sub>IN</sub>		-	-	15	V	2
Operating Current	I <sub>Q</sub>	V <sub>IN</sub> =4.6V	-	10	20	μA	2
Load Regulation	ΔV <sub>OUT</sub> /ΔI <sub>OUT</sub>	V <sub>IN</sub> =4.6V, I <sub>OUT</sub> =1~20mA	-	15	180	mV	3
Line Regulation	ΔV <sub>OUT</sub> /(ΔV <sub>IN</sub> ·V <sub>OUT</sub> )	V <sub>IN</sub> =3.6~12.0V	-	0.1	-	%/V	3

**+2.7V Version**

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =4.7V, I <sub>OUT</sub> =10mA	2.646	2.70	2.754	V	1
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>OUT</sub> =20mA	-	0.2	0.6	V	1
Input Voltage	V <sub>IN</sub>		-	-	15	V	2
Operating Current	I <sub>Q</sub>	V <sub>IN</sub> =4.7V	-	10	20	μA	2
Load Regulation	ΔV <sub>OUT</sub> /ΔI <sub>OUT</sub>	V <sub>IN</sub> =4.7V, I <sub>OUT</sub> =1~20mA	-	15	180	mV	3
Line Regulation	ΔV <sub>OUT</sub> /(ΔV <sub>IN</sub> ·V <sub>OUT</sub> )	V <sub>IN</sub> =3.7~12.0V	-	0.1	-	%/V	3

**+2.8V Version**

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =4.8V, I <sub>OUT</sub> =10mA	2.744	2.800	2.856	V	1
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>OUT</sub> =20mA	-	0.2	0.6	V	1
Input Voltage	V <sub>IN</sub>		-	-	15	V	2
Operating Current	I <sub>Q</sub>	V <sub>IN</sub> =4.8V	-	10	20	μA	2
Load Regulation	ΔV <sub>OUT</sub> /ΔI <sub>OUT</sub>	V <sub>IN</sub> =4.8V, I <sub>OUT</sub> =1~20mA	-	15	180	mV	3
Line Regulation	ΔV <sub>OUT</sub> /(ΔV <sub>IN</sub> ·V <sub>OUT</sub> )	V <sub>IN</sub> =3.8~12.0V	-	0.1	-	%/V	3

**+2.9V Version**

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =4.9V, I <sub>OUT</sub> =10mA	2.842	2.900	2.958	V	1
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>OUT</sub> =20mA	-	0.2	0.6	V	1
Input Voltage	V <sub>IN</sub>		-	-	15	V	2
Operating Current	I <sub>Q</sub>	V <sub>IN</sub> =4.9V	-	10	20	μA	2
Load Regulation	ΔV <sub>OUT</sub> /ΔI <sub>OUT</sub>	V <sub>IN</sub> =4.9V, I <sub>OUT</sub> =1~20mA	-	15	180	mV	3
Line Regulation	ΔV <sub>OUT</sub> /(ΔV <sub>IN</sub> ·V <sub>OUT</sub> )	V <sub>IN</sub> =3.9~12.0V	-	0.1	-	%/V	3

+3.0V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	$V_{OUT}$	$V_{IN}=5.0V, I_{OUT}=10mA$	2.94	3.00	3.06	V	1
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=20mA$	-	0.2	0.6	V	1
Input Voltage	$V_{IN}$		-	-	15	V	2
Operating Current	$I_Q$	$V_{IN}=5.0V$	-	10	20	$\mu A$	2
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	$V_{IN}=5.0V, I_{OUT}=1\sim 20mA$	-	15	180	mV	3
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	$V_{IN}=4.0\sim 12.0V$	-	0.1	-	%/V	3

+3.3V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	$V_{OUT}$	$V_{IN}=5.3V, I_{OUT}=10mA$	3.234	3.300	3.366	V	1
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=20mA$	-	0.2	0.6	V	1
Input Voltage	$V_{IN}$		-	-	15	V	2
Operating Current	$I_Q$	$V_{IN}=5.3V$	-	10	20	$\mu A$	2
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	$V_{IN}=5.3V, I_{OUT}=1\sim 20mA$	-	15	180	mV	3
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	$V_{IN}=4.3\sim 12.0V$	-	0.1	-	%/V	3

+5.0V Version

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

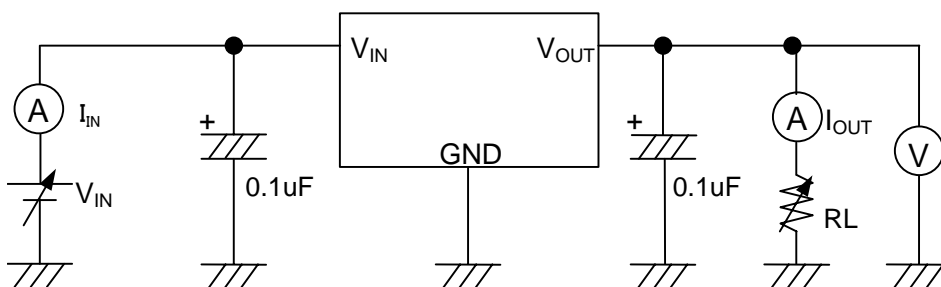
PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	$V_{OUT}$	$V_{IN}=7.0V, I_{OUT}=30mA$	4.90	5.00	5.10	V	1
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=40mA$	-	0.3	0.6	V	1
Input Voltage	$V_{IN}$		-	-	15	V	2
Operating Current	$I_Q$	$V_{IN}=7.0V$	-	10	20	$\mu A$	2
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	$V_{IN}=7.0V, I_{OUT}=1\sim 40mA$	-	35	120	mV	3
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	$V_{IN}=6.0\sim 12.0V$	-	0.1	-	%/V	3

+5.0V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	$V_{OUT}$	$V_{IN}=7.2V, I_{OUT}=30mA$	5.096	5.200	5.304	V	1
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=40mA$	-	0.3	0.6	V	1
Input Voltage	$V_{IN}$		-	-	15	V	2
Operating Current	$I_Q$	$V_{IN}=7.2V$	-	10	20	$\mu A$	2
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	$V_{IN}=7.2V, I_{OUT}=1\sim 40mA$	-	35	120	mV	3
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	$V_{IN}=6.2\sim 12.0V$	-	0.1	-	%/V	3

□ MEASUREMENT CIRCUIT



**[CAUTION]**  
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