SUPER LOW OPERATING CURRENT C-MOS 3-TERMINAL POSITIVE VOLTAGE REGULATOR

■ GENERAL DESCRIPTION

The NJU7200 series is a super low operating current C-MOS 3-terminal positive voltage regulator contains internal accurate voltage reference, 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 NJU7200 series is suitable for battery operated items and battery back-up systems because of low operating current and low dropout voltage.

■ PACKAGE OUTLINE





NJU7200L

NJU7200U

■ FEATURES

Super Low Operating Current

Wide Range of Output Voltage Setting

Low Dropout Voltage

● Small Temperature Coefficient

Package Outline C-MOS Technology

T0-92/S0T-89

Vou = 1.0~8.0V

0. 9uA typ @Vouτ=1. 0V

 $\Delta V_{+o} < 0.18V @V_{out} = 1.0V, I_o = 0.5mA$

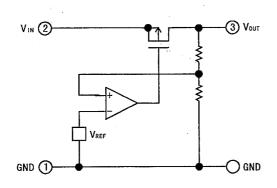
OUTPUT VOLTAGE LINE-UP

Output Voltage	T0-92 Type	SOT-89 Type	Output Voltage	T0-92 Type	SOT-89 Type
+1. 0V	NJU7200L10	NJU7200U10	+3. 2V	NJU7200L32	NJU7200U32
+1. 1V	NJU7200L11	NJU7200U11	+3. 3V	NJU7200L33	NJU7200U33
+1. 2V	NJU7200L12	NJU7200U12	+3. 5V	NJU7200L35	NJU7200U35
+1. 5V	NJU7200L15	NJU7200U15	+4. 0V	NJU7200L40	NJU7200U40
+2. 1V	NJU7200L21*	NJU7200U21*	+4. 5V	NJU7200L45*	NJU7200U45*
+2. 5V	NJU7200L25	NJU7200U25	+4. 8V	NJU7200L48	NJU7200U48
+2. 6V	NJU7200L26	NJU7200U26	+5. 0V	NJU7200L50	NJU7200U50
+2. 7V	NJU7200L27	NJU7200U27	+5. 2V	NJU7200L52*	NJU7200U52*
+2. 9V	NJU7200L29	NJU7200U29	+5. 5V	NJU7200L55	NJU7200U55
+3. 0V	NJU7200L30	NJU7200U30	+8. 0V	NJU7200L80*	NJU7200U80*

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

Note2) * : Planning products.

■ TERMINAL DESCRIPTION



■ TERMINAL DESCRIPTION

No.	Description
1	GND
· 2.	Input
3	Output

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

			14 20 07
PRAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	VIN	14	٧ :
Output Voltage	Vout	GND-0.3 ~ Vin+0.3	٧
Output Current	lout	100	mA
Power Dissipation	P₀	500 (T0-92) 300 (S0T-89)	mW
Operating Temperature	Topr	- 25 ~ + 75	သိ
Storage Temperature	Tstg	- 40 ∼ +125	ပ္

■ ELECTRICAL CHARACTERISTICS

+1.0V Version

 $(C_{LN}=C_0=0.1\mu F. Ta=25^{\circ}C)$

TI. UT TO STUIT				(O) N-V	<u>, 10 −0. Tuli, </u>	14-23 C/
PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Output Voltage	Vout	V: N=3. OV, lout=5mA	0. 95	1.00	1. 05	V
Dropout Voltage	ΔV10	Ιουτ=0.5mA	-	0.06	0.18	٧
Input Voltage	Vin		_	_	12	٧
Operating Current	la .	V _{1 N} =3. 0V	_	0. 90	2. 40	uA
Load Regulation	<u>ΔVουτ</u> ΔΙουτ	V: N=3. OV, IOUT=1~15mA	_	10	120	mV
Line Regulation	Δ V ₀ υ τ Δ V ₁ ν · V ₀ υ τ	V _{1 N} =1.5~12V	_	0. 10	_	%/V

+1.1V Version

(C: N=Co=0. 1uF, Ta=25°C)

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Output Voltage	Vout	V:N=3.0V, lou⊤=5mA	1. 045	1. 100	1. 155	٧
Dropout Voltage	ΔΫιο	1 ou τ=0. 5mA] -	0.06	0. 18	V
Input Voltage	VIN		-	_	12	٧
Operating Current	l a	V _{1 N} =3. 0V	-	0. 90	2. 40	uA
Load Regulation	<u> </u>	V _{1 N} =3. 0V, l _{0UT} =1~15mA	_	10	120	mV
Line Regulation	<u>Δ</u> V _{0 U T} ΔV: N·V _{0 U T}	V; n=1.5~12V	_	0. 10	-	%/V

+1.2V Version

(C: N=Co=0. 1uF, Ta=25°C)

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Output Voltage	Vout	V: N=3. OV, IOUT=5mA	1. 14	1. 20	1. 26	V
Dropout Voltage	ΔV10	Ιουτ≕Ο. 5mA		0.06	0.18	٧
Input Voltage	VIN		—	_	12	٧
Operating Current	· la	V: N=3. 0V	_	0. 90	2. 40	uA
Load Regulation	<u>ΔVουτ</u> ΔΙουτ	V: N=3. OV, 100 T=1~15mA	_	10	120	mV
Line Regulation	$\frac{\Delta V_{\text{out}}}{\Delta V_{\text{in}} \cdot V_{\text{out}}}$	V _{1N} =1.5~12V	_	0. 10	_	%/V

+1.5V Version	1.5V Version					Ta=25°C)
PARAMETER	SYMBOL.	CONDITION	MIN	TYP	MAX	単 位
Output Voltage	Vout	V:N=3. OV, 1 OU T=5mA	1. 425	1. 500	1. 575	٧
Dropout Voltage	ΔVιο	1ουτ=0. 5mA		0.04	0. 12	V
Input Voltage	VIN				12	٧
Operating Current	la	V _{1N} =3. 0V		0. 90	2. 40	uA
Load Regulation	<u>Δ</u> V _{ουτ} <u>Δ</u> Ι _{ουτ}	V _{1N} =3. 0V, Ιουτ=1~15mA	_	_	120	mV
Line Regulation	AVout AV.N.Vout	V _{1N} =1.8~12V	_	0. 10		%/V

+2.1V Version	(C:N=C	o=0. 1uF,	Ta=25°C)			
PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	単位
Output Voltage	Vout	V _{1N} =4. 1V, I _{OUT} =5mA	1. 995	2. 100	2. 205	٧
Dropout Voltage	ΔVιο	I оп т=0. 5mA	_	0. 04	0. 12	٧
Input Voltage	VIN		· —	_	12	٧
Operating Current	la	V _{IN} =4. 1V		0. 90	2. 40	uA
Load Regulation	<u>Δ</u> V _{ουτ} ΔΙουτ	V _{1N} =4. 1V, l _{ουτ} =1~20mA	_	_	120	mV
Line Regulation	<u>Δ</u> V ₀ υτ <u>Δ</u> V ₁ N · V ₀ υτ	V _{1N} =2.5~12V		0. 10	_	%/V

+2.5V Version				(C _{1N} =C	o=0. 1uF,	Ta=25°C)
PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	単位
Output Voltage	Vout	V _{IN} =4. 5V, Іоит=10mA	2. 375	2. 500	2. 625	٧
Dropout Voltage	ΔV10	lour=10mA		0. 45	1. 20	٧
Input Voltage	VIN		_	_	12	٧ .
Operating Current	. Ia	V _{1N} =4.5V	_	1. 0	2. 4	uA
Load Regulation	<u>ΔVουτ</u> <u>ΔΙουτ</u>	V _{1N} =4. 5V, Ιουτ=1~20mA	-		120	mV
Line Regulation	<u>ΔV_{ουτ}</u> ΔV _{ιν} ·V _{ουτ}	V _{IN} =3.5~12V	_	0. 10	_	%/V

+2. 6V Version (C _{IN} =C _O =0. 1uF, Ta=2						
PARAMETER	SYMBOL.	CONDITION	MIN	TYP	MAX	単位
Output Voltage	Vout	VIN=4. 6V, IOUT=10mA	2. 47	2. 60	2. 73	٧
Dropout Voltage	ΔVιο	lou⊤=10mA	_	0. 45	1. 20	٧
Input Voltage	Vin		_	. —	12	٧
Operating Current	la .	V _{IN} =4.6V		1. 0	2. 4	uA
Load Regulation	<u> </u>	V _{IN} =4. 6V, Ιουτ=1~20mA	_	_	120	mV
Line Regulation	<u>Δ</u> V ₀ υτ <u>Δ</u> V ₁ ν·V ₀ υτ	V _{IN} =3.6~12V		0. 10	-	%/V

+2.7V Version	(Cin=C	o=0. 1uF,	Ta=25°C)			
PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	単位
Output Voltage	V _{ou t}	V _{IN} =4. 7V, I _{OUT} =10mA	2. 565	2. 700	2. 835	٧
Dropout Voltage	ΔVιο	louπ=10mA 🔍		0. 4	1.0	٧
Input Voltage	VIN.		-		12	٧
Operating Current	اه	V _{IN} =4.7V	-	1.0	2. 4	uA
Load Regulation	<u>ΔVουτ</u> <u>ΔΙουτ</u>	V _{1 N} =4. 7V, l _{OUT} =1~20mA	–	_	120	mV
Line Regulation	AVout AVIN·Vout	V _{1N} =3.7~12V	_	0. 10	_	%/V

+2.9V Version	2.9V Version					
PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	単位
Output Voltage	Vout	V _{IN} =4.9V, I _{OUT} =10mA	2. 755	2. 900	3, 045	٧
Dropout Voltage	ΔV_{10}	lour=10mA	_	0. 4	1.0	٧
Input Voltage	VIN			_	12	٧
Operating Current	la	V _{1N} =4.9V		1.0	2. 4	uA
Load Regulation	<u>ΔVουτ</u> <u>ΔΙουτ</u>	V _{IN} =4. 9V, Ιουτ=1~20mA	_	-	120	Vm
Line Regulation	ΔVouτ	V _{1N} =3.9~12V	_	0. 10	-	%/V

AVIN-VOUT

(C_{1N}=C₀=0. 1uF, Ta=25°C) +3.0V Version MIN TYP MAX 単 位 SYMBOL. CONDITION PARAMETER 3.00 3. 15 VIN=5. OV, 100 T=10mA 2.85 Vout Output Voltage 0.36 0.85 ٧ ΔVιο lour=10mA Dropout Voltage ٧ 12 Vin Input Voltage 1.0 2. 4 uA 10 V 1 N=5. OV Operating Current Δνουτ VIN=5. OV, 1007=1~20mA 15 120 mV Load Regulation Alour ΔVouτ %/V $V_{1N}=4.0 \sim 12V$ 0.10 Line Regulation $\Delta V_{IN} \cdot V_{OUT}$

 $(C_{1N}=C_{0}=0.1uF, Ta=25^{\circ}C)$ +3.2V Version MAX 単 位 SYMBOL CONDITION MIN TYP PARAMETER VIN=5. 2V, Iou = 10mA 3.04 3, 20 3. 36 Output Voltage Vout 0. 80 Dropout Voltage ΔV_{10} lour=10mA 0.33 12 Input Voltage VIN 1.1 2.4 uA V: N=5. 2V ١٩ Operating Current ΔVour 120 mV V_{IN}=5. 2V, lou T=1~20mA Load Regulation Alout ΔVour 0.10 %/V $V_{1N}=4.2\sim12V$ Line Regulation **△V:n·V**out

 $(C_{1N}=C_{0}=0.1 \text{uF, Ta}=25^{\circ}\text{C})$ +3.3V Version PARAMETER SYMBOL CONDITION MIN MAX 位 3, 300 3.465 3. 135 Vout VIN=5. 3V, IOUT=10mA Output Voltage 0, 80 0.33 ٧ ΔV10. Iou T=10mA Dropout Voltage 12 VIN. Input Voltage 1. 1 2. 4 VIN=5.3V uA Operating Current la ΔV_{out} VIN=5. 3V. lour=1~20mA 120 mV Load Regulation ΔI_{OUT} ΔVουτ %/V V_{1N}=4.3~12V 0.10 Line Regulation AVIN Vout

`, (C₁N=Co=0. 1uF, Ta=25°C) +3.5V Version MIN 単位 PARAMETER SYMBOL CONDITION TYP MAX 3. 325 3.500 3.675 Output Voltage Vout VIN=5.5V, IOUT=10mA 0.30 0.70 ΔV_{10} lout=10mA Dropout Voltage 12 ٧ Input Voltage VIN V I N=5. 5V la 1.1 2.4 uА Operating Current Δνουτ 120 V_{IN}=5.5V, I_{OUT}=1~20mA mV Load Regulation $\Delta 1$ o σ ΔV_{out} 0.10 %/V VIN=4.5~12V Line Regulation AVIN-Vout

+4.0V Version					$(C_{1N}=C_0=0.1 \mu F, Ta=25 ^{\circ}C)$			
PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	単位		
Output Voltage	Vout	V _{IN} =6. OV, I _{OUT} =30mA	3.80	4.00	4. 20	٧		
Dropout Voltage	ΔV_{10}	Ιουτ=10mA	_	0. 26	0.60	٧		
Input Voltage	VIN			_	12	٧		
Operating Current	la .	V _{1N} =6. OV	_	1. 1	2. 4	uA		
Load Regulation	<u> Δ</u> Vουτ <u>Δ</u> Ιουτ	V _{1N} =6. OV, Ι _{Ουτ} =1~40mA	_	_	120	mV		
Line Regulation	$\frac{\Delta V_{\text{OUT}}}{\Delta V_{\text{IN}} \cdot V_{\text{OUT}}}$	V _{1N} =5.0~12V	-	0. 10		%/V		

(C_{1N}=C₀=0. 1uF, Ta=25°C) +4.5V Version PARAMETER SYMBOL CONDITION MIN TYP MAX 単 位 4.500 4. 725 VIN=6.5V. IOUT=30mA 4. 275 Output Voltage Vout ٧ 0. 22 0.50 ΔV_{10} lour=10mA Dropout Voltage 12 V. · Input Voltage VIN V_{1N}=6.5V 1.2 2.4 uA Operating Current ١۵ ΔV_{out} 120 mV V_{IN}=6.5V, Iou T=1~40mA Load Regulation Alout ΔVouτ V . N=5. 5~12V 0.10 %/V Line Regulation AVIN. Vout

 $(C_{1N}=C_{0}=0.1 \text{uF}, Ta=25^{\circ}C)$ +4.8V Version SYMBOL CONDITION MIN TYP MAX PARAMETER 4. 56 4.80 5. 04 V: N=6. 8V, IOUT=30mA Output Voltage Vout ΔV_{10} Iour=10mA 0.22 0.50 V Dropout Voltage 12 ٧ Input Voltage VIN V1 N=6. 8V 1.2 2.4 uΑ a Operating Current Δνουτ 120 Load Regulation V_{IN}=6.8V, Iou T=1~40mA mV Δlour ΔVουτ %/V 0.10 VIN=5.8~12V Line Regulation AVIN. VOUT

+5.0V Version (C_{1N}=C₀=0. 1uF, Ta=25°C) SYMBOL CONDITION MIN TYP MAX 位 PARAMETER VIN=7. OV, 1001=30mA 5. 00 Output Voltage Vout 4.75 5.25 Iou T=10mA 0.22 0.45 Dropout Voltage ΔV_{10} 12 VIN . Input Voltage Operating Current V: N=7. OV 1. 2 2. 4 uΑ l۵ ΔV_{out} $V_{1N}=7$, OV, $I_{OUT}=1 \sim 40 \text{mA}$ 35 120 mV Load Regulation ΔΙουτ Δνουτ V_{1N}=6, 0~12V 0.10 %/V Line Regulation AVIN-Vout

(C1N=C0=0. 1uF, Ta=25°C) +5.2V Version PARAMETER SYMBOL CONDITION MIN TYP MAX 単 位 4. 94 5. 20 5. 46 Output Voltage Vour VIN=7. 2V, 100 T=30mA 0.20 0.45 ٧ ΔV_{10} Iou T=10mA Dropout Voltage Vin 12 Input Voltage 1.3 V: N=7. 2V 2.4 Operating Current la uΑ **△V**ou т $V_{1N}=7.2V, I_{OUT}=1\sim 40mA$ 120 mV Load Regulation ΔΙουτ ΔVоυт VIN=6. 2~12V 0.10 %/V Line Regulation AVIN-Vout

Line Regulation

+5.5V Version					$(C_{1N}=C_{0}=0.1 \text{uF}, Ta=25 °C)$			
PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	単位		
Output Voltage	Vout	V _{IN} =7.5V, lout=30mA	5. 225	5. 500	5. 775	٧		
Dropout Voltage	ΔV10	louτ=10mA	_	0. 20	0.40	٧		
Input Voltage	VIN			1	12	٧		
Operating Current	la	V _{1N} =7. 5V	_	1. 3	2. 4	uA		
Load Regulation	<u>ΔVουτ</u> <u>ΔΙουτ</u>	V _{IN} =7.5V, I _{OUT} =1~40mA	_	_	120	mV		
line Perulation	ΔVουτ	V. v=6. 5~12V		0.10	_	%/V		

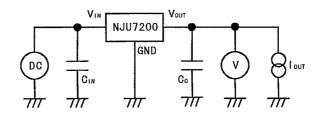
%/V

V: N=6. 5~12V

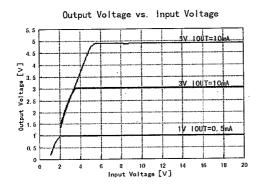
AVIN·Vout

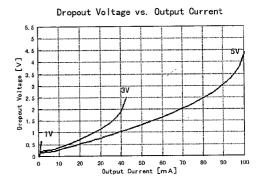
(C_{1 N}=C₀=0. 1uF, Ta=25°C) +8.0V Version SYMBOL CONDITION MIN TYP MAX 位 PARAMETER V: N=10. OV, Iou T=30mA 7. 60 8.00 8.40 ٧ Output Voltage Vout 0.40 Dropout Voltage ΔV_{10} Iour=10mA 0.20 ٧ 12 ٧.٠ Input Voltage VIN V: N=10. OV 2. 0 4.0 uA Operating Current ١۵ ΔVουτ V_{IN}=10. OV, Ιουτ=1~40mA 120 mV Load Regulation ΔΙουτ $\Delta V_{
m out}$ %/V V_{1N}=9.0~12V 0.10 Line Regulation ΔV_{IN}·V_{OUT}

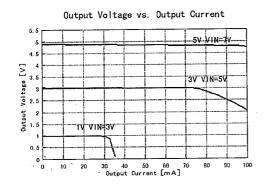
MEASUREMENT CIRCUIT



TYPICAL CHARACTERISTICS







NJU7200 Series

MEMO

[CAUTION]
The specifications on this databook are only given for information , without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.