

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 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 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 0.9uA typ @V<sub>OUT</sub>=1.0V
- Wide Range of Output Voltage Setting V<sub>OUT</sub>=1.0~8.0V
- Low Dropout Voltage ΔV<sub>IO</sub><0.18V @V<sub>OUT</sub>=1.0V, I<sub>O</sub>=0.5mA
- Small Temperature Coefficient
- Package Outline TO-92/SOT-89
- C-MOS Technology

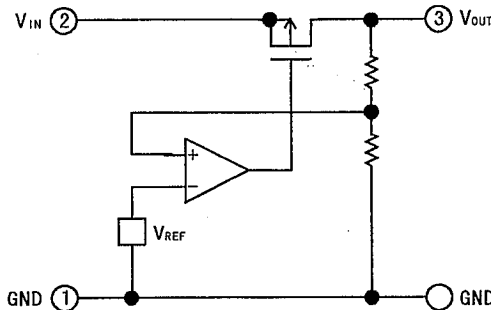
■ OUTPUT VOLTAGE LINE-UP

Output Voltage	TO-92 Type	SOT-89 Type	Output Voltage	TO-92 Type	SOT-89 Type
+1.0V	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*

Note1) 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)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V <sub>IN</sub>	14	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>	500 (TO-92) 300 (SOT-89)	mW
Operating Temperature	Topr	- 25 ~ + 75	°C
Storage Temperature	Tstg	- 40 ~ +125	°C

## ■ ELECTRICAL CHARACTERISTICS

+1.0V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =3.0V, I <sub>OUT</sub> =5mA	0.95	1.00	1.05	V
Dropout Voltage	ΔV <sub>I/O</sub>	I <sub>OUT</sub> =0.5mA	—	0.06	0.18	V
Input Voltage	V <sub>IN</sub>		—	—	12	V
Operating Current	I <sub>O</sub>	V <sub>IN</sub> =3.0V	—	0.90	2.40	μA
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	V <sub>IN</sub> =3.0V, I <sub>OUT</sub> =1~15mA	—	10	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V <sub>IN</sub> =1.5~12V	—	0.10	—	%/V

+1.1V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =3.0V, I <sub>OUT</sub> =5mA	1.045	1.100	1.155	V
Dropout Voltage	ΔV <sub>I/O</sub>	I <sub>OUT</sub> =0.5mA	—	0.06	0.18	V
Input Voltage	V <sub>IN</sub>		—	—	12	V
Operating Current	I <sub>O</sub>	V <sub>IN</sub> =3.0V	—	0.90	2.40	μA
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	V <sub>IN</sub> =3.0V, I <sub>OUT</sub> =1~15mA	—	10	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V <sub>IN</sub> =1.5~12V	—	0.10	—	%/V

+1.2V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =3.0V, I <sub>OUT</sub> =5mA	1.14	1.20	1.26	V
Dropout Voltage	ΔV <sub>I/O</sub>	I <sub>OUT</sub> =0.5mA	—	0.06	0.18	V
Input Voltage	V <sub>IN</sub>		—	—	12	V
Operating Current	I <sub>O</sub>	V <sub>IN</sub> =3.0V	—	0.90	2.40	μA
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	V <sub>IN</sub> =3.0V, I <sub>OUT</sub> =1~15mA	—	10	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V <sub>IN</sub> =1.5~12V	—	0.10	—	%/V

### +1.5V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	單位
Output Voltage	$V_{OUT}$	$V_{IN}=3.0V, I_{OUT}=5mA$	1.425	1.500	1.575	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=0.5mA$	—	0.04	0.12	V
Input Voltage	$V_{IN}$		—	—	12	V
Operating Current	$I_Q$	$V_{IN}=3.0V$	—	0.90	2.40	$\mu A$
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$V_{IN}=3.0V, I_{OUT}=1\sim 15mA$	—	—	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{IN}=1.8\sim 12V$	—	0.10	—	%/V

### +2.1V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	單位
Output Voltage	$V_{OUT}$	$V_{IN}=4.1V, I_{OUT}=5mA$	1.995	2.100	2.205	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=0.5mA$	—	0.04	0.12	V
Input Voltage	$V_{IN}$		—	—	12	V
Operating Current	$I_Q$	$V_{IN}=4.1V$	—	0.90	2.40	$\mu A$
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$V_{IN}=4.1V, I_{OUT}=1\sim 20mA$	—	—	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{IN}=2.5\sim 12V$	—	0.10	—	%/V

### +2.5V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	單位
Output Voltage	$V_{OUT}$	$V_{IN}=4.5V, I_{OUT}=10mA$	2.375	2.500	2.625	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=10mA$	—	0.45	1.20	V
Input Voltage	$V_{IN}$		—	—	12	V
Operating Current	$I_Q$	$V_{IN}=4.5V$	—	1.0	2.4	$\mu A$
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$V_{IN}=4.5V, I_{OUT}=1\sim 20mA$	—	—	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{IN}=3.5\sim 12V$	—	0.10	—	%/V

### +2.6V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	單位
Output Voltage	$V_{OUT}$	$V_{IN}=4.6V, I_{OUT}=10mA$	2.47	2.60	2.73	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=10mA$	—	0.45	1.20	V
Input Voltage	$V_{IN}$		—	—	12	V
Operating Current	$I_Q$	$V_{IN}=4.6V$	—	1.0	2.4	$\mu A$
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$V_{IN}=4.6V, I_{OUT}=1\sim 20mA$	—	—	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{IN}=3.6\sim 12V$	—	0.10	—	%/V

### +2.7V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	單位
Output Voltage	$V_{OUT}$	$V_{IN}=4.7V, I_{OUT}=10mA$	2.565	2.700	2.835	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=10mA$	—	0.4	1.0	V
Input Voltage	$V_{IN}$		—	—	12	V
Operating Current	$I_Q$	$V_{IN}=4.7V$	—	1.0	2.4	$\mu A$
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$V_{IN}=4.7V, I_{OUT}=1\sim 20mA$	—	—	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{IN}=3.7\sim 12V$	—	0.10	—	%/V



# NJU7200 Series

+2.9V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	單位
Output Voltage	$V_{OUT}$	$V_{IN}=4.9V, I_{OUT}=10mA$	2.755	2.900	3.045	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=10mA$	—	0.4	1.0	V
Input Voltage	$V_{IN}$		—	—	12	V
Operating Current	$I_Q$	$V_{IN}=4.9V$	—	1.0	2.4	$\mu A$
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$V_{IN}=4.9V, I_{OUT}=1\sim 20mA$	—	—	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{IN}=3.9\sim 12V$	—	0.10	—	%/V

+3.0V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	單位
Output Voltage	$V_{OUT}$	$V_{IN}=5.0V, I_{OUT}=10mA$	2.85	3.00	3.15	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=10mA$	—	0.36	0.85	V
Input Voltage	$V_{IN}$		—	—	12	V
Operating Current	$I_Q$	$V_{IN}=5.0V$	—	1.0	2.4	$\mu A$
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$V_{IN}=5.0V, I_{OUT}=1\sim 20mA$	—	15	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{IN}=4.0\sim 12V$	—	0.10	—	%/V

+3.2V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	單位
Output Voltage	$V_{OUT}$	$V_{IN}=5.2V, I_{OUT}=10mA$	3.04	3.20	3.36	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=10mA$	—	0.33	0.80	V
Input Voltage	$V_{IN}$		—	—	12	V
Operating Current	$I_Q$	$V_{IN}=5.2V$	—	1.1	2.4	$\mu A$
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$V_{IN}=5.2V, I_{OUT}=1\sim 20mA$	—	—	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{IN}=4.2\sim 12V$	—	0.10	—	%/V

+3.3V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	單位
Output Voltage	$V_{OUT}$	$V_{IN}=5.3V, I_{OUT}=10mA$	3.135	3.300	3.465	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=10mA$	—	0.33	0.80	V
Input Voltage	$V_{IN}$		—	—	12	V
Operating Current	$I_Q$	$V_{IN}=5.3V$	—	1.1	2.4	$\mu A$
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$V_{IN}=5.3V, I_{OUT}=1\sim 20mA$	—	—	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{IN}=4.3\sim 12V$	—	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	單位
Output Voltage	$V_{OUT}$	$V_{IN}=5.5V, I_{OUT}=10mA$	3.325	3.500	3.675	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=10mA$	—	0.30	0.70	V
Input Voltage	$V_{IN}$		—	—	12	V
Operating Current	$I_Q$	$V_{IN}=5.5V$	—	1.1	2.4	$\mu A$
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$V_{IN}=5.5V, I_{OUT}=1\sim 20mA$	—	—	120	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<sub>IN</sub>=C<sub>O</sub>=0.1μF, T<sub>a</sub>=25°C)

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	單位
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =6.0V, I <sub>OUT</sub> =30mA	3.80	4.00	4.20	V
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>OUT</sub> =10mA	—	0.26	0.60	V
Input Voltage	V <sub>IN</sub>		—	—	12	V
Operating Current	I <sub>Q</sub>	V <sub>IN</sub> =6.0V	—	1.1	2.4	μA
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	V <sub>IN</sub> =6.0V, I <sub>OUT</sub> =1~40mA	—	—	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V <sub>IN</sub> =5.0~12V	—	0.10	—	%/V

### +4.5V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	單位
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =6.5V, I <sub>OUT</sub> =30mA	4.275	4.500	4.725	V
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>OUT</sub> =10mA	—	0.22	0.50	V
Input Voltage	V <sub>IN</sub>		—	—	12	V
Operating Current	I <sub>Q</sub>	V <sub>IN</sub> =6.5V	—	1.2	2.4	μA
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	V <sub>IN</sub> =6.5V, I <sub>OUT</sub> =1~40mA	—	—	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V <sub>IN</sub> =5.5~12V	—	0.10	—	%/V

### +4.8V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	單位
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =6.8V, I <sub>OUT</sub> =30mA	4.56	4.80	5.04	V
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>OUT</sub> =10mA	—	0.22	0.50	V
Input Voltage	V <sub>IN</sub>		—	—	12	V
Operating Current	I <sub>Q</sub>	V <sub>IN</sub> =6.8V	—	1.2	2.4	μA
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	V <sub>IN</sub> =6.8V, I <sub>OUT</sub> =1~40mA	—	—	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V <sub>IN</sub> =5.8~12V	—	0.10	—	%/V

### +5.0V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	單位
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =7.0V, I <sub>OUT</sub> =30mA	4.75	5.00	5.25	V
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>OUT</sub> =10mA	—	0.22	0.45	V
Input Voltage	V <sub>IN</sub>		—	—	12	V
Operating Current	I <sub>Q</sub>	V <sub>IN</sub> =7.0V	—	1.2	2.4	μA
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	V <sub>IN</sub> =7.0V, I <sub>OUT</sub> =1~40mA	—	35	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V <sub>IN</sub> =6.0~12V	—	0.10	—	%/V

### +5.2V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	單位
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =7.2V, I <sub>OUT</sub> =30mA	4.94	5.20	5.46	V
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>OUT</sub> =10mA	—	0.20	0.45	V
Input Voltage	V <sub>IN</sub>		—	—	12	V
Operating Current	I <sub>Q</sub>	V <sub>IN</sub> =7.2V	—	1.3	2.4	μA
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	V <sub>IN</sub> =7.2V, I <sub>OUT</sub> =1~40mA	—	—	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V <sub>IN</sub> =6.2~12V	—	0.10	—	%/V

6

# NJU7200 Series

+5.5V Version

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

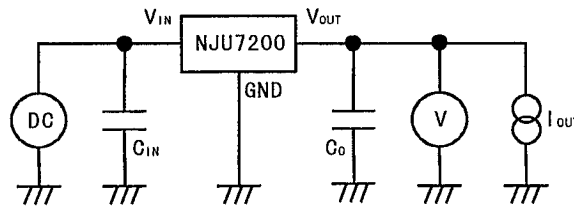
PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	單位
Output Voltage	$V_{OUT}$	$V_{IN}=7.5V, I_{OUT}=30mA$	5.225	5.500	5.775	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=10mA$	—	0.20	0.40	V
Input Voltage	$V_{IN}$		—	—	12	V
Operating Current	$I_O$	$V_{IN}=7.5V$	—	1.3	2.4	$\mu A$
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$V_{IN}=7.5V, I_{OUT}=1\sim 40mA$	—	—	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{IN}=6.5\sim 12V$	—	0.10	—	%/V

+8.0V Version

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

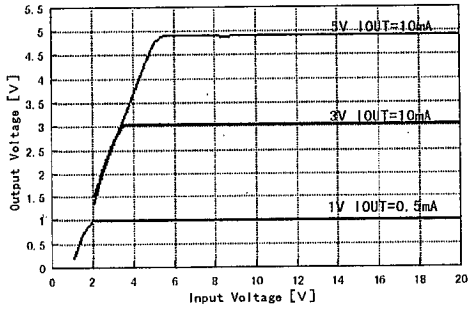
PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	單位
Output Voltage	$V_{OUT}$	$V_{IN}=10.0V, I_{OUT}=30mA$	7.60	8.00	8.40	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT}=10mA$	—	0.20	0.40	V
Input Voltage	$V_{IN}$		—	—	12	V
Operating Current	$I_O$	$V_{IN}=10.0V$	—	2.0	4.0	$\mu A$
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	$V_{IN}=10.0V, I_{OUT}=1\sim 40mA$	—	—	120	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{IN}=9.0\sim 12V$	—	0.10	—	%/V

## MEASUREMENT CIRCUIT

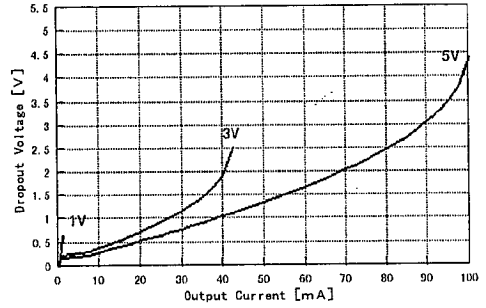


## ■ TYPICAL CHARACTERISTICS

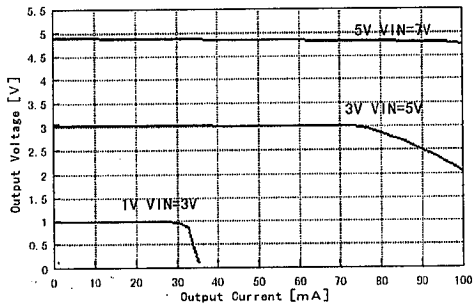
Output Voltage vs. Input Voltage



Dropout Voltage vs. Output Current



Output Voltage vs. Output Current



# NJU7200 Series

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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.