

## C-MOS 3-TERMINAL POSITIVE VOLTAGE REGULATOR

### ■ GENERAL DESCRIPTION

The **NJU7201 series** is a C-MOS 3-terminal positive voltage regulator which contains internal accurate voltage reference, error amplifier, control transistor and output voltage setting resistor.

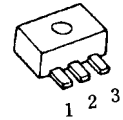
The regulation voltage is fixed by internal circuits and the following line-up of different output voltage versions are available.

The **NJU7201 series** is suitable for battery operated items and battery back-up systems because of low operating current and low dropout voltage.

### ■ PACKAGE OUTLINE



NJU7201L(TO-92)



NJU7201U(SOT-89)

### ■ FEATURES

- Low Operating Current (19 $\mu$ A typ.)
- Wide Operating Voltage Range
- Low Dropout Voltage
  - ( $\Delta V_{IO} < 0.3V$  1.2 to 1.5V output,  $I_{OUT} = 0.5mA$ )
  - ( $\Delta V_{IO} < 0.6V$  2.5 to 3.5V output,  $I_{OUT} = 20mA$ )
  - ( $\Delta V_{IO} < 0.6V$  4.0 to 5.5V output,  $I_{OUT} = 40mA$ )
- Small Temperature Coefficient of Output Voltage
- Package Outline (TO-92/SOT-89)
- C-MOS Technology

### ■ TERMINAL DESCRIPTION

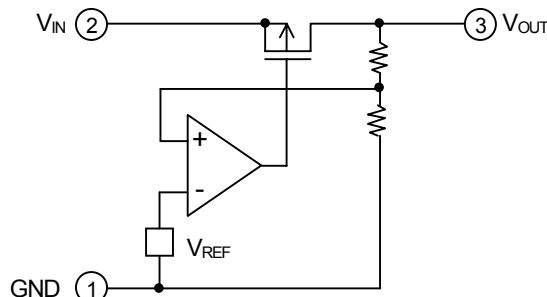
No.	Description
1	GND
2	Input
3	Output

### ■ OUTPUT VOLTAGE LINE-UP

Output Voltage	TO-92 Type	SOT-89 Type	Output Voltage	TO-92 Type	SOT-89 Type
+1.2V	NJU7201L12	NJU7201U12	+3.5V	NJU7201L35	NJU7201U35
+1.5V	NJU7201L15	NJU7201U15	+4.0V	NJU7201L40	NJU7201U40
+2.5V	NJU7201L25	NJU7201U25	+4.5V	NJU7201L45	NJU7201U45
+2.7V	NJU7201L27	NJU7201U27	+5.0V	NJU7201L50	NJU7201U50
+3.0V	NJU7201L30	NJU7201U30	+5.2V	NJU7201L52	NJU7201U52
+3.2V	NJU7201L32	NJU7201U32	+5.5V	NJU7201L55	NJU7201U55

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

### ■ EQUIVALENT CIRCUIT



# NJU7201 Series

## ■ ABSOLUTE MAXIMUM RATINGS

( $T_a = 25^\circ\text{C}$ )

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	$V_{IN}$	14	V
Output Voltage	$V_{OUT}$	$V_{IN}+0.3$ to GND-0.3	V
Output Current	$I_{OUT}$	100	mA
Power Dissipation	$P_D$	500 (TO-92) 300 (SOT-89)	mW
Operating Temperature	$T_{opr}$	-25 to +75	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-40 to +125	$^\circ\text{C}$

## ■ ELECTRICAL CHARACTERISTICS

+1.2V Version

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 3.0\text{V}$ , $I_{OUT} = 5\text{mA}$	1.14	1.20	1.26	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 0.5\text{mA}$	-	0.020	0.30	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 3.0\text{V}$	-	19	30	$\mu\text{A}$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 3.0\text{V}$ , $I_{OUT} = 1 \sim 15\text{mA}$	-	10	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 1.5 \sim 12\text{V}$	-	0.10	-	%/V

+1.5V Version

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 3.0\text{V}$ , $I_{OUT} = 5\text{mA}$	1.425	1.500	1.575	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 0.5\text{mA}$	-	0.020	0.30	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 3.0\text{V}$	-	19	30	$\mu\text{A}$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 3.0\text{V}$ , $I_{OUT} = 1 \sim 15\text{mA}$	-	-	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 1.8 \sim 12\text{V}$	-	0.10	-	%/V

+2.5V Version

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 4.5\text{V}$ , $I_{OUT} = 10\text{mA}$	2.375	2.500	2.625	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 20\text{mA}$	-	0.20	0.60	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 4.5\text{V}$	-	19	30	$\mu\text{A}$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 4.5\text{V}$ , $I_{OUT} = 1 \sim 20\text{mA}$	-	-	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 3.5 \sim 12\text{V}$	-	0.10	-	%/V

+2.7V Version

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 4.7\text{V}$ , $I_{OUT} = 10\text{mA}$	2.565	2.700	2.835	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 20\text{mA}$	-	0.20	0.60	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 4.7\text{V}$	-	19	30	$\mu\text{A}$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 4.7\text{V}$ , $I_{OUT} = 1 \sim 20\text{mA}$	-	-	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 3.7 \sim 12\text{V}$	-	0.10	-	%/V

# NJU7201 Series

## +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	$V_{OUT}$	$V_{IN} = 5.0V$ , $I_{OUT} = 10mA$	2.85	3.00	3.15	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 20mA$	-	0.20	0.60	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 5.0V$	-	19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 5.0V$ , $I_{OUT} = 1 \sim 20mA$	-	15	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 4.0 \sim 12.0V$	-	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.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 5.2V$ , $I_{OUT} = 10mA$	3.04	3.20	3.36	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 20mA$	-	0.20	0.60	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 5.0V$	-	19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 5.0V$ , $I_{OUT} = 1 \sim 20mA$	-	-	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 4.0 \sim 12.0V$	-	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	$V_{OUT}$	$V_{IN} = 5.5V$ , $I_{OUT} = 10mA$	3.325	3.500	3.675	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 20mA$	-	0.20	0.60	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 5.5V$	-	19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 5.5V$ , $I_{OUT} = 1 \sim 20mA$	-	-	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 4.5 \sim 12.0V$	-	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	$V_{OUT}$	$V_{IN} = 6.0V$ , $I_{OUT} = 30mA$	3.8	4.0	4.2	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 40mA$	-	0.30	0.60	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 6.0V$	-	19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 6.0V$ , $I_{OUT} = 1 \sim 40mA$	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 5.0 \sim 12.0V$	-	0.10	-	%/V

# NJU7201 Series

+4.5V Version

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 6.5V, I_{OUT} = 30mA$	4.275	4.5	4.725	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 40mA$	-	0.30	0.60	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 6.5V$	-	19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 6.5V, I_{OUT} = 1\sim 40mA$	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 5.5\sim 12.0V$	-	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	$V_{OUT}$	$V_{IN} = 7.0V, I_{OUT} = 30mA$	4.75	5.00	5.25	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 40mA$	-	0.30	0.60	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 7.0V$	-	19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 7.0V, I_{OUT} = 1\sim 40mA$	-	35	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 6.0\sim 12.0V$	-	0.10	-	%/V

+5.2V Version

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

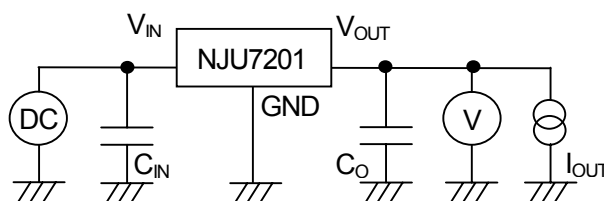
PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 7.2V, I_{OUT} = 30mA$	4.94	5.20	5.46	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 40mA$	-	0.30	0.60	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 7.2V$	-	19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 7.2V, I_{OUT} = 1\sim 40mA$	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 6.2\sim 12.0V$	-	0.10	-	%/V

+5.5V Version

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

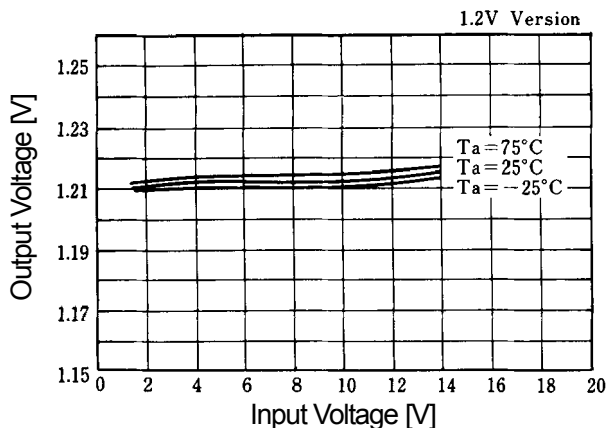
PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT}$	$V_{IN} = 7.5V, I_{OUT} = 30mA$	5.225	5.500	5.775	V
Dropout Voltage	$\Delta V_{IO}$	$I_{OUT} = 40mA$	-	0.30	0.60	V
Input Voltage	$V_{IN}$		-	-	12	V
Operating Current	$I_Q$	$V_{IN} = 7.5V$	-	19	30	$\mu A$
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 7.5V, I_{OUT} = 1\sim 40mA$	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 6.5\sim 12.0V$	-	0.10	-	%/V

## MEASUREMENT CIRCUIT

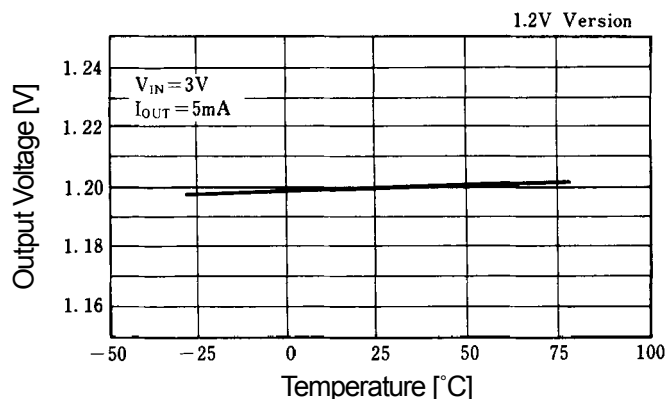


## ■ TYPICAL CHARACTERISTICS

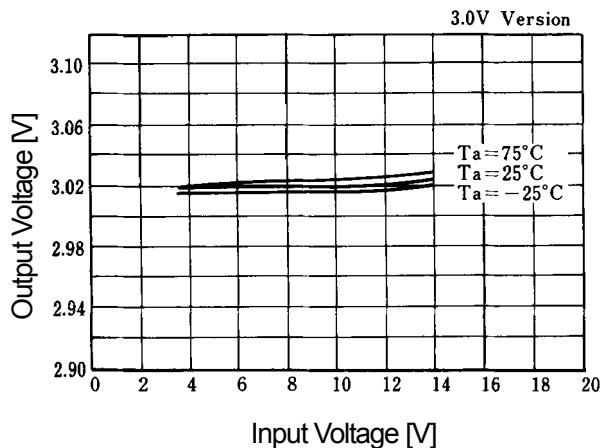
### Output Voltage vs. Input Voltage



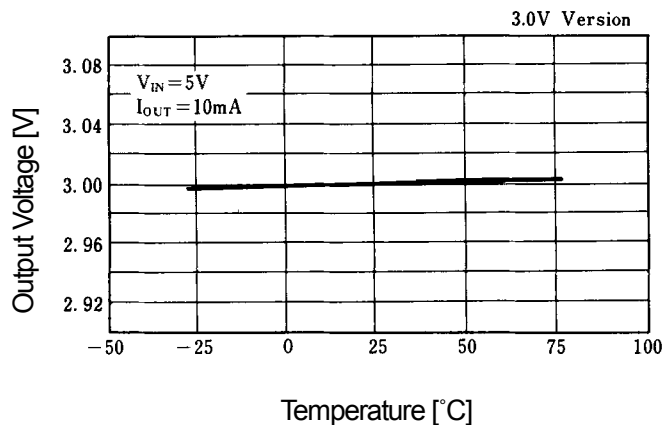
### Output Voltage vs. Input Temperature



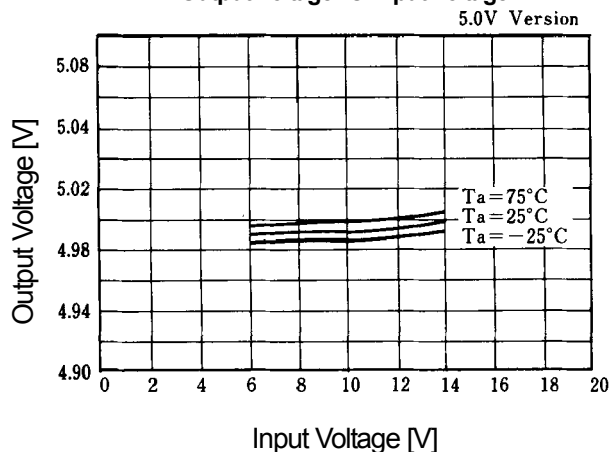
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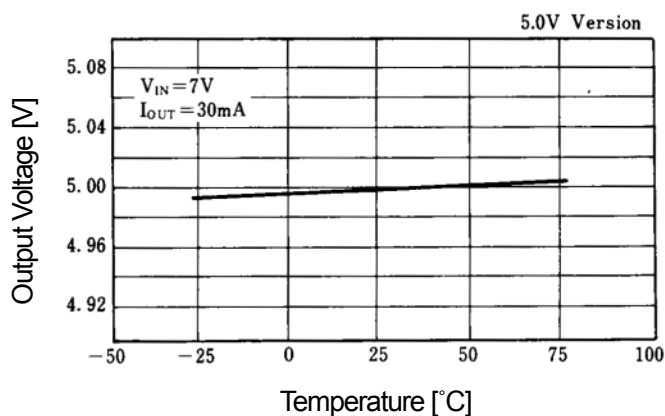
### Output Voltage vs. Input Temperature



### Output Voltage vs. Input Voltage

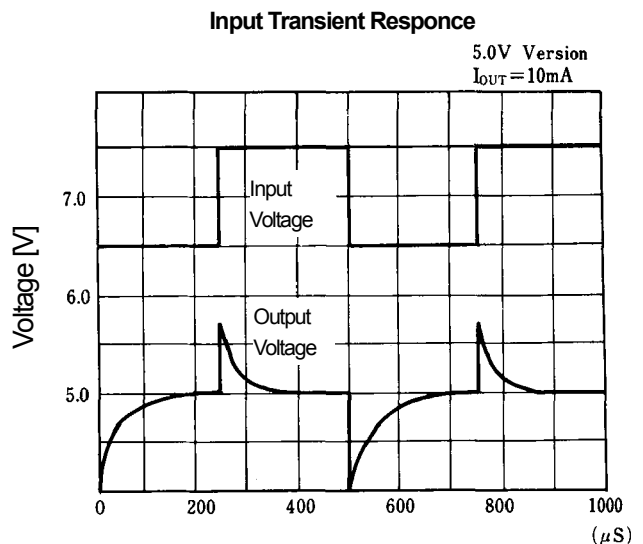
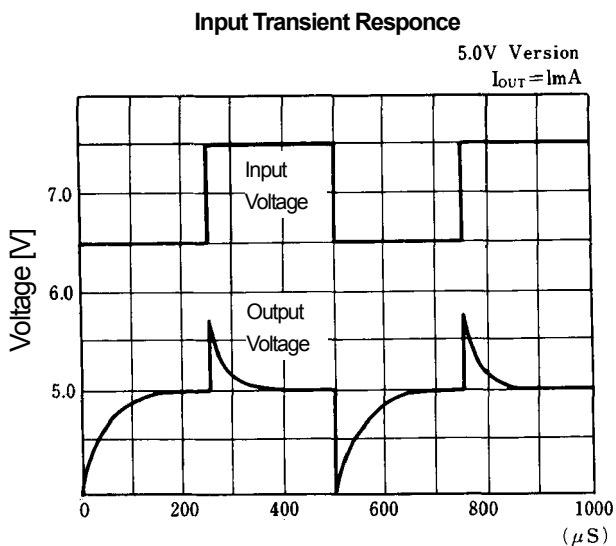
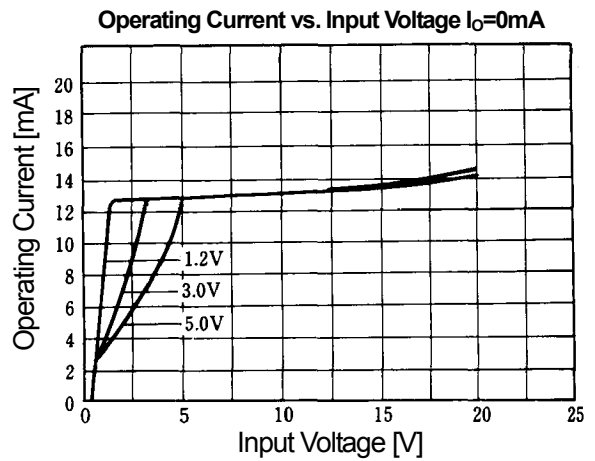
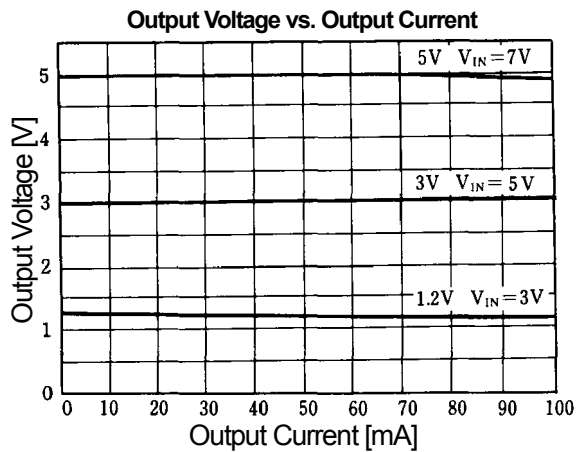
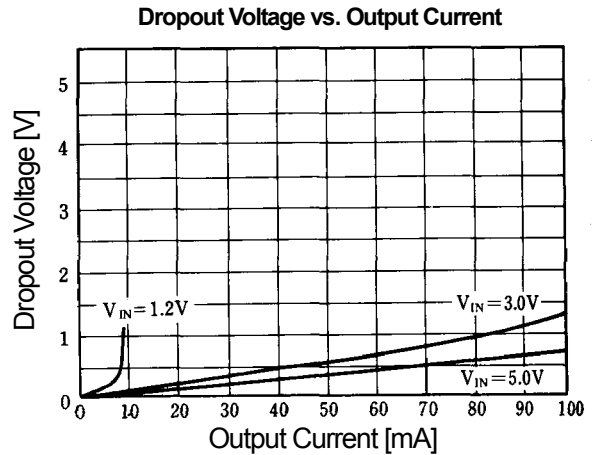
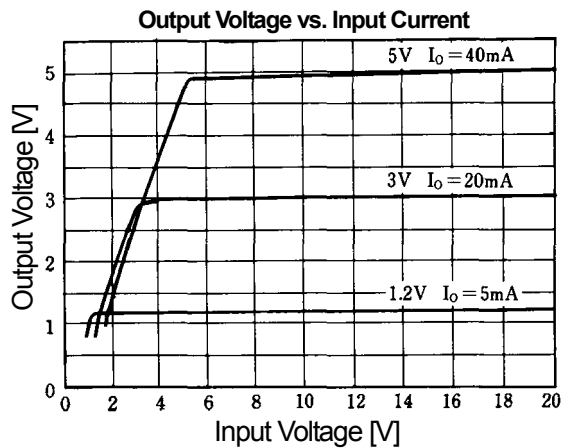


### Output Voltage vs. Input Temperature



# NJU7201 Series



## ■ TYPICAL CHARACTERISTICS



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