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.
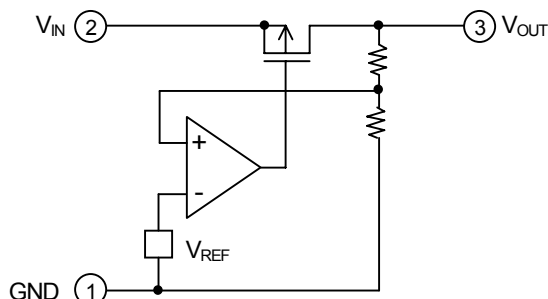
■ FEATURES

- Low Operating Current   (19µA 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   (SOT-89)
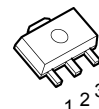- C-MOS Technology

■ PACKAGE OUTLINE

NJU7201U (SOT-89)

■ TERMINAL DESCRIPTION

No.	Description
1	GND
2	Input
3	Output

■ OUTPUT VOLTAGE LINE-UP

Output Voltage	SOT-89 Type	Output Voltage	SOT-89 Type
+1.2V	NJU7201U12	+3.5V	NJU7201U35
+1.5V	NJU7201U15	+4.0V	NJU7201U40
+2.5V	NJU7201U25	+4.5V	NJU7201U45
+2.7V	NJU7201U27	+5.0V	NJU7201U50
+3.0V	NJU7201U30	+5.2V	NJU7201U52
+3.2V	NJU7201U32	+5.5V	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$_a$ = 25ºC)

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$_D$	300 (SOT-89)	mW
Operating Temperature	T$_{opr}$	-25 to + 75	ºC
Storage Temperature	T$_{stg}$	-40 to +125	ºC

■ ELECTRICAL CHARACTERISTICS

+1.2V Version (C$_{IN}$ = C$_o$ = 0.1µF, T$_a$ = 25°C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V$_{OUT}$	V$_{IN}$ = 3.0V, I$_{OUT}$ = 5mA	1.14	1.20	1.26	V
Dropout Voltage	ΔV$_{IO}$	I$_{OUT}$ = 0.5mA	-	0.020	0.30	V
Input Voltage	V$_{IN}$		-	-	12	V
Operating Current	I$_Q$	V$_{IN}$ = 3.0V	-	19	30	µA
Load Regulation	ΔV$_{OUT}$ / ΔI$_{OUT}$	V$_{IN}$ = 3.0V, I$_{OUT}$ = 1~15mA	-	10	180	mV
Line Regulation	ΔV$_{OUT}$ / (ΔV$_{IN}$·V$_{OUT}$)	V$_{IN}$ = 1.5~12V	-	0.10	-	%/V

+1.5V Version (C$_{IN}$ = C$_o$ = 0.1µF, T$_a$ = 25°C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V$_{OUT}$	V$_{IN}$ = 3.0V, I$_{OUT}$ = 5mA	1.425	1.500	1.575	V
Dropout Voltage	ΔV$_{IO}$	I$_{OUT}$ = 0.5mA	-	0.020	0.30	V
Input Voltage	V$_{IN}$		-	-	12	V
Operating Current	I$_Q$	V$_{IN}$ = 3.0V	-	19	30	µA
Load Regulation	ΔV$_{OUT}$ / ΔI$_{OUT}$	V$_{IN}$ = 3.0V, I$_{OUT}$ = 1~15mA	-	-	180	mV
Line Regulation	ΔV$_{OUT}$ / (ΔV$_{IN}$·V$_{OUT}$)	V$_{IN}$ = 1.8~12V	-	0.10	-	%/V

+2.5V Version (C$_{IN}$ = C$_o$ = 0.1µF, T$_a$ = 25°C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V$_{OUT}$	V$_{IN}$ = 4.5V, I$_{OUT}$ = 10mA	2.375	2.500	2.625	V
Dropout Voltage	ΔV$_{IO}$	I$_{OUT}$ = 20mA	-	0.20	0.60	V
Input Voltage	V$_{IN}$		-	-	12	V
Operating Current	I$_Q$	V$_{IN}$ = 4.5V	-	19	30	µA
Load Regulation	ΔV$_{OUT}$ / ΔI$_{OUT}$	V$_{IN}$ = 4.5V, I$_{OUT}$ = 1~20mA	-	-	180	mV
Line Regulation	ΔV$_{OUT}$ / (ΔV$_{IN}$·V$_{OUT}$)	V$_{IN}$ = 3.5~12V	-	0.10	-	%/V

+2.7V Version (C$_{IN}$ = C$_o$ = 0.1µF, T$_a$ = 25°C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V$_{OUT}$	V$_{IN}$ = 4.7V, I$_{OUT}$ = 10mA	2.565	2.700	2.835	V
Dropout Voltage	ΔV$_{IO}$	I$_{OUT}$ = 20mA	-	0.20	0.60	V
Input Voltage	V$_{IN}$		-	-	12	V
Operating Current	I$_Q$	V$_{IN}$ = 4.7V	-	19	30	µA
Load Regulation	ΔV$_{OUT}$ / ΔI$_{OUT}$	V$_{IN}$ = 4.7V, I$_{OUT}$ = 1~20mA	-	-	180	mV
Line Regulation	ΔV$_{OUT}$ / (ΔV$_{IN}$·V$_{OUT}$)	V$_{IN}$ = 3.7~12V	-	0.10	-	%/V

+3.0V Version
$(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 5.0V, \quad I_{OUT} = 10mA$	2.85	3.00	3.15	V
Dropout Voltage	ΔV_{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	μA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 5.0V, I_{OUT} = 1\sim20mA$	-	15	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 4.0\sim12.0V$	-	0.10	-	%/V

+3.2V Version
$(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 5.2V, \quad I_{OUT} = 10mA$	3.04	3.20	3.36	V
Dropout Voltage	ΔV_{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	μA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 5.0V, I_{OUT} = 1\sim20mA$	-	-	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 4.0\sim12.0V$	-	0.10	-	%/V

+3.5V Version
$(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 5.5V, \quad I_{OUT} = 10mA$	3.325	3.500	3.675	V
Dropout Voltage	ΔV_{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	μA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 5.5V, I_{OUT} = 1\sim20mA$	-	-	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 4.5\sim12.0V$	-	0.10	-	%/V

+4.0V Version
$(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 6.0V, \quad I_{OUT} = 30mA$	3.8	4.0	4.2	V
Dropout Voltage	ΔV_{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	μA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 6.0V, I_{OUT} = 1\sim40mA$	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 5.0\sim12.0V$	-	0.10	-	%/V

NJU7201 Series

+4.5V Version $(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

| PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 6.5V,\quad I_{OUT} = 30mA$	4.275	4.5	4.725	V
Dropout Voltage	ΔV_{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	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 6.5V, I_{OUT} = 1\sim40mA$	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 5.5\sim12.0V$	-	0.10	-	%/V

+5.0V Version $(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 7.0V,\quad I_{OUT} = 30mA$	4.75	5.00	5.25	V
Dropout Voltage	ΔV_{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	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 7.0V, I_{OUT} = 1\sim40mA$	-	35	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 6.0\sim12.0V$	-	0.10	-	%/V

+5.2V Version $(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 7.2V,\quad I_{OUT} = 30mA$	4.94	5.20	5.46	V
Dropout Voltage	ΔV_{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	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 7.2V, I_{OUT} = 1\sim40mA$	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 6.2\sim12.0V$	-	0.10	-	%/V

+5.5V Version $(C_{IN} = C_o = 0.1\mu F, T_a = 25°C)$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	$V_{IN} = 7.5V,\quad I_{OUT} = 30mA$	5.225	5.500	5.775	V
Dropout Voltage	ΔV_{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	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$	$V_{IN} = 7.5V, I_{OUT} = 1\sim40mA$	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	$V_{IN} = 6.5\sim12.0V$	-	0.10	-	%/V

■ **MEASUREMENT CIRCUIT**
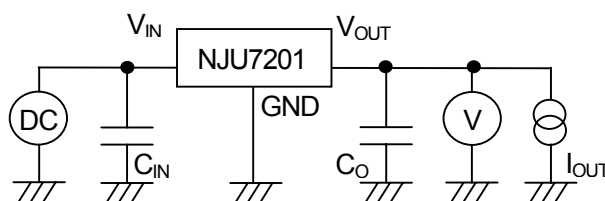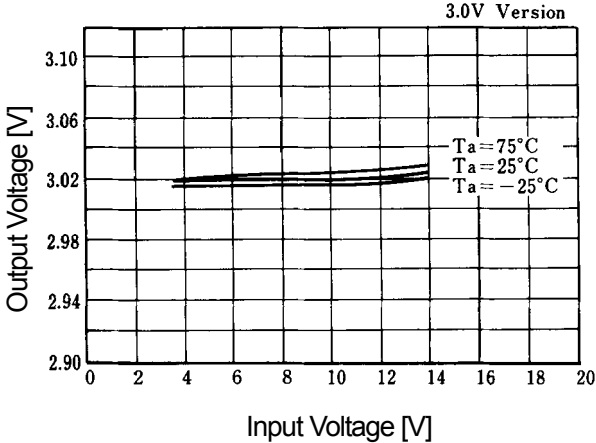
■ TYPICAL CHARACTERISTICS
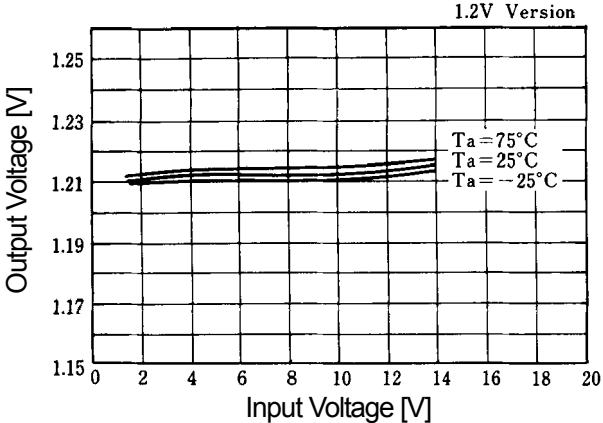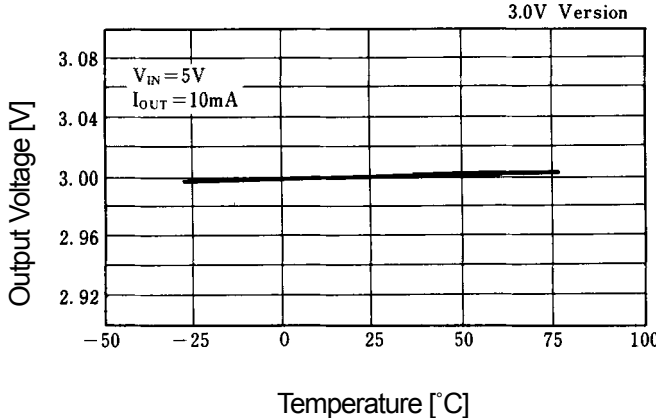
Output Voltage vs. Input Voltage

1.2V Version

Output Voltage vs. Input Temperature

1.2V Version

$V_{IN} = 3V$
$I_{OUT} = 5mA$

Output Voltage vs. Input Voltage

3.0V Version

Output Voltage vs. Input Temperature

3.0V Version

$V_{IN} = 5V$
$I_{OUT} = 10mA$

Output Voltage vs. Input Voltage

5.0V Version

Output Voltage vs. Input Temperature

5.0V Version

$V_{IN} = 7V$
$I_{OUT} = 30mA$

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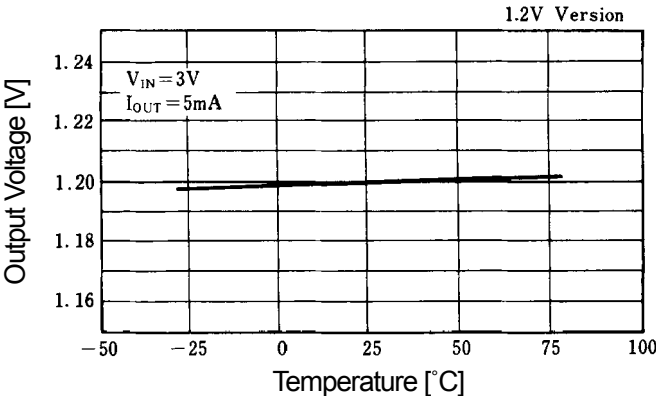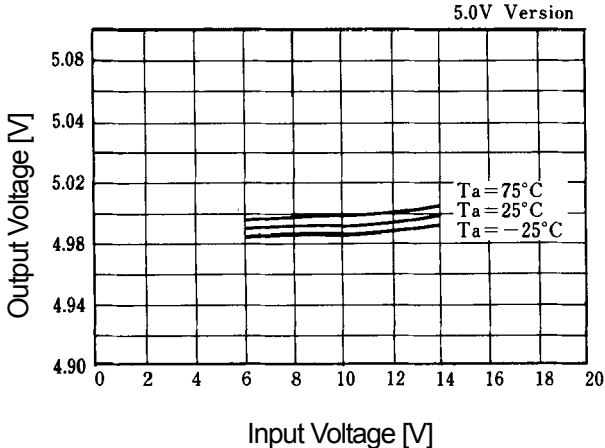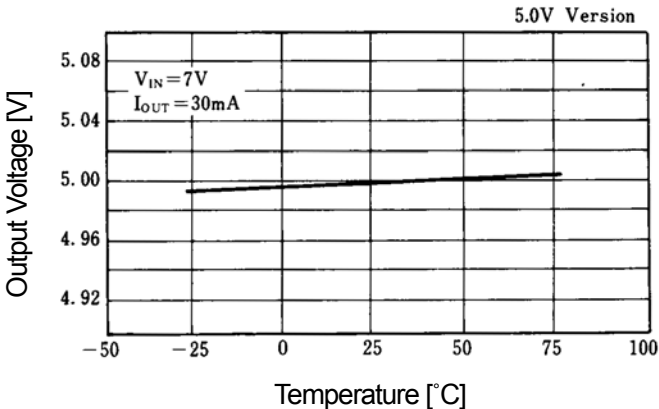
NJU7201 Series

■ TYPICAL CHARACTERISTICS
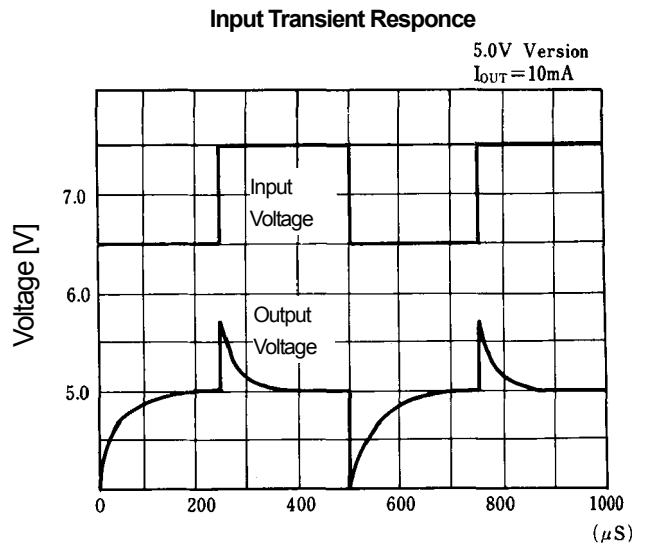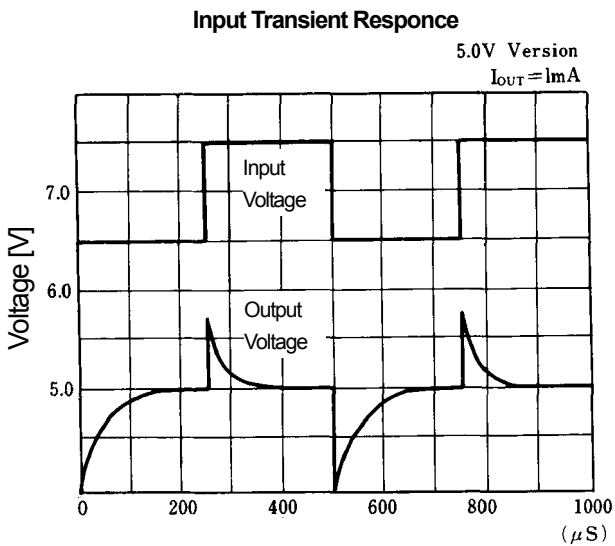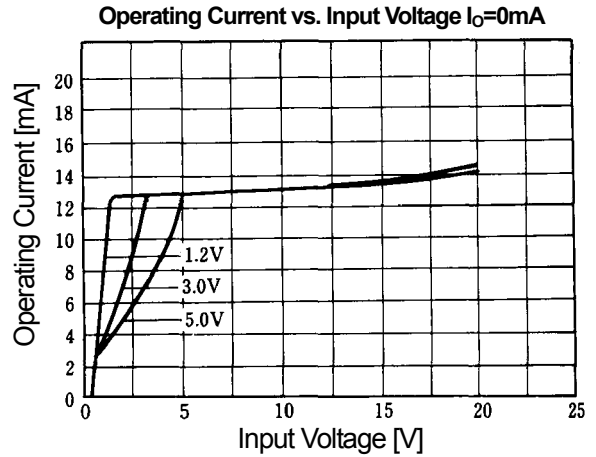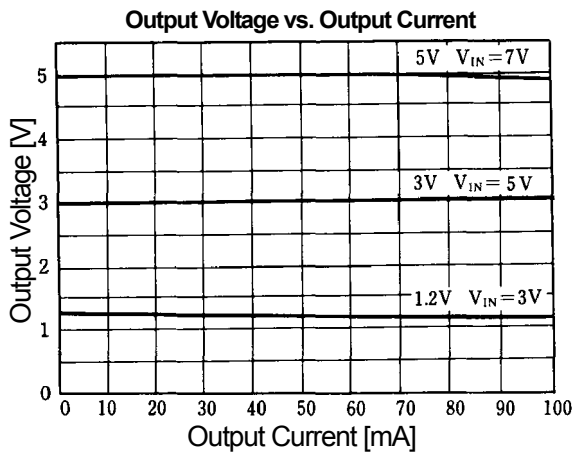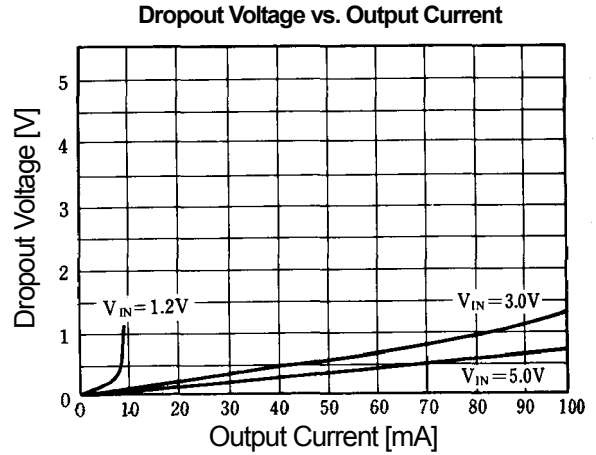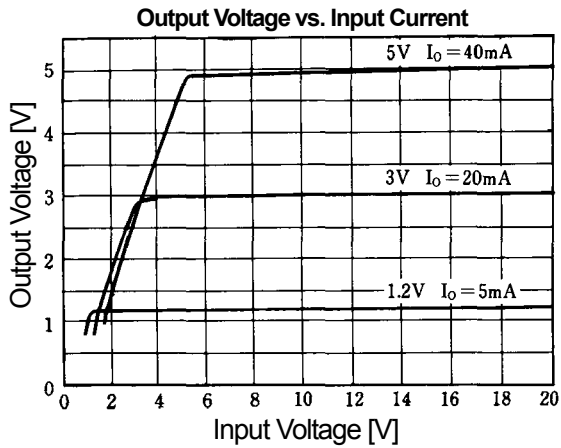
Output Voltage vs. Input Current

Dropout Voltage vs. Output Current

Output Voltage vs. Output Current

Operating Current vs. Input Voltage I_O=0mA

Input Transient Responce

Input Transient Responce

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