C-MOS 3-TERMINAL POSITIVE VOLTAGE REGULATOR

■ GENERAL DESCRIPTION

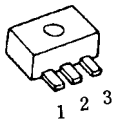
The **NJU7201 series** is a C-MOS 3-terminal positive voltage regulator which contains internal accurate voltage reference, error amplifier, control transistor and output voltage setting resistor.

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 (19μA typ.)
- Wide Operating Voltage Range
- Low Dropout Voltage
  (ΔV_{IO} < 0.3V 1.2 to 1.5V output, I_{OUT} = 0.5mA)
  (ΔV_{IO} < 0.6V 2.5 to 3.5V output, I_{OUT} = 20mA)
  (ΔV_{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

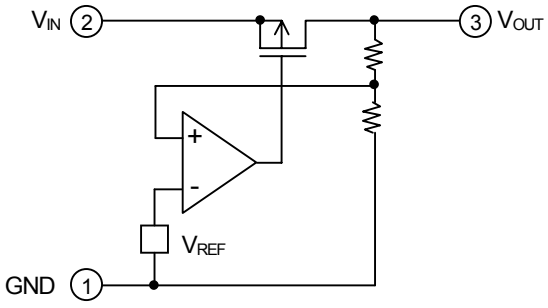
No.	Description
1	GND
2	Input
3	Output

■ 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



■ 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	500 (TO-92) 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	$\Delta V_{OUT} / \Delta I_{OUT}$	V_{IN} = 3.0V, I_{OUT} = 1～15mA	-	10	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	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	$\Delta V_{OUT} / \Delta I_{OUT}$	V_{IN} = 3.0V, I_{OUT} = 1～15mA	-	-	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	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	$\Delta V_{OUT} / \Delta I_{OUT}$	V_{IN} = 4.5V, I_{OUT} = 1～20mA	-	-	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	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	$\Delta V_{OUT} / \Delta I_{OUT}$	V_{IN} = 4.7V, I_{OUT} = 1～20mA	-	-	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	V_{IN} = 3.7～12V	-	0.10	-	%/V

+3.0V Version (C_{IN} = C_o = 0.1µF, T_a = 25°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	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} = 1～20mA	-	15	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	V_{IN} = 4.0～12.0V	-	0.10	-	%/V

+3.2V Version (C_{IN} = C_o = 0.1µF, T_a = 25°C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN} = 5.2V, 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} = 1～20mA	-	-	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	V_{IN} = 4.0～12.0V	-	0.10	-	%/V

+3.5V Version (C_{IN} = C_o = 0.1µF, T_a = 25°C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN} = 5.5V, 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} = 1～20mA	-	-	180	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	V_{IN} = 4.5～12.0V	-	0.10	-	%/V

+4.0V Version (C_{IN} = C_o = 0.1µF, T_a = 25°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	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} = 1～40mA	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	V_{IN} = 5.0～12.0V	-	0.10	-	%/V

+4.5V Version (C_{IN} = C_o = 0.1µF, T_a = 25°C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN} = 6.5V, 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} = 1～40mA	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	V_{IN} = 5.5～12.0V	-	0.10	-	%/V

+5.0V Version (C_{IN} = C_o = 0.1µF, T_a = 25°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	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} = 1～40mA	-	35	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	V_{IN} = 6.0～12.0V	-	0.10	-	%/V

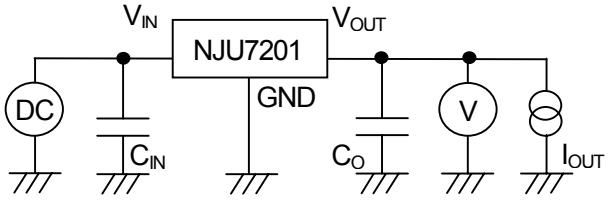
+5.2V Version (C_{IN} = C_o = 0.1µF, T_a = 25°C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN} = 7.2V, 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} = 1～40mA	-	-	120	mV
Line Regulation	$\Delta V_{OUT} / (\Delta V_{IN} \cdot V_{OUT})$	V_{IN} = 6.2～12.0V	-	0.10	-	%/V

+5.5V Version (C_{IN} = C_o = 0.1µF, T_a = 25°C)

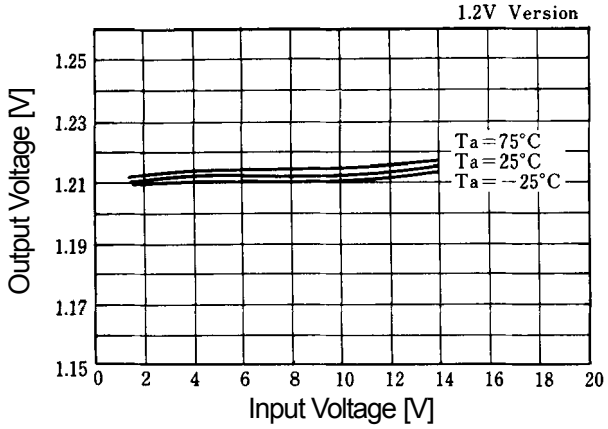
PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN} = 7.5V, I_{OUT} = 30mA	5.225	5.500	5.775	V
Dropout Voltage	ΔV_{IO}	I_{OUT} = 40mA	-	0.30	0.60	V
Input Voltage	V_{IN}		-	-	12	V
Operating Current	I_Q	V_{IN} = 7.5V	-	19	30	µA
Load Regulation	$\Delta V_{OUT} / \Delta I_{OUT}$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

■ MEASUREMENT CIRCUIT

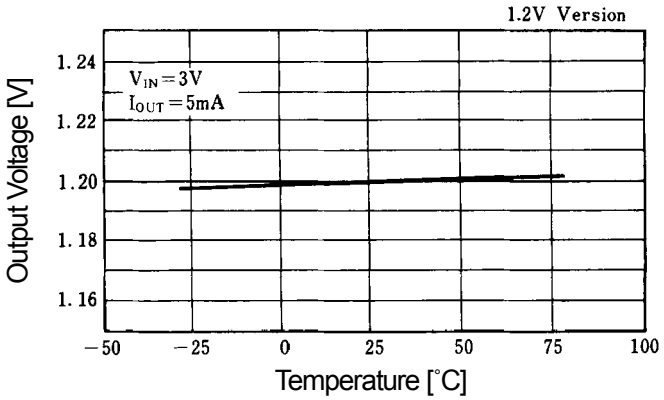


■ TYPICAL CHARACTERISTICS

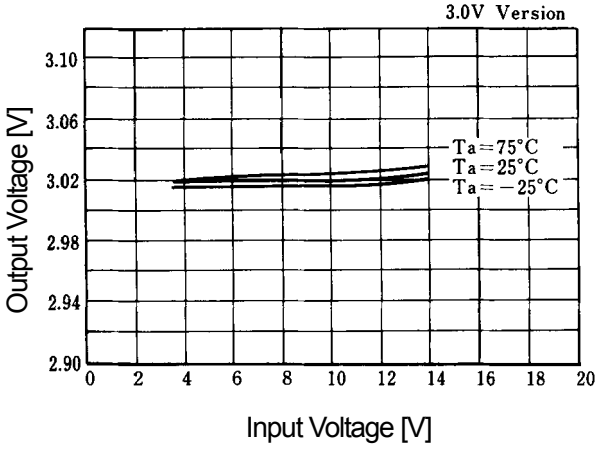
Output Voltage vs. Input Voltage



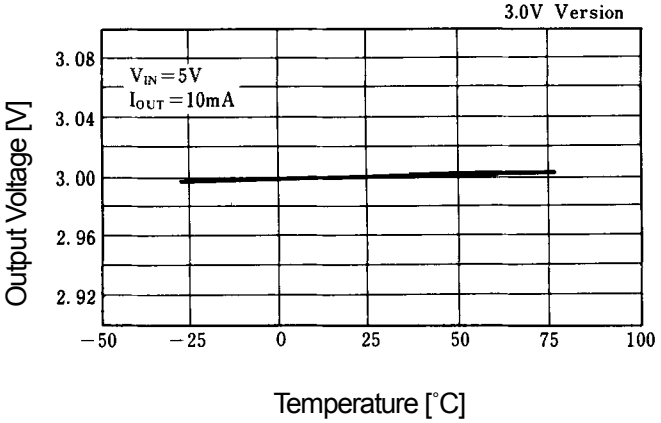
Output Voltage vs. Input Temperature



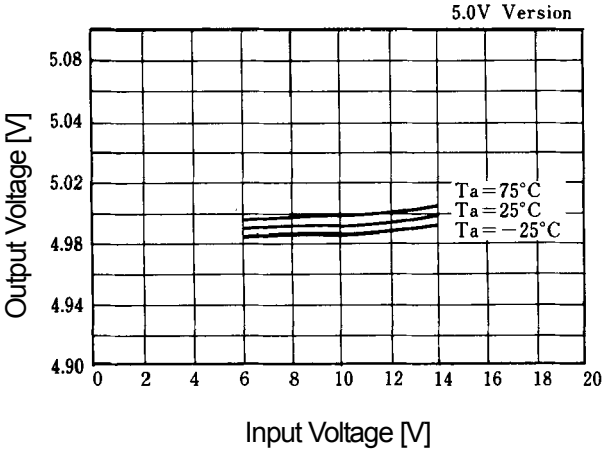
Output Voltage vs. Input Voltage



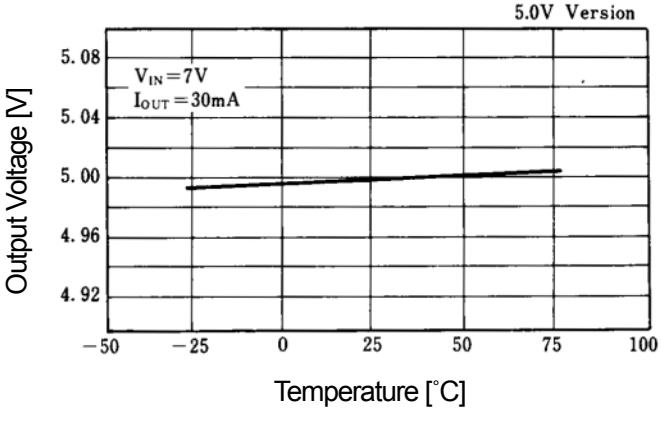
Output Voltage vs. Input Temperature



Output Voltage vs. Input Voltage

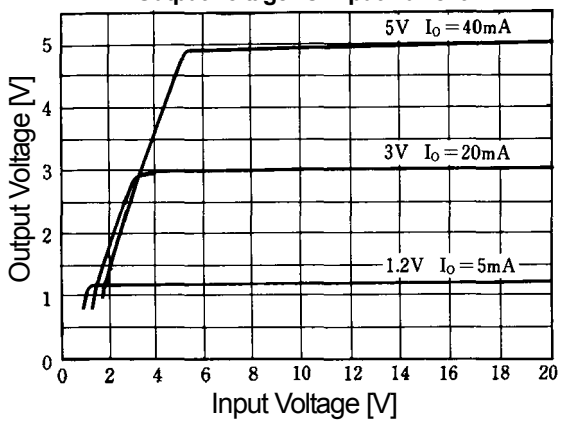


Output Voltage vs. Input Temperature

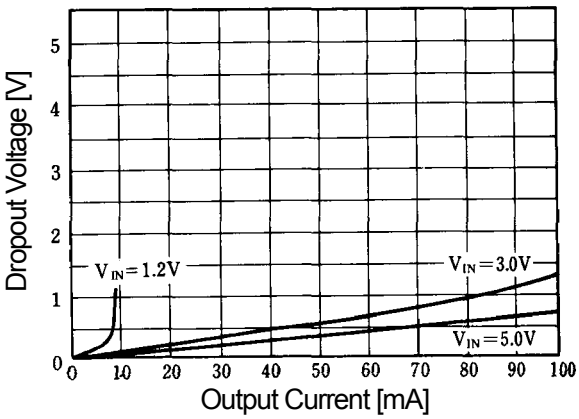


■ TYPICAL CHARACTERISTICS

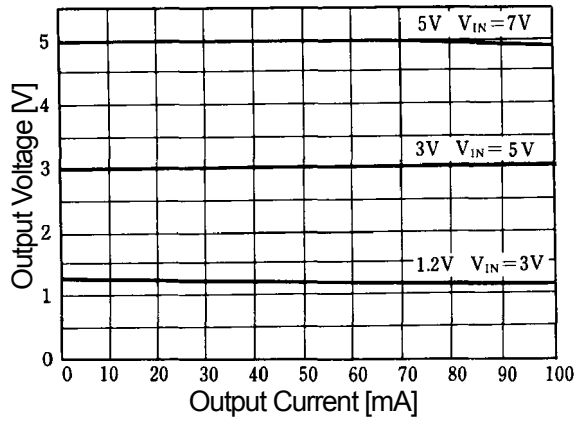
Output Voltage vs. Input Current



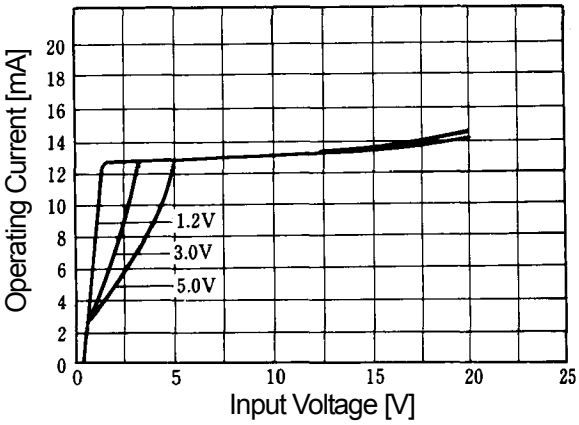
Dropout Voltage vs. Output Current



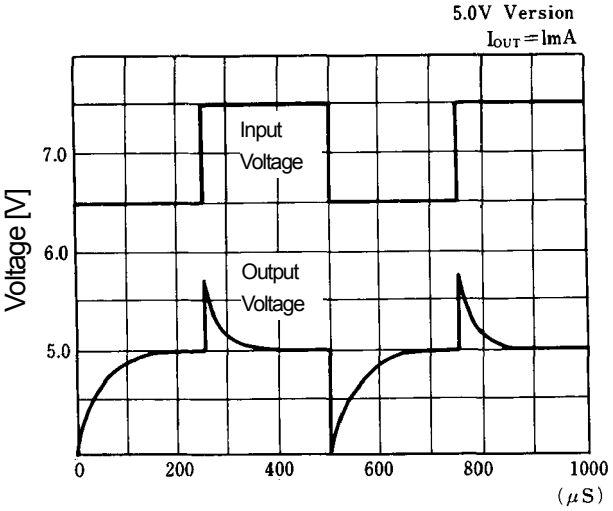
Output Voltage vs. Output Current



Operating Current vs. Input Voltage I_O=0mA



Input Transient Responce



Input Transient Responce