## C-MOS 3-TERMINAL NEGATIVE VOLTAGE REGULATOR

■ GENERAL DESCRIPTION

The **NJU7211 series** is a C-MOS 3-terminal negative voltage regulator which contains internal precision 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 **NJU7211 series** is suitable for battery operated items and battery back-up systems because of low operating current and low dropout voltage.
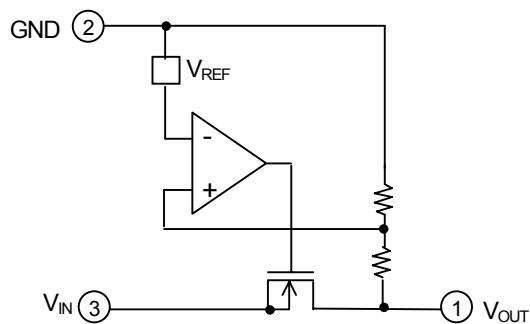
■ FEATURES

- Low Operating Current   (19µA typ.)
- Wide Operating Voltage Range
- Low Dropout Voltage
  - ($\Delta V_{IO} < 0.6V$ -3.0V output, $I_{OUT} = 20mA$)
  - ($\Delta V_{IO} < 0.6V$ -5.0V output, $I_{OUT} = 40mA$)
- Small Temperature Coefficient of Output Voltage
- Package Outline   (SOT-89)
- C-MOS Technology
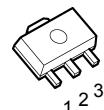
■ OUTPUT VOLTAGE LINE-UP

Output Voltage	SOT-89 Type
-2.0V	NJU7211U20
-3.0V	NJU7211U30
-4.0V	NJU7211U40
-5.0V	NJU7211U50

■ PACKAGE OUTLINE

NJU7221U (SOT-89)

■ TERMINAL DESCRIPTION

No.	Description
1	Output
2	GND
3	Input

■ EQUIVALENT CIRCUIT

NJU7211 Series

■ ABSOLUTE MAXIMUM RATINGS (T$_a$ = 25ºC)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V$_{IN}$	-14	V
Output Voltage	V$_{OUT}$	GND+0.3 to V$_{IN}$-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
Soldering Temperature / Time	T$_{sold}$	260ºC/10 sec	-

■ ELECTRICAL CHARACTERISTICS

-2.0V Version (C$_{IN}$ = C$_o$ = 0.1μF, T$_a$ = 25°C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V$_{OUT}$	V$_{IN}$ = - 4.0V, I$_{OUT}$ = 10mA	- 2.10	- 2.00	- 1.90	V
Dropout Voltage	ΔV$_{IO}$	I$_{OUT}$ = 20mA	-	0.2	0.6	V
Input Voltage	V$_{IN}$		- 12	-	-	V
Operating Current	I$_Q$	V$_{IN}$ = - 4.0V	-	19	30	μA
Load Regulation	ΔV$_{OUT}$ / ΔI$_{OUT}$	V$_{IN}$ = - 4.0V, I$_{OUT}$ = 1∼20mA	-	-	120	mV
Line Regulation	ΔV$_{OUT}$ / (ΔV$_{IN}$·V$_{OUT}$)	V$_{IN}$ = - 3.0 ∼ - 12V	-	0.1	-	%/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	- 3.15	- 3.00	- 2.85	V
Dropout Voltage	ΔV$_{IO}$	I$_{OUT}$ = 20mA	-	0.2	0.6	V
Input Voltage	V$_{IN}$		- 12	-	-	V
Operating Current	I$_Q$	V$_{IN}$ = - 5.0V	-	19	30	μA
Load Regulation	ΔV$_{OUT}$ / ΔI$_{OUT}$	V$_{IN}$ = - 5.0V, I$_{OUT}$ = 1∼20mA	-	80	120	mV
Line Regulation	ΔV$_{OUT}$ / (ΔV$_{IN}$·V$_{OUT}$)	V$_{IN}$ = - 4.0 ∼ - 12V	-	0.1	-	%/V

-4.0V Version (C$_{IN}$ = C$_o$ = 0.1μF, T$_a$ = 25°C)
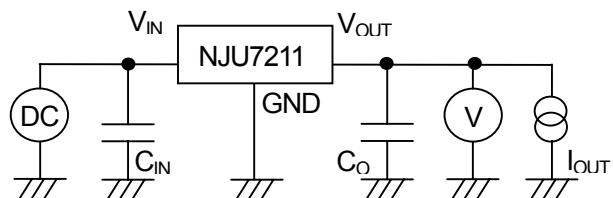
PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V$_{OUT}$	V$_{IN}$ = - 6.0V, I$_{OUT}$ = 30mA	- 5.25	- 5.00	- 4.75	V
Dropout Voltage	ΔV$_{IO}$	I$_{OUT}$ = 40mA	-	0.3	0.6	V
Input Voltage	V$_{IN}$		- 12	-	-	V
Operating Current	I$_Q$	V$_{IN}$ = - 6.0V	-	19	30	μA
Load Regulation	ΔV$_{OUT}$ / ΔI$_{OUT}$	V$_{IN}$ = - 6.0V, I$_{OUT}$ = 1∼40mA	-	-	120	mV
Line Regulation	ΔV$_{OUT}$ / (ΔV$_{IN}$·V$_{OUT}$)	V$_{IN}$ = - 5.0 ∼ - 12V	-	0.1	-	%/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	- 5.25	- 5.00	- 4.75	V
Dropout Voltage	ΔV$_{IO}$	I$_{OUT}$ = 40mA	-	0.3	0.6	V
Input Voltage	V$_{IN}$		- 12	-	-	V
Operating Current	I$_Q$	V$_{IN}$ = - 7.0V	-	19	30	μA
Load Regulation	ΔV$_{OUT}$ / ΔI$_{OUT}$	V$_{IN}$ = - 7.0V, I$_{OUT}$ = 1∼40mA	-	80	120	mV
Line Regulation	ΔV$_{OUT}$ / (ΔV$_{IN}$·V$_{OUT}$)	V$_{IN}$ = - 6.0 ∼ - 12V	-	0.1	-	%/V

■ **MEASUREMENT CIRCUIT**

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