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High Precision C-MOS 3-Terminal Voltage Regulator

■ GENERAL DESCRIPTION

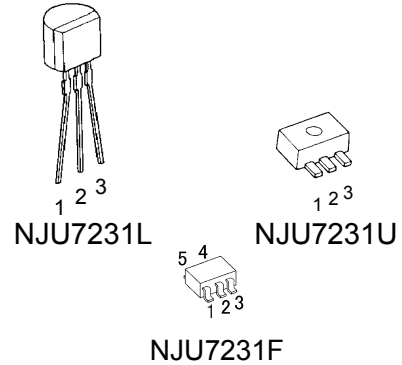
The NJU7231 is high precision output voltage 3-terminal positive voltage regulator.

The NJU7231 is suitable for battery operated items and battery back-up systems, because of low operating current and low dropout voltage.

■ FEATURES

- High Precision Output $V_o \pm 2\%$
- Low Operating Current 10 μ A typ.
- Low Dropout Voltage $\Delta V_{I-O} < 0.6V$ @ $I_o = 40mA$
- Wide Operating Voltage Range
- Package Outline TO-92/SOT-89/MTP-5
- Bipolar Technology

■ PACKAGE OUTLINE



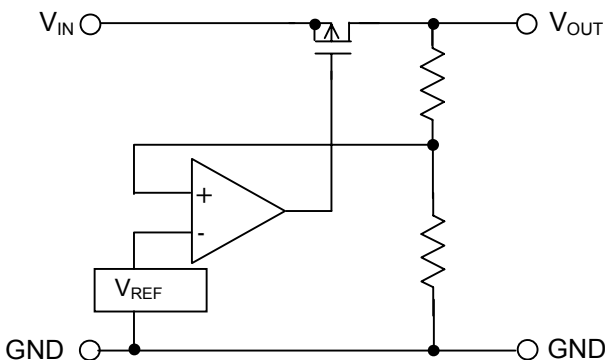
■ OUTPUT VOLTAGE RANK LIST

Output Voltage	TO-92	SOT-89	MTP-5
+1.2V	NJU7231L12	NJU7231U12	NJU7231F12
+1.5V	NJU7231L15	NJU7231U15	NJU7231F15
+1.8V	NJU7231L18	NJU7231U18	NJU7231F18
+2.5V	NJU7231L25	NJU7231U25	NJU7231F25
+2.6V	NJU7231L26	NJU7231U26	NJU7231F26
+2.7V	NJU7231L27	NJU7231U27	NJU7231F27
+2.8V	NJU7231L28	NJU7231U28	NJU7231F28
+2.9V	NJU7231L29	NJU7231U29	NJU7231F29
+3.0V	NJU7231L30	NJU7231U30	NJU7231F30
+3.3V	NJU7231L33	NJU7231U33	NJU7231F33
+5.0V	NJU7231L50	NJU7231U50	NJU7231F50
+5.2V	NJU7231L52	NJU7231U52	NJU7231F52

■ TERMINAL DESCRIPTION

No.	Description	
	TO-92/SOT-89	MTP-5
1	GND	GND
2	INPUT	INPUT
3	OUTPUT	OUTPUT
4	-	NC
5	-	NC

■ EQUIVALENT CIRCUIT



■ ABSOLUTE MAXIMUM RATING

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V _{IN}	18	V
Output Voltage	V _{OUT}	GND-0.3 ~ V _{IN} +0.3	V
Output Current	I _{OUT}	100	mA
Power Dissipation	P _D	500 (T0-92) 300 (SOT-89) 200 (MTP-5)	mW
Operating Temperature	Topr	- 40 ~ + 85	°C
Storage Temperature	Tstg	- 55 ~ +125	°C

■ ELECTRICAL CHARACTERISTICS

+1.2V Version

 (C_{IN}=C_O=0.1uF, Ta=25°C)

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V _{OUT}	V _{IN} =3.0V, I _{OUT} =5mA	1.176	1.200	1.224	V	1
Dropout Voltage	ΔV _{IO}	I _{OUT} =0.5mA	-	0.02	0.3	V	1
Input Voltage	V _{IN}		-	-	15	V	2
Operating Current	I _Q	V _{IN} =3.0V	-	10	20	uA	2
Load Regulation	ΔV _{OUT} /ΔI _{OUT}	V _{IN} =3.0V, I _{OUT} =1~15mA	-	10	180	mV	3
Line Regulation	ΔV _{OUT} /(ΔV _{IN} ·V _{OUT})	V _{IN} =1.5~12.0V	-	0.1	-	%/V	3

+1.5V Version

 (C_{IN}=C_O=0.1uF, Ta=25°C)

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V _{OUT}	V _{IN} =3.0V, I _{OUT} =5mA	1.470	1.500	1.530	V	1
Dropout Voltage	ΔV _{IO}	I _{OUT} =0.5mA	-	0.02	0.30	V	1
Input Voltage	V _{IN}		-	-	15	V	2
Operating Current	I _Q	V _{IN} =3.0V	-	10	20	uA	2
Load Regulation	ΔV _{OUT} /ΔI _{OUT}	V _{IN} =3.0V, I _{OUT} =1~15mA	-	10	180	mV	3
Line Regulation	ΔV _{OUT} /(ΔV _{IN} ·V _{OUT})	V _{IN} =1.5~12.0V	-	0.1	-	%/V	3

+1.8V Version

 (C_{IN}=C_O=0.1uF, Ta=25°C)

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V _{OUT}	V _{IN} =3.0V, I _{OUT} =5mA	1.764	1.800	1.836	V	1
Dropout Voltage	ΔV _{IO}	I _{OUT} =0.5mA	-	0.02	0.30	V	1
Input Voltage	V _{IN}		-	-	15	V	2
Operating Current	I _Q	V _{IN} =3.0V	-	10	20	uA	2
Load Regulation	ΔV _{OUT} /ΔI _{OUT}	V _{IN} =3.0V, I _{OUT} =1~15mA	-	10	180	mV	3
Line Regulation	ΔV _{OUT} /(ΔV _{IN} ·V _{OUT})	V _{IN} =2.1~12.0V	-	0.1	-	%/V	3

+2.5V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V_{OUT}	$V_{IN}=4.5V$, $I_{OUT}=10mA$	2.45	2.50	2.55	V	1
Dropout Voltage	ΔV_{IO}	$I_{OUT}=20mA$	-	0.2	0.6	V	1
Input Voltage	V_{IN}		-	-	15	V	2
Operating Current	I_Q	$V_{IN}=4.5V$	-	10	20	μA	2
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	$V_{IN}=4.5V$, $I_{OUT}=1\sim 20mA$	-	15	180	mV	3
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	$V_{IN}=3.5\sim 12.0V$	-	0.1	-	%/V	3

+2.6V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V_{OUT}	$V_{IN}=4.6V$, $I_{OUT}=10mA$	2.548	2.600	2.652	V	1
Dropout Voltage	ΔV_{IO}	$I_{OUT}=20mA$	-	0.2	0.6	V	1
Input Voltage	V_{IN}		-	-	15	V	2
Operating Current	I_Q	$V_{IN}=4.6V$	-	10	20	μA	2
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	$V_{IN}=4.6V$, $I_{OUT}=1\sim 20mA$	-	15	180	mV	3
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	$V_{IN}=3.6\sim 12.0V$	-	0.1	-	%/V	3

+2.7V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V_{OUT}	$V_{IN}=4.7V$, $I_{OUT}=10mA$	2.646	2.70	2.754	V	1
Dropout Voltage	ΔV_{IO}	$I_{OUT}=20mA$	-	0.2	0.6	V	1
Input Voltage	V_{IN}		-	-	15	V	2
Operating Current	I_Q	$V_{IN}=4.7V$	-	10	20	μA	2
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	$V_{IN}=4.7V$, $I_{OUT}=1\sim 20mA$	-	15	180	mV	3
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	$V_{IN}=3.7\sim 12.0V$	-	0.1	-	%/V	3

+2.8V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V_{OUT}	$V_{IN}=4.8V$, $I_{OUT}=10mA$	2.744	2.800	2.856	V	1
Dropout Voltage	ΔV_{IO}	$I_{OUT}=20mA$	-	0.2	0.6	V	1
Input Voltage	V_{IN}		-	-	15	V	2
Operating Current	I_Q	$V_{IN}=4.8V$	-	10	20	μA	2
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	$V_{IN}=4.8V$, $I_{OUT}=1\sim 20mA$	-	15	180	mV	3
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	$V_{IN}=3.8\sim 12.0V$	-	0.1	-	%/V	3

+2.9V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V_{OUT}	$V_{IN}=4.9V$, $I_{OUT}=10mA$	2.842	2.900	2.958	V	1
Dropout Voltage	ΔV_{IO}	$I_{OUT}=20mA$	-	0.2	0.6	V	1
Input Voltage	V_{IN}		-	-	15	V	2
Operating Current	I_Q	$V_{IN}=4.9V$	-	10	20	μA	2
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	$V_{IN}=4.9V$, $I_{OUT}=1\sim 20mA$	-	15	180	mV	3
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	$V_{IN}=3.9\sim 12.0V$	-	0.1	-	%/V	3

+3.0V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V_{OUT}	$V_{IN}=5.0V$, $I_{OUT}=10mA$	2.94	3.00	3.06	V	1
Dropout Voltage	ΔV_{IO}	$I_{OUT}=20mA$	-	0.2	0.6	V	1
Input Voltage	V_{IN}		-	-	15	V	2
Operating Current	I_Q	$V_{IN}=5.0V$	-	10	20	μA	2
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	$V_{IN}=5.0V$, $I_{OUT}=1\sim 20mA$	-	15	180	mV	3
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	$V_{IN}=4.0\sim 12.0V$	-	0.1	-	%/V	3

+3.3V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V_{OUT}	$V_{IN}=5.3V$, $I_{OUT}=10mA$	3.234	3.300	3.366	V	1
Dropout Voltage	ΔV_{IO}	$I_{OUT}=20mA$	-	0.2	0.6	V	1
Input Voltage	V_{IN}		-	-	15	V	2
Operating Current	I_Q	$V_{IN}=5.3V$	-	10	20	μA	2
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	$V_{IN}=5.3V$, $I_{OUT}=1\sim 20mA$	-	15	180	mV	3
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	$V_{IN}=4.3\sim 12.0V$	-	0.1	-	%/V	3

+5.0V Version

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

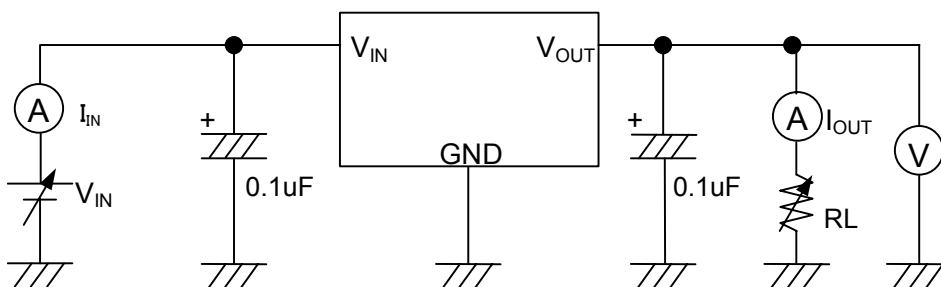
PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V_{OUT}	$V_{IN}=7.0V$, $I_{OUT}=30mA$	4.90	5.00	5.10	V	1
Dropout Voltage	ΔV_{IO}	$I_{OUT}=40mA$	-	0.3	0.6	V	1
Input Voltage	V_{IN}		-	-	15	V	2
Operating Current	I_Q	$V_{IN}=7.0V$	-	10	20	μA	2
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	$V_{IN}=7.0V$, $I_{OUT}=1\sim 40mA$	-	35	120	mV	3
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	$V_{IN}=6.0\sim 12.0V$	-	0.1	-	%/V	3

+5.0V Version

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

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	V_{OUT}	$V_{IN}=7.2V$, $I_{OUT}=30mA$	5.096	5.200	5.304	V	1
Dropout Voltage	ΔV_{IO}	$I_{OUT}=40mA$	-	0.3	0.6	V	1
Input Voltage	V_{IN}		-	-	15	V	2
Operating Current	I_Q	$V_{IN}=7.2V$	-	10	20	μA	2
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	$V_{IN}=7.2V$, $I_{OUT}=1\sim 40mA$	-	35	120	mV	3
Line Regulation	$\Delta V_{OUT}/(\Delta V_{IN}\cdot V_{OUT})$	$V_{IN}=6.2\sim 12.0V$	-	0.1	-	%/V	3

■ MEASUREMENT CIRCUIT



[CAUTION]

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