

## 500mA Low Dropout Voltage Regulator

### ■ GENERAL DESCRIPTION

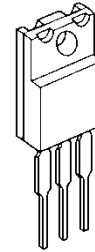
The NJU7223 series is a high precision output voltage, low drop output, low current consumption and high output current 3-terminal positive voltage regulator with a over current protection and a thermal shutdown.

Low dropout voltage is realized at high current output.

### ■ FEATURES

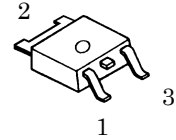
- High Precision Output Voltage  $\pm 2\%$
- High Output Current  $I_o(\text{max.})=500\text{mA}$
- Low Current Consumption  $30\mu\text{A}$
- Low Dropout Voltage  $\Delta V_{IO}=0.4\text{V typ. } (I_o=0.5\text{A}, V_o=5\text{V})$
- Internal Over Current Protection
- Internal Thermal Shutdown Protection
- Package Outline TO-220F, TO-252
- C-MOS Technology

### ■ PACKAGE OUTLINE



1 2 3

NJM7223F



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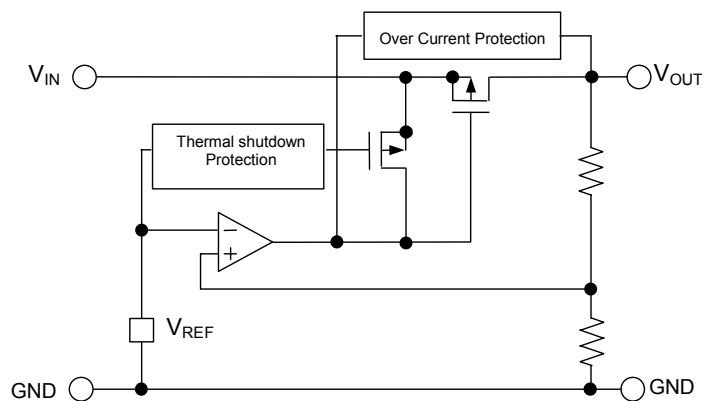
NJU7223DL1

- 1.  $V_{OUT}$
- 2.  $V_{IN}$
- 3. GND

### ■ OUTPUT VOLTAGE LINE-UP

$V_{OUT}$	TO-220F	TO-252
+1.8V	NJU7223F18	NJU7223DL1-18
+2.5V	NJU7223F25	NJU7223DL1-25
+3.0V	NJU7223F30	NJU7223DL1-30
+3.3V	NJU7223F33	NJU7223DL1-33
+5.0V	NJU7223F50	NJU7223DL1-50

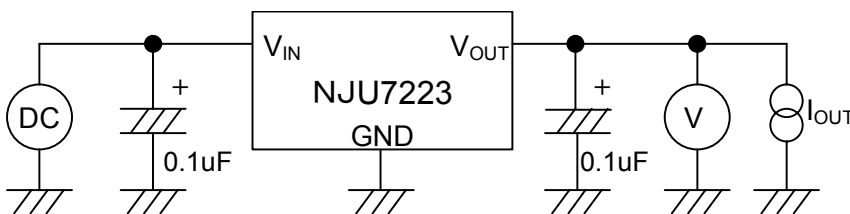
### ■ EQUIVALENT CIRCUIT



## ■ ABSOLUTE MAXIMUM RATINGS (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	$I_{OUT}$	700	mA
Power Dissipation	$P_D$	TO-220F 7.5(Tc≤85°C) TO-252 7.5(Tc≤56°C) 1.0(Ta=25°C)	W
Operating Temperature Range	Topr	-40 ~ 85	°C
Storage Temperature Range	Tstg	-55 ~ 150	°C

## ■ TEST CIRCUIT



**■ ELECTRICAL CHARACTERISTICS (C<sub>IN</sub>=C<sub>O</sub>=0.1μF, T<sub>j</sub>=25°C)**

Measurement is to be conducted in pulse testing.

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Vo=1.8V Version Output Voltage	V <sub>O</sub>	V <sub>IN</sub> =3.8V, I <sub>o</sub> =300mA	1.764	1.80	1.836	V
Input Voltage	V <sub>IN</sub>		-	-	14	V
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>o</sub> =150mA	-	0.4	0.6	V
Line Regulation	ΔV <sub>o</sub> /ΔV <sub>IN</sub> ·V <sub>o</sub>	V <sub>IN</sub> =2.8V ~ 12.0V	-	0.10	-	%/V
Load Regulation	ΔV <sub>o</sub> /ΔI <sub>o</sub>	V <sub>IN</sub> =3.8V, I <sub>o</sub> =1 ~ 500mA	-	120	160	mV
Quiescent Current	I <sub>DD</sub>	V <sub>IN</sub> =3.8V	-	30	60	μA
Ripple Rejection	RR	V <sub>IN</sub> =3.8V, e <sub>in</sub> =1V <sub>P-P</sub> f=120Hz, I <sub>o</sub> =300mA	-	57	-	dB
Output Noise Voltage	V <sub>NO</sub>	V <sub>IN</sub> =3.8V, I <sub>o</sub> =300mA BW=10Hz ~ 100kHz	-	65	-	μV
Vo=2.5V Version Output Voltage	V <sub>O</sub>	V <sub>IN</sub> =4.5V, I <sub>o</sub> =300mA	2.45	2.50	2.55	V
Input Voltage	V <sub>IN</sub>		-	-	14	V
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>o</sub> =300mA	-	0.4	0.6	V
Line Regulation	ΔV <sub>o</sub> /ΔV <sub>IN</sub> ·V <sub>o</sub>	V <sub>IN</sub> =3.5V ~ 12.0V	-	0.10	-	%/V
Load Regulation	ΔV <sub>o</sub> /ΔI <sub>o</sub>	V <sub>IN</sub> =4.5V, I <sub>o</sub> =1 ~ 500mA	-	120	160	mV
Quiescent Current	I <sub>DD</sub>	V <sub>IN</sub> =4.5V	-	30	60	μA
Ripple Rejection	RR	V <sub>IN</sub> =4.5V, e <sub>in</sub> =1V <sub>P-P</sub> f=120Hz, I <sub>o</sub> =300mA	-	57	-	dB
Output Noise Voltage	V <sub>NO</sub>	V <sub>IN</sub> =4.5V, I <sub>o</sub> =300mA BW=10Hz ~ 100kHz	-	110	-	μV
Vo=3.0V Version Output Voltage	V <sub>O</sub>	V <sub>IN</sub> =5.0V, I <sub>o</sub> =300mA	2.94	3.00	3.06	V
Input Voltage	V <sub>IN</sub>		-	-	14	V
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>o</sub> =300mA	-	0.4	0.6	V
Line Regulation	ΔV <sub>o</sub> /ΔV <sub>IN</sub> ·V <sub>o</sub>	V <sub>IN</sub> =4.0V ~ 12.0V	-	0.10	-	%/V
Load Regulation	ΔV <sub>o</sub> /ΔI <sub>o</sub>	V <sub>IN</sub> =5.0V, I <sub>o</sub> =1 ~ 500mA	-	120	160	mV
Quiescent Current	I <sub>DD</sub>	V <sub>IN</sub> =5.0V	-	30	60	μA
Ripple Rejection	RR	V <sub>IN</sub> =5.0V, e <sub>in</sub> =1V <sub>P-P</sub> f=120Hz, I <sub>o</sub> =300mA	-	57	-	dB
Output Noise Voltage	V <sub>NO</sub>	V <sub>IN</sub> =5.0V, I <sub>o</sub> =300mA BW=10Hz ~ 100kHz	-	115	-	μV

**■ ELECTRICAL CHARACTERISTICS (C<sub>IN</sub>=C<sub>O</sub>=0.1μF, T<sub>j</sub>=25°C)**

Measurement is to be conducted in pulse testing.

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Vo=3.3V Version Output Voltage	V <sub>O</sub>	V <sub>IN</sub> =5.3V, I <sub>o</sub> =300mA	3.234	3.30	3.366	V
Input Voltage	V <sub>IN</sub>		-	-	14	V
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>o</sub> =300mA	-	0.4	0.6	V
Line Regulation	ΔV <sub>o</sub> /ΔV <sub>IN</sub> ·V <sub>o</sub>	V <sub>IN</sub> =4.3V ~ 12.0V	-	0.10	-	%/V
Load Regulation	ΔV <sub>o</sub> /ΔI <sub>o</sub>	V <sub>IN</sub> =5.3V, I <sub>o</sub> =1 ~ 500mA	-	120	160	mV
Quiescent Current	I <sub>DD</sub>	V <sub>IN</sub> =5.3V	-	30	60	μA
Ripple Rejection	RR	V <sub>IN</sub> =5.3V, e <sub>in</sub> =1V <sub>P-P</sub> f=120Hz, I <sub>o</sub> =300mA	-	56	-	dB
Output Noise Voltage	V <sub>NO</sub>	V <sub>IN</sub> =5.3V, I <sub>o</sub> =300mA BW=10Hz ~ 100kHz	-	117	-	μV
Vo=5.0V Version Output Voltage	V <sub>O</sub>	V <sub>IN</sub> =7.0V, I <sub>o</sub> =500mA	4.90	5.00	5.10	V
Input Voltage	V <sub>IN</sub>		-	-	14	V
Dropout Voltage	ΔV <sub>IO</sub>	I <sub>o</sub> =500mA	-	0.4	0.6	V
Line Regulation	ΔV <sub>o</sub> /ΔV <sub>IN</sub> ·V <sub>o</sub>	V <sub>IN</sub> =6.0V ~ 12.0V	-	0.10	-	%/V
Load Regulation	ΔV <sub>o</sub> /ΔI <sub>o</sub>	V <sub>IN</sub> =7.0V, I <sub>o</sub> =1 ~ 500mA	-	120	160	mV
Quiescent Current	I <sub>DD</sub>	V <sub>IN</sub> =7.0V	-	30	60	μA
Ripple Rejection	RR	V <sub>IN</sub> =7.0V, e <sub>in</sub> =1V <sub>P-P</sub> f=120Hz, I <sub>o</sub> =300mA	-	55	-	dB
Output Noise Voltage	V <sub>NO</sub>	V <sub>IN</sub> =7.0V, I <sub>o</sub> =300mA BW=10Hz ~ 100kHz	-	122	-	μV

**[CAUTION]**

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