500mA Low Dropout Voltage Regulator

■ GENERAL DESCRIPTION

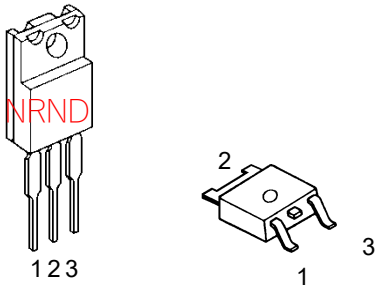
The NJU7223 series is a high precision output voltage, low drop output, low current consumption and high output current 3-terminal positive voltage regulator with a over current protection and a thermal shutdown.

Low dropout voltage is realized at high current output.

■ FEATURES

- High Precision Output ±2.0%
- Output Current Io(max.)=500mA
- Low Current Consumption Iq=30μA
- Low Dropout Voltage 0.4V typ. (Io=500mA,Vo=5.0V)
- Internal Over Current Protection
- Internal Thermal Shutdown Protection
- CMOS Technology
- Package Outline TO-220F, TO-252

■ PACKAGE OUTLINE

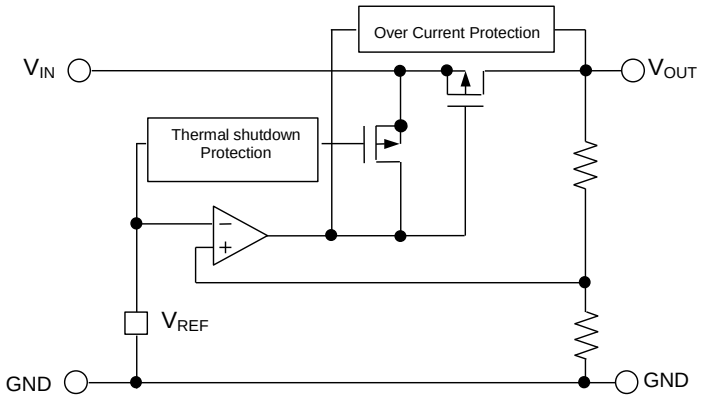


NJU7223F NJU7223DL1

■ PIN CONFIGURATION

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

■ EQUIVALENT CIRCUIT



■ OUTPUT VOLTAGE RANK LIST

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

■ 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) *1 TO-252 7.5(Tc≤56°C) *1	W
Operating Temperature Range	Topr	–40 ~ 85	°C
Storage Temperature Range	Tstg	–55 ~ 150	°C

*1) Infinite Heet Sink

■ THERMAL CHARACTERISTICS

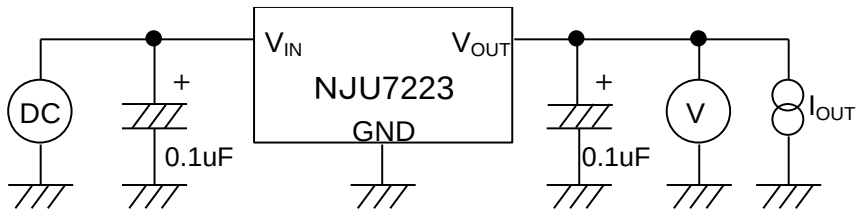
Package	Measurement Result		Unit
	Thermal Resistance (θja)	Thermal Characterization Parameter (ψjt)	
TO-252	141 *1 / 35 *2	32 *1 / 10 *2	°C/W

θja: Junction-to-Ambient Thermal Resistance, ψjt: Junction-to-Top Thermal Characterization Parameter

*1 2-Layer: Mounted on glass epoxy board (76.2 mm × 114.3 mm × 1.6 mm: based on EIA/JEDEC standard, 2-layer FR-4), Cu area: 100 mm^2

*2 4-Layer: Mounted on glass epoxy board (76.2 mm × 114.3 mm × 1.6 mm: based on EIA/JEDEC standard, 4-layer FR-4).
(For 4-layer: Applying 74.2 mm × 74.2 mm inner Cu area and a thermal via hole to a board based on JEDEC standard JESD51-5.)

■ TEST CIRCUIT



■ ELECTRICAL CHARACTERISTICS (C_{IN}=Co=0.1μF, Tj=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_O	V_{IN}=3.8V, Io=300mA	1.764	1.80	1.836	V
Input Voltage	V_{IN}		-	-	14	V
Dropout Voltage	ΔV_{IO}	Io=150mA	-	0.4	0.6	V
Line Regulation	$\Delta Vo/\Delta V_{IN}\cdot Vo$	V_{IN}=2.8V ~ 12.0V	-	0.10	-	%/V
Load Regulation	$\Delta Vo/\Delta Io$	V_{IN}=3.8V, Io=1 ~ 500mA	-	120	160	mV
Quiescent Current	I_{DD}	V_{IN}=3.8V	-	30	60	μA
Ripple Rejection	RR	V_{IN}=3.8V, ein=1V_{P-P} f=120Hz, Io=300mA	-	57	-	dB
Output Noise Voltage	V_{NO}	V_{IN}=3.8V, Io=300mA BW=10Hz ~ 100kHz	-	65	-	μV
Vo=2.5V Version Output Voltage	V_O	V_{IN}=4.5V, Io=300mA	2.45	2.50	2.55	V
Input Voltage	V_{IN}		-	-	14	V
Dropout Voltage	ΔV_{IO}	Io=300mA	-	0.4	0.6	V
Line Regulation	$\Delta Vo/\Delta V_{IN}\cdot Vo$	V_{IN}=3.5V ~ 12.0V	-	0.10	-	%/V
Load Regulation	$\Delta Vo/\Delta Io$	V_{IN}=4.5V, Io=1 ~ 500mA	-	120	160	mV
Quiescent Current	I_{DD}	V_{IN}=4.5V	-	30	60	μA
Ripple Rejection	RR	V_{IN}=4.5V, ein=1V_{P-P} f=120Hz, Io=300mA	-	57	-	dB
Output Noise Voltage	V_{NO}	V_{IN}=4.5V, Io=300mA BW=10Hz ~ 100kHz	-	110	-	μV
Vo=3.0V Version Output Voltage	V_O	V_{IN}=5.0V, Io=300mA	2.94	3.00	3.06	V
Input Voltage	V_{IN}		-	-	14	V
Dropout Voltage	ΔV_{IO}	Io=300mA	-	0.4	0.6	V
Line Regulation	$\Delta Vo/\Delta V_{IN}\cdot Vo$	V_{IN}=4.0V ~ 12.0V	-	0.10	-	%/V
Load Regulation	$\Delta Vo/\Delta Io$	V_{IN}=5.0V, Io=1 ~ 500mA	-	120	160	mV
Quiescent Current	I_{DD}	V_{IN}=5.0V	-	30	60	μA
Ripple Rejection	RR	V_{IN}=5.0V, ein=1V_{P-P} f=120Hz, Io=300mA	-	57	-	dB
Output Noise Voltage	V_{NO}	V_{IN}=5.0V, Io=300mA BW=10Hz ~ 100kHz	-	115	-	μV

■ ELECTRICAL CHARACTERISTICS (C_{IN}=Co=0.1μF, Tj=25°C)

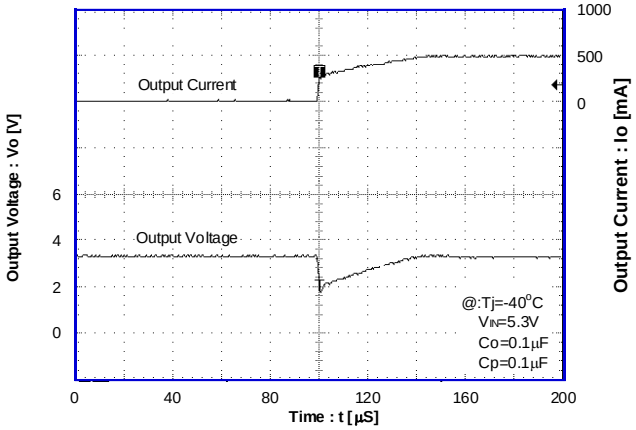
Measurement is to be conducted in pulse testing.

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Vo=3.3V Version Output Voltage	V_O	V_{IN}=5.3V, Io=300mA	3.234	3.30	3.366	V
Input Voltage	V_{IN}		-	-	14	V
Dropout Voltage	ΔV_{IO}	Io=300mA	-	0.4	0.6	V
Line Regulation	$\Delta Vo/\Delta V_{IN} \cdot Vo$	V_{IN}=4.3V ~ 12.0V	-	0.10	-	%/V
Load Regulation	$\Delta Vo/\Delta Io$	V_{IN}=5.3V, Io=1 ~ 500mA	-	120	160	mV
Quiescent Current	I_{DD}	V_{IN}=5.3V	-	30	60	μA
Ripple Rejection	RR	V_{IN}=5.3V, ein=1V_{P-P} f=120Hz, Io=300mA	-	56	-	dB
Output Noise Voltage	V_{NO}	V_{IN}=5.3V, Io=300mA BW=10Hz ~ 100kHz	-	117	-	μV
Vo=5.0V Version Output Voltage	V_O	V_{IN}=7.0V, Io=500mA	4.90	5.00	5.10	V
Input Voltage	V_{IN}		-	-	14	V
Dropout Voltage	ΔV_{IO}	Io=500mA	-	0.4	0.6	V
Line Regulation	$\Delta Vo/\Delta V_{IN} \cdot Vo$	V_{IN}=6.0V ~ 12.0V	-	0.10	-	%/V
Load Regulation	$\Delta Vo/\Delta Io$	V_{IN}=7.0V, Io=1 ~ 500mA	-	120	160	mV
Quiescent Current	I_{DD}	V_{IN}=7.0V	-	30	60	μA
Ripple Rejection	RR	V_{IN}=7.0V, ein=1V_{P-P} f=120Hz, Io=300mA	-	55	-	dB
Output Noise Voltage	V_{NO}	V_{IN}=7.0V, Io=300mA BW=10Hz ~ 100kHz	-	122	-	μV

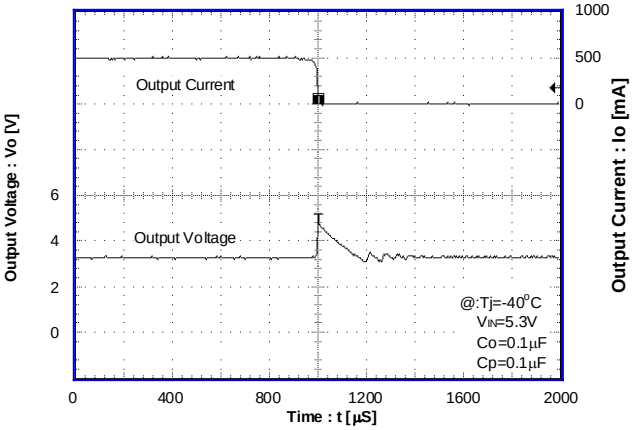
■ TYPICAL CHARACTERISTICS

Load Transient Response (Vo=3.3V version)

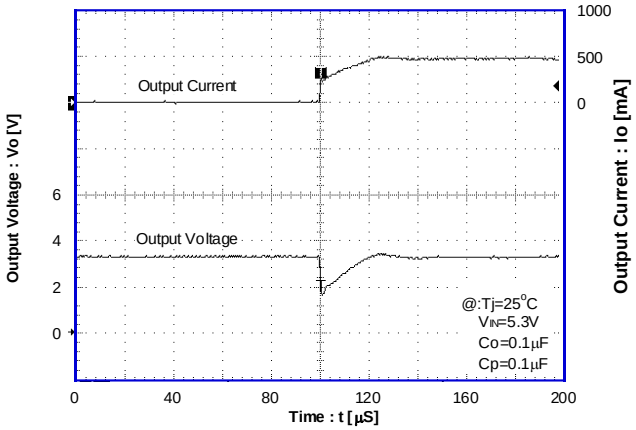
NJU7223_3.3V
Load Transient Response (Io=1-500mA)



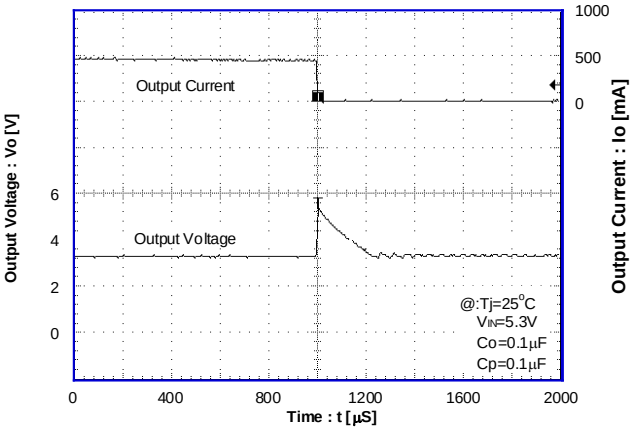
NJU7223_3.3V
Load Transient Response (Io=500-1mA)



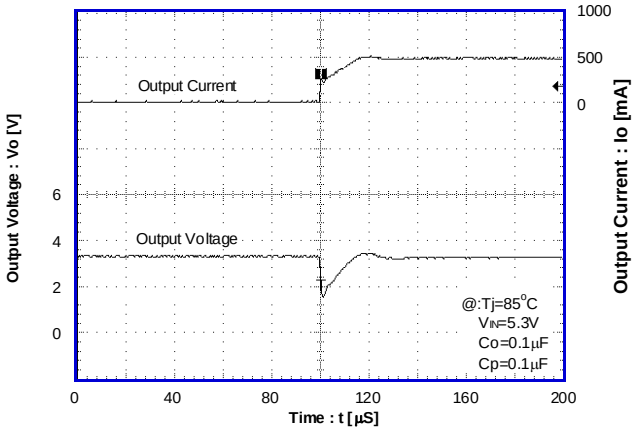
NJU7223_3.3V
Load Transient Response (Io=1-500mA)



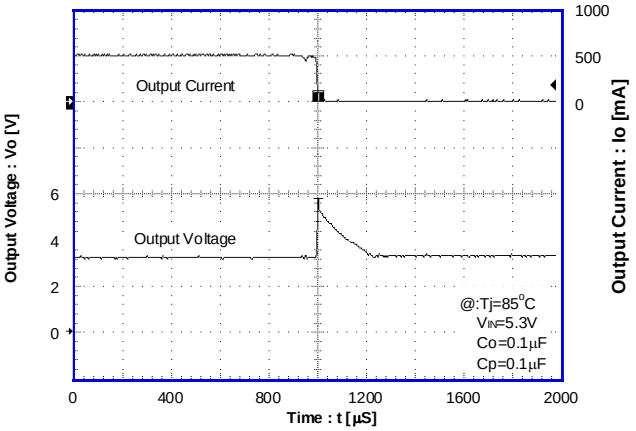
NJU7223_3.3V
Load Transient Response (Io=500-1mA)



NJU7223_3.3V
Load Transient Response (Io=1-500mA)



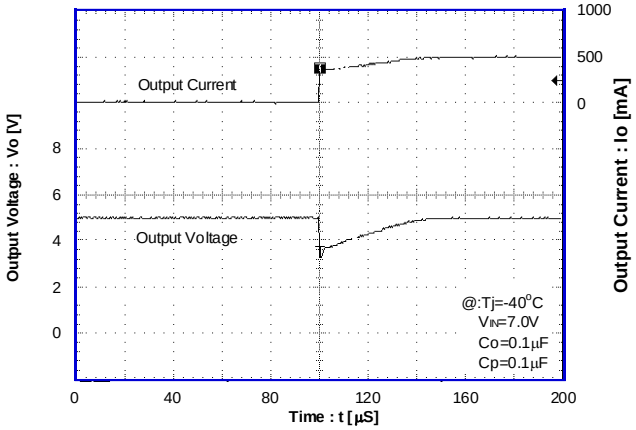
NJU7223_3.3V
Load Transient Response (Io=500-1mA)



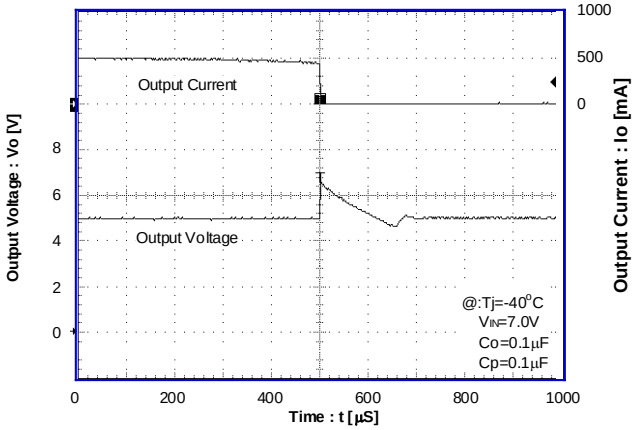
■ TYPICAL CHARACTERISTICS

Load Transient Response (Vo=5.0V version)

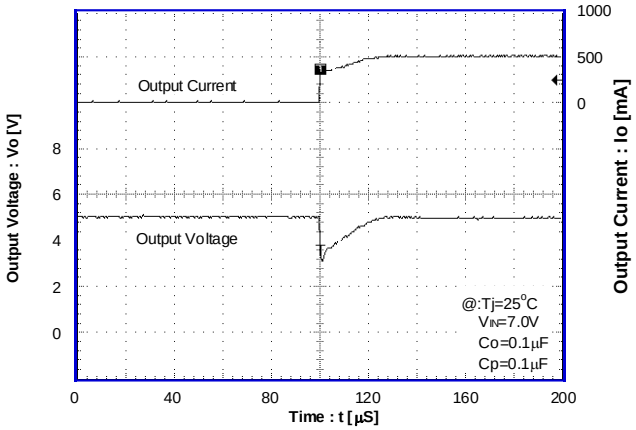
NJU7223_5.0V
Load Transient Response (Io=1-500mA)



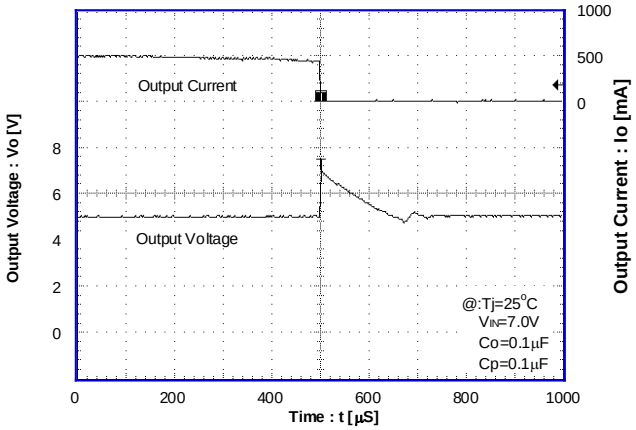
NJU7223_5.0V
Load Transient Response (Io=500-1mA)



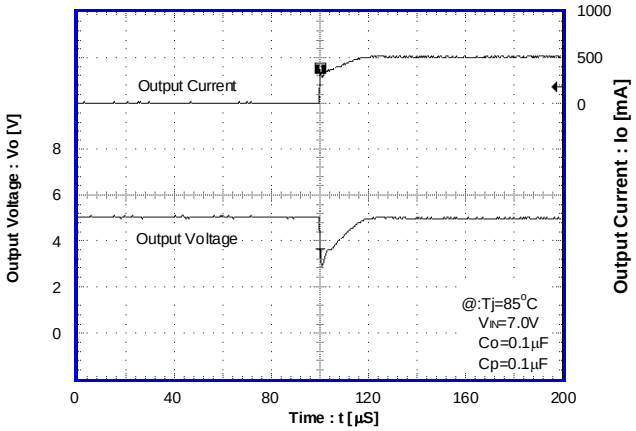
NJU7223_5.0V
Load Transient Response (Io=1-500mA)



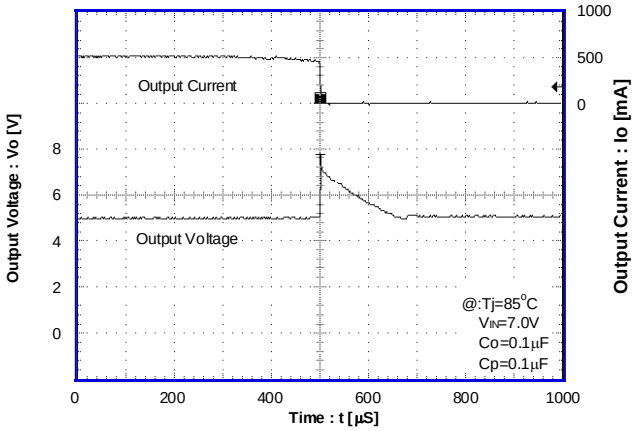
NJU7223_5.0V
Load Transient Response (Io=500-1mA)



NJU7223_5.0V
Load Transient Response (Io=1-500mA)



NJU7223_5.0V
Load Transient Response (Io=500-1mA)



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