

500mA Low Dropout Voltage Regulator

■ GENERAL DESCRIPTION

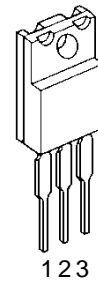
The NJU7223 series is a high precision output voltage, low drop output, low current consumption and high output current 3-terminal positive voltage regulator with a over current protection and a thermal shutdown.

Low dropout voltage is realized at high current output.

■ FEATURES

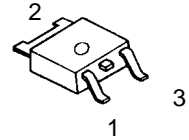
- High Precision Output $\pm 2.0\%$
- Output Current $I_o(\text{max.})=500\text{mA}$
- Low Current Consumption $I_q=30\mu\text{A}$
- Low Dropout Voltage $0.4\text{V typ. } (I_o=500\text{mA}, V_o=5.0\text{V})$
- Internal Over Current Protection
- Internal Thermal Shutdown Protection
- CMOS Technology
- Package Outline TO-220F, TO-252

■ PACKAGE OUTLINE



1 2 3

NJU7223F



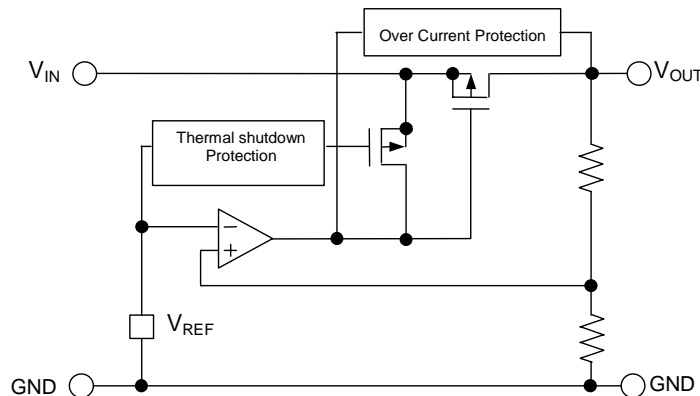
2 1 3

NJU7223DL1

■ PIN CONFIGURATION

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

■ EQUIVALENT CIRCUIT



■ OUTPUT VOLTAGE RANK LIST

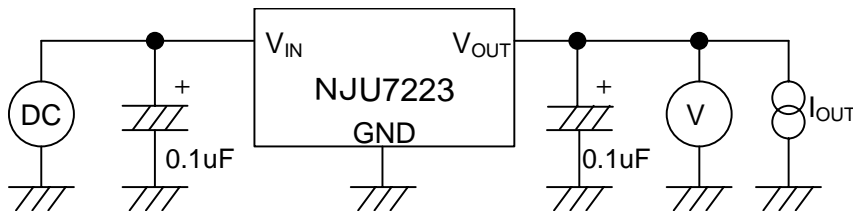
| V_{OUT} | TO-220F | TO-252 |
|-----------|------------|---------------|
| +1.8V | NJU7223F18 | NJU7223DL1-18 |
| +2.5V | NJU7223F25 | NJU7223DL1-25 |
| +3.0V | NJU7223F30 | NJU7223DL1-30 |
| +3.3V | NJU7223F33 | NJU7223DL1-33 |
| +5.0V | NJU7223F50 | NJU7223DL1-50 |

NJU7223

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

Measurement is to be conducted in pulse testing.

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|------------------------|-------------------------------------|--|-------|------|-------|---------|
| Vo=1.8V Version | | | | | | |
| Output Voltage | V_O | $V_{IN}=3.8V$, $I_o=300mA$ | 1.764 | 1.80 | 1.836 | V |
| Input Voltage | V_{IN} | | - | - | 14 | V |
| Dropout Voltage | ΔV_{IO} | $I_o=150mA$ | - | 0.4 | 0.6 | V |
| Line Regulation | $\Delta V_o/\Delta V_{IN}\cdot V_o$ | $V_{IN}=2.8V \sim 12.0V$ | - | 0.10 | - | %/V |
| Load Regulation | $\Delta V_o/\Delta I_o$ | $V_{IN}=3.8V$, $I_o=1 \sim 500mA$ | - | 120 | 160 | mV |
| Quiescent Current | I_{DD} | $V_{IN}=3.8V$ | - | 30 | 60 | μA |
| Ripple Rejection | RR | $V_{IN}=3.8V$, $e_{in}=1V_{P-P}$ $f=120Hz$, $I_o=300mA$ | - | 57 | - | dB |
| Output Noise Voltage | V_{NO} | $V_{IN}=3.8V$, $I_o=300mA$ $BW=10Hz \sim 100kHz$ | - | 65 | - | μV |
| Vo=2.5V Version | | | | | | |
| Output Voltage | V_O | $V_{IN}=4.5V$, $I_o=300mA$ | 2.45 | 2.50 | 2.55 | V |
| Input Voltage | V_{IN} | | - | - | 14 | V |
| Dropout Voltage | ΔV_{IO} | $I_o=300mA$ | - | 0.4 | 0.6 | V |
| Line Regulation | $\Delta V_o/\Delta V_{IN}\cdot V_o$ | $V_{IN}=3.5V \sim 12.0V$ | - | 0.10 | - | %/V |
| Load Regulation | $\Delta V_o/\Delta I_o$ | $V_{IN}=4.5V$, $I_o=1 \sim 500mA$ | - | 120 | 160 | mV |
| Quiescent Current | I_{DD} | $V_{IN}=4.5V$ | - | 30 | 60 | μA |
| Ripple Rejection | RR | $V_{IN}=4.5V$, $e_{in}=1V_{P-P}$ $f=120Hz$, $I_o=300mA$ | - | 57 | - | dB |
| Output Noise Voltage | V_{NO} | $V_{IN}=4.5V$, $I_o=300mA$ $BW=10Hz \sim 100kHz$ | - | 110 | - | μV |
| Vo=3.0V Version | | | | | | |
| Output Voltage | V_O | $V_{IN}=5.0V$, $I_o=300mA$ | 2.94 | 3.00 | 3.06 | V |
| Input Voltage | V_{IN} | | - | - | 14 | V |
| Dropout Voltage | ΔV_{IO} | $I_o=300mA$ | - | 0.4 | 0.6 | V |
| Line Regulation | $\Delta V_o/\Delta V_{IN}\cdot V_o$ | $V_{IN}=4.0V \sim 12.0V$ | - | 0.10 | - | %/V |
| Load Regulation | $\Delta V_o/\Delta I_o$ | $V_{IN}=5.0V$, $I_o=1 \sim 500mA$ | - | 120 | 160 | mV |
| Quiescent Current | I_{DD} | $V_{IN}=5.0V$ | - | 30 | 60 | μA |
| Ripple Rejection | RR | $V_{IN}=5.0V$, $e_{in}=1V_{P-P}$ $f=120Hz$, $I_o=300mA$ | - | 57 | - | dB |
| Output Noise Voltage | V_{NO} | $V_{IN}=5.0V$, $I_o=300mA$ $BW=10Hz \sim 100kHz$ | - | 115 | - | μV |

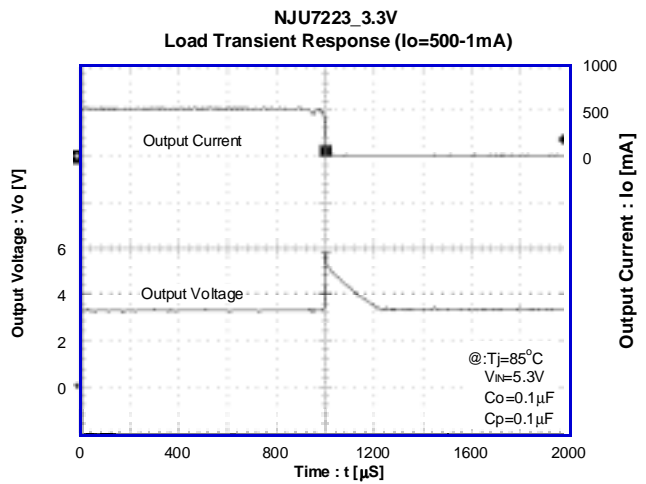
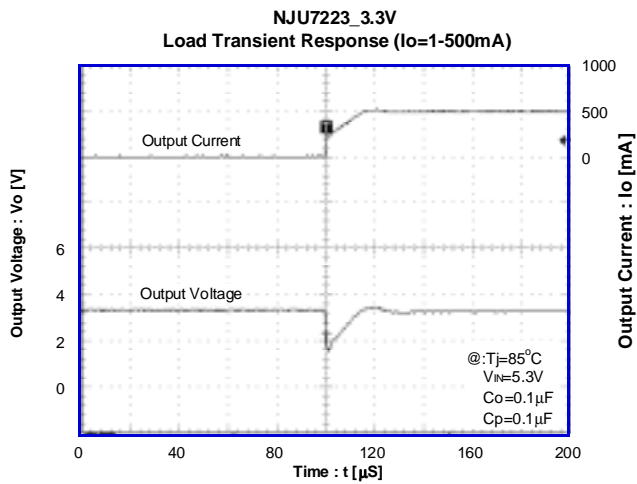
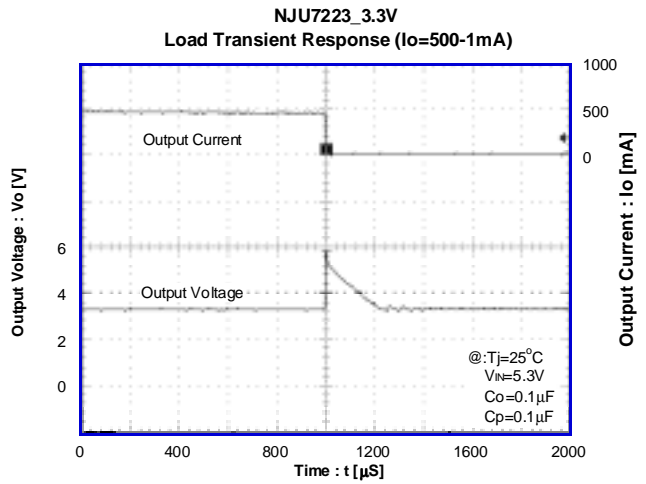
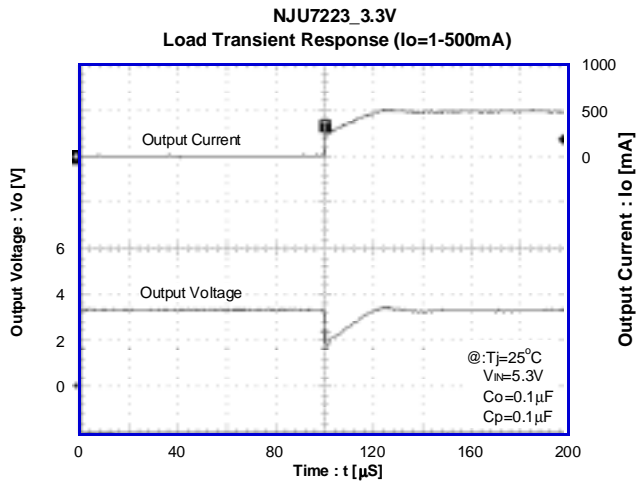
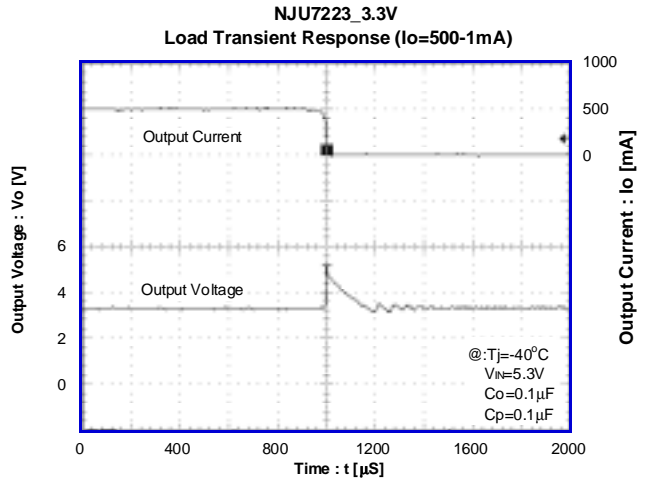
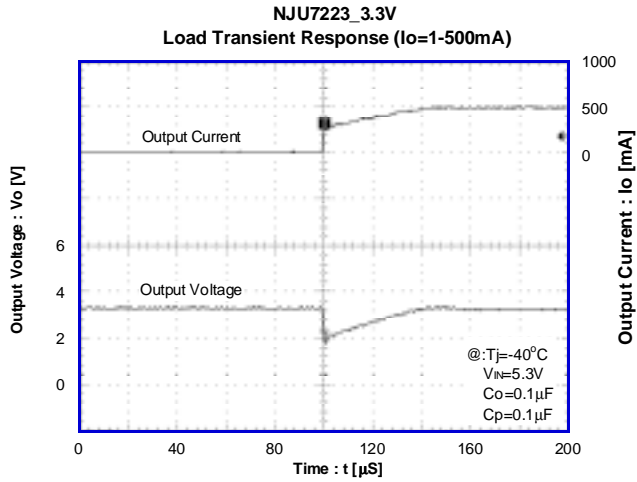
■ ELECTRICAL CHARACTERISTICS ($C_{IN}=C_O=0.1\mu F$, $T_j=25^\circ C$)

Measurement is to be conducted in pulse testing.

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

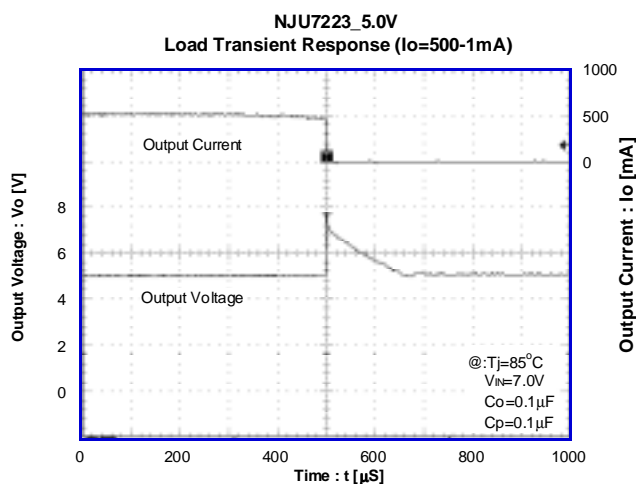
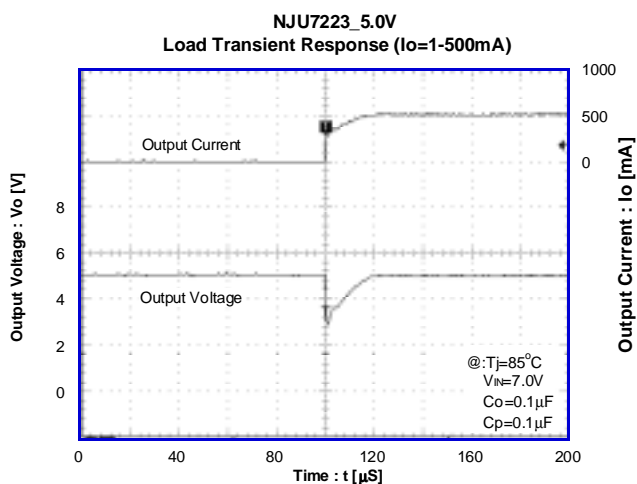
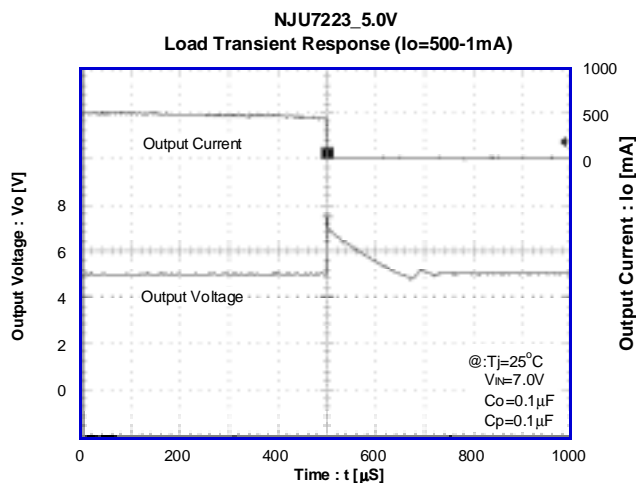
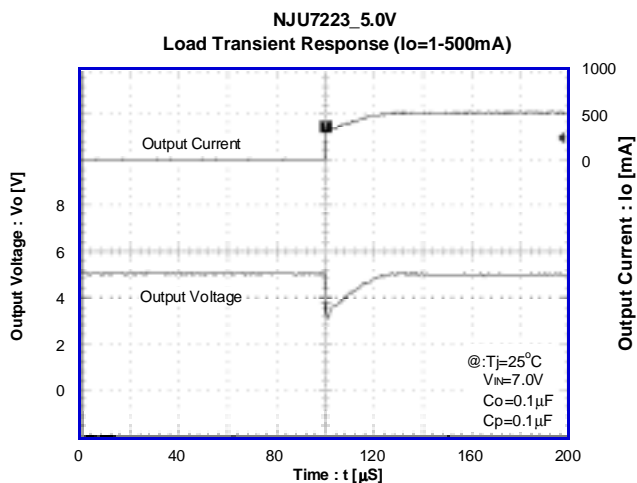
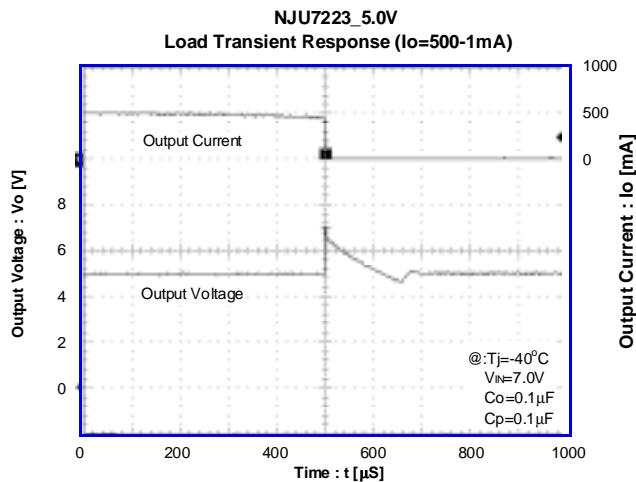
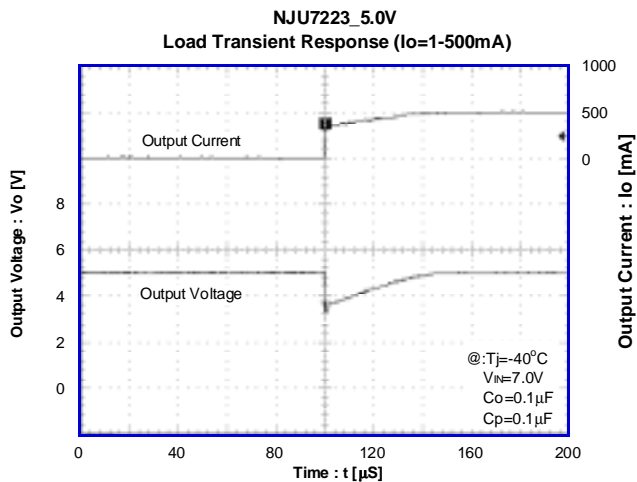
■ TYPICAL CHARACTERISTICS

Load Transient Response (Vo=3.3V version)



■ TYPICAL CHARACTERISTICS

Load Transient Response (Vo=5.0V version)



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