

## LOW DROPOUT VOLTAGE REGULATOR

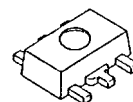
## ■ GENERAL DESCRIPTION

The NJU7790 is a 500mA output low dropout voltage regulator with ON/OFF control.

Advanced CMOS technology achieves high ripple rejection and low quiescent current.

Small packaging and 2.2μF small decoupling capacitor make the NJU7790 suitable for space conscious applications.

## ■ PACKAGE OUTLINE

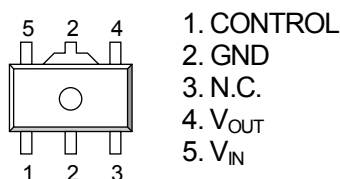


NJU7790U1

## ■ FEATURES

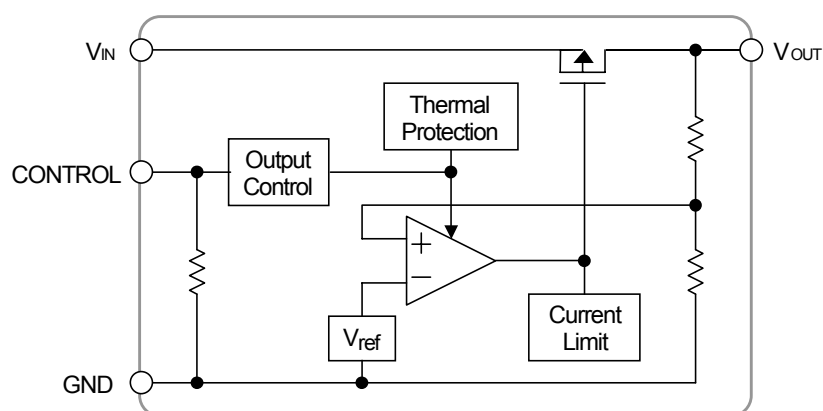
- High Ripple Rejection                      65dB typ. (f=400Hz, Vo=3.0V Version)
- Low quiescent Current                      Iq=30μA typ. (Io=0mA)
- Output Current                                Io(max.)=500mA
- High Precision Output                      Vo±1.0%
- Output capacitor with 2.2μF ceramic capacitor (Vo≥2.1V version)
- Low Dropout Voltage                      0.14V typ. (Io=300mA, Vo=3.0V Version)
- ON/OFF Control
- Internal Thermal Overload Protection
- Internal Over Current Protection
- CMOS Technology
- Package Outline                                SOT-89-5

## ■ PIN CONFIGURATION



NJU7790U1

### ■ EQUIVALENT CIRCUIT



## ■ OUTPUT VOLTAGE RANK LIST

| Device Name  | V <sub>OUT</sub> |
|--------------|------------------|
| NJU7790U1-15 | 1.5V             |
| NJU7790U1-21 | 2.1V             |
| NJU7790U1-03 | 3.0V             |
| NJU7790U1-33 | 3.3V             |
| NJU7790U1-05 | 5.0V             |

## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER             | SYMBOL            | RATINGS  | UNIT |
|-----------------------|-------------------|----------|------|
| Input Voltage         | V <sub>IN</sub>   | +9       | V    |
| Control Voltage       | V <sub>CONT</sub> | +9(*1)   | V    |
| Power Dissipation     | P <sub>D</sub>    | 350(*2)  | mW   |
| Operating Temperature | Topr              | -40~+85  | °C   |
| Storage Temperature   | Tstg              | -40~+125 | °C   |

(\*1) : When input voltage is less than +10V, the absolute maximum control voltage is equal to the input voltage.

(\*2) : Device itself.

## ■ Operating voltage

V<sub>IN</sub>=+2.3 ~ +8V (In case of Vo<2.1V version)

## ■ ELECTRICAL CHARACTERISTICS (V<sub>IN</sub>=Vo+1V, C<sub>IN</sub>=1.0μF, Co=2.2μF(Co=4.7μF: Vo≤2.0V), Ta=25°C)

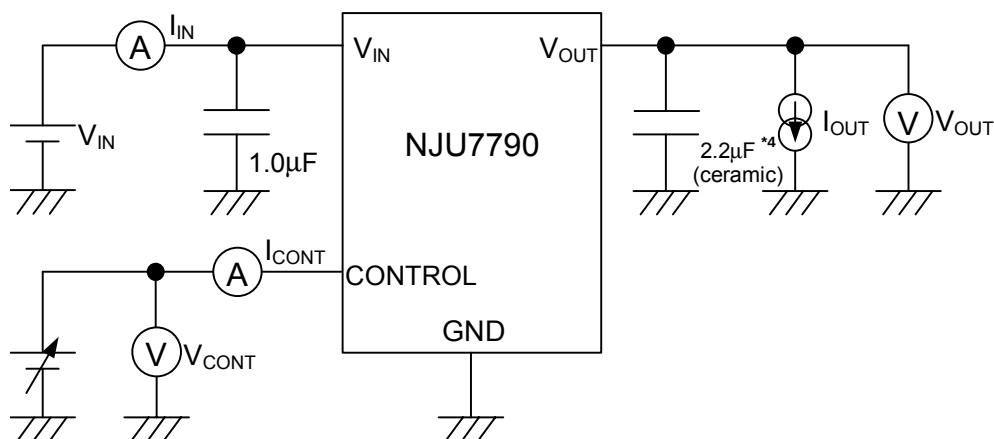
| PARAMETER                                         | SYMBOL                 | TEST CONDITION                                                                                                             | MIN.         | TYP. | MAX.  | UNIT   |
|---------------------------------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------|--------------|------|-------|--------|
| Output Voltage                                    | Vo                     | I <sub>o</sub> =30mA                                                                                                       | -1.0%        | —    | +1.0% | V      |
| Input Voltage                                     | V <sub>IN</sub>        |                                                                                                                            | —            | —    | 8     | V      |
| Quiescent Current                                 | I <sub>Q</sub>         | I <sub>o</sub> =0mA, V <sub>CONT</sub> =V <sub>IN</sub> , Include I <sub>CONT</sub>                                        | —            | 30   | 60    | μA     |
| Quiescent Current at Control OFF                  | I <sub>Q(OFF)</sub>    | V <sub>CONT</sub> =0V                                                                                                      | —            | 0.1  | 1.0   | μA     |
| Output Current                                    | I <sub>o</sub>         | Vo - 0.1V (Vo≤2.0V Version)<br>Vo - 0.3V (Vo≥2.1V Version)                                                                 | 500          | —    | —     | mA     |
| Short Current Limit                               | I <sub>LIM</sub>       | Vo=0V                                                                                                                      | —            | 180  | —     | mA     |
| Line Regulation                                   | ΔVo/ΔV <sub>IN</sub>   | V <sub>IN</sub> =Vo+1V ~ Vo+6.0V (Vo<2V Version)<br>V <sub>IN</sub> =Vo+1V ~ 8.0V (Vo≥2V Version),<br>I <sub>o</sub> =30mA | —            | —    | 0.15  | %/V    |
| Load Regulation                                   | ΔVo/ΔI <sub>o</sub>    | I <sub>o</sub> =0 ~ 500mA                                                                                                  | —            | —    | 0.005 | %/mA   |
| Dropout Voltage(*3)                               | ΔV <sub>LO</sub>       | I <sub>o</sub> =300mA                                                                                                      | 2.1V≤Vo<2.5V | —    | 0.17  | 0.22 V |
|                                                   |                        |                                                                                                                            | 2.5V≤Vo<2.9V | —    | 0.15  | 0.19 V |
|                                                   |                        |                                                                                                                            | 2.9V≤Vo<3.5V | —    | 0.14  | 0.18 V |
|                                                   |                        |                                                                                                                            | 3.5V≤Vo≤5.0V | —    | 0.12  | 0.16 V |
| Ripple Rejection                                  | RR                     | e <sub>in</sub> =200mVrms, f=400Hz, I <sub>o</sub> =10mA,<br>Vo=3V Version                                                 | —            | 65   | —     | dB     |
| Average Temperature Coefficient of Output Voltage | ΔVo/ΔTa                | Ta=0 ~ +85°C, I <sub>o</sub> =10mA                                                                                         | —            | ±100 | —     | ppm/°C |
| Output Noise Voltage                              | V <sub>NO</sub>        | f=10Hz ~ 80kHz, I <sub>o</sub> =10mA,<br>Vo=3V Version                                                                     | —            | 75   | —     | μVrms  |
| Pull-down Resistance                              | R <sub>CONT</sub>      |                                                                                                                            | 2            | 5    | 10    | MΩ     |
| Control Voltage for ON-state                      | V <sub>CONT(ON)</sub>  |                                                                                                                            | 1.6          | —    | —     | V      |
| Control Voltage for OFF-state                     | V <sub>CONT(OFF)</sub> |                                                                                                                            | —            | —    | 0.3   | V      |

(\*3): Except output voltage less than 2.1V.

The above specification is a common specification for all output voltages.

Therefore, it may be different from the individual specification for a specific output voltage.

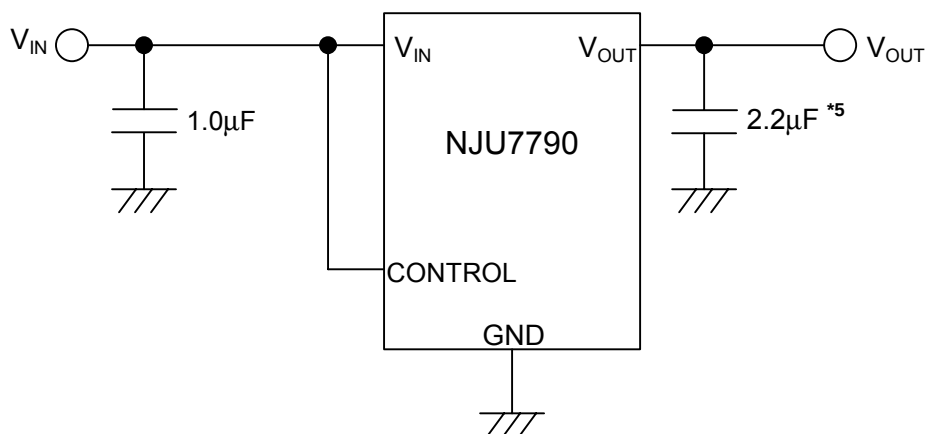
## ■ TEST CIRCUIT



\*4  $V_O \leq 2.0V$  version:  $C_O = 4.7\mu F$  (ceramic)

## ■ TYPICAL APPLICATION

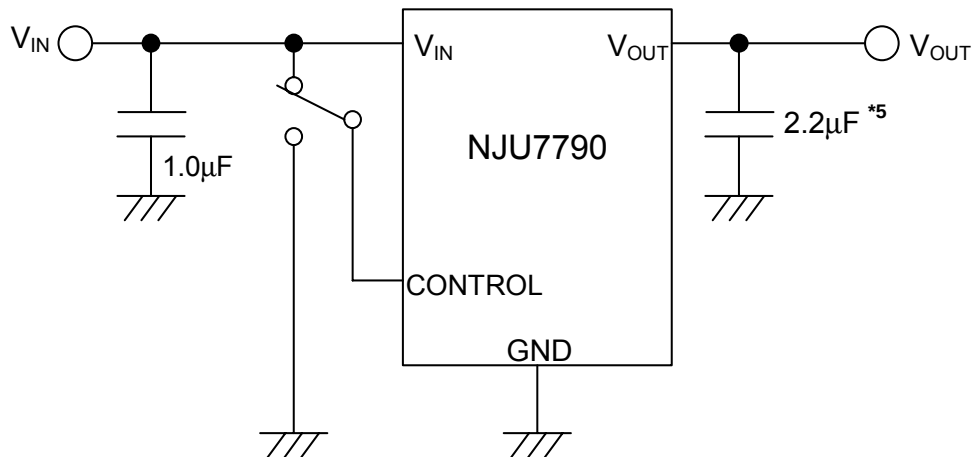
① In case that ON/OFF Control is not required:



\*5:  $V_O \leq 2.0V$  version:  $C_O = 4.7\mu F$

Connect control terminal to  $V_{IN}$  terminal.

## ② In use of ON/OFF Control



\*5:  $V_O \leq 2.0V$  version:  $C_O = 4.7\mu F$

State of control terminal:

- "H" → output is enabled.
- "L" or "open" → output is disabled.

### \*Input Capacitance $C_{IN}$

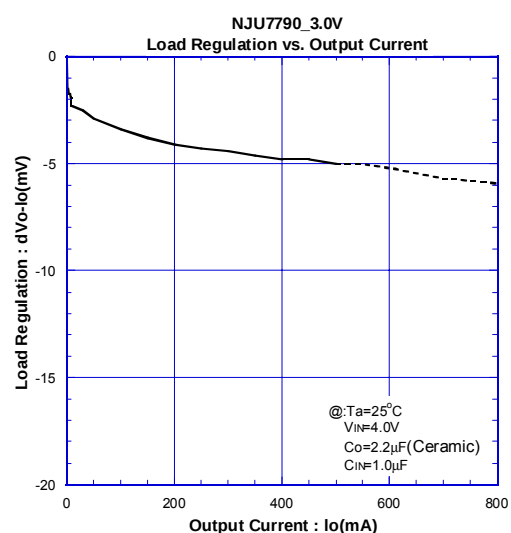
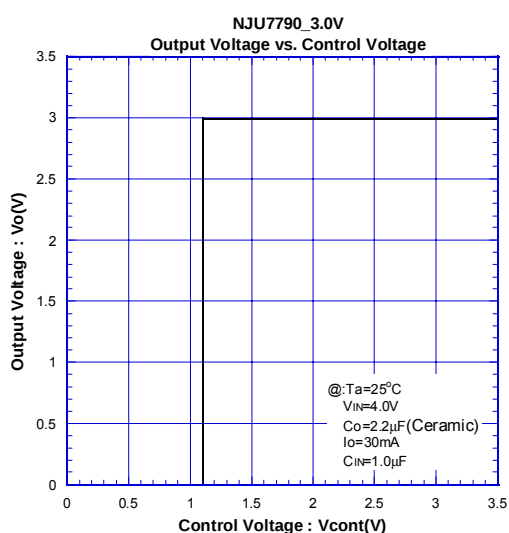
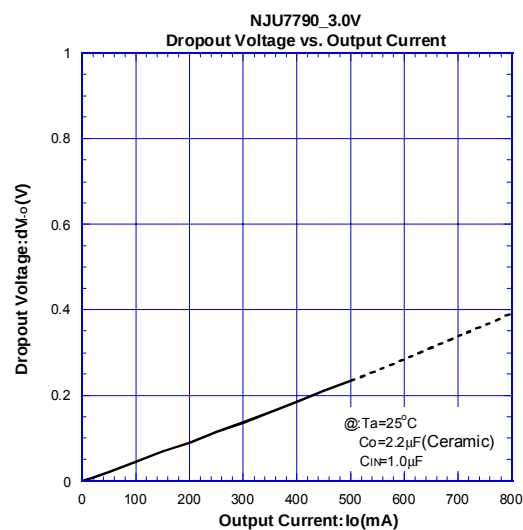
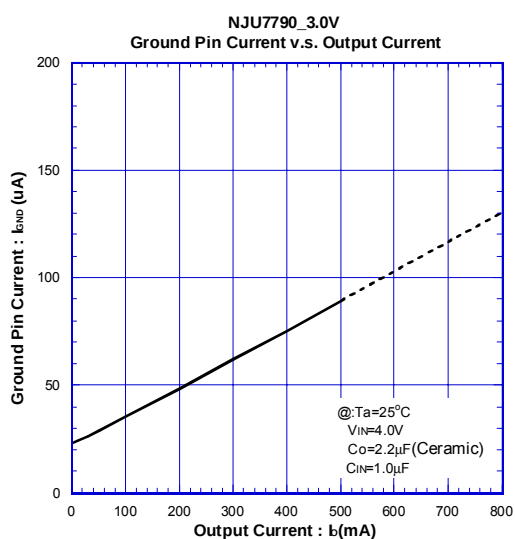
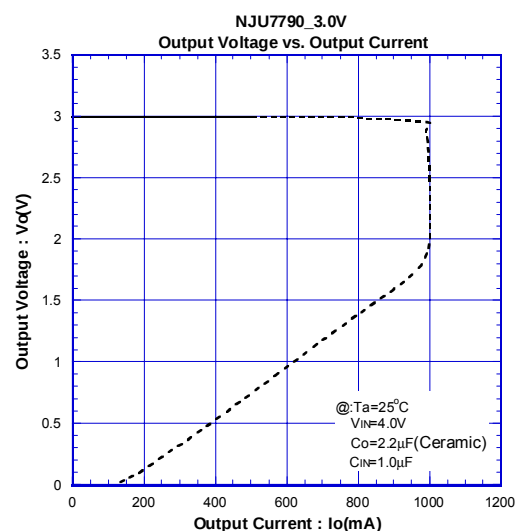
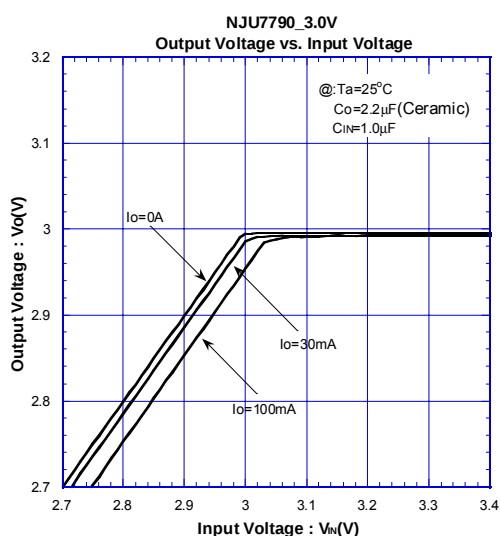
Input Capacitance  $C_{IN}$  is required to prevent oscillation and reduce power supply ripple for applications with high power supply impedance or a long power supply line.

Use the  $C_{IN}$  value of  $1.0\mu F$  greater to avoid the problem.

$C_{IN}$  should connect between GND and  $V_{IN}$  as short as possible.

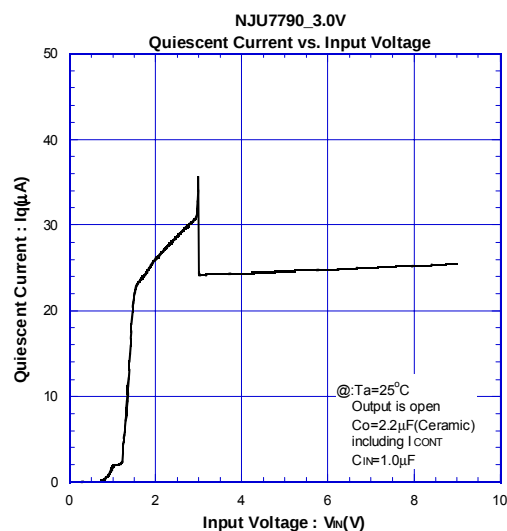
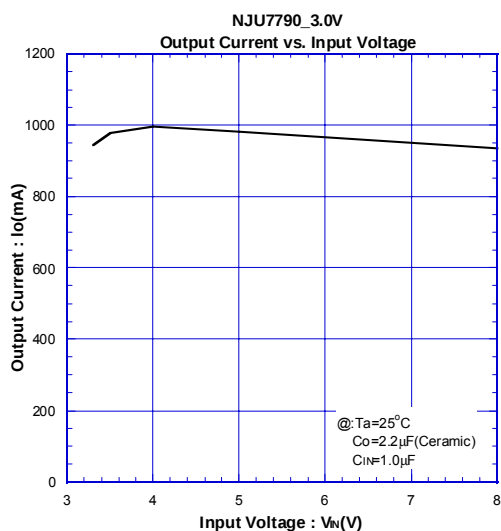
## ■ TYPICAL CHARACTERISTICS

### ● DC CHARACTERISTICS

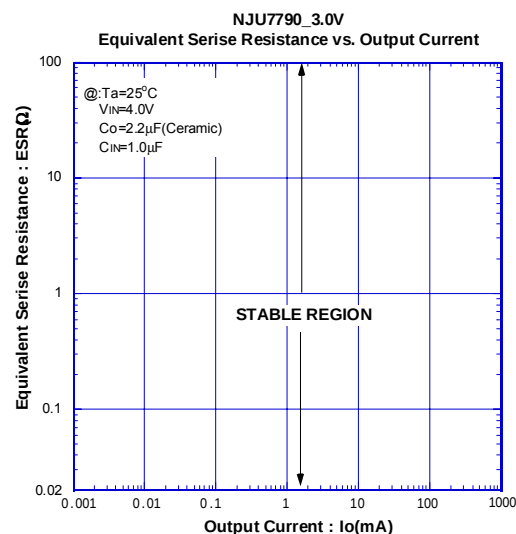
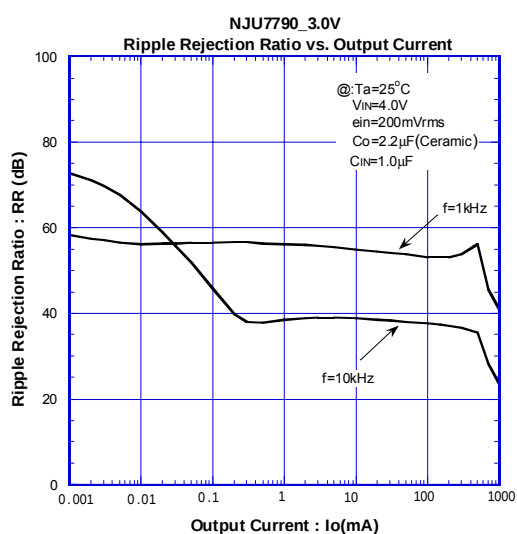
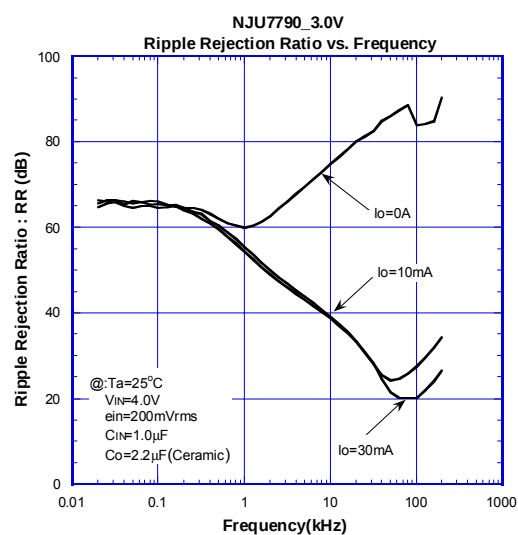
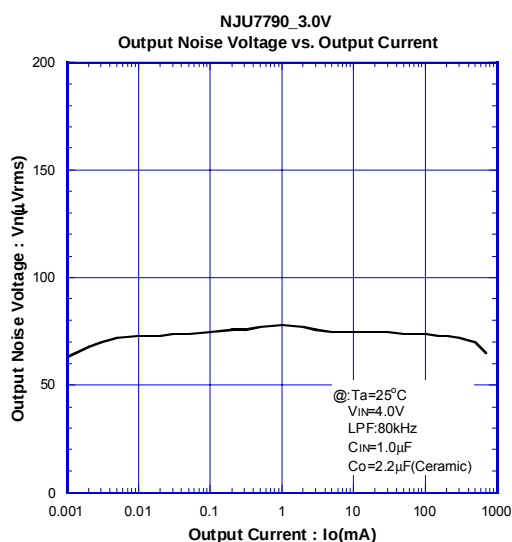


## ■ TYPICAL CHARACTERISTICS

### ● DC CHARACTERISTICS

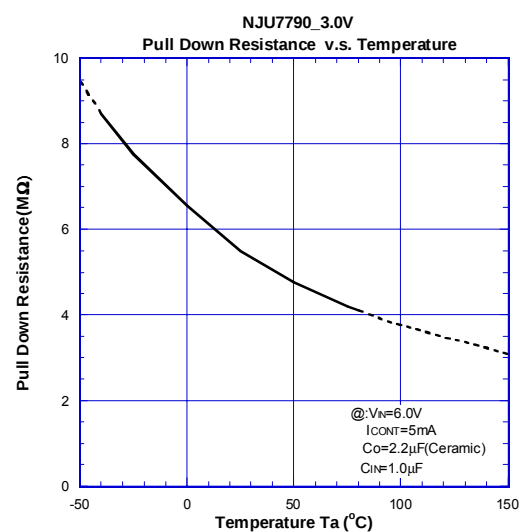
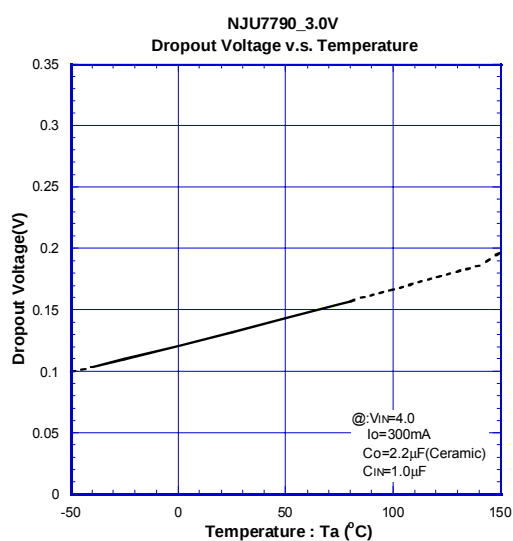
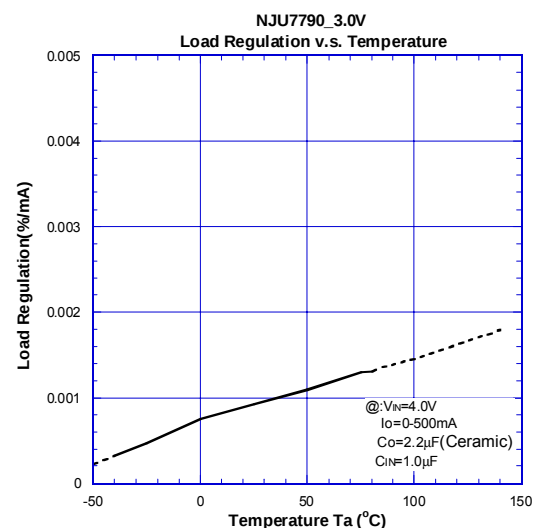
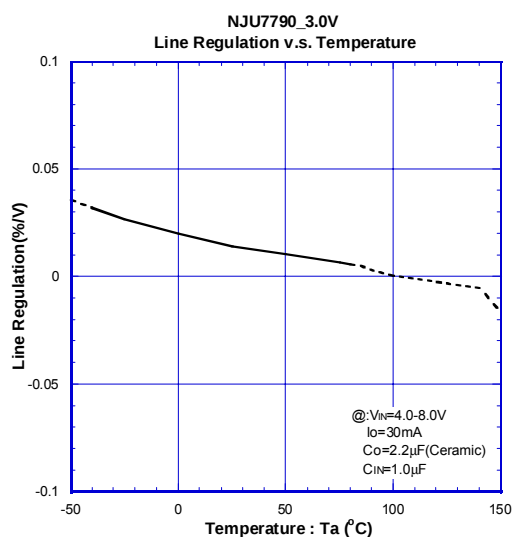
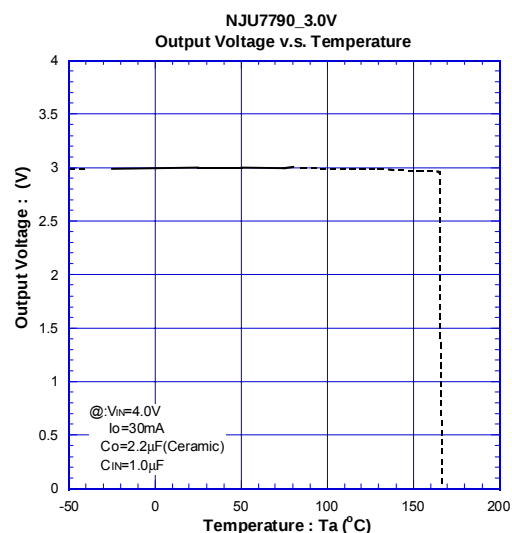
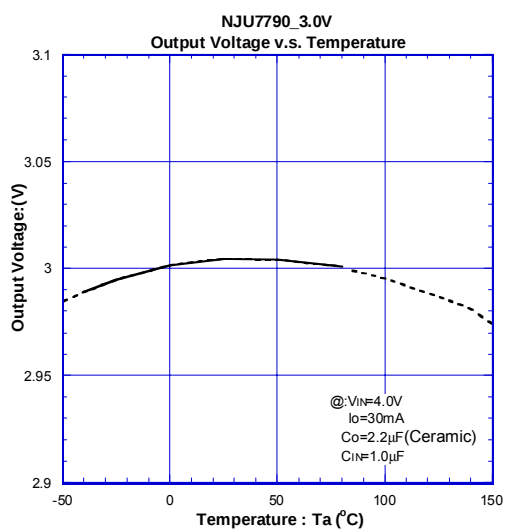


### ● AC CHARACTERISTICS



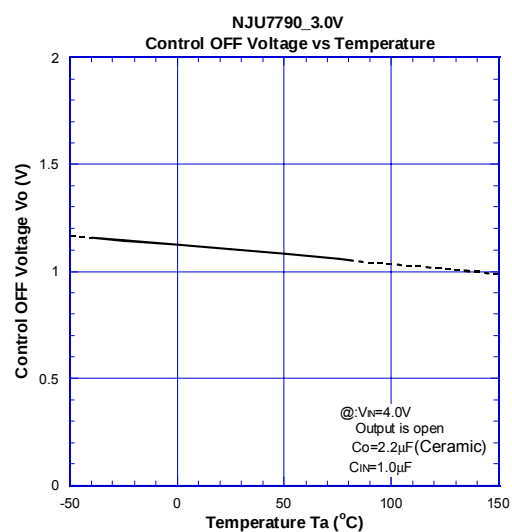
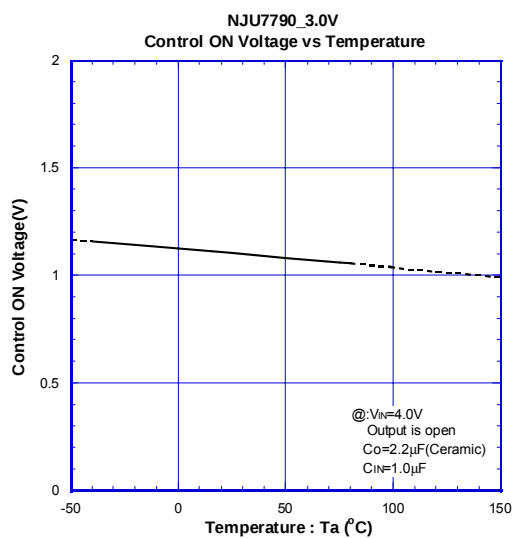
## ■ TYPICAL CHARACTERISTICS

### ● TEMPERATURE CHARACTERISTICS



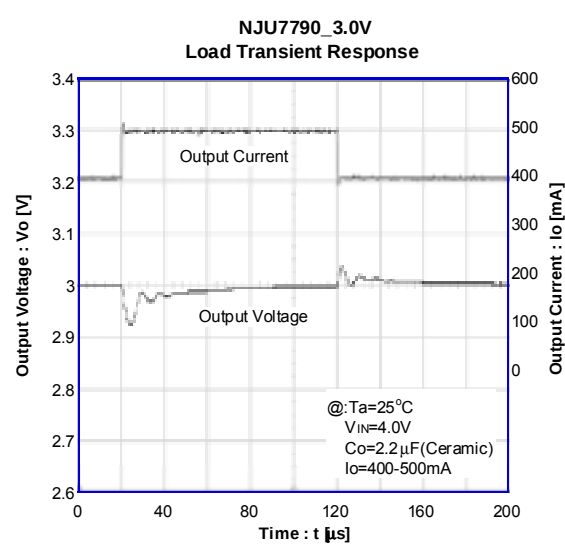
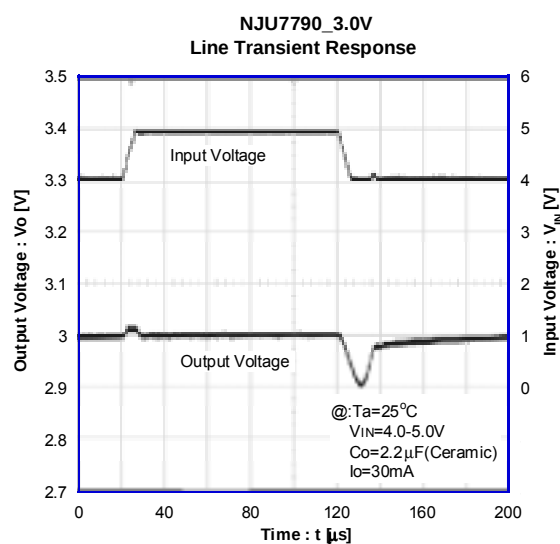
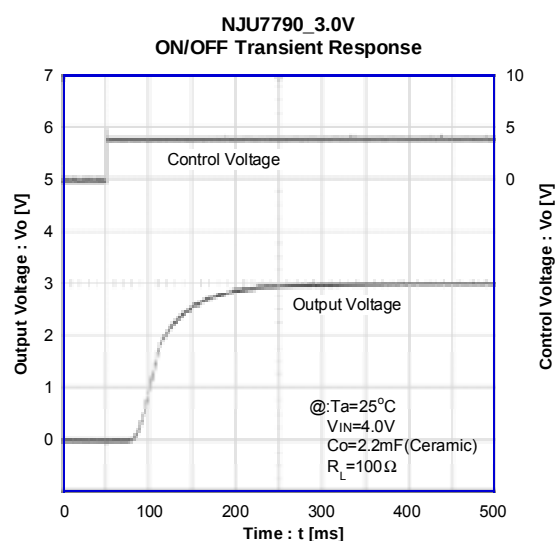
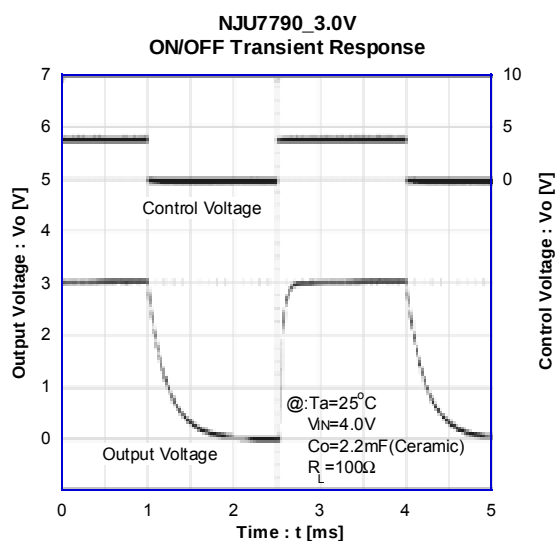
## ■ TYPICAL CHARACTERISTICS

### ● TEMPERATURE CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS

### ● TRANSIENT RESPONSE



#### [CAUTION]

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