

## LOW DROPOUT VOLTAGE REGULATOR

### ■ GENERAL DESCRIPTION

The NJM2860 is a low dropout voltage regulator.

Advanced Bipolar technology achieves low noise, high ripple rejection and low quiescent current.

It features small SC-88A package.

### ■ PACKAGE OUTLINE

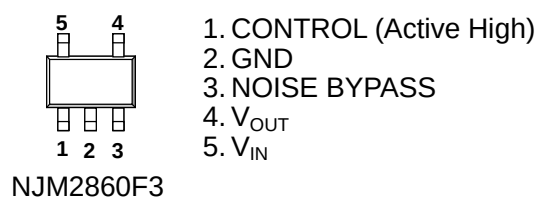


NJM2860F3

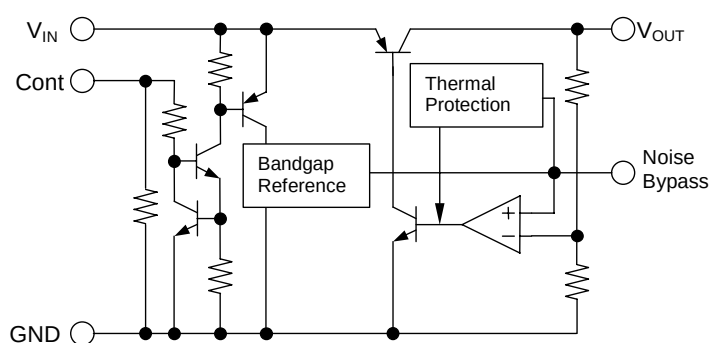
### ■ FEATURES

- High Ripple Rejection 70dB typ. ( $f=1\text{kHz}$ ,  $V_o=3\text{V}$  Version)
- Output Noise Voltage  $V_{no}=30\mu\text{V}_{\text{rms}}$  typ. ( $C_p=0.01\mu\text{F}$ )
- Output capacitor with  $1.0\mu\text{F}$  ceramic capacitor ( $V_o\geq 2.7\text{V}$ )
- Output Current  $I_o(\text{max.})=100\text{mA}$
- High Precision Output  $V_o\pm 1.0\%$
- Low Dropout Voltage  $0.10\text{V}$  typ. ( $I_o=60\text{mA}$ )
- ON/OFF Control (Active High)
- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Bipolar Technology
- Package Outline SC88A

### ■ PIN CONFIGURATION



### ■ EQUIVALENT CIRCUIT



## ■ OUTPUT VOLTAGE RANK LIST

| Device Name  | V <sub>OUT</sub> |
|--------------|------------------|
| NJM2860F3-15 | 1.5V             |
| NJM2860F3-18 | 1.8V             |
| NJM2860F3-19 | 1.9V             |
| NJM2860F3-21 | 2.1V             |
| NJM2860F3-25 | 2.5V             |
| NJM2860F3-26 | 2.6V             |
| NJM2860F3-27 | 2.7V             |

| Device Name   | V <sub>OUT</sub> |
|---------------|------------------|
| NJM2860F3-28  | 2.8V             |
| NJM2860F3-285 | 2.85V            |
| NJM2860F3-03  | 3.0V             |
| NJM2860F3-31  | 3.1V             |
| NJM2860F3-32  | 3.2V             |
| NJM2860F3-33  | 3.3V             |
| NJM2860F3-35  | 3.5V             |

| Device Name   | V <sub>OUT</sub> |
|---------------|------------------|
| NJM2860F3-355 | 3.55V            |
| NJM2860F3-38  | 3.8V             |
| NJM2860F3-04  | 4.0V             |
| NJM2860F3-46  | 4.6V             |
| NJM2860F3-47  | 4.7V             |
| NJM2860F3-05  | 5.0V             |

## ■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

| PARAMETER             | SYMBOL            | RATINGS    | UNIT |
|-----------------------|-------------------|------------|------|
| Input Voltage         | V <sub>IN</sub>   | +14        | V    |
| Control Voltage       | V <sub>CONT</sub> | +14(*1)    | V    |
| Power Dissipation     | P <sub>D</sub>    | 250(*2)    | mW   |
| Operating Temperature | Topr              | -40 ~ +85  | °C   |
| Storage Temperature   | Tstg              | -40 ~ +125 | °C   |

(\*1):When input voltage is less than +14V, the absolute maximum control voltage is equal to the input voltage.

(\*2):Mounted on glass epoxy board based on EIA/JEDEC. (114.3x76.2x1.6mm: 2Layers)

## ■ Operating voltage

V<sub>IN</sub>=+2.5V ~ +14.0V (In case of Vo<2.1V)

## ■ ELECTRICAL CHARACTERISTICS

(V<sub>IN</sub>=Vo+1V, C<sub>IN</sub>=0.1μF, Co=1.0uF: Vo≥2.7V (Co=2.2uF: Vo≤2.6V), Cp=0.01μF, Ta=25°C)

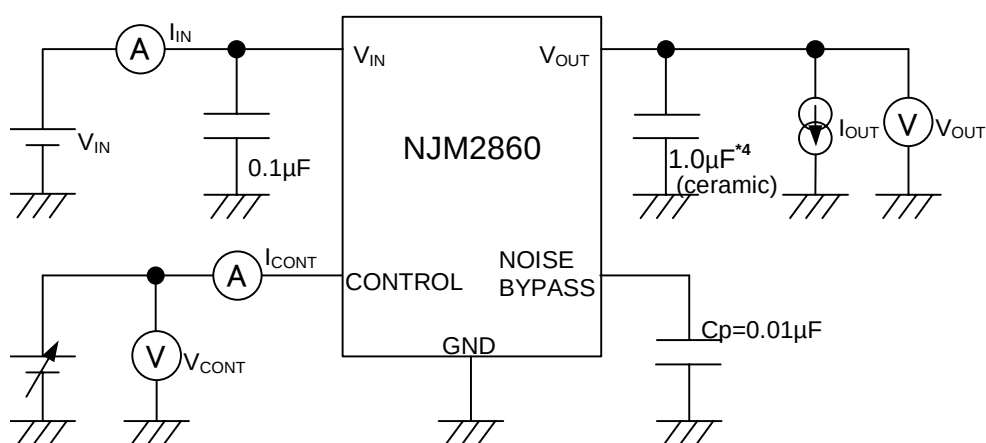
| PARAMETER                                         | SYMBOL                 | TEST CONDITION                               | MIN.  | TYP. | MAX.  | UNIT   |
|---------------------------------------------------|------------------------|----------------------------------------------|-------|------|-------|--------|
| Output Voltage                                    | Vo                     | Io=30mA                                      | -1.0% | —    | +1.0% | V      |
| Quiescent Current                                 | I <sub>Q</sub>         | Io=0mA, expect Icont                         | —     | 120  | 180   | μA     |
| Quiescent Current at Control OFF                  | I <sub>Q(OFF)</sub>    | V <sub>CONT</sub> =0V                        | —     | —    | 100   | nA     |
| Output Current                                    | Io                     | Vo=0.3V                                      | 100   | 130  | —     | mA     |
| Line Regulation                                   | ΔVo/ΔV <sub>IN</sub>   | V <sub>IN</sub> =Vo+1V ~ Vo+6V, Io=30mA      | —     | —    | 0.10  | %/V    |
| Load Regulation                                   | ΔVo/ΔIo                | Io=0 ~ 60mA                                  | —     | —    | 0.03  | %/mA   |
| Dropout Voltage(*3)                               | ΔV <sub>I-O</sub>      | Io=60mA                                      | —     | 0.10 | 0.18  | V      |
| Ripple Rejection                                  | RR                     | ein=200mVrms, f=1kHz, Io=10mA, Vo=3V Version | —     | 70   | —     | dB     |
| Average Temperature Coefficient of Output Voltage | ΔVo/ΔTa                | Ta=0~85°C, Io=10mA                           | —     | ±50  | —     | ppm/°C |
| Output Noise Voltage                              | V <sub>NO</sub>        | f=10Hz~80kHz, Io=10mA, Vo=3V Version         | —     | 30   | —     | μVrms  |
| Control Voltage for ON-state                      | V <sub>CONT(ON)</sub>  |                                              | 1.6   | —    | —     | V      |
| Control Voltage for OFF-state                     | V <sub>CONT(OFF)</sub> |                                              | —     | —    | 0.6   | V      |

(\*3): The output voltage excludes under 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.

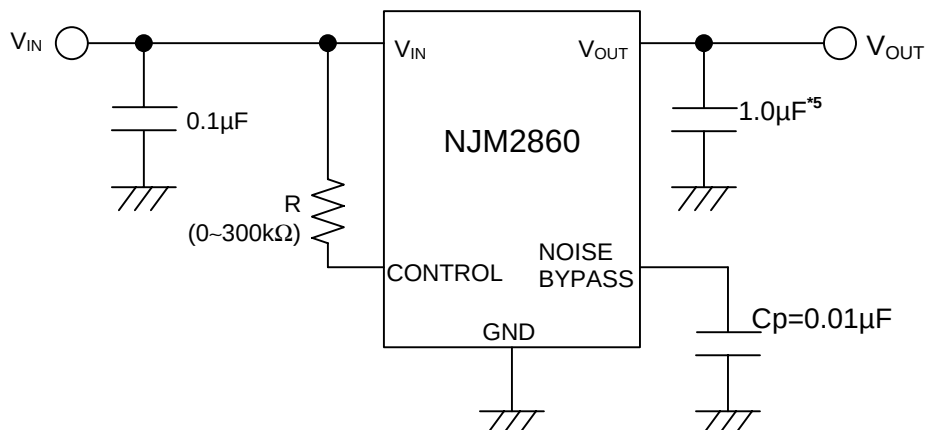
## ■ TEST CIRCUIT



\*4  $V_o \leq 2.6V$  version:  $C_o = 2.2\mu F$  (ceramic)

## ■ TYPICAL APPLICATION

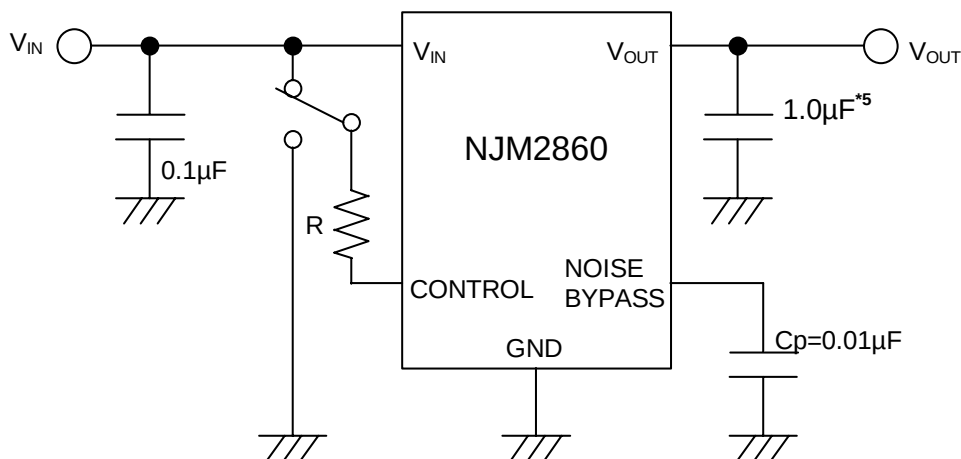
① In the case where ON/OFF Control is not required:



\*5  $V_O \leq 2.6V$  version:  $C_O = 2.2\mu F$

Connect control terminal to  $V_{IN}$  terminal

② In use of ON/OFF CONTROL:



\*5  $V_O \leq 2.6V$  version:  $C_O = 2.2\mu F$

State of control terminal:

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

### \*Noise bypass Capacitance $C_p$

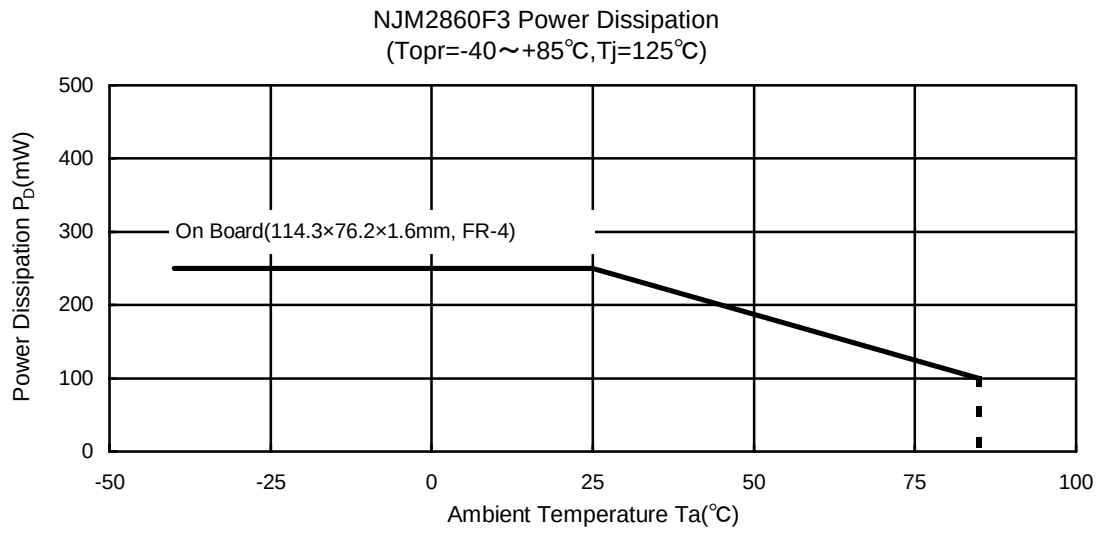
Noise bypass capacitance  $C_p$  reduces noise generated by band-gap reference circuit. Noise level and ripple rejection will be improved when larger  $C_p$  is used. Use of smaller  $C_p$  value may cause oscillation. Use the  $C_p$  value of  $0.01\mu F$  greater to avoid the problem.

### \*In the case of using a resistance "R" between $V_{IN}$ and control.

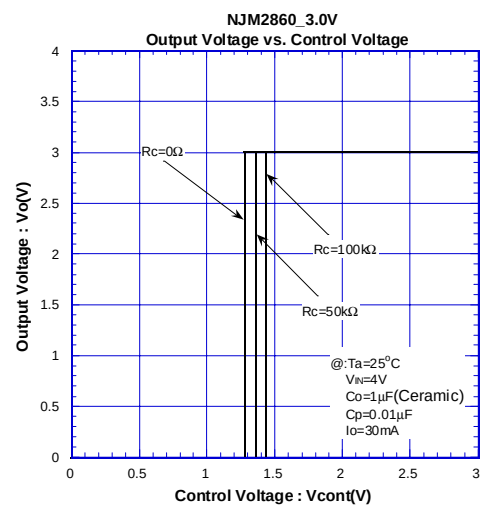
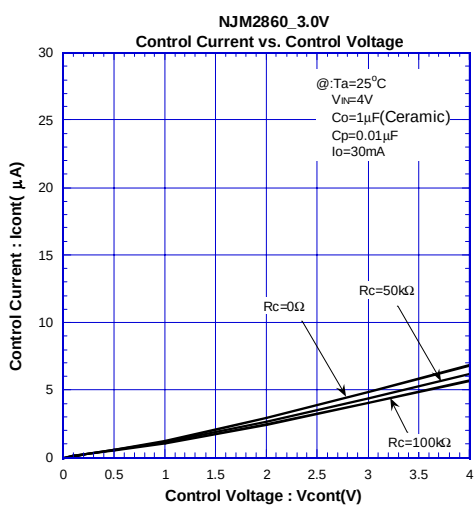
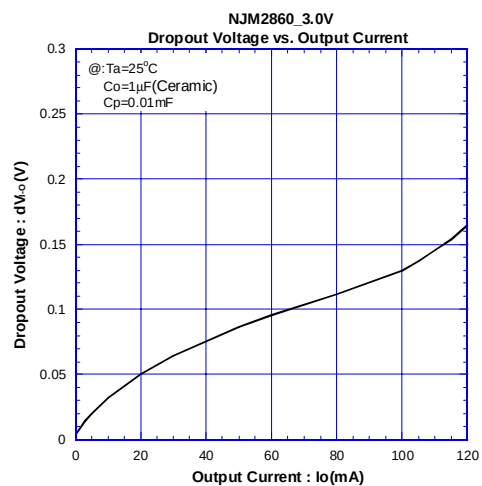
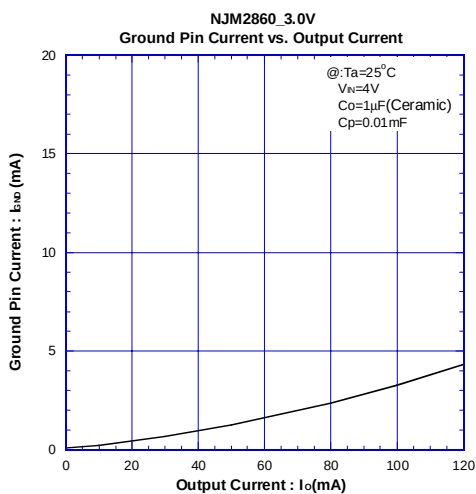
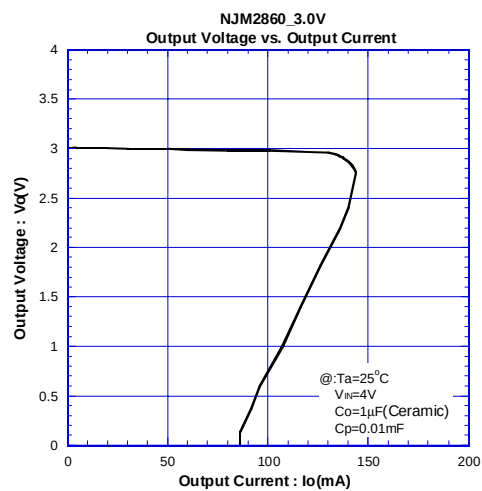
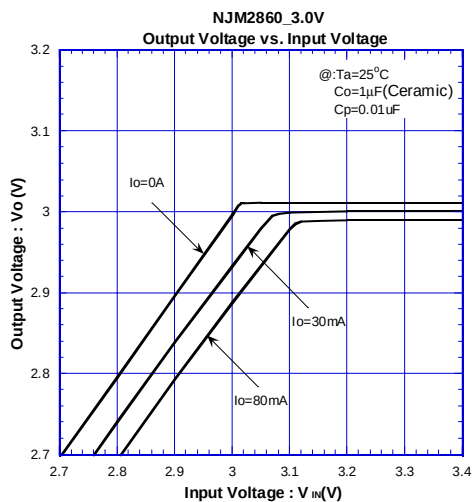
The current flow into the control terminal while the IC is ON state ( $I_{CONT}$ ) can be reduced when a pull up resistance "R" is inserted between  $V_{IN}$  and the control terminal.

The minimum control voltage for ON state ( $V_{CONT(ON)}$ ) is increased due to the voltage drop caused by  $I_{CONT}$  and the resistance "R". The  $I_{CONT}$  is temperature dependence as shown in the "Control Current vs. Temperature" characteristics. Therefore, the resistance "R" should be carefully selected to ensure the control voltage exceeds the  $V_{CONT(ON)}$  over the required temperature range.

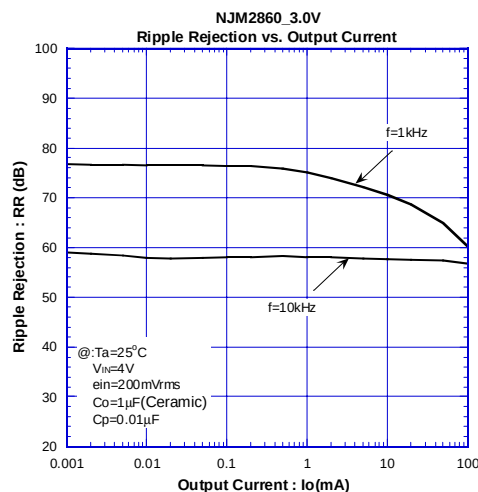
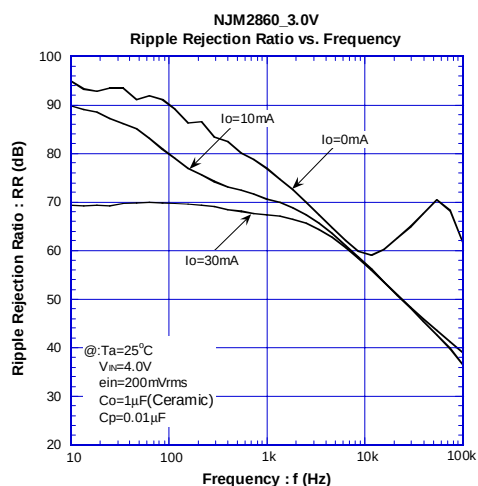
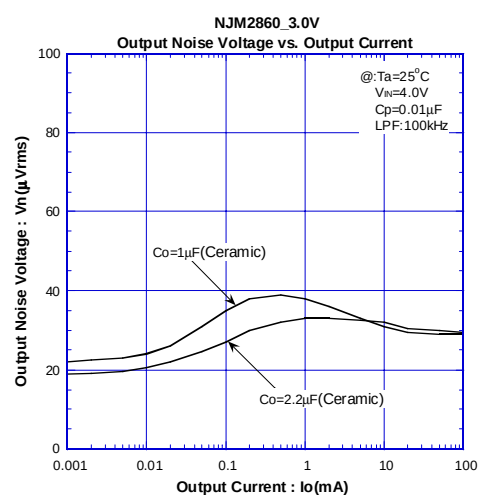
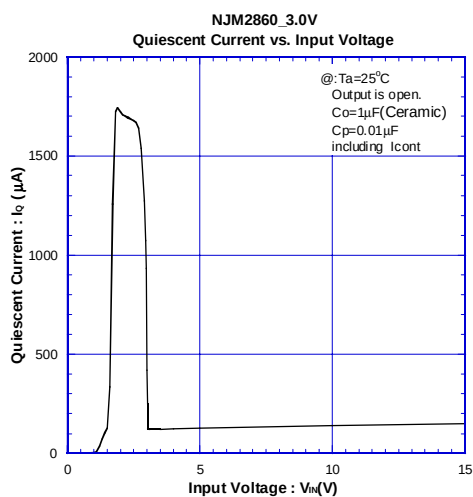
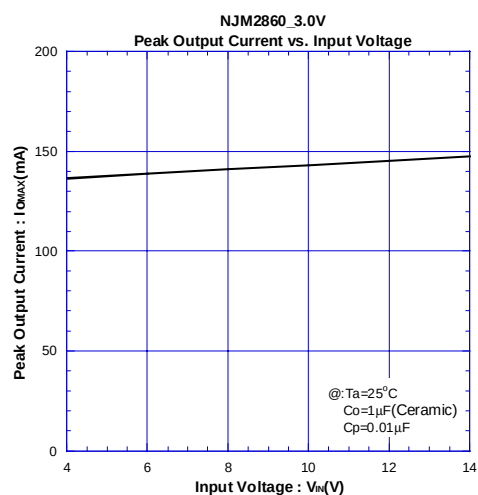
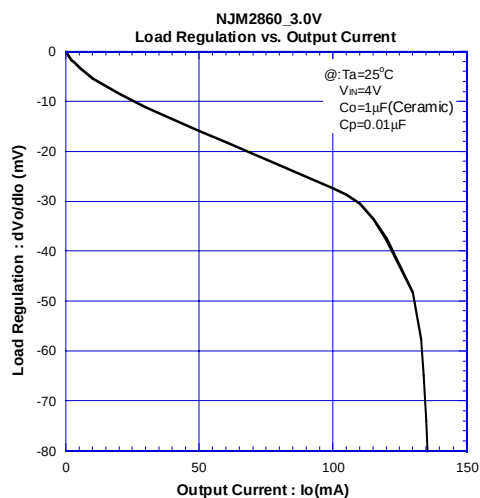
■ POWER DISSIPATION vs. AMBIENT TEMPERATURE



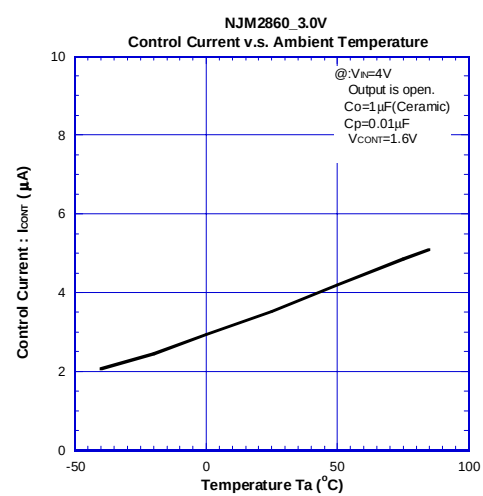
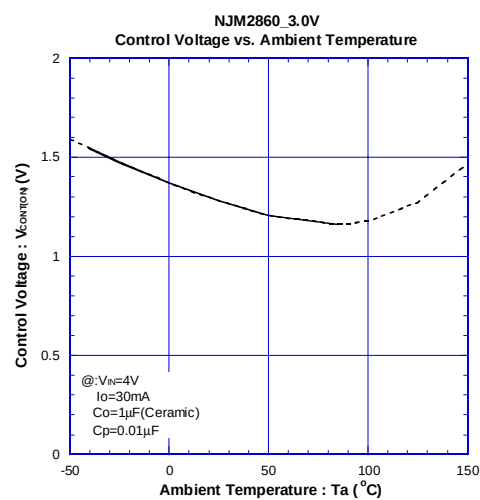
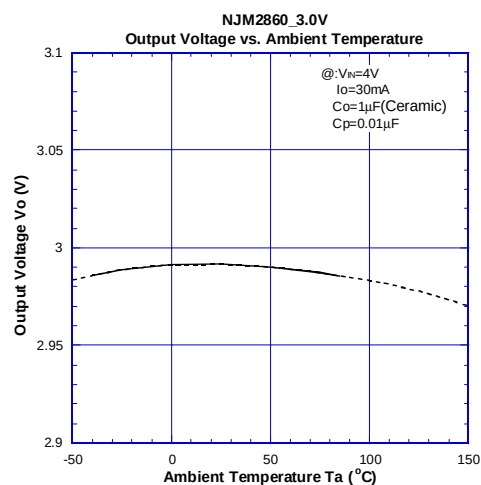
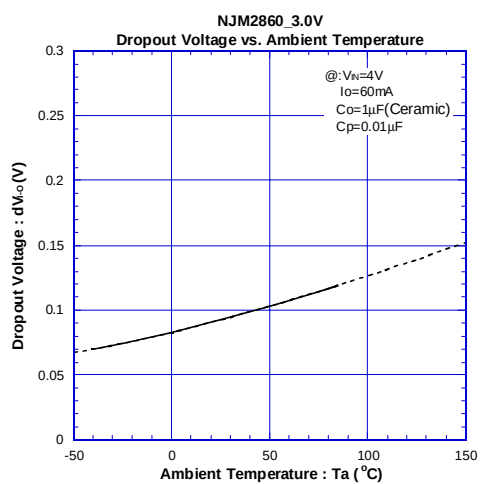
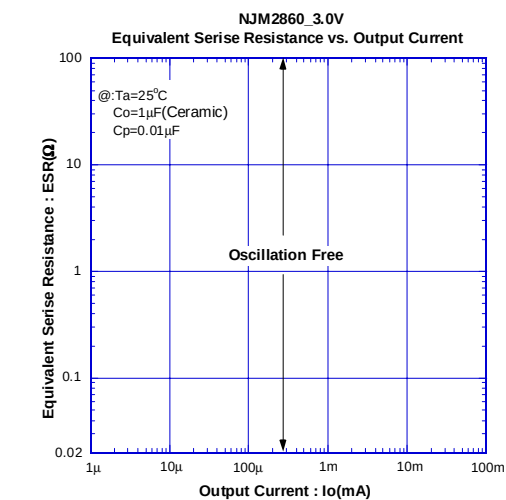
## TYPICAL CHARACTERISTICS



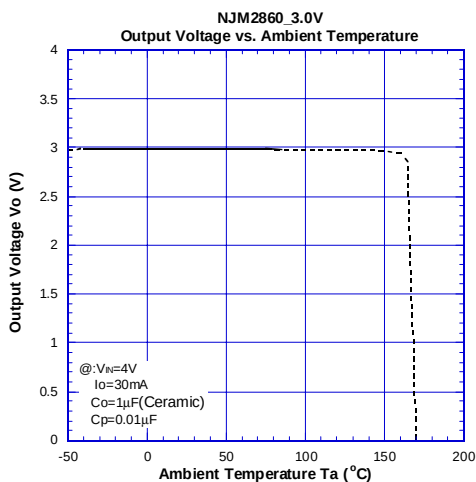
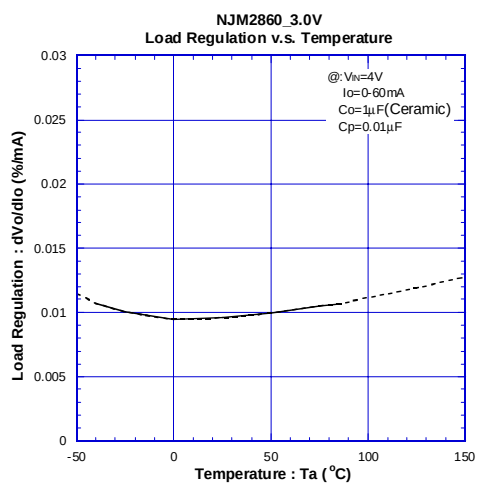
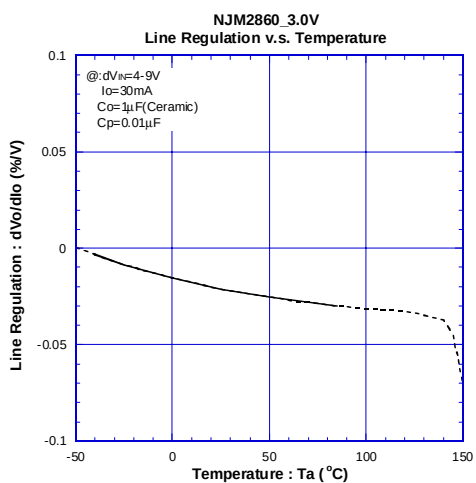
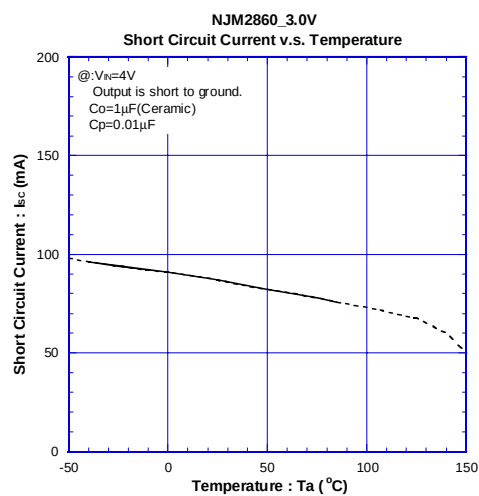
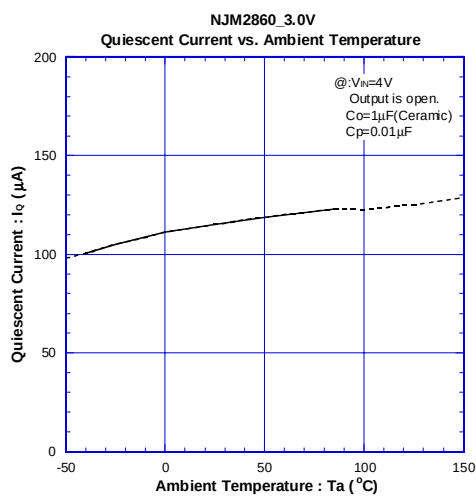
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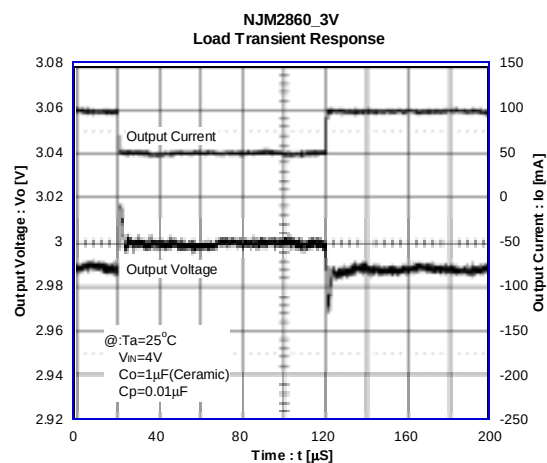
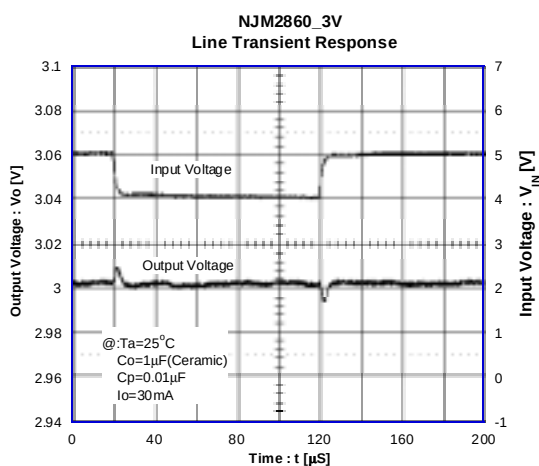
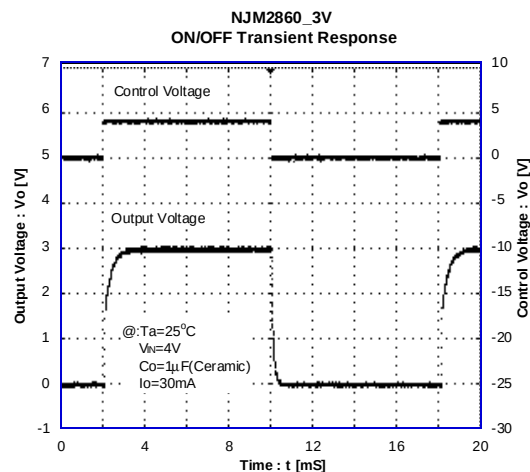
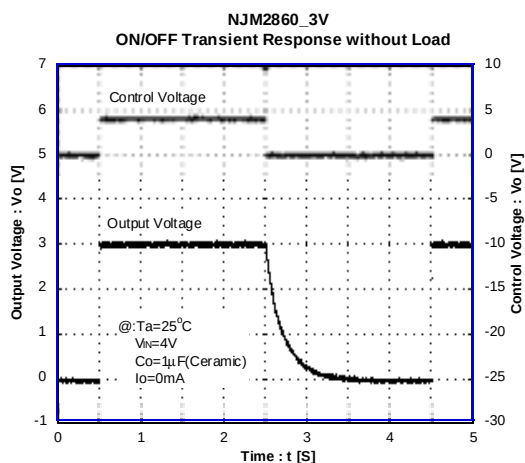
## TYPICAL CHARACTERISTICS



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### [CAUTION]

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- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.