

## 2ch ULTRA LOW NOISE LOW DROPOUT VOLTAGE REGULATOR

### ■ GENERAL DESCRIPTION

The NJM2898 is a 2ch ultra low noise low dropout voltage regulator designed for VCO Applications.

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

### ■ PACKAGE OUTLINE

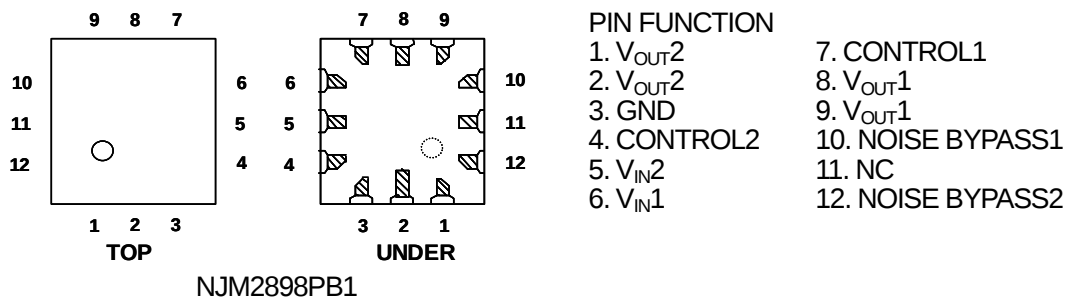


NJM2898PB1

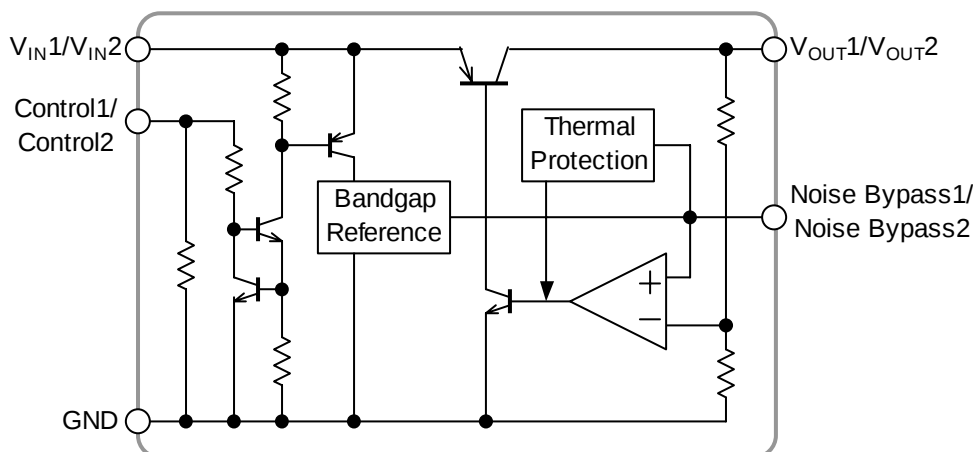
### ■ FEATURES

- High Ripple Rejection 75dB typ. ( $f=1\text{kHz}$ ,  $V_o=3\text{V}$  Version)
- Output Noise Voltage  $V_{no}=19\mu\text{Vrms}$  typ. ( $C_p=0.01\mu\text{F}$ ,  $C_o=1.0\mu\text{F}$ (Ceramic))  
 $V_{no}=12\mu\text{Vrms}$  typ. ( $C_p=0.1\mu\text{F}$ ,  $C_o=10\mu\text{F}$ (Tantalum))
- Output capacitor with 1.0uF ceramic capacitor
- Output Current  $I_o(\text{max.})=100\text{mA} \times 2\text{ch}$
- High Precision Output  $V_o \pm 1.0\%$
- Low Dropout Voltage 0.10V typ. ( $I_o=60\text{mA}$ )
- ON/OFF Control (Active High)
- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Bipolar Technology
- Package Outline FFP12-B1 (2.0×2.0×0.85mm)

### ■ PIN CONFIGURATION



### ■ EQUIVALENT CIRCUIT



## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER             | SYMBOL     | RATINGS    | UNIT |
|-----------------------|------------|------------|------|
| Input Voltage         | $V_{IN}$   | +14        | V    |
| Control Voltage       | $V_{CONT}$ | +14(*1)    | V    |
| Power Dissipation     | $P_D$      | 350(*2)    | mW   |
| Operating Temperature | $T_{opr}$  | -40 ~ +85  | °C   |
| Storage Temperature   | $T_{stg}$  | -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)

## ■ ELECTRICAL CHARACTERISTICS

(1CH/2CH:  $V_{IN}=V_O+1V$ ,  $C_{IN}=0.1\mu F$ ,  $C_O=1.0\mu F$ :  $V_O \geq 2.7V$  ( $C_O=2.2\mu F$ :  $V_O \leq 2.6V$ ),  $C_P=0.01\mu F$ ,  $T_a=25^\circ C$ )

| PARAMETER                                         | SYMBOL                       | TEST CONDITION                                                                                  | MIN.  | TYP.     | MAX.  | UNIT          |
|---------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------|-------|----------|-------|---------------|
| Output Voltage                                    | $V_O$                        | $I_O=30mA$                                                                                      | -1.0% | —        | +1.0% | V             |
| Quiescent Current                                 | $I_Q$                        | $I_O=0mA$ , except $I_{cont}$ , per 1ch                                                         | —     | 120      | 180   | $\mu A$       |
| Quiescent Current at Control OFF                  | $I_{Q(OFF)}$                 | $V_{CONT}=0V$ , per 1ch                                                                         | —     | —        | 100   | nA            |
| Output Current                                    | $I_O$                        | $V_O=0.3V$                                                                                      | 100   | 130      | —     | mA            |
| Line Regulation                                   | $\Delta V_O / \Delta V_{IN}$ | $V_{IN}=V_O+1V \sim V_O+6V$ , $I_O=30mA$                                                        | —     | —        | 0.10  | %/V           |
| Load Regulation                                   | $\Delta V_O / \Delta I_O$    | $I_O=0 \sim 100mA$                                                                              | —     | —        | 0.03  | %/mA          |
| Dropout Voltage                                   | $\Delta V_{I-O}$             | $I_O=60mA$                                                                                      | —     | 0.10     | 0.18  | V             |
| Ripple Rejection                                  | RR                           | $e_{in}=200mV_{rms}$ , $f=1kHz$ , $I_O=10mA$ , $V_O=3V$ Version                                 | —     | 75       | —     | dB            |
| Average Temperature Coefficient of Output Voltage | $\Delta V_O / \Delta T_a$    | $T_a=0 \sim 85^\circ C$ , $I_O=10mA$                                                            | —     | $\pm 50$ | —     | ppm/°C        |
| Output Noise Voltage1                             | $V_{NO1}$                    | $f=10Hz \sim 80kHz$ , $I_O=10mA$ , $C_P=0.01\mu F$ , $C_O=1.0\mu F$ (Ceramic), $V_O=3V$ Version | —     | 19       | —     | $\mu V_{rms}$ |
| Output Noise Voltage2                             | $V_{NO2}$                    | $f=10Hz \sim 80kHz$ , $I_O=10mA$ , $C_P=0.1\mu F$ , $C_O=10\mu F$ (Tantalum), $V_O=3V$ Version  | —     | 12       | —     | $\mu V_{rms}$ |
| Control Voltage for ON-state                      | $V_{CONT(ON)}$               |                                                                                                 | 1.6   | —        | —     | V             |
| Control Voltage for OFF-state                     | $V_{CONT(OFF)}$              |                                                                                                 | —     | —        | 0.6   | V             |

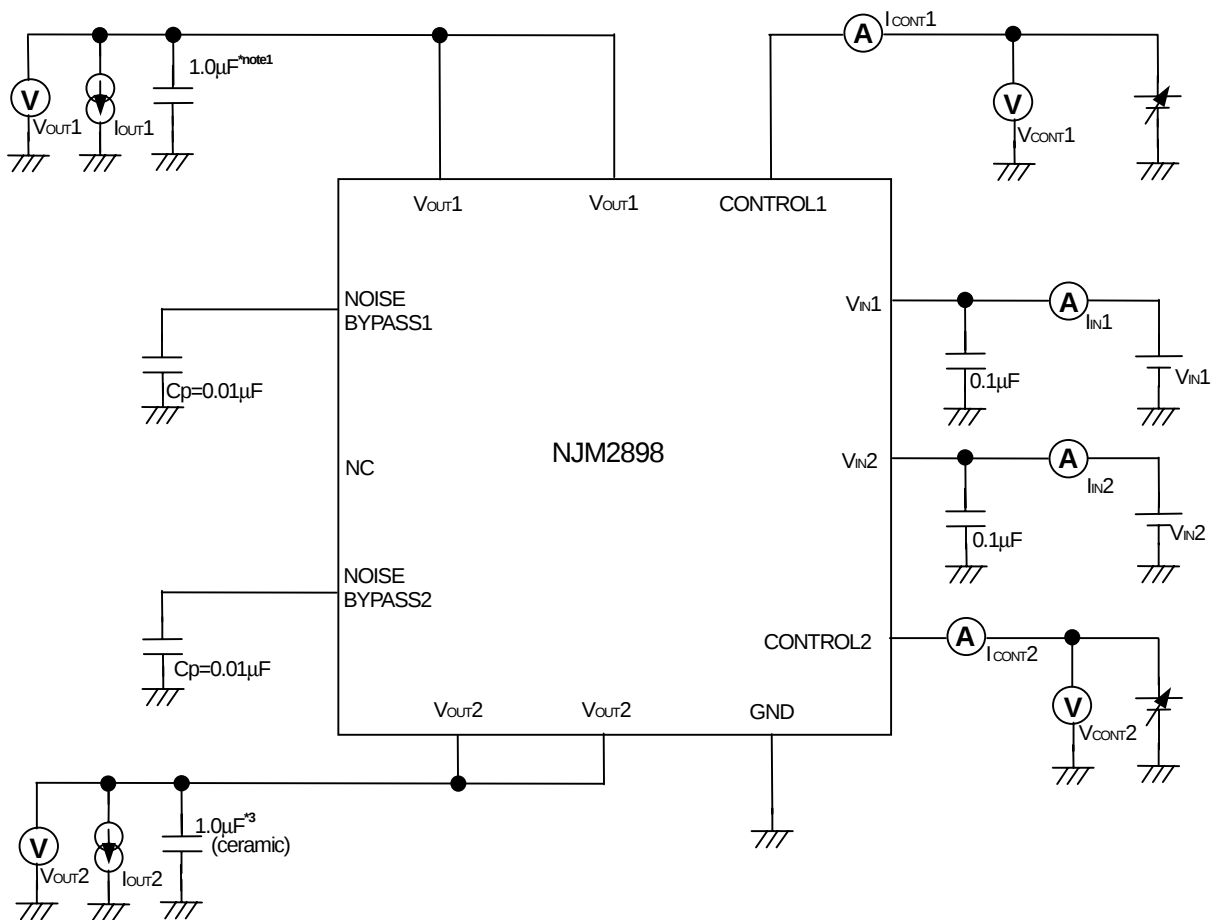
The above specification is a common specification for all output voltages.

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

## ■ OUTPUT VOLTAGE RANK LIST

| Device Name     | $V_{OUT}$ |       |
|-----------------|-----------|-------|
|                 | CH1       | CH2   |
| NJM2898PB1-2828 | 2.8V      | 2.8V  |
| NJM2898PB1-JJ   | 2.85V     | 2.85V |
| NJM2898PB1-0303 | 3.0V      | 3.0V  |
| NJM2898PB1-0521 | 5.0V      | 2.1V  |

## ■ TEST CIRCUIT

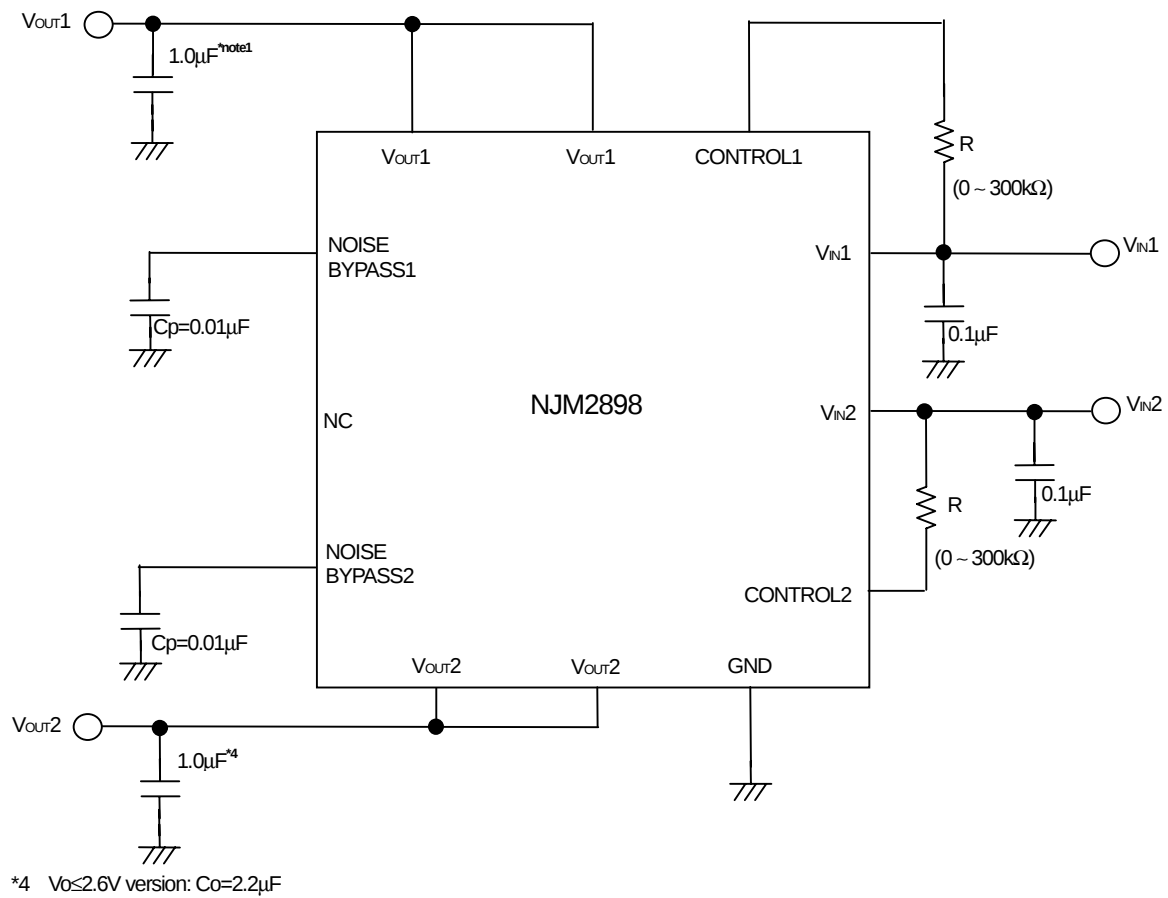


\*3  $V_{O} \leq 2.6V$  version:  $C_O = 2.2\mu F$  (ceramic)

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## ■ TYPICAL APPLICATION

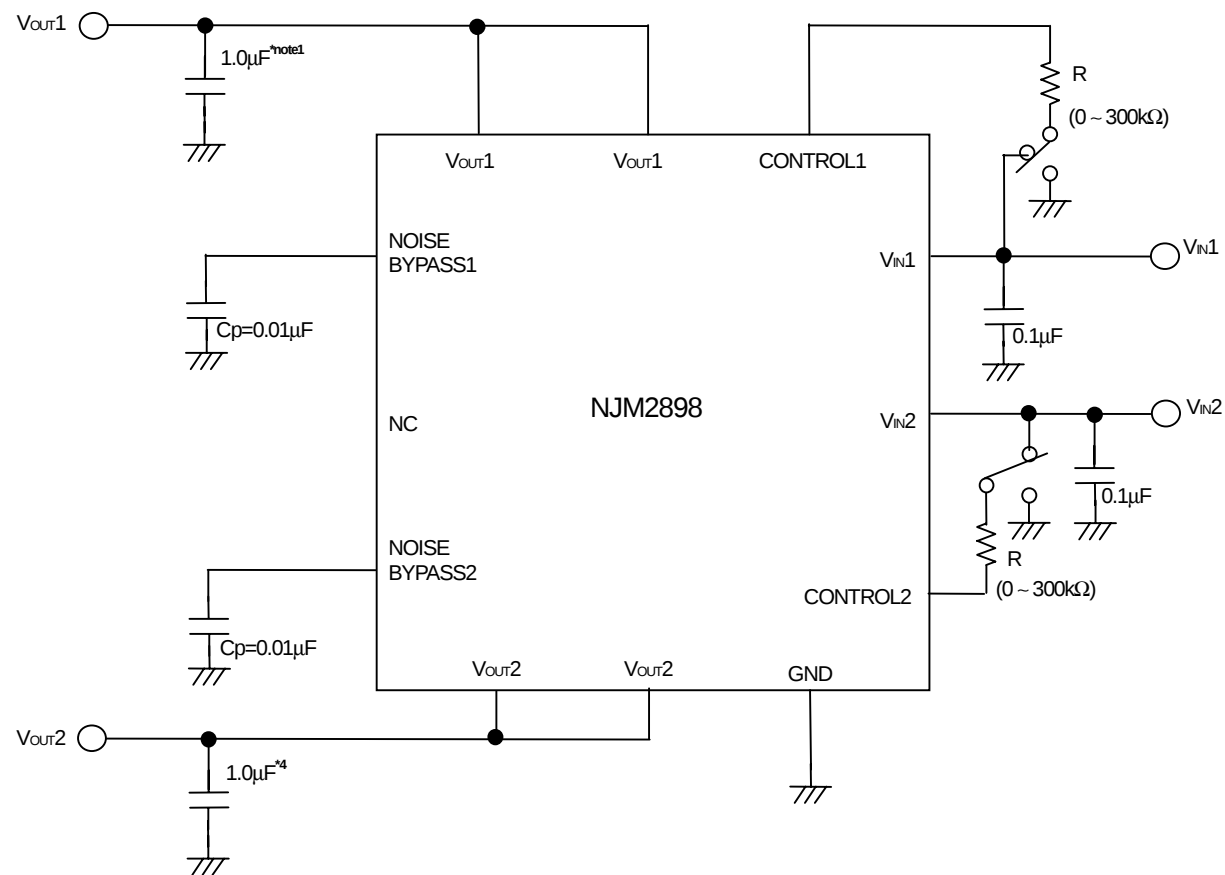
① In the case where ON/OFF Control is not required:



Connect control terminal to  $V_{IN}$  terminal

The quiescent current can be reduced by using a resistance "R". Instead, it increases the minimum operating voltage. For further information, please refer to Figure "Output Voltage vs. Control Voltage".

## ② In use of ON/OFF CONTROL:



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

State of control terminal:

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

### \*Noise bypass Capacitance $C_p$

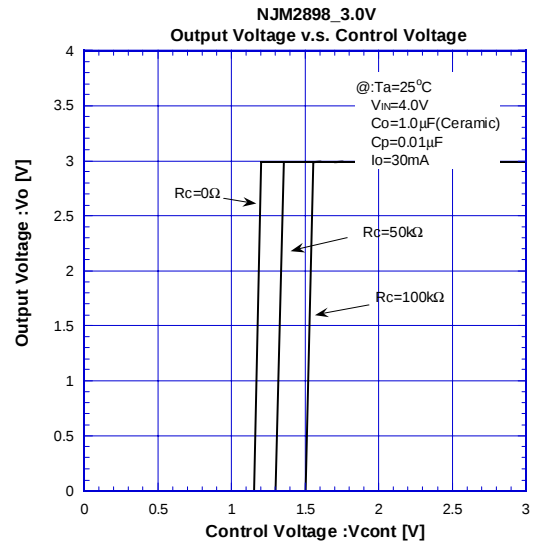
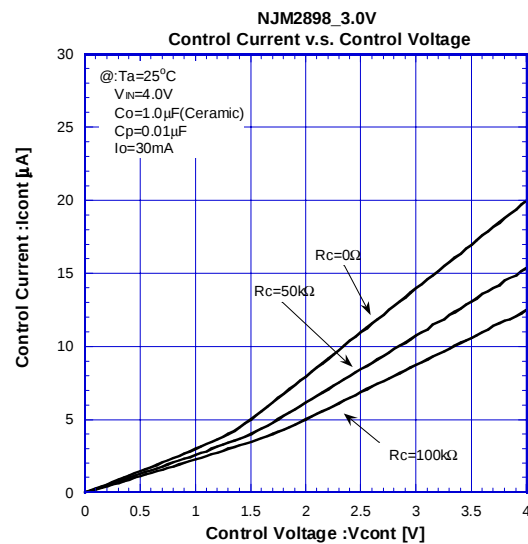
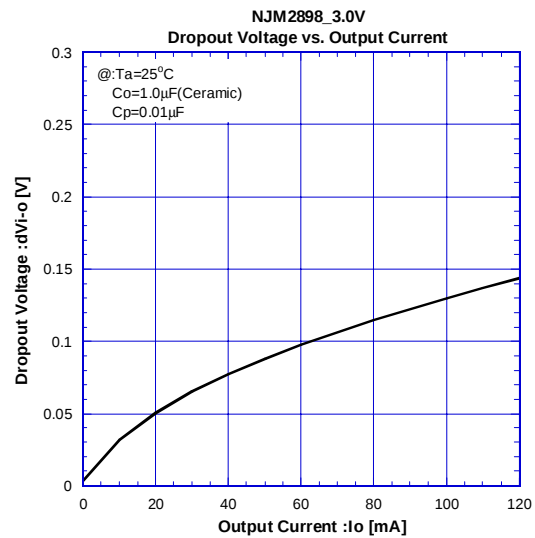
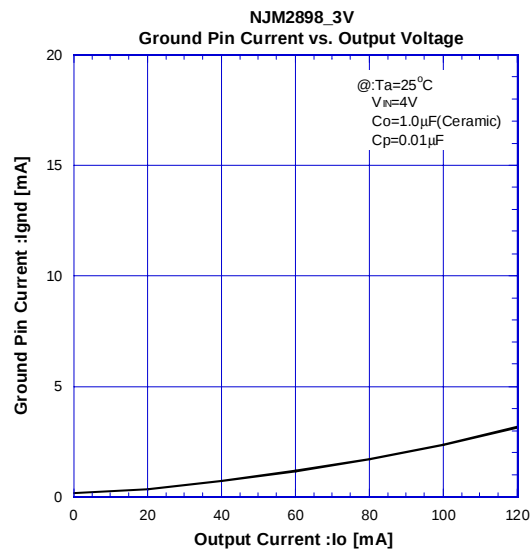
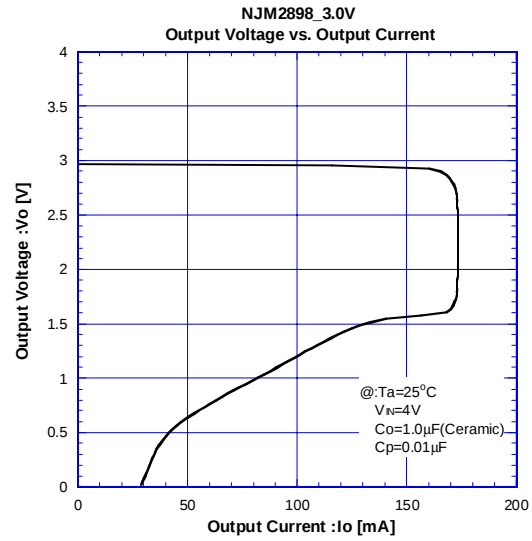
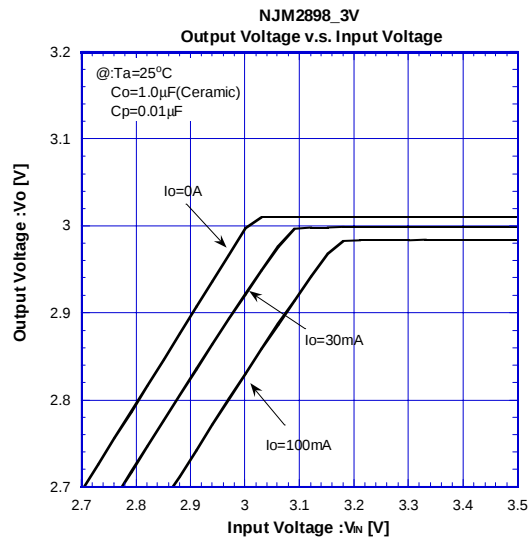
Noise bypass capacitance  $C_p$  reduces noise generated by band-gap reference circuit.

Noise level and ripple rejection will be improved when larger  $C_p$  is used.

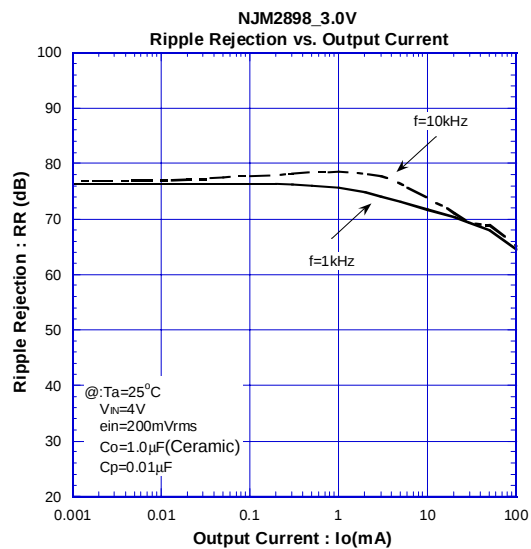
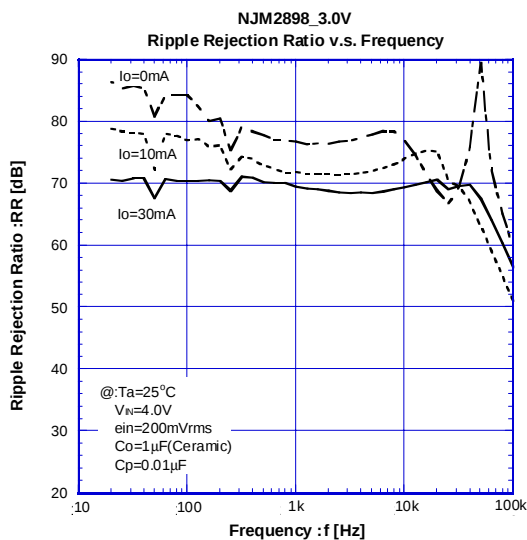
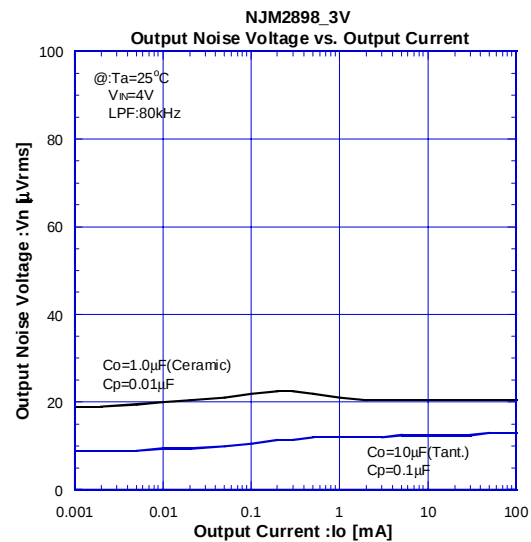
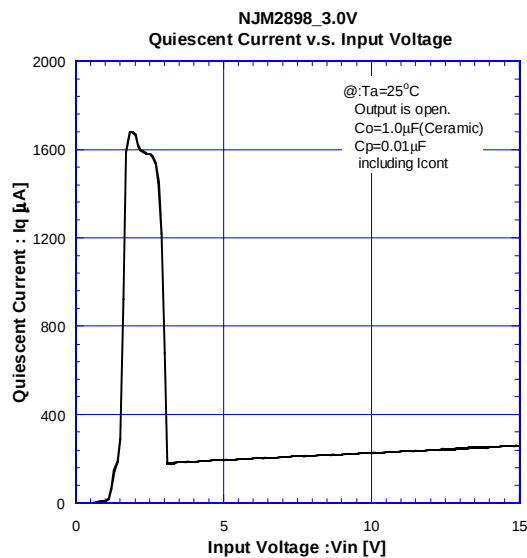
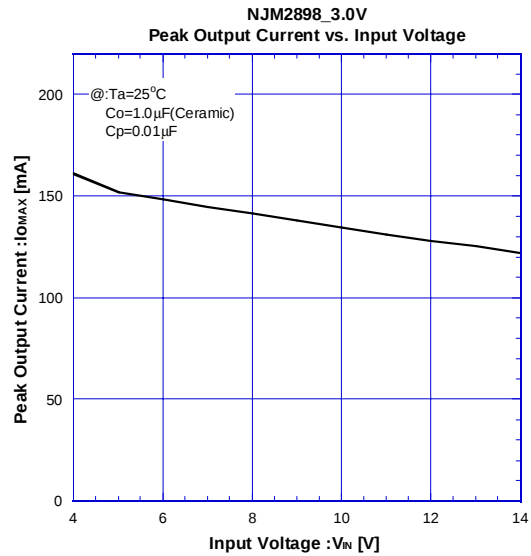
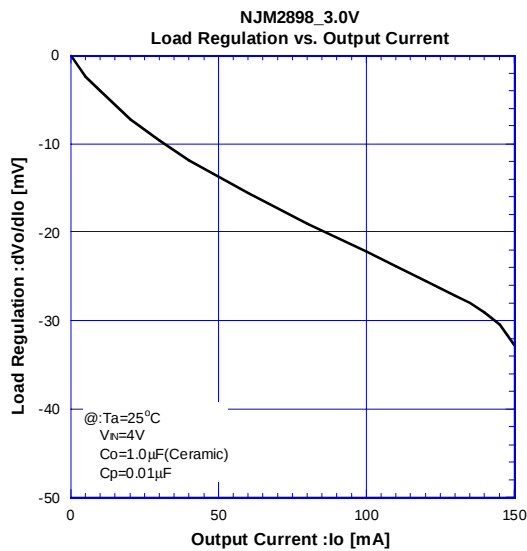
Use of smaller  $C_p$  value may cause oscillation.

Use the  $C_p$  value of 0.01µF greater to avoid the problem.

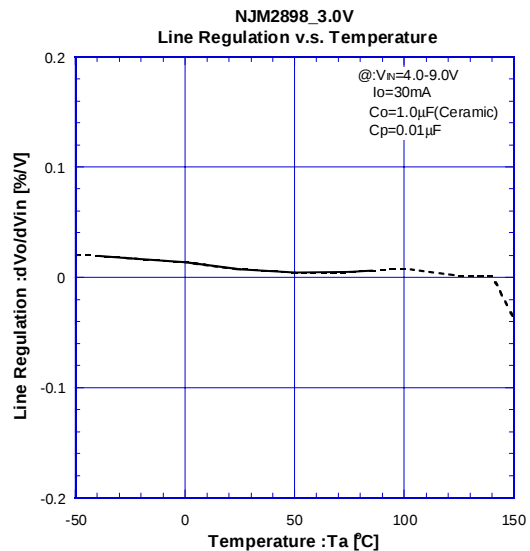
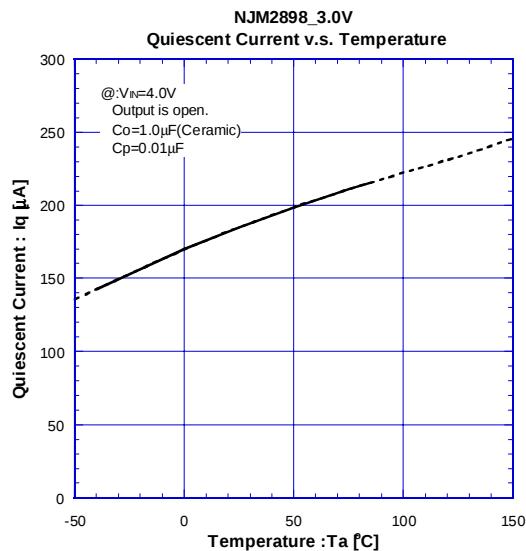
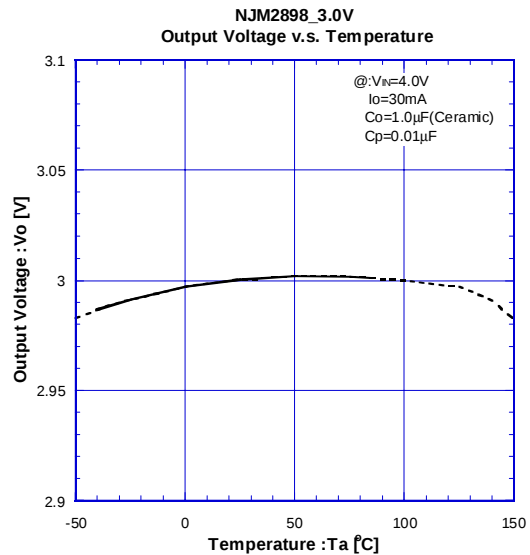
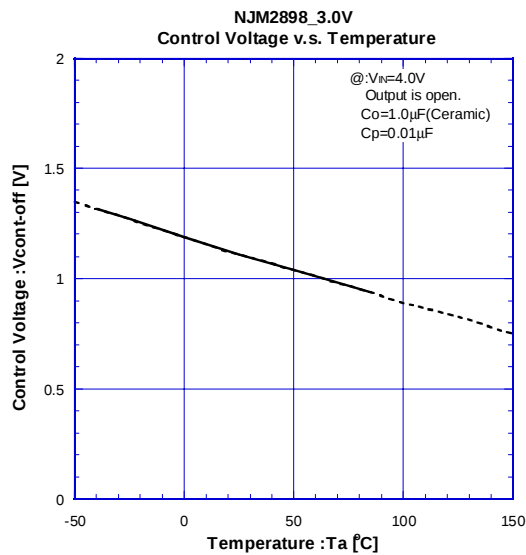
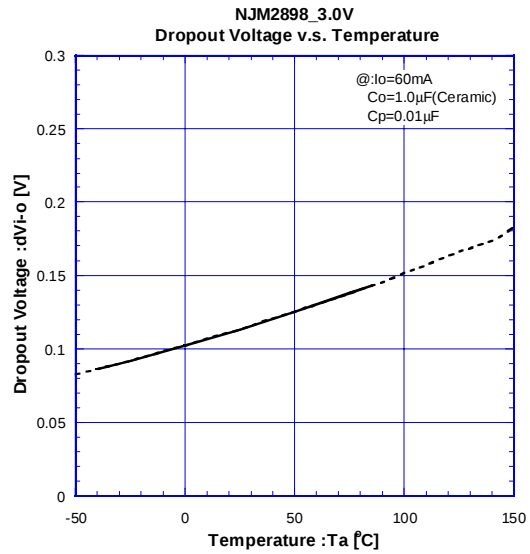
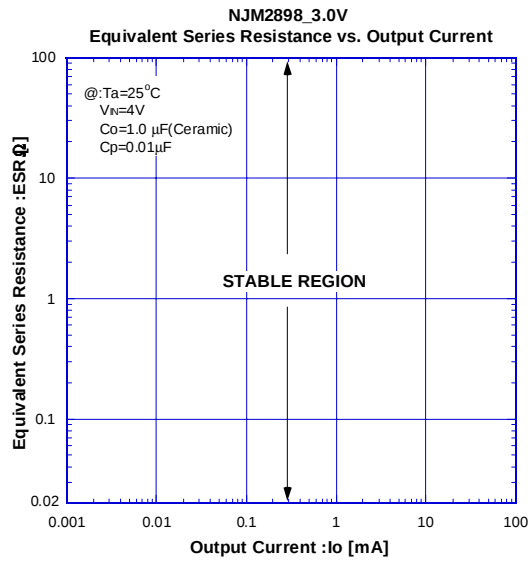
## ELECTRICAL CHARACTERISTICS



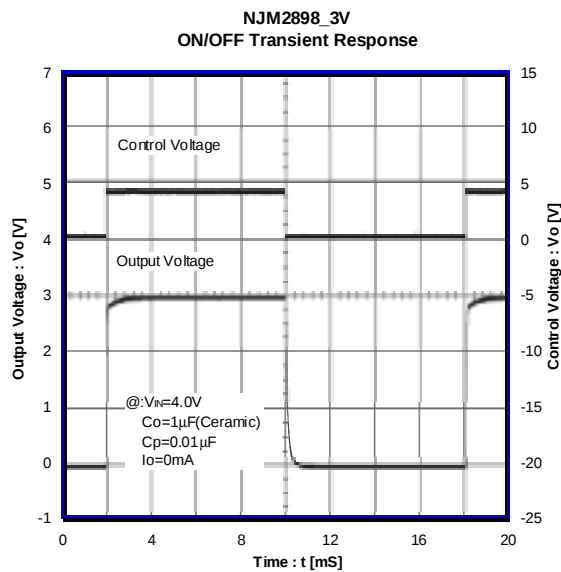
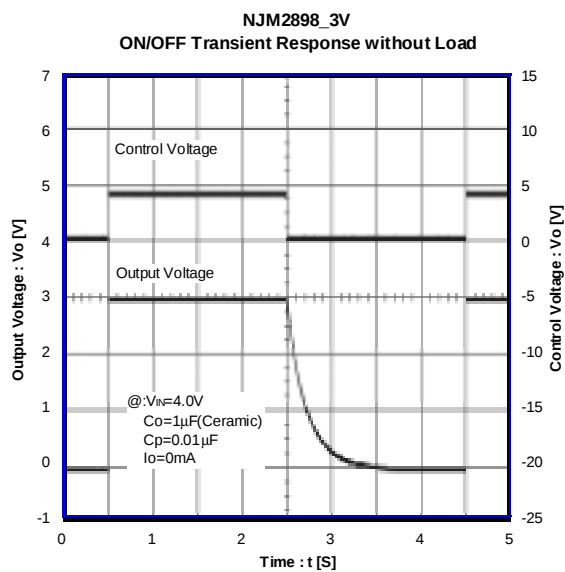
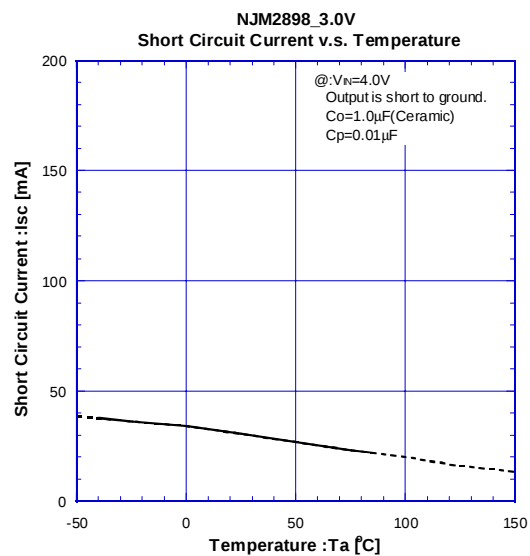
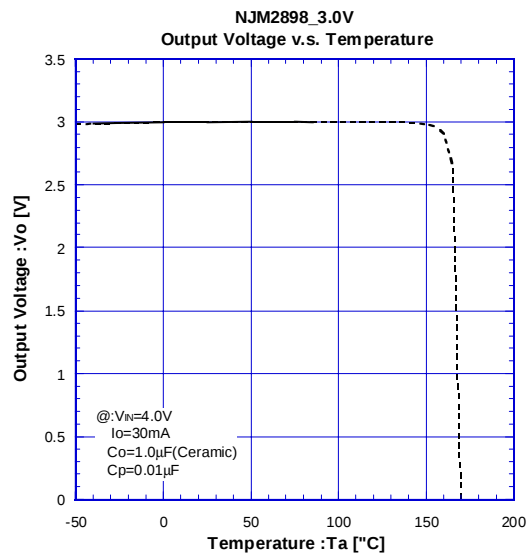
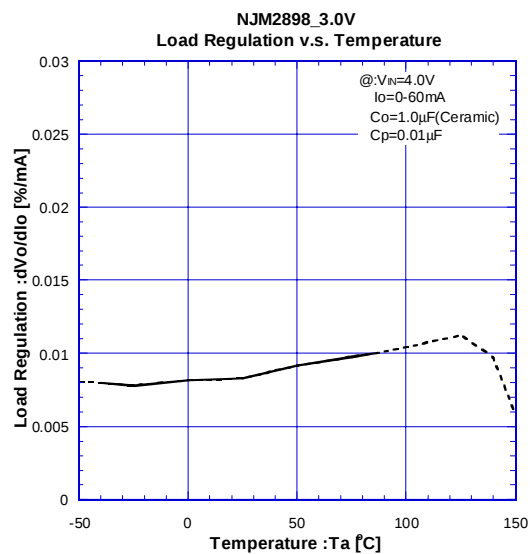
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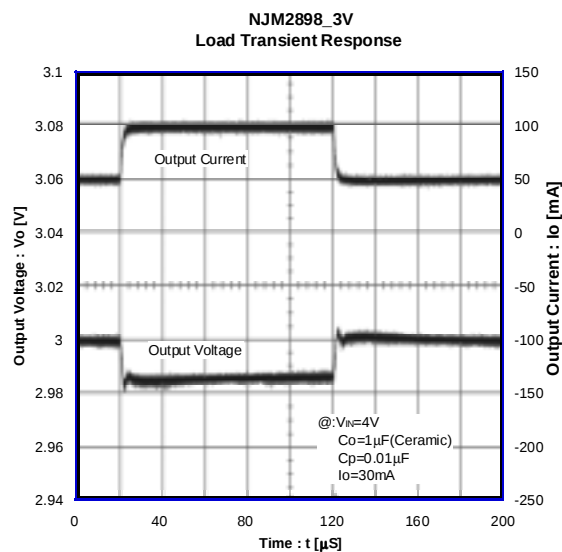
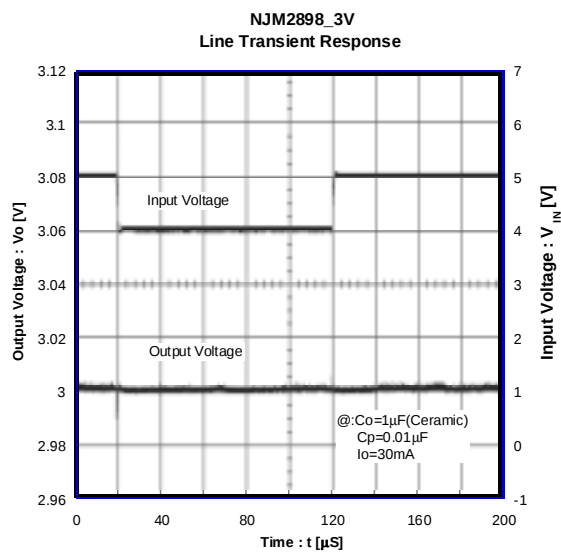


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