

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

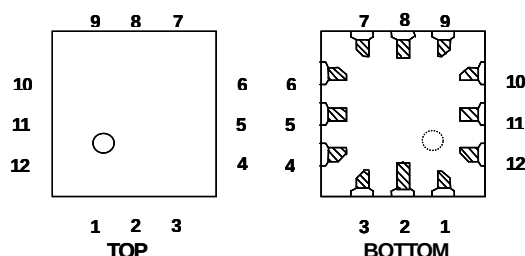


NJM2898PB1

■ FEATURES

- High Ripple Rejection 75dB typ. (f=1kHz, Vo=3V Version)
- Output Noise Voltage Vno=19μVrms typ. (Cp=0.01μF, Co=1.0μF(Ceramic))
Vno=12μVrms typ. (Cp=0.1μF, Co=10μF(Tantalum))
- Output capacitor with 1.0uF ceramic capacitor
- Output Current Io(max.)=100mA × 2ch
- High Precision Output Vo±1.0%
- Low Dropout Voltage 0.10V typ. (Io=60mA)
- 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

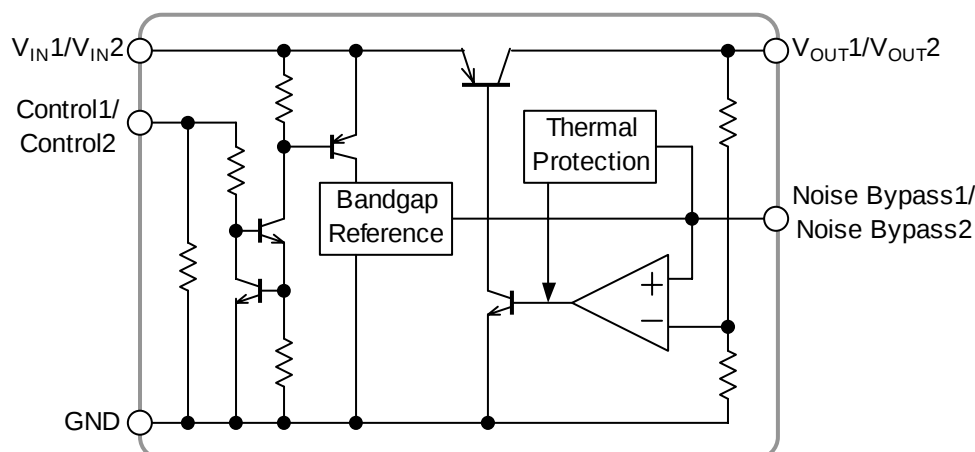


NJM2898PB1

PIN FUNCTION

- | | |
|----------------------|----------------------|
| 1. V _{OUT2} | 7. CONTROL1 |
| 2. V _{OUT2} | 8. V _{OUT1} |
| 3. GND | 9. V _{OUT1} |
| 4. CONTROL2 | 10. NOISE BYPASS1 |
| 5. V _{IN2} | 11. NC |
| 6. V _{IN1} | 12. NOISE BYPASS2 |

■ EQUIVALENT CIRCUIT



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■ 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

■ 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

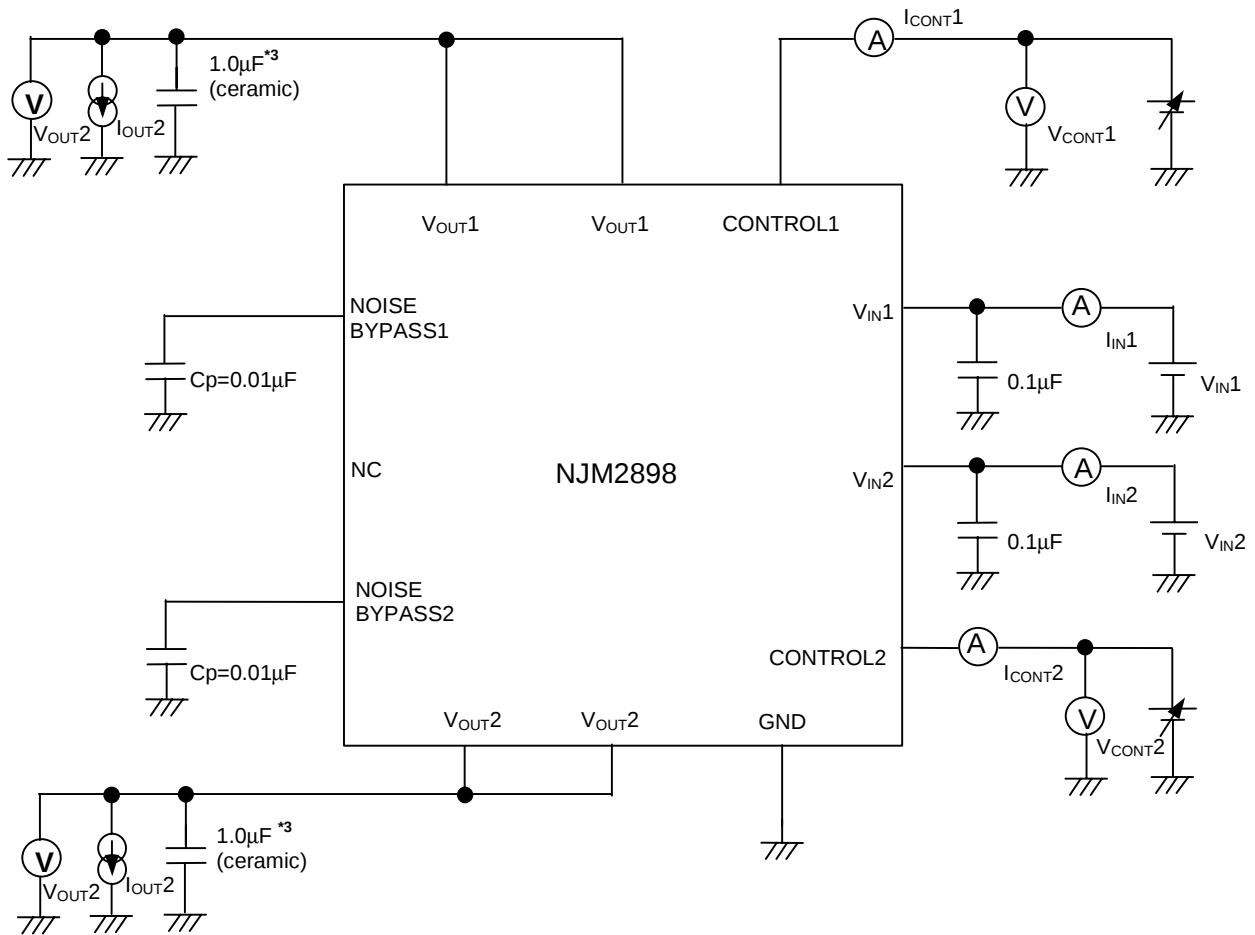
(1CH/2CH: V_{IN}=V_O+1V, C_{IN}=0.1μF, C_O=1.0μF: V_O≥2.7V (C_O=2.2μF: V_O≤2.6V), C_p=0.01μF, Ta=25°C)

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	μA
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	ΔV _O /ΔV _{IN}	V _{IN} =V _O +1V ~ V _O +6V, I _O =30mA	—	—	0.10	%/V
Load Regulation	ΔV _O /ΔI _O	I _O =0 ~ 100mA	—	—	0.03	%/mA
Dropout Voltage	ΔV _{I-O}	I _O =60mA	—	0.10	0.18	V
Ripple Rejection	RR	e _{in} =200mVrms, f=1kHz, I _O =10mA, V _O =3V Version	—	75	—	dB
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔTa	Ta=0 ~ 85°C, I _O =10mA	—	± 50	—	ppm/°C
Output Noise Voltage1	V _{NO1}	f=10Hz ~ 80kHz, I _O =10mA, C _p =0.01μF, C _O =1.0μF(Ceramic), V _O =3V Version	—	19	—	μVrms
Output Noise Voltage2	V _{NO2}	f=10Hz ~ 80kHz, I _O =10mA, C _p =0.1μF, C _O =10μF(Tantalum), V _O =3V Version	—	12	—	μVrms
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.

■ TEST CIRCUIT



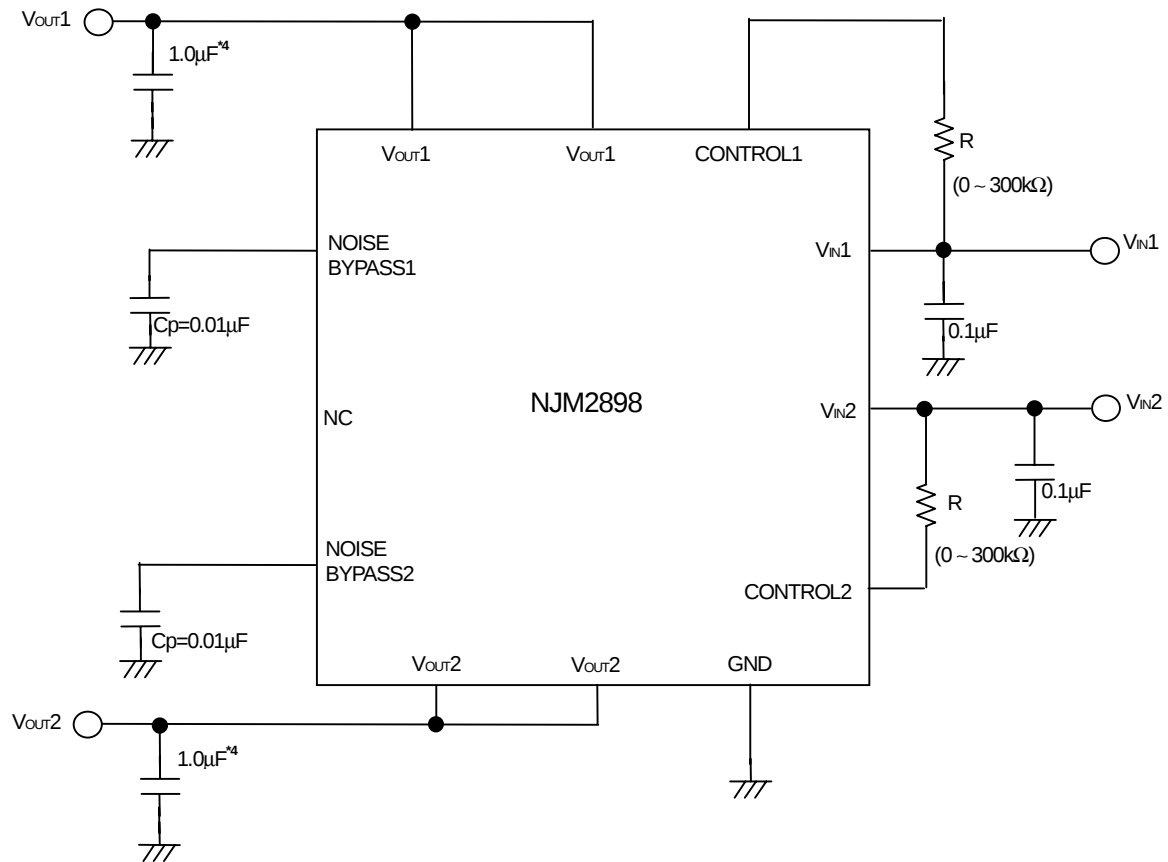
*3 $V_o \leq 2.6V$ version: $C_o = 2.2\mu F$ (ceramic)

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■ TYPICAL APPLICATION

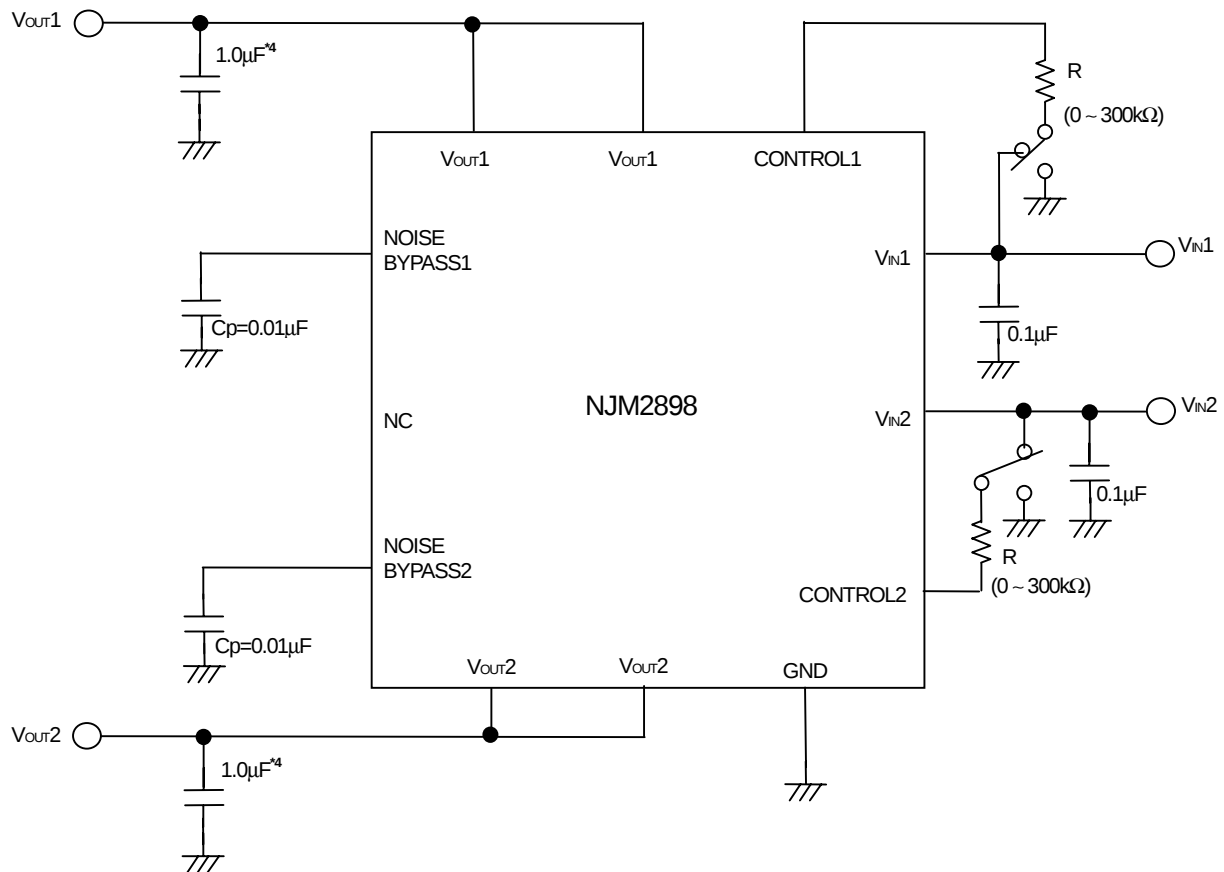
① In the case where ON/OFF Control is not required:



*4 $V_{OS} \leq 2.6V$ version: $C_O = 2.2\mu F$

Connect control terminal to V_{IN} terminal

② In use of ON/OFF CONTROL:



*4 $V_{OS} \leq 2.6V$ 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.

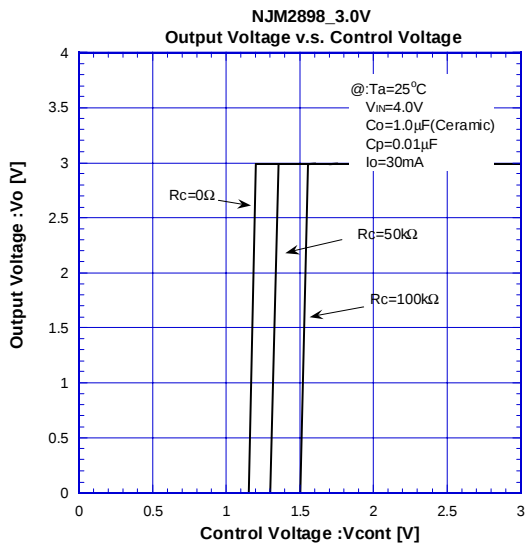
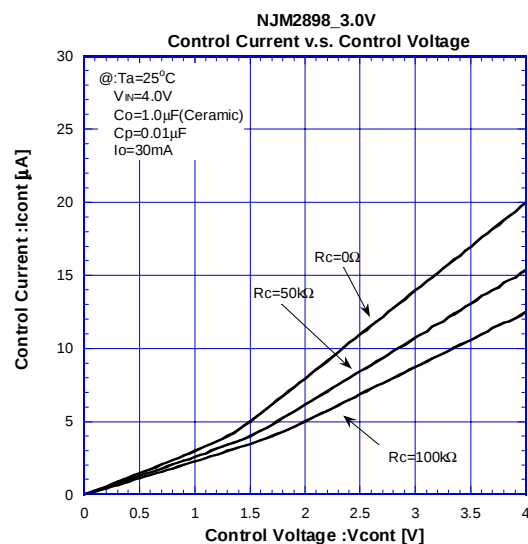
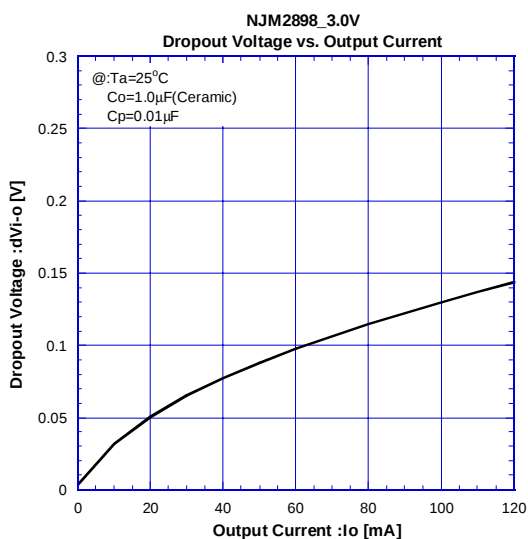
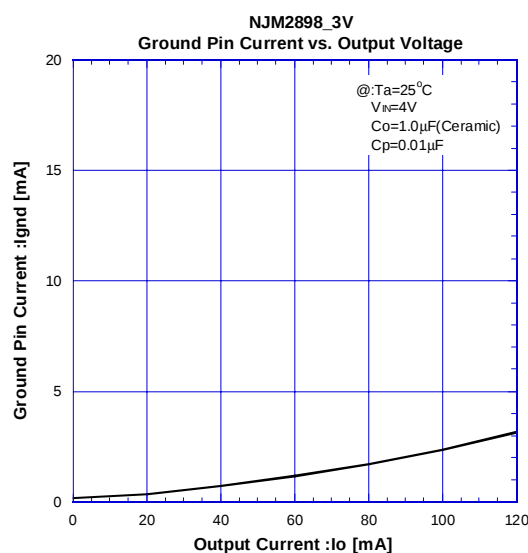
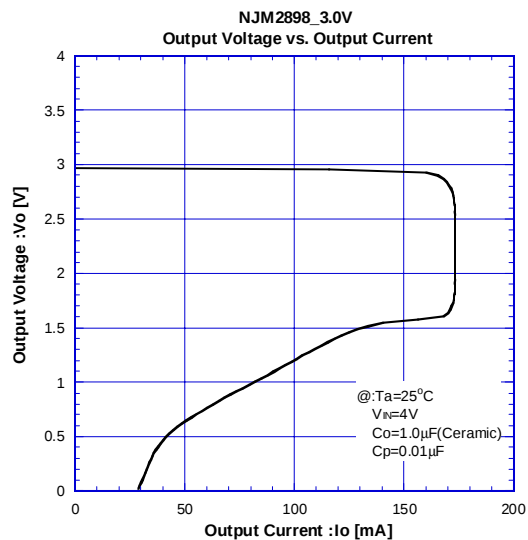
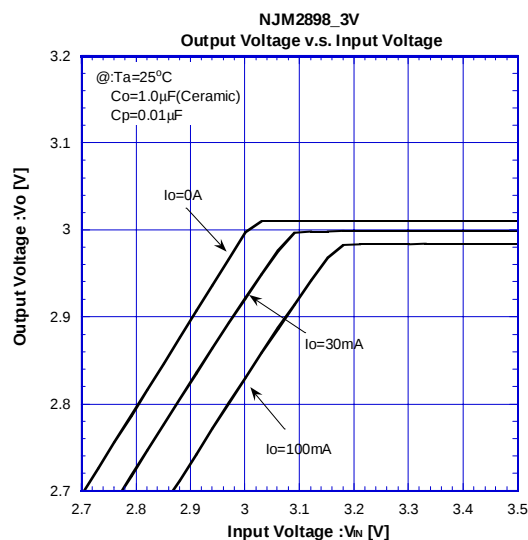
Use the C_p value of $0.01\mu F$ greater to avoid the problem.

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

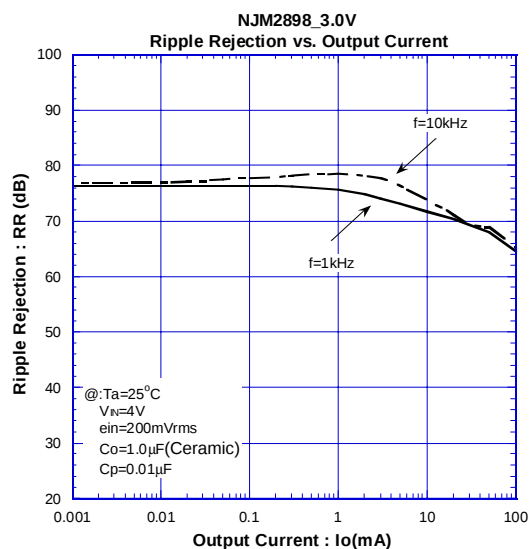
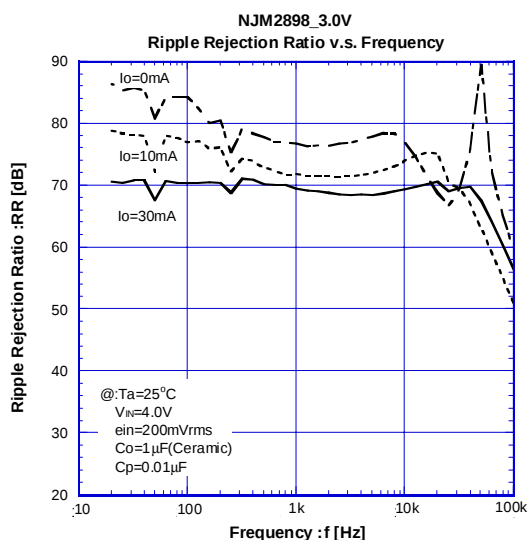
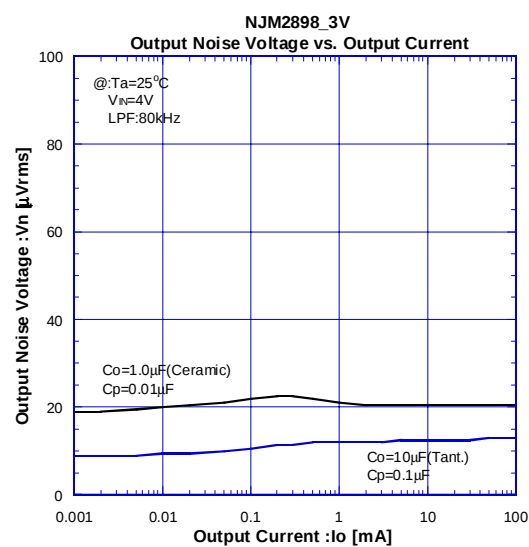
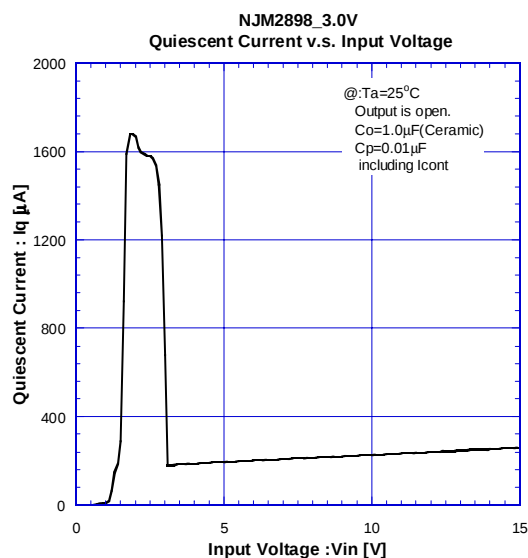
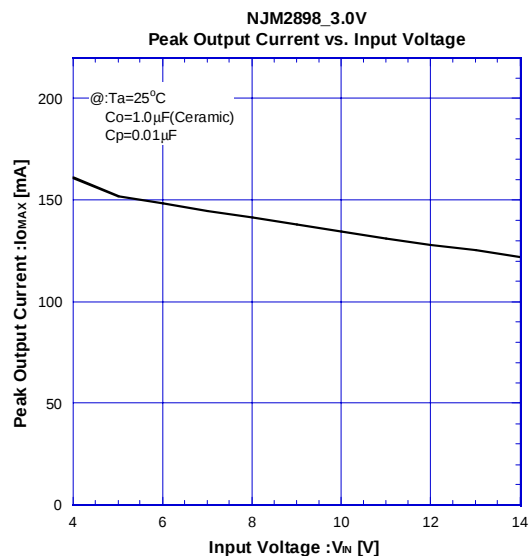
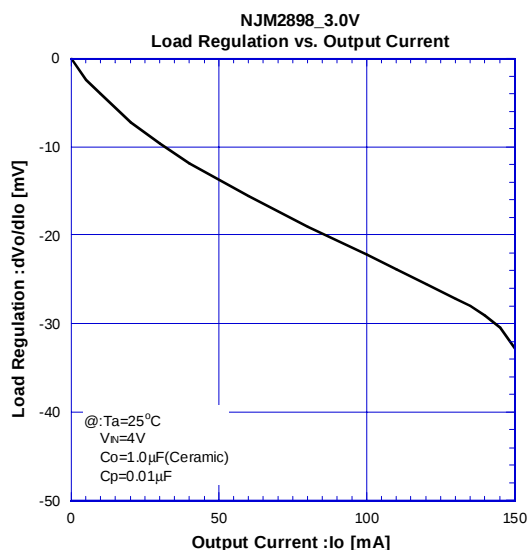
The current flow into the control terminal while the IC is ON state (I_{CONT}) can be reduced when a pull up resistance "R" is inserted between V_{IN} and the control terminal.

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.

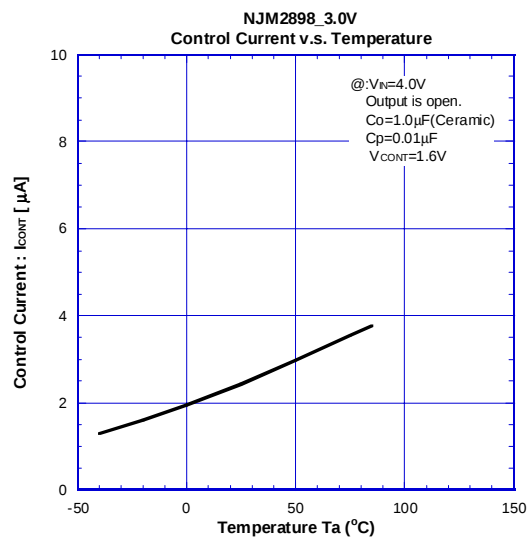
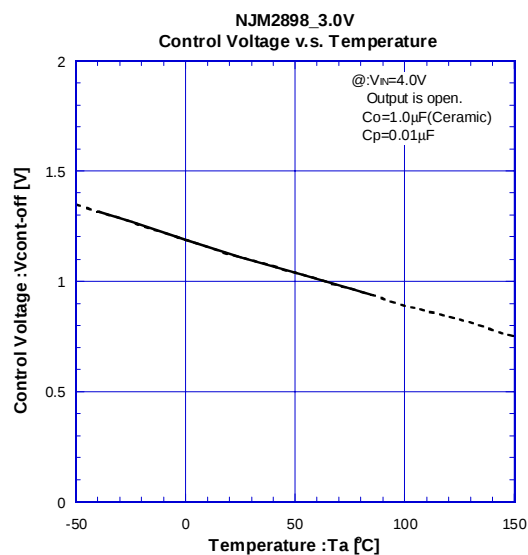
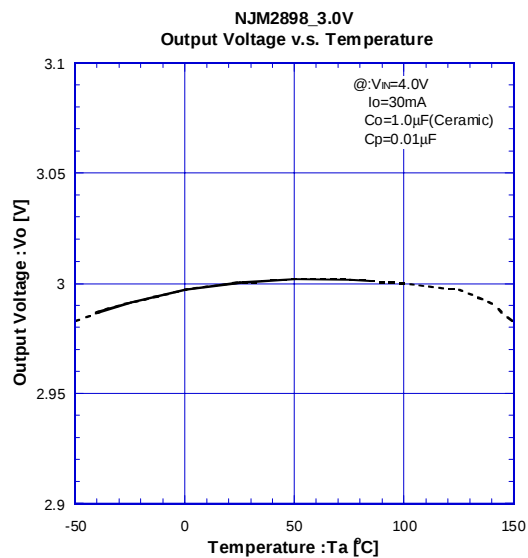
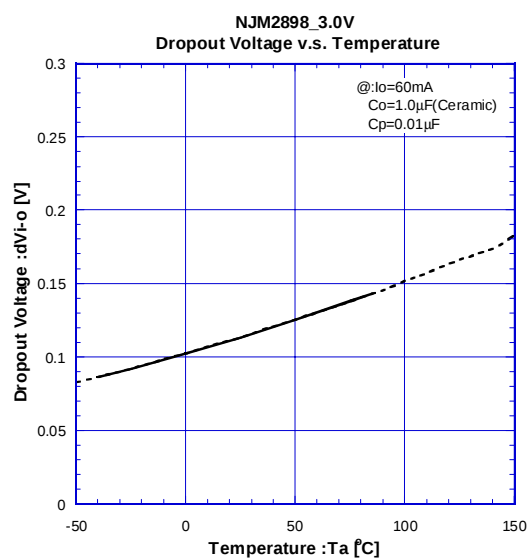
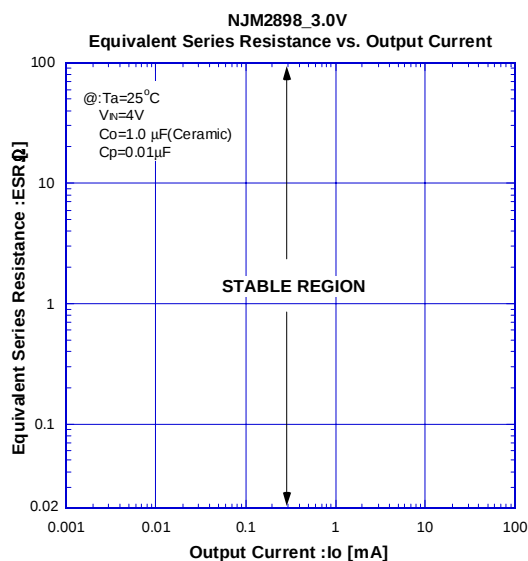
ELECTRICAL CHARACTERISTICS



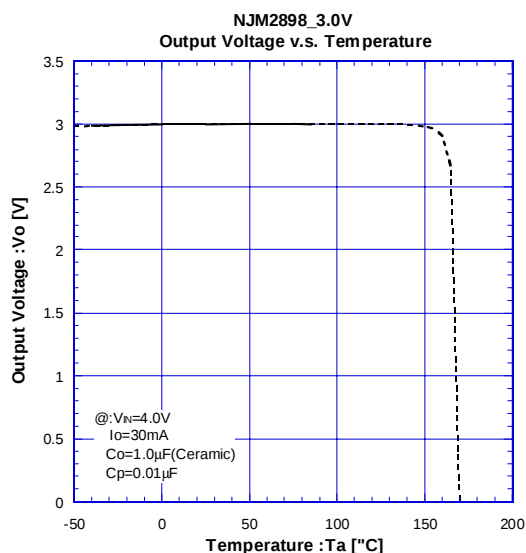
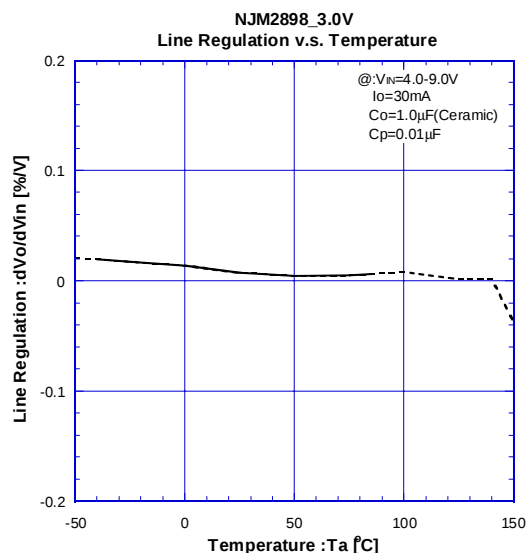
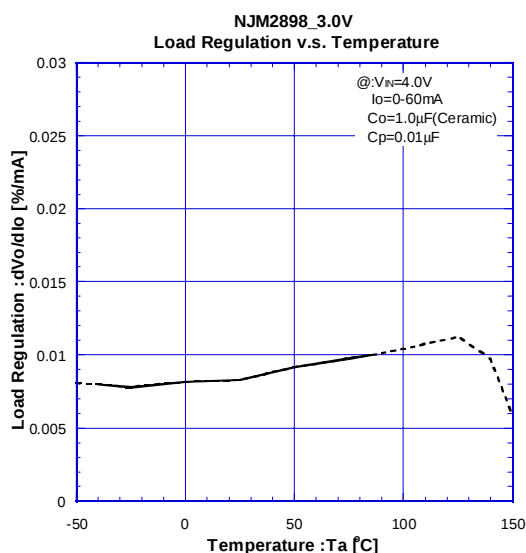
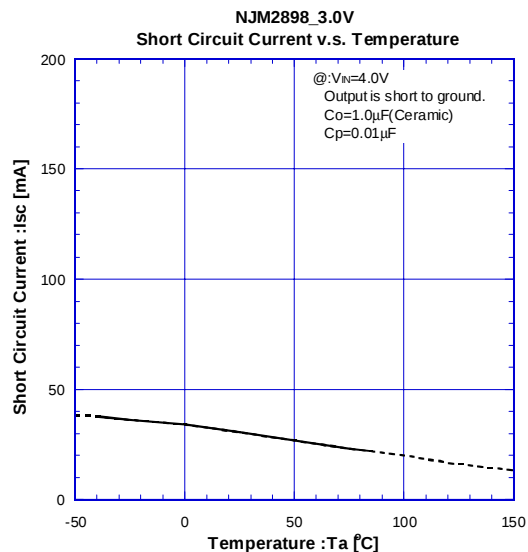
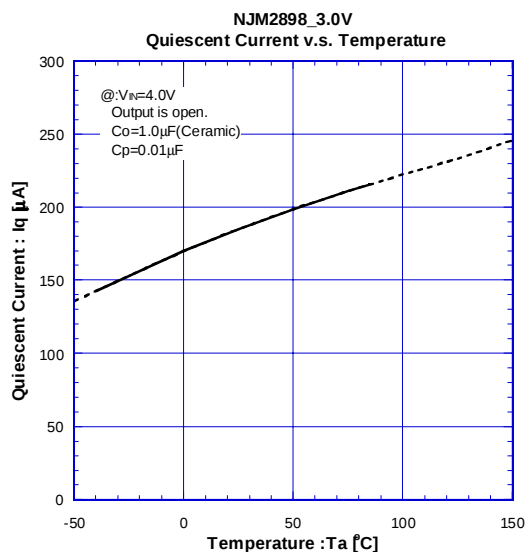
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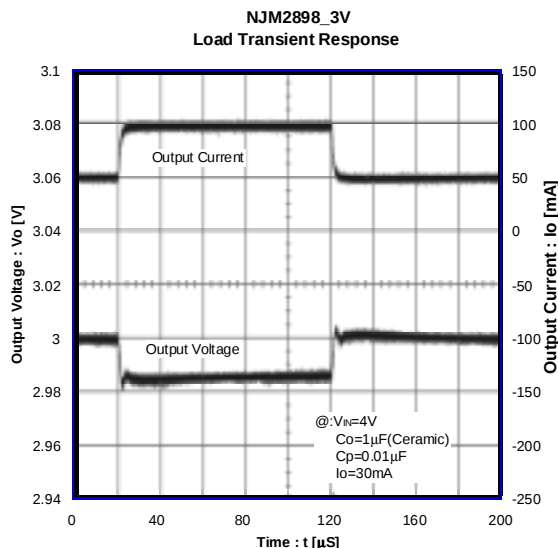
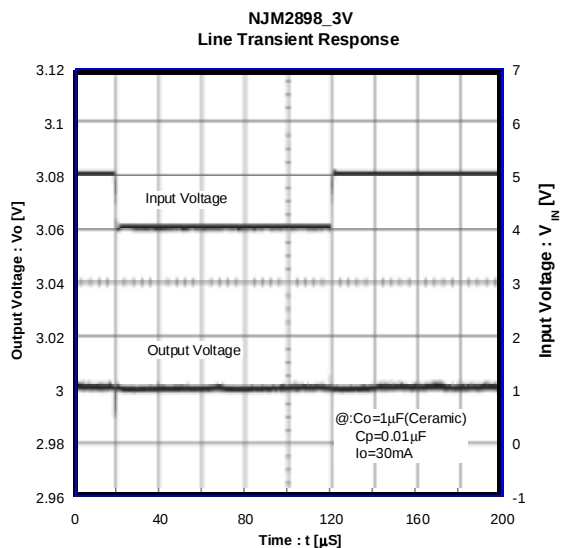
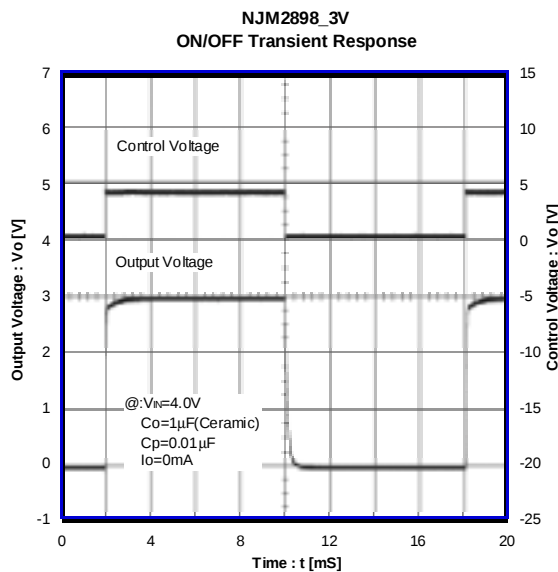
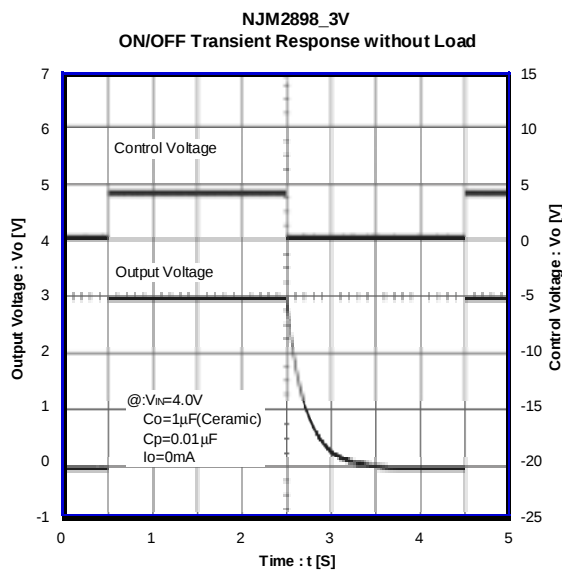
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ELECTRICAL CHARACTERISTICS



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