3OUTPUT LOW DROPOUT VOLTAGE REGULATOR

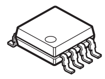
■ GENERAL DESCRIPTION

The NJM2894 is a low dropout 3-channel positive voltage regulator with ON/OFF control. It has a low quiescent current, output current of 150mA (ch1), 80mA (ch2,ch3) and low dropout voltage of 0.1V (at IO=60mA).

Further it offers a low output noise, high ripple rejection and low quiescent current on stand-by mode.

The NJM2894 is available in a small and thin surface mount 8-lead MSOP (TVSP) package, and it can use a small ceramic capacitor as an output capacitor. Therefore it can achieve a high-density mounting and is suitable for small precision devices, portable devices and others.

■ PACKAGE OUTLINE

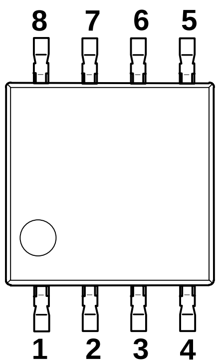


NJM2894RB1
(MSOP8 (TVSP8))

■ FEATURES

- ● High Ripple Rejection　75dB typ. (f=1kHz,Vo=3V Version)
- ● Output Noise Voltage　Vno=45μVrms typ.
- ● Output capacitor with 1.0uF ceramic capacitor (Vo≥2.7V)
- ● Output Current　Io(max.)=ch1=150mA　ch2,ch3=80mA
- ● 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　MSOP8 (TVSP8)*　*MEET JEDEC MO-187-DA / THIN TYPE

■ PIN CONFIGURATION

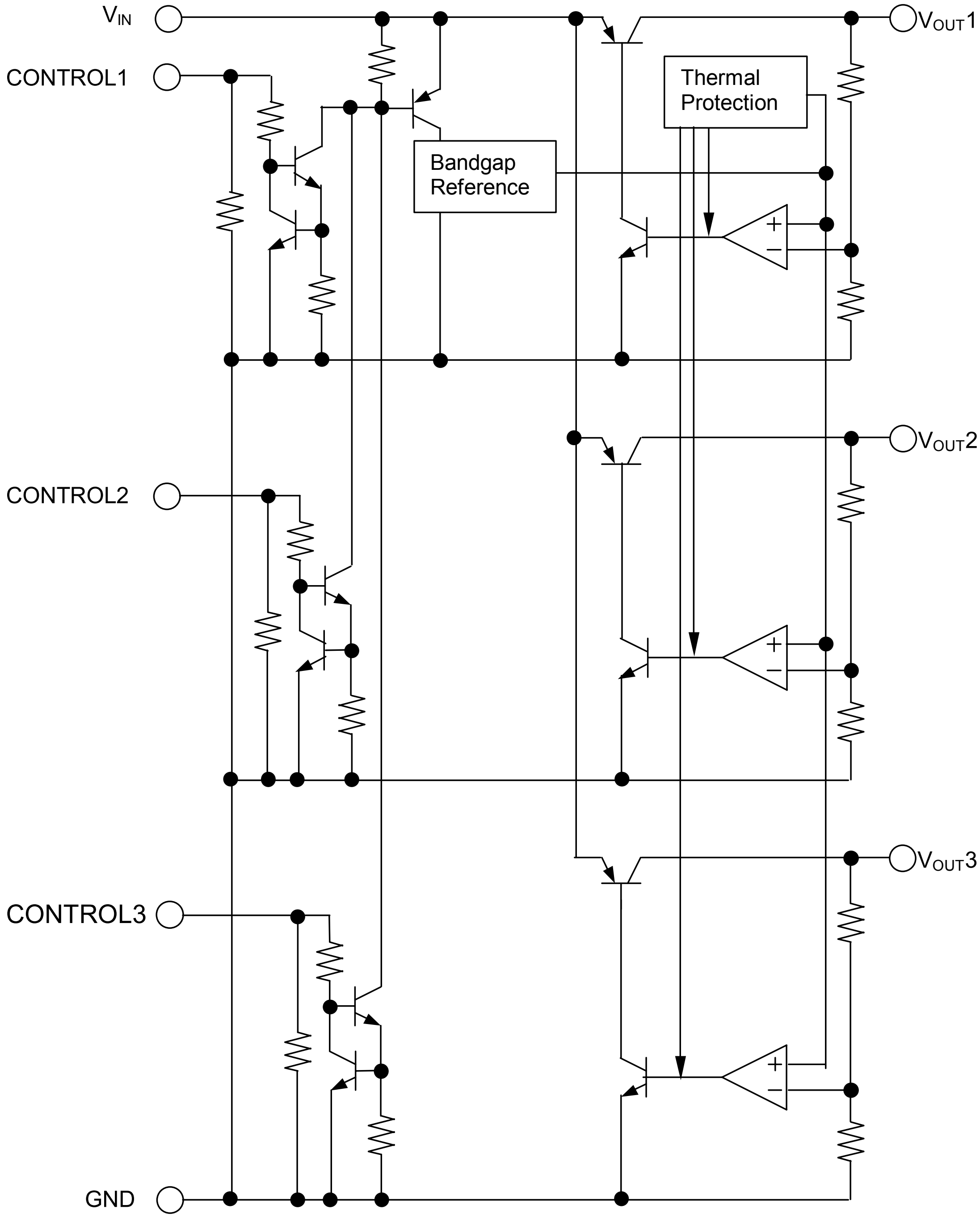


NJM2894RB1-xxx

PIN FUNCTION

1.V_{OUT}1
2.V_{OUT}2
3.V_{OUT}3
4.GND
5.CONTROL3
6.CONTROL2
7.CONTROL1
8.V_{IN}

■ EQUIVALENT CIRCUIT



■ OUTPUT VOLTAGE RANK LIST

Device Name	Vout		
	CH1	CH2	CH3
NJM2894RB1-CCC	2.1V	2.1V	2.1V
NJM2894RB1-LLL	3.0V	3.0V	3.0V
NJM2894RB1-YLC	5.0V	3.0V	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	320	mW
Operating Temperature	Topr	–40 to +85	°C
Storage Temperature	Tstg	–40 to +125	°C

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

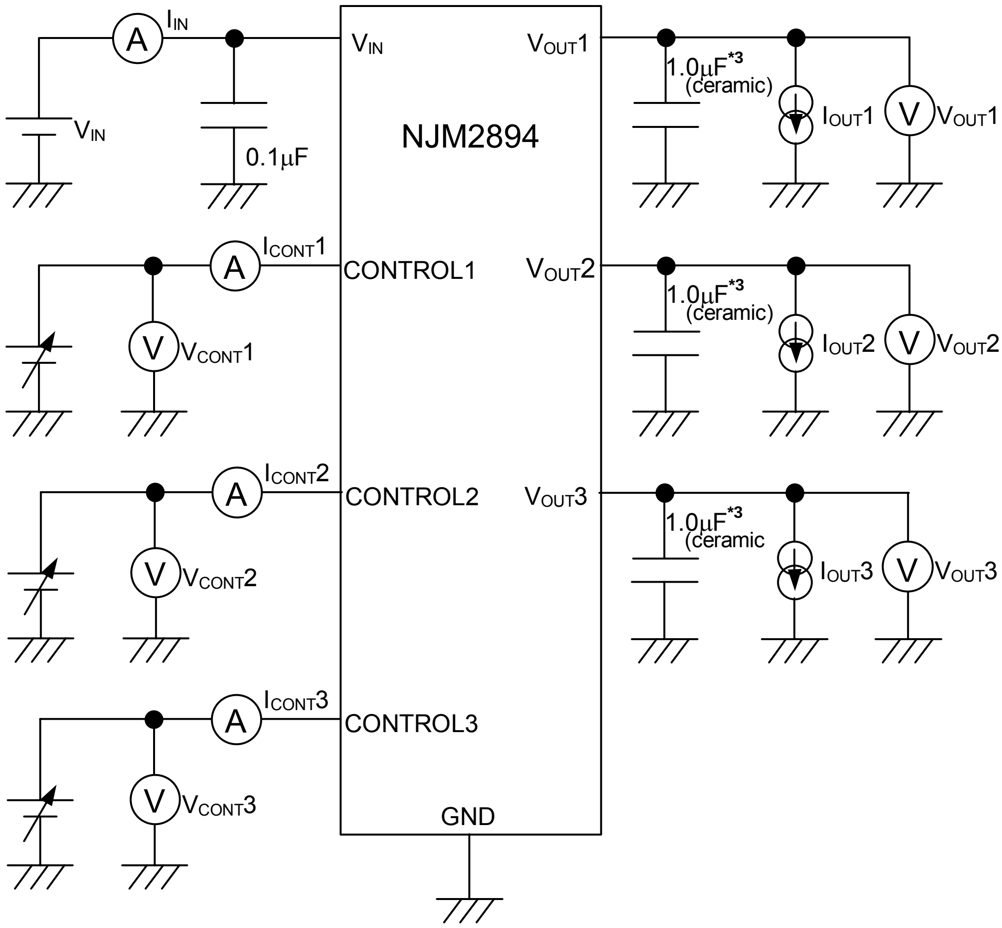
■ ELECTRICAL CHARACTERISTICS

(V_{IN}=Vo+1V, C_{IN}=0.1µF, Co=1.0uF: Vo≥2.7V (Co=2.2uF: Vo≤2.6V), Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	Vo	Io=30mA	-1.0%	–	+1.0%	V
Quiescent Current1	I_{Q1}	V_{CONT1}=V_{IN}, V_{CONT2}=V_{CONT3}=0V *1ch ON Io=0mA, expect Icont	–	150	220	µA
Quiescent Current2	I_{Q2}	V_{CONT1}= V_{CONT2}=V_{IN}, V_{CONT3}=0V *2ch ON Io=0mA, expect Icont	–	270	400	µA
Quiescent Current3	I_{Q3}	V_{CONT1}= V_{CONT2}=V_{CONT3}=V_{IN} Io=0mA, expect Icont	–	390	580	µA
Quiescent Current at Control OFF	$I_{Q(OFF)}$	V_{CONT}=0V	–	–	100	nA
Output Current1	Io	Ch1 : Vo–0.3V	150	200	-	mA
Output Current2	Io	Ch2,3 : Vo–0.3V	80	100	-	mA
Line Regulation	$\Delta Vo/\Delta V_{IN}$	V_{IN}=Vo+1V to Vo+6V, Io=30mA	–	–	0.10	%/V
Load Regulation1	ΔVo/ΔIo1	Ch1 : Io=0 to 100mA	–	–	0.03	%/mA
Load Regulation2	ΔVo/ΔIo2	Ch2,3 : Io=0 to 60mA	–	–	0.03	%/mA
Dropout Voltage1	ΔV_{I-O1}	Io=60mA	–	0.10	0.18	V
Dropout Voltage2	ΔV_{I-O2}	Io=40mA	–	0.10	0.18	V
Ripple Rejection	RR	ein=200mVrms,f=1kHz, Io=10mA, Vo=3V Version	–	75	–	dB
Average Temperature Coefficient of Output Voltage	ΔVo/ΔTa	Ta=0 to 85°C, Io=10mA	–	±50	–	ppm/°C
Output Noise Voltage	V_{NO}	f=10Hz to 80kHz, Io=10mA, Vo=3V Version	–	45	–	µVrms
Control Voltage for ON-state	$V_{CONT(ON)}$		1.6	–	–	V
Control Voltage for OFF-state	$V_{CONT(OFF)}$		–	–	0.6	V

(*2) V_{IN} =Vo+1V means add 1V to higher output voltage.
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.

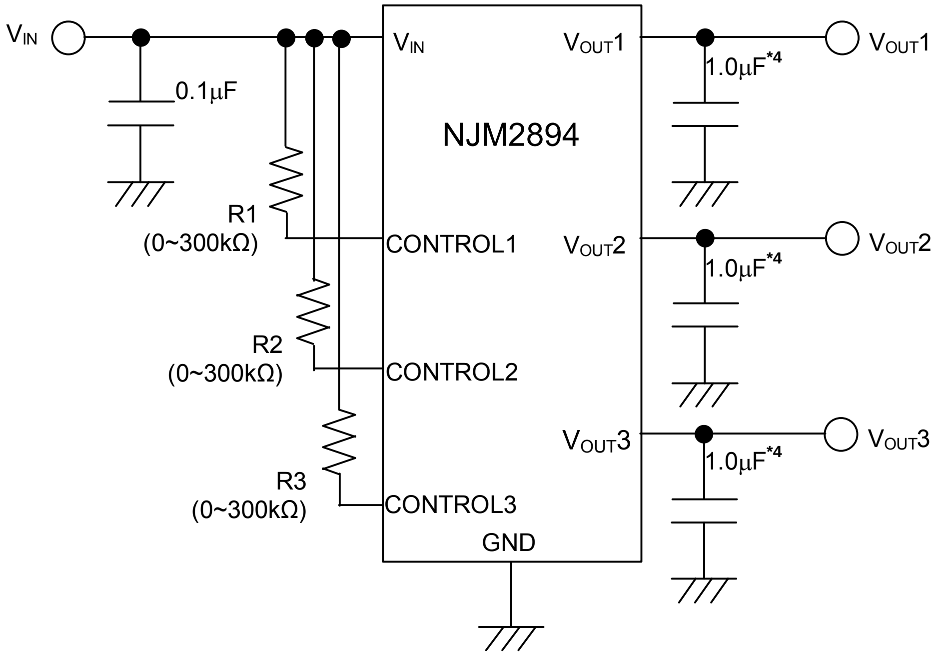
■ TEST CIRCUIT



*3 Vo≤2.6V version: Co=2.2µF(ceramic)

■ TYPICAL APPLICATION

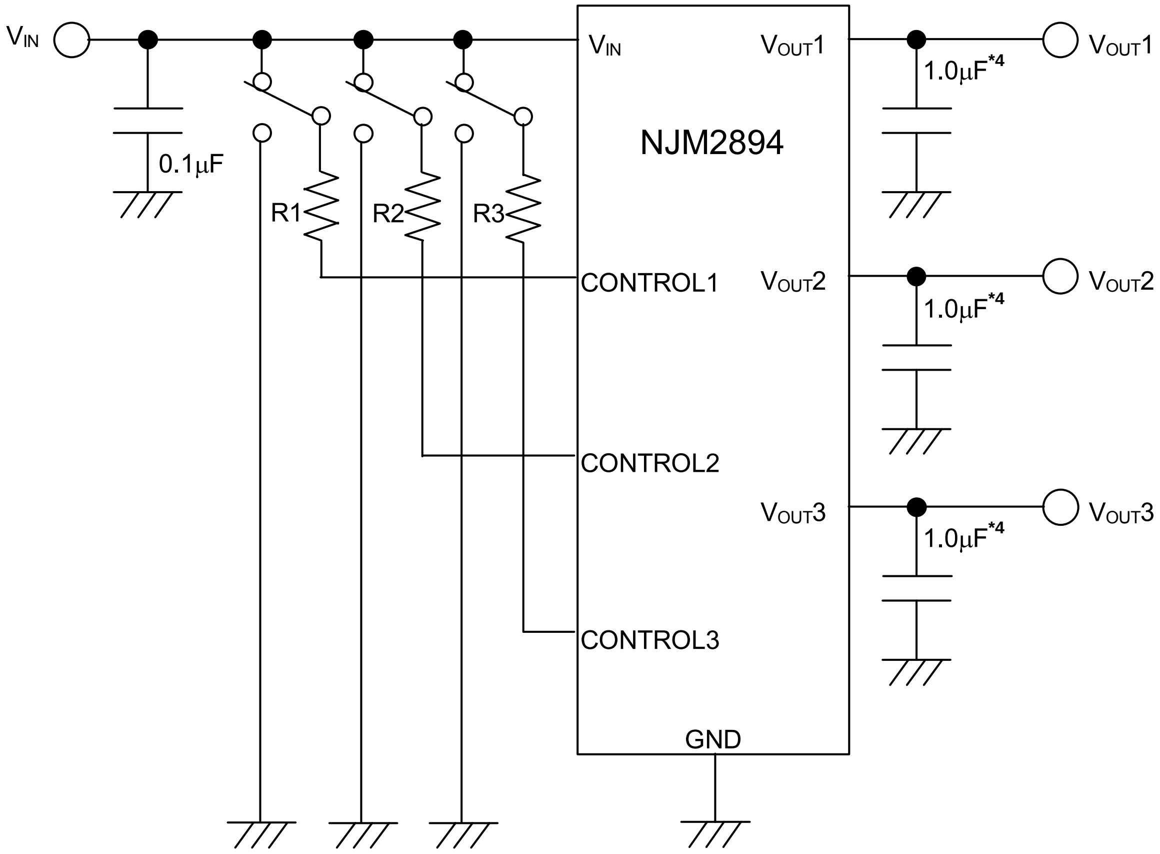
① In the case where ON/OFF Control is not required:



*4 Vo≤2.6V version: Co=2.2μF

Connect control terminal to V_{IN} terminal

② In use of ON/OFF CONTROL:

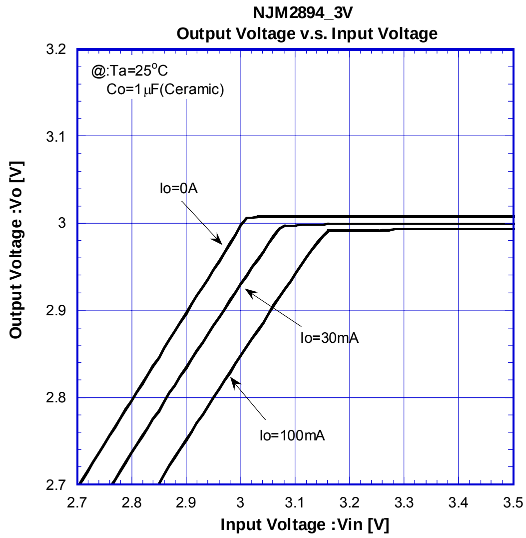


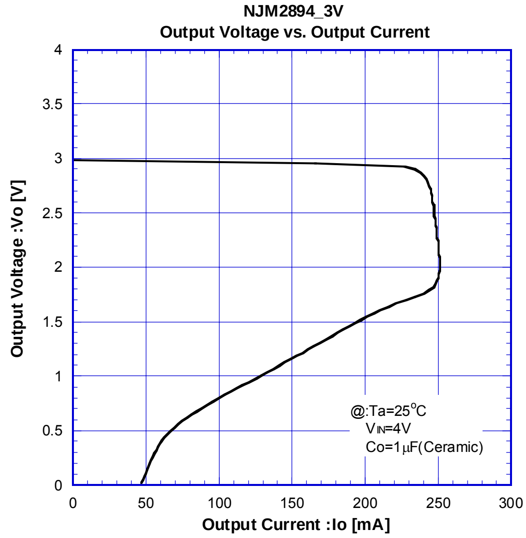
*4 Vo≤2.6V version: Co=2.2µF

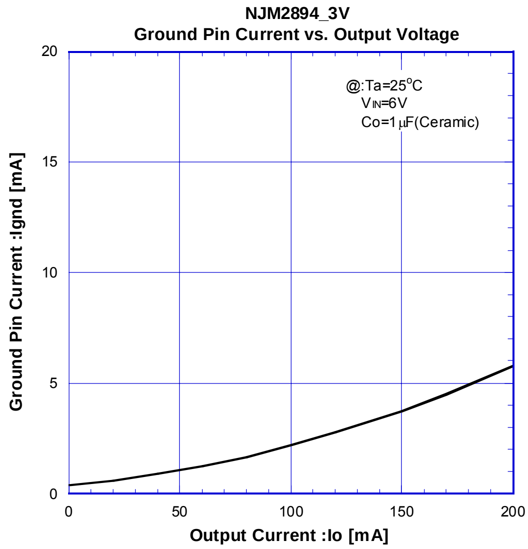
State of control terminal:
- "H"→ output is enabled.
- "L" or "open" → output is disabled.

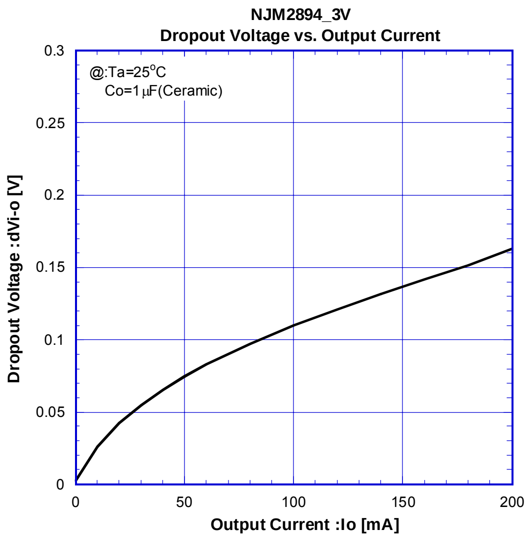
∗In the case of using a resistance "R" between V_{IN} and control.
The current flow into the control terminal while the IC is ON state (I_{CONT}) can be reduced when a pull up resistance "R" is inserted between V_{IN} and the control terminal.
The minimum control voltage for ON state ($V_{CONT\,(ON)}$) 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.

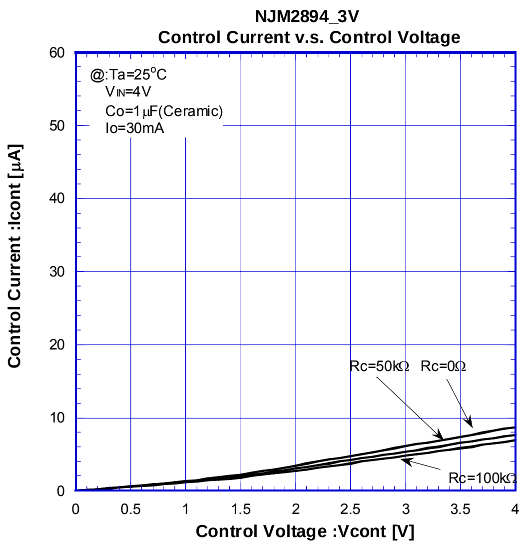
■ ELECTRICAL CHARACTERISTICS

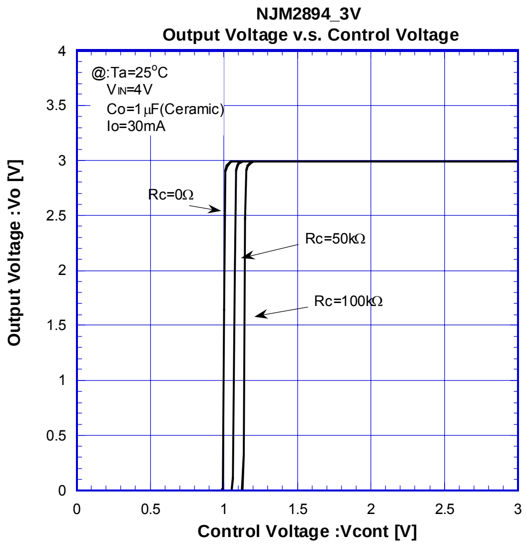




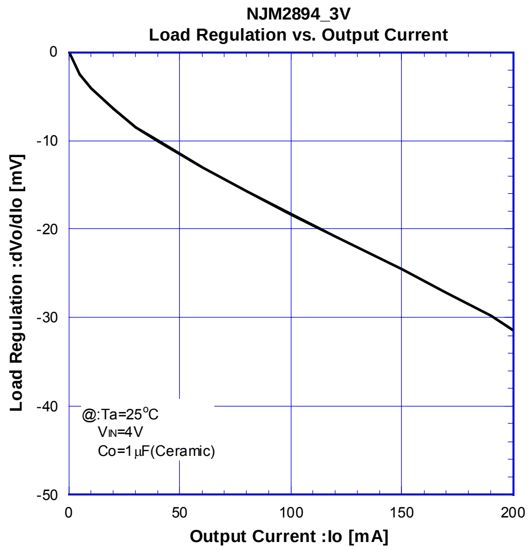


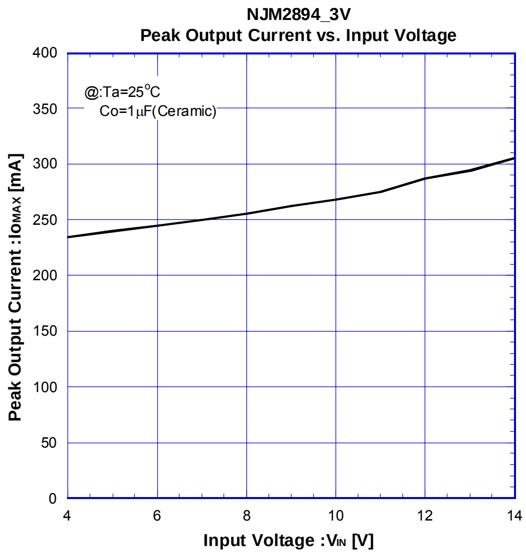


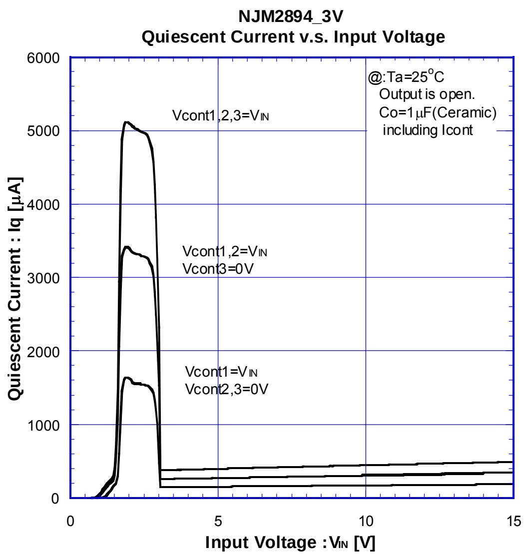


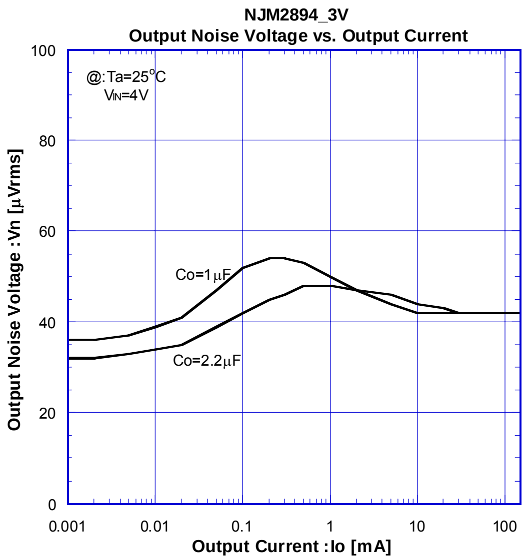


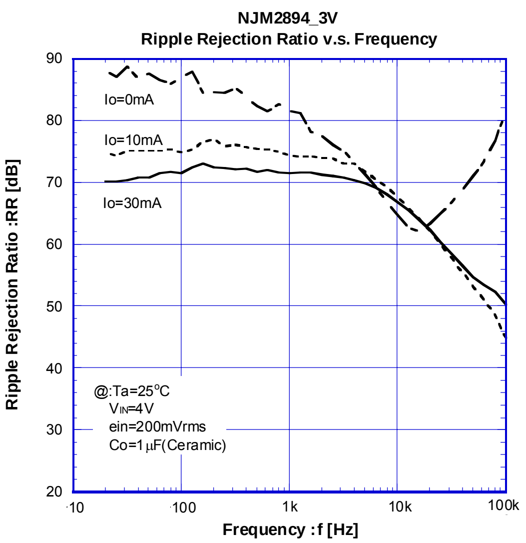
■ ELECTRICAL CHARACTERISTICS

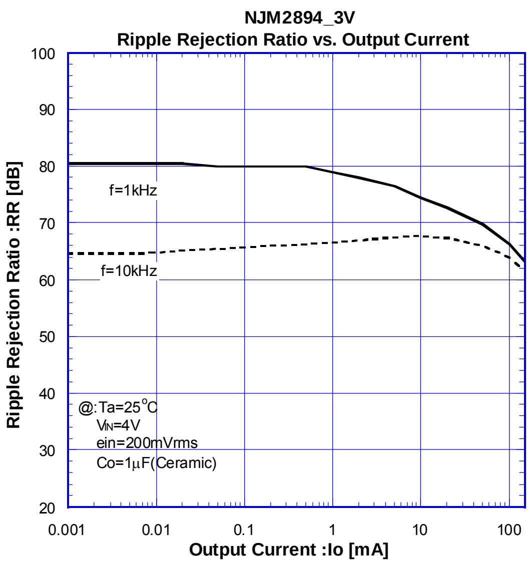






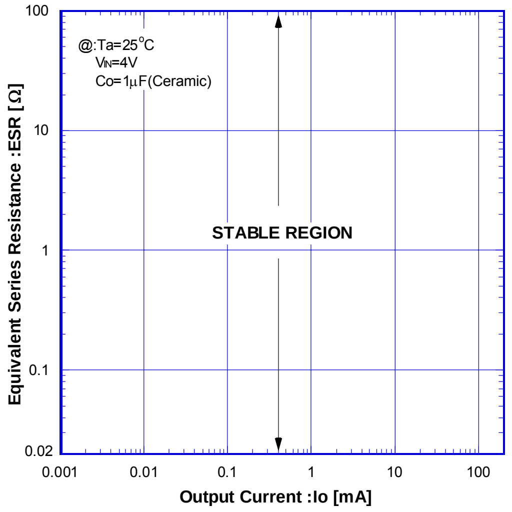




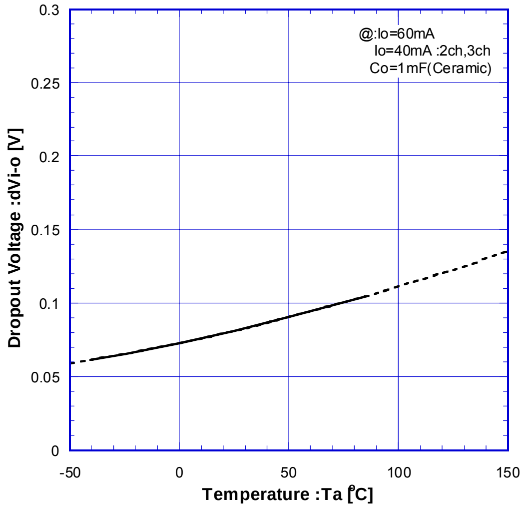


■ ELECTRICAL CHARACTERISTICS

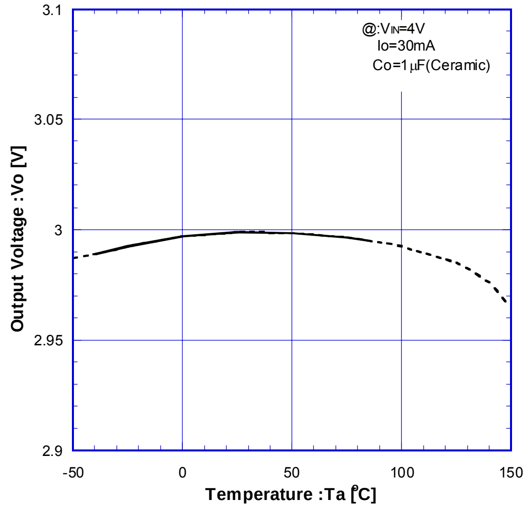
NJM2894_3V
Equivalent Series Resistance vs. Output Current



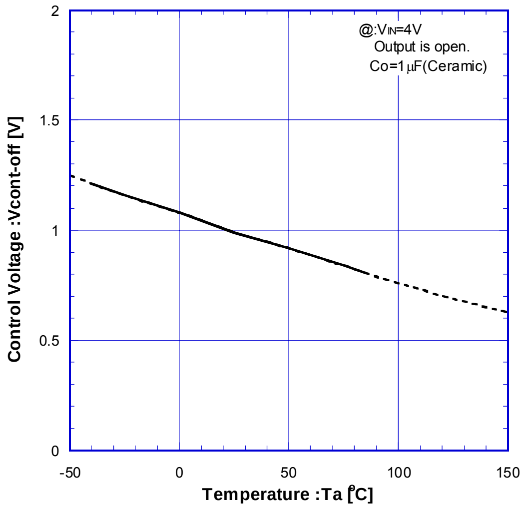
NJM2894_3V
Dropout Voltage v.s. Temperature



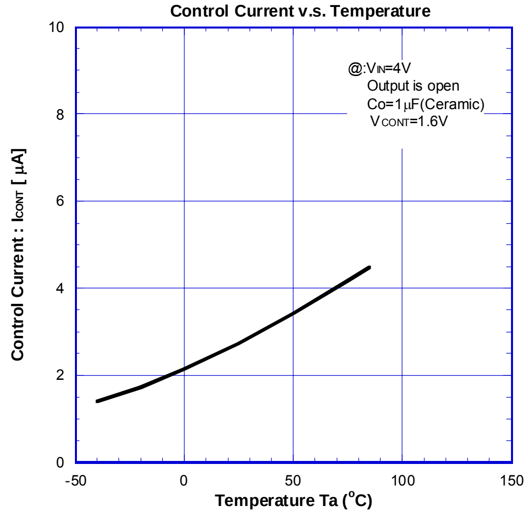
NJM2894_3V
Output Voltage v.s. Temperature



NJM2894_3V
Control Voltage v.s. Temperature

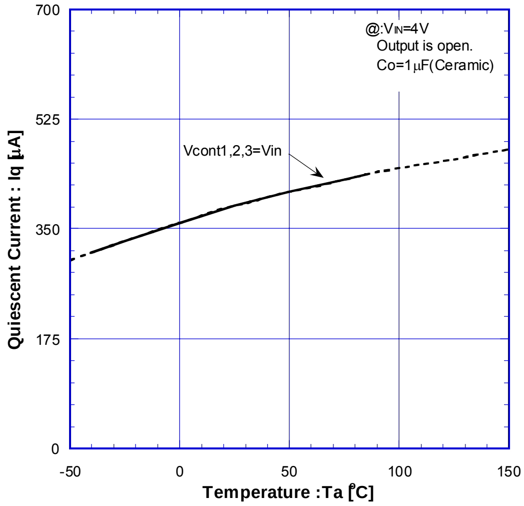


NJM2894_3.0V
Control Current v.s. Temperature

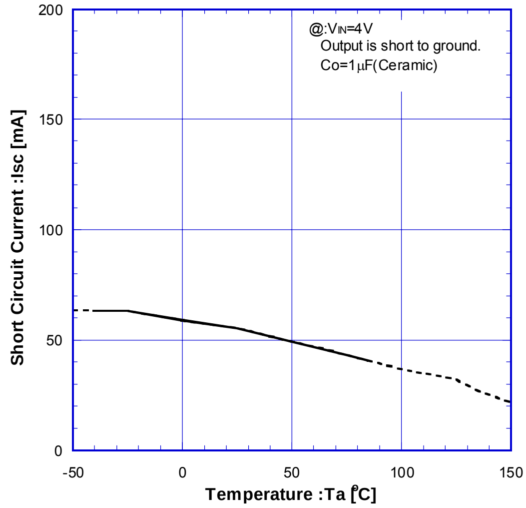


■ ELECTRICAL CHARACTERISTICS

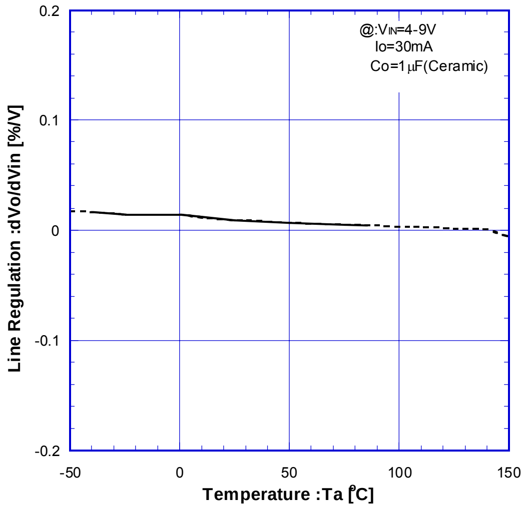
NJM2894_3V
Quiescent Current v.s. Temperature



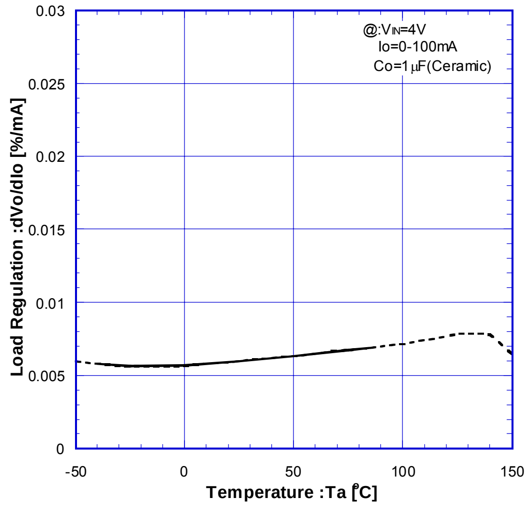
NJM2894_3V
Short Circuit Current v.s. Temperature



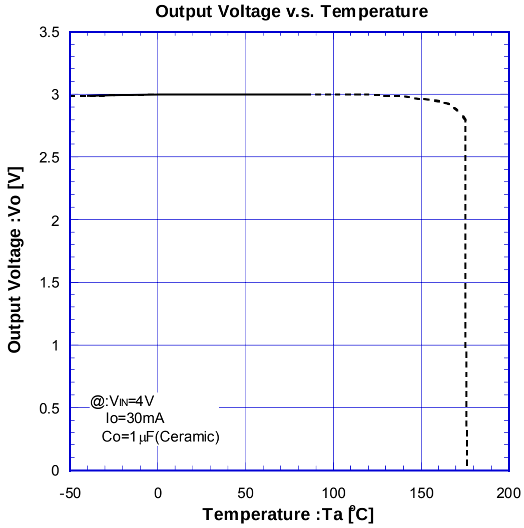
NJM2894_3V
Line Regulation v.s. Temperature



NJM2894_3V
Load Regulation v.s. Temperature



NJM2894_3V
Output Voltage v.s. Temperature



■ ELECTRICAL CHARACTERISTICS