

## LOW DROPOUT VOLTAGE REGULATOR

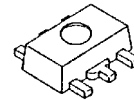
### ■ GENERAL DESCRIPTION

The NJM2830 is a 300mA output low dropout voltage regulator with ON/OFF control.

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

2.1V to 15.5V output voltage range, 1 $\mu$ F small decoupling capacitor, built-in noise bypass capacitor make the NJM2830 suitable for various applications.

### ■ PACKAGE OUTLINE

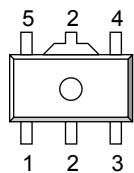


NJM2830U1

### ■ FEATURES

- Output voltage options available      2.1 ~ 15.5V (0.1V step)
- High Ripple Rejection                    75dB typ. (f=1kHz Vo=3V Version)
- Output Noise Voltage                    Vno=50 $\mu$ Vrms typ. (Vo=3V Version)
- Output capacitor with 1.0 $\mu$ F ceramic capacitor (Vo $\geq$ 5.1V)
- Output Current                            Io(max.)=300mA
- High Precision Output                    Vo $\pm$ 1.0%
- Low Dropout Voltage                    0.10V typ. (Io=100mA)
- ON/OFF Control                            (Active High)
- Internal Thermal Overload Protection
- Internal Over Current Protection
- Bipolar Technology
- Package Outline                            SOT-89-5

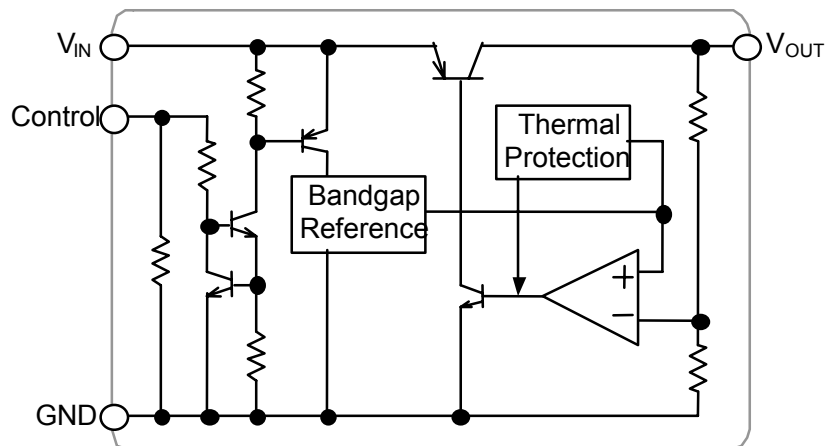
### ■ PIN CONFIGURATION



NJM2830U1

1. CONTROL
2. GND
3. NC
4. V<sub>OUT</sub>
5. V<sub>IN</sub>

### ■ EQUIVALENT CIRCUIT



# NJM2830

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## ■ OUTPUT VOLTAGE

Device Name	Vout
NJM2830U1-21	2.1V
NJM2830U1-25	2.5V
NJM2830U1-03	3.0V
NJM2830U1-33	3.3V
NJM2830U1-05	5.0V
NJM2830U1-57	5.7V
NJM2830U1-58	5.8V
NJM2830U1-06	6.0V
NJM2830U1-08	8.0V
NJM2830U1-85	8.5V
NJM2830U1-86	8.6V
NJM2830U1-09	9.0V
NJM2830U1-12	12.0V
NJM2830U1-15	15.0V

The WHITE column shows applicable Voltage Rank(s)

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

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	$V_{IN}$	+20	V
Control Voltage	$V_{CONT}$	+20	V
Power Dissipation	$P_D$	440	mW
Operating Temperature	$T_{opr}$	-40~+85	°C
Storage Temperature	$T_{stg}$	-40~+150	°C

## ■ INPUT VOLTAGE RANGE

$V_{IN}=+2.3V\sim 18V$  (In case of  $V_o < 2.2V$ )

## ■ ELECTRICAL CHARACTERISTICS

( $V_{IN}=V_o+1V$ ,  $C_{IN}=0.1\mu F$ ,  $C_o=1.0\mu F$  (4.9V< $V_o\leq 5.5V$ : $C_o=2.2\mu F$ , 2.9V< $V_o\leq 4.9V$ : $C_o=4.7\mu F$ ,  $V_o\leq 2.9V$ :  $C_o=10\mu F$ ),  $T_a=25^\circ C$ )

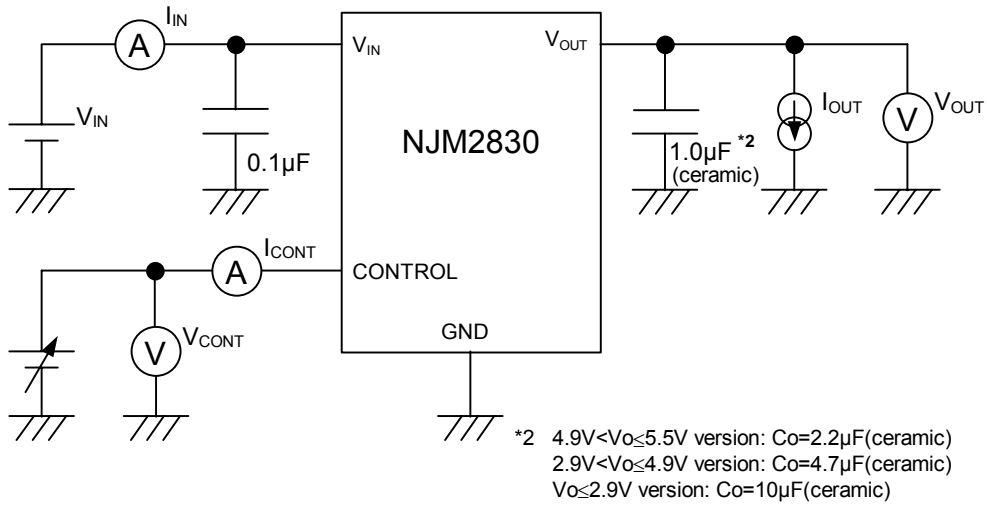
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	$V_o$	$I_o=30mA$	-1.0%	—	+1.0%	V	
Quiescent Current	$I_Q$	$I_o=0mA$ , except $I_{cont}$	$V_o\leq 5V$ Version	—	130	180	$\mu A$
			5V< $V_o\leq 10V$ Version	—	145	195	$\mu A$
			10V< $V_o\leq 15V$ Version	—	160	210	$\mu A$
Quiescent Current at Control OFF	$I_{Q(OFF)}$	$V_{CONT}=0V$	—	—	100	nA	
Output Current	$I_o$	$V_o-0.3V$	300	400	—	mA	
Line Regulation	$\Delta V_o/\Delta V_{IN}$	$V_{IN}=V_o+1V \sim V_o+6V$ ( $V_o\leq 12V$ Version) $V_{IN}=V_o+1V \sim 18V$ ( $V_o>12V$ Version), $I_o=30mA$	—	—	0.10	%/V	
Load Regulation	$\Delta V_o/\Delta I_o$	$I_o=0 \sim 300mA$	—	—	0.009	%/mA	
Dropout Voltage(*1)	$\Delta V_{I-O}$	$I_o=100mA$	—	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 Voltage	$V_{NO}$	$f=10Hz \sim 80kHz$ , $I_o=10mA$ $V_o=3V$ Version	—	50	—	$\mu V_{rms}$	
Control Current	$I_{CONT}$	$V_{CONT}=1.6V$	—	3	12	$\mu A$	
Control Voltage for ON-state	$V_{CONT(ON)}$		1.6	—	—	V	
Control Voltage for OFF-state	$V_{CONT(OFF)}$		—	—	0.6	V	

(\*1): 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.

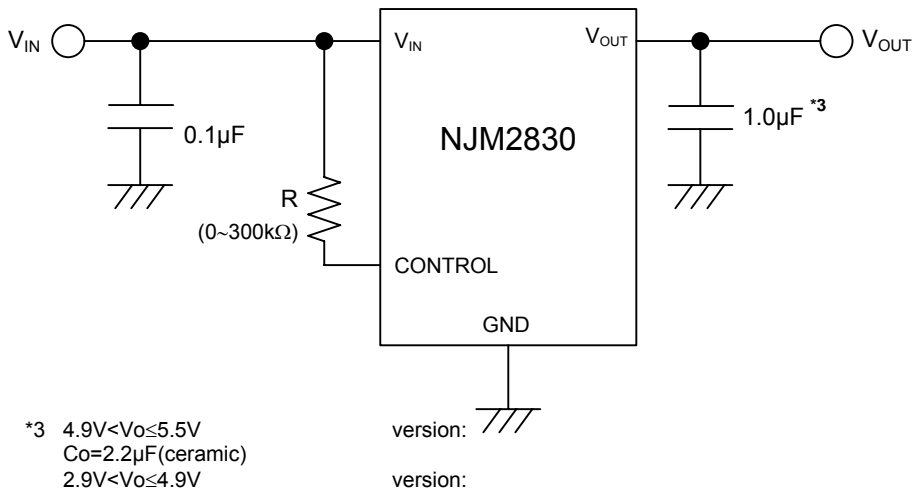
# NJM2830

## TEST CIRCUIT



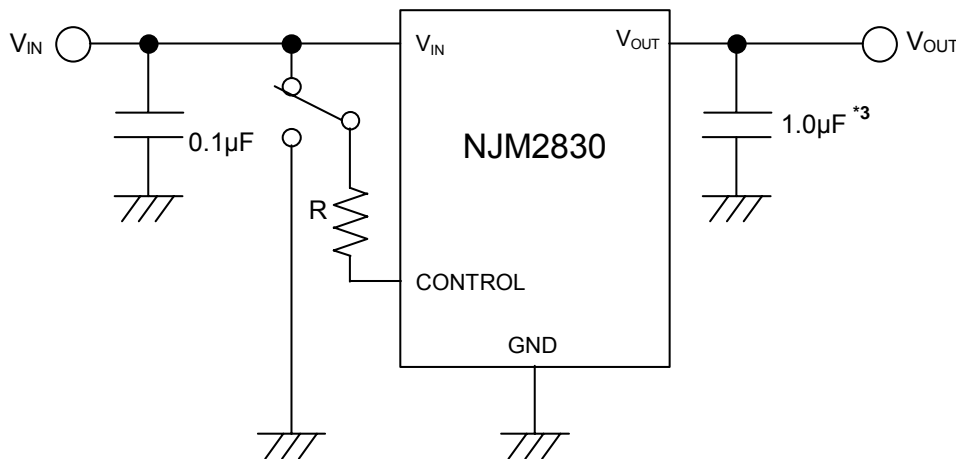
## TYPICAL APPLICATIONS

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



Connect control terminal to  $V_{IN}$  terminal

## ② In use of ON/OFF CONTROL:



\*3 4.9V<V<sub>o</sub>≤5.5V version: C<sub>o</sub>=2.2µF(ceramic)  
 2.9V<V<sub>o</sub>≤4.9V version: C<sub>o</sub>=4.7µF(ceramic)  
 V<sub>o</sub>≤2.9V version: C<sub>o</sub>=10µF(ceramic)

State of control terminal:

- “H”→ output is enabled.
- “L” or “open” → output is disabled.

### \*In the case of using a resistance "R" between V<sub>IN</sub> and control.

The current flow into the control terminal while the IC is ON state (I<sub>CONT</sub>) can be reduced when a pull up resistance "R" is inserted between V<sub>IN</sub> and the control terminal.

The minimum control voltage for ON state (V<sub>CONT(ON)</sub>) is increased due to the voltage drop caused by I<sub>CONT</sub> and the resistance "R". The I<sub>CONT</sub> 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<sub>CONT(ON)</sub> over the required temperature range.

### \*Input Capacitance C<sub>IN</sub>

Input capacitance C<sub>IN</sub> 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<sub>IN</sub> value of 0.1µF greater to avoid the problem.

C<sub>IN</sub> should connect between GND and V<sub>IN</sub> as short as possible.

### \*Output Capacitance C<sub>O</sub>

Output capacitor (C<sub>o</sub>) is required for a phase compensation of the internal error amplifier. The capacitance and the equivalent series resistance (ESR) influences stability of the regulator.

This product is designed to work with a low ESR capacitor for the C<sub>o</sub>; however, use of recommended capacitance or greater value is essential for stable operation.

Use of a smaller C<sub>o</sub> may cause excess output noise or oscillation of the regulator due to lack of the phase compensation.

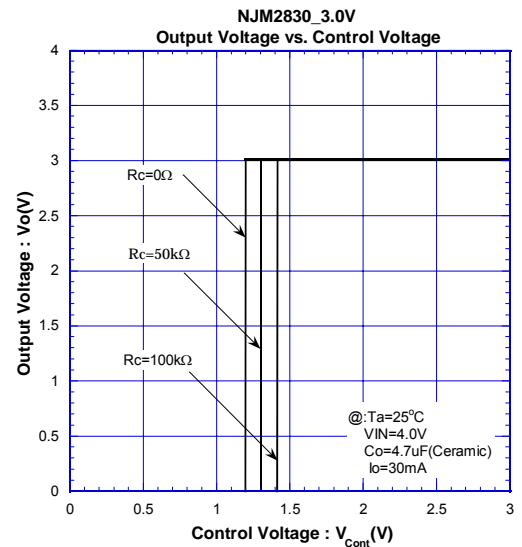
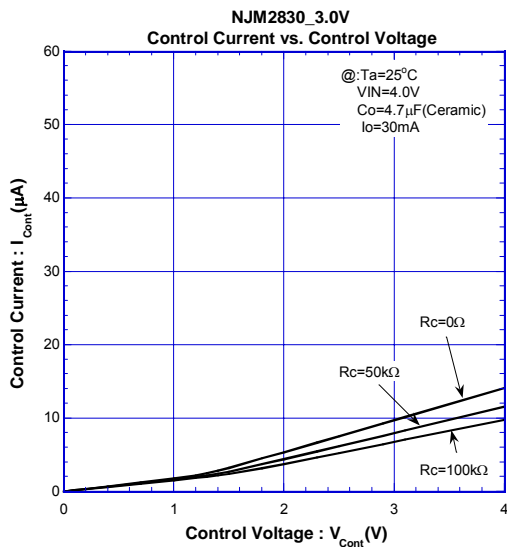
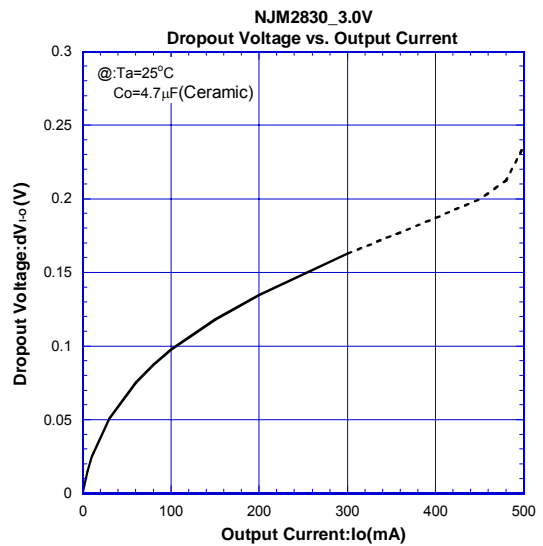
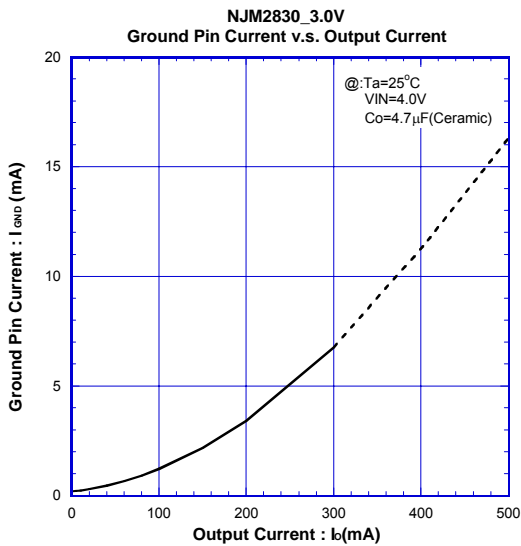
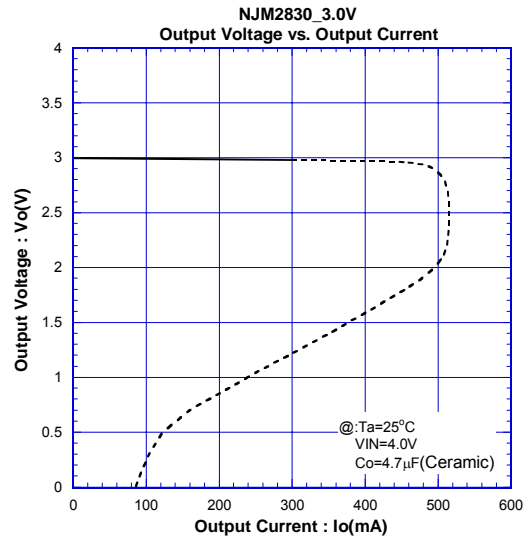
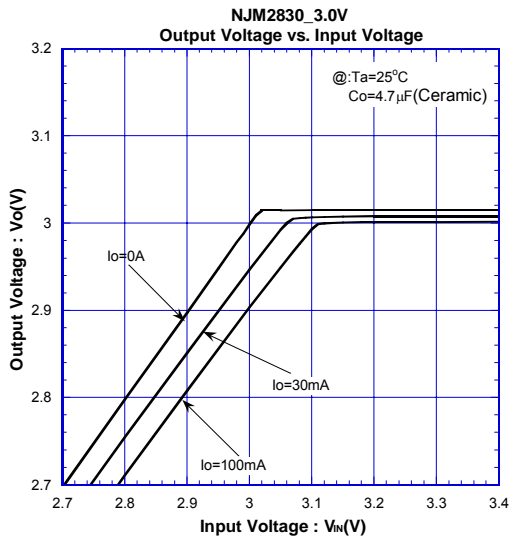
Therefore, use C<sub>o</sub> with the recommended capacitance or greater value and connect between V<sub>o</sub> terminal and GND terminal with minimal wiring. The recommended capacitance depends on the output voltage. Low voltage regulator requires greater value of the C<sub>o</sub>. Thus, check the recommended capacitance for each output voltage.

Use of a greater C<sub>o</sub> reduces output noise and ripple output, and also improves transient response of the output voltage against rapid load change.

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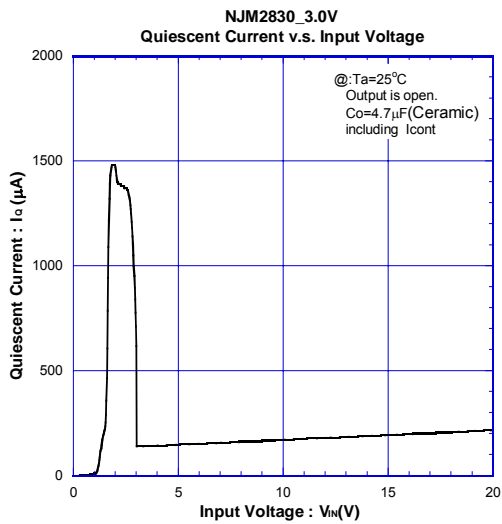
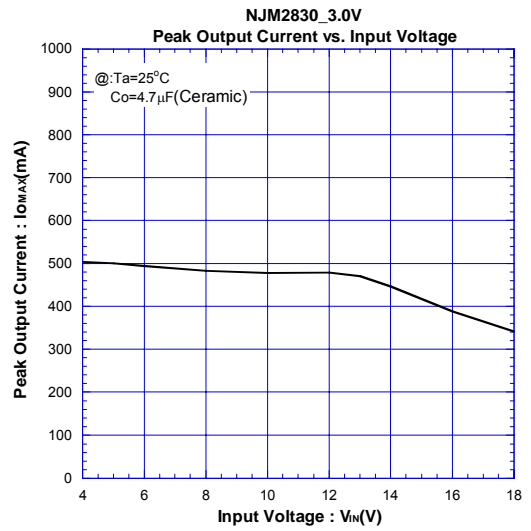
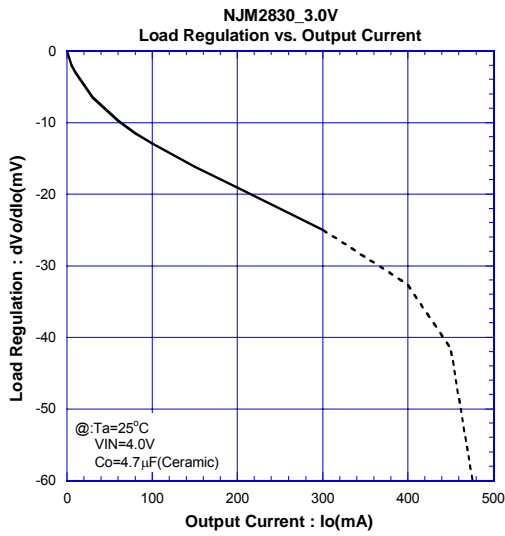
## ■ TYPICAL CHARACTERISTICS

### ● DC CHARACTERISTICS (3V Version)



## TYPICAL CHARACTERISTICS

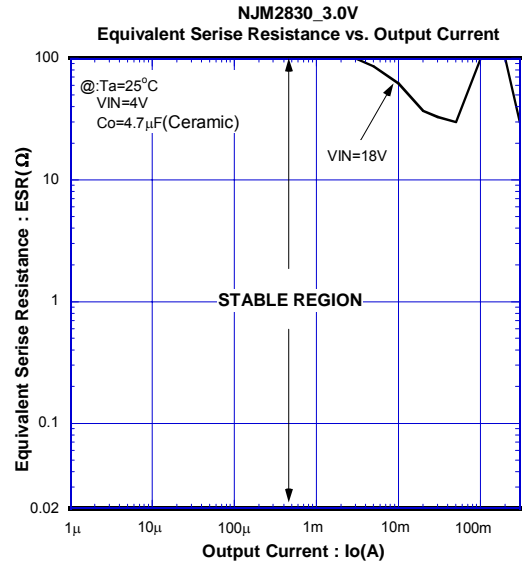
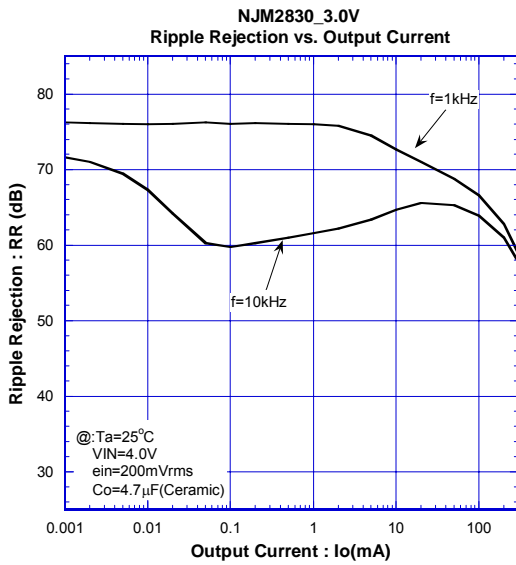
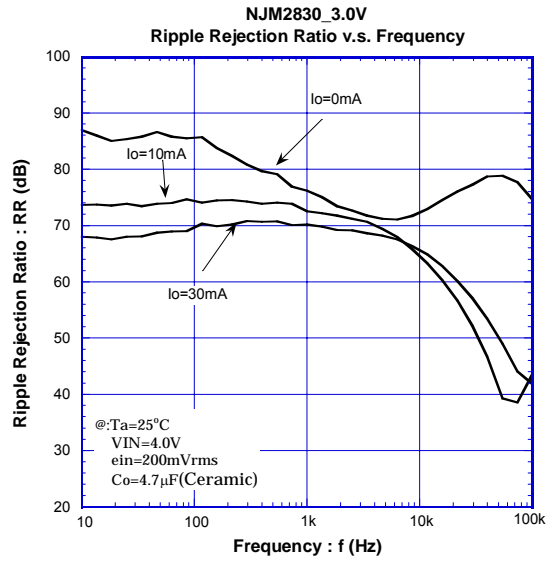
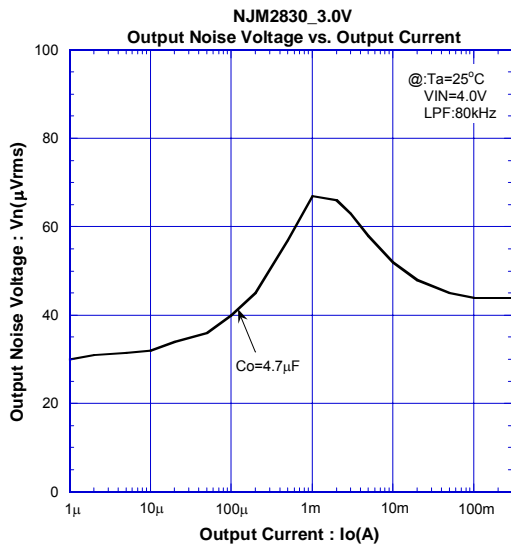
### DC CHARACTERISTICS (3V Version)



# NJM2830

## TYPICAL CHARACTERISTICS

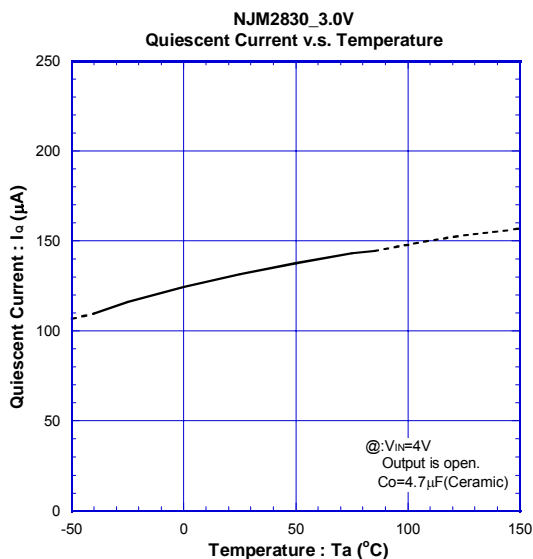
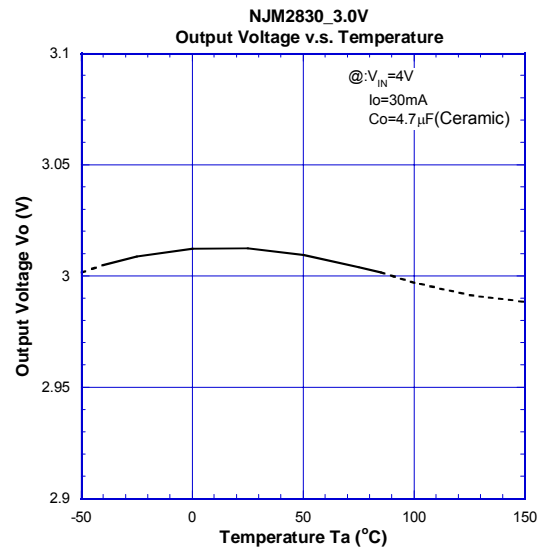
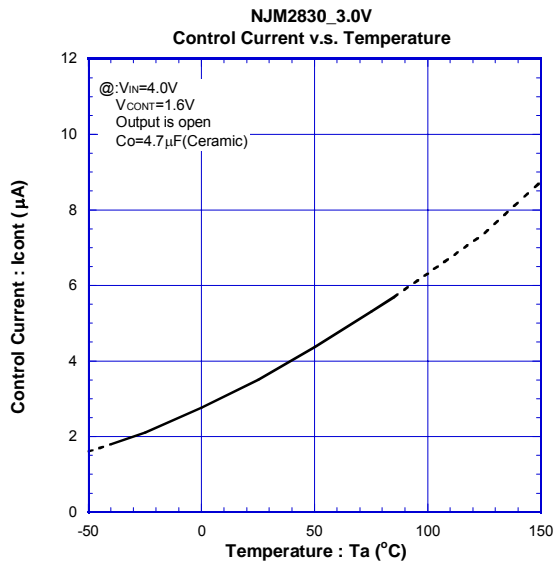
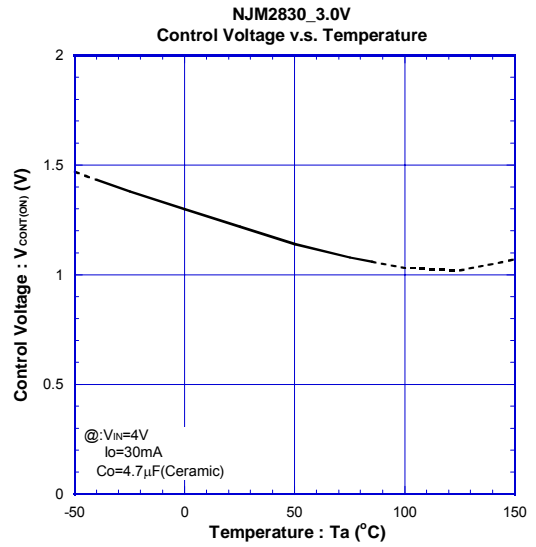
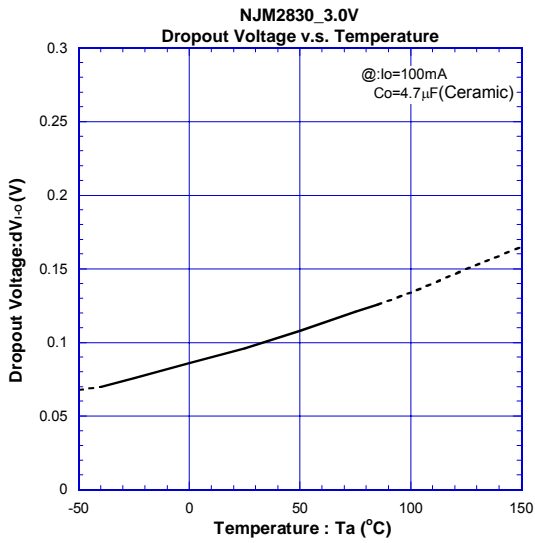
### AC CHARACTERISTICS (3V Version)





## TYPICAL CHARACTERISTICS

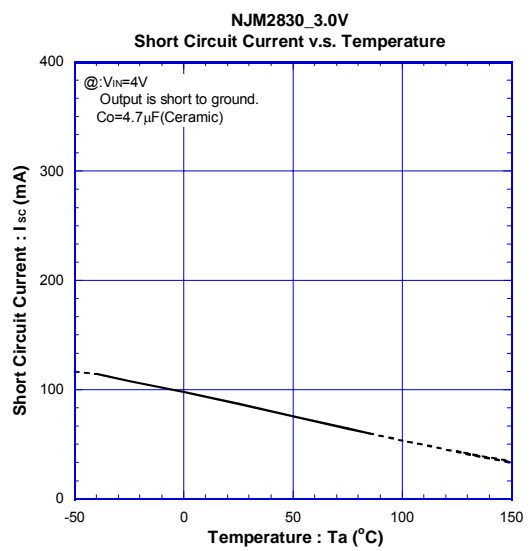
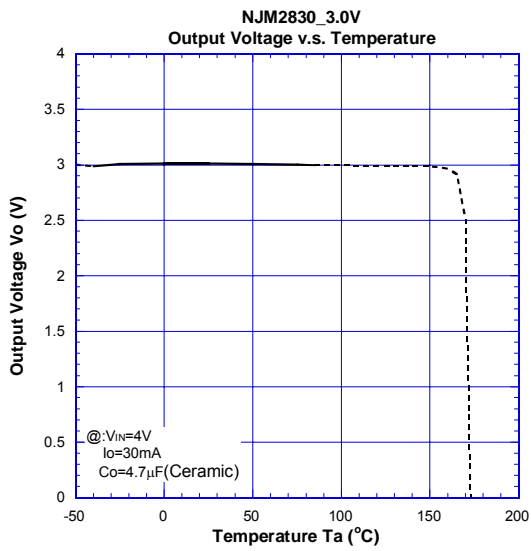
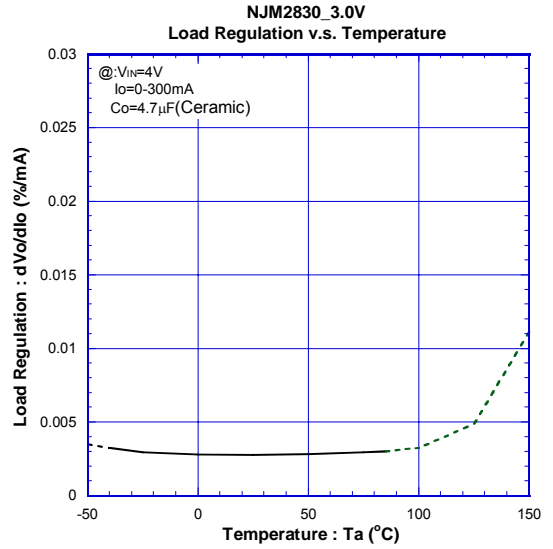
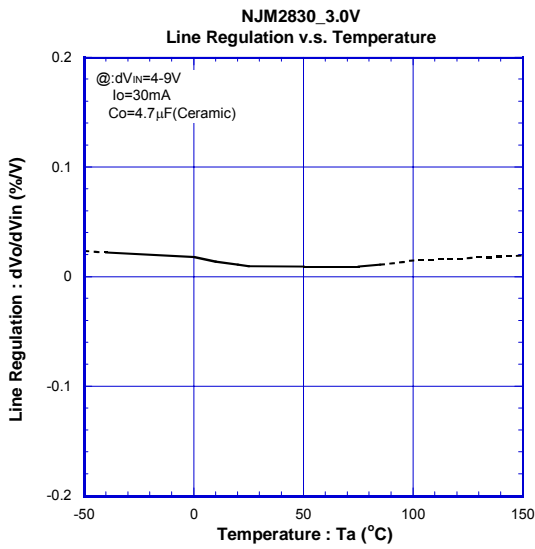
### ● TEMPERATURE CHARACTERISTICS (3V Version)



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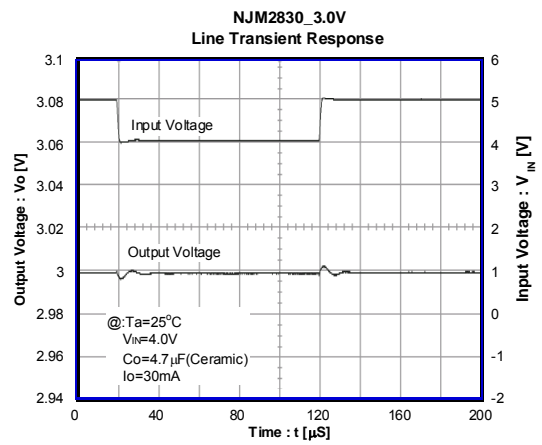
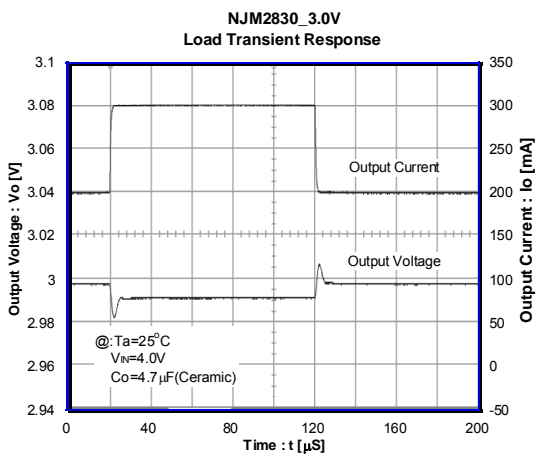
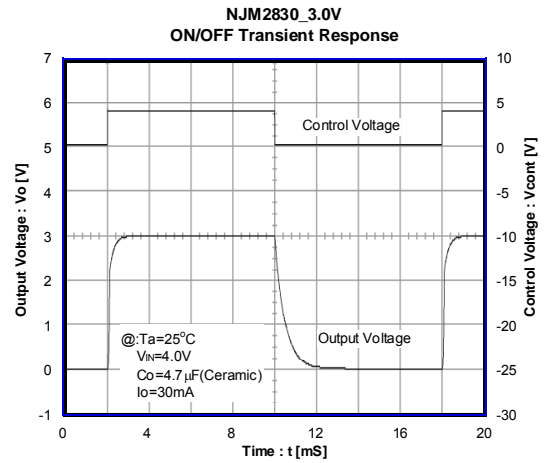
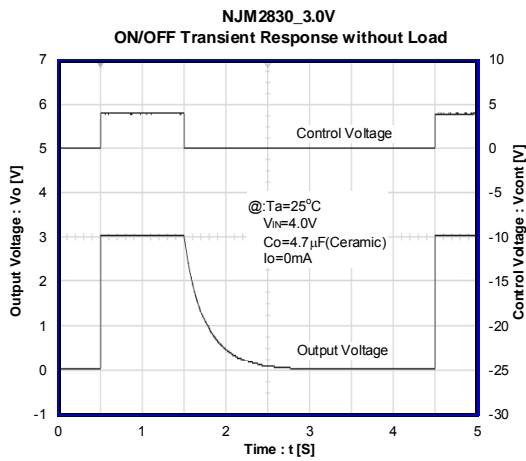
## TYPICAL CHARACTERISTICS

### TEMPERATURE CHARACTERISTICS (3V Version)



## TYPICAL CHARACTERISTICS

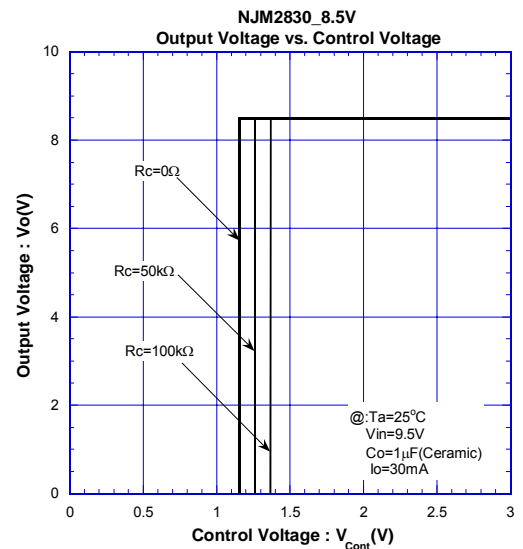
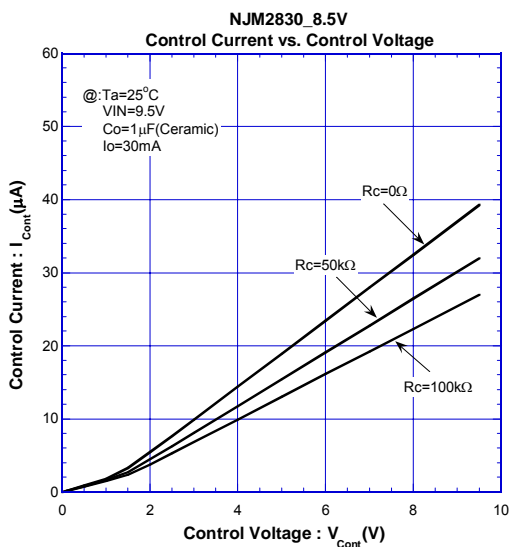
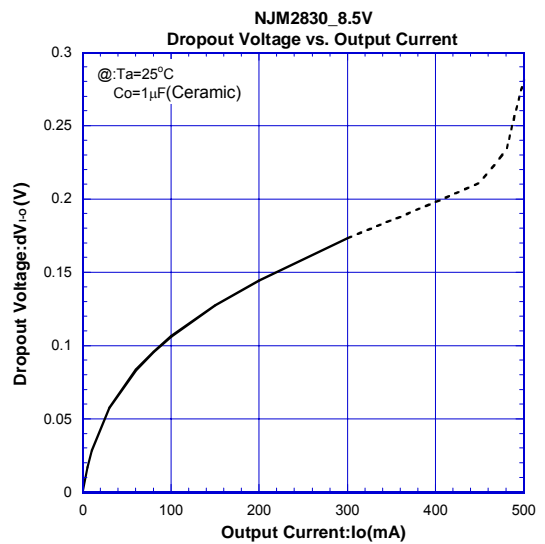
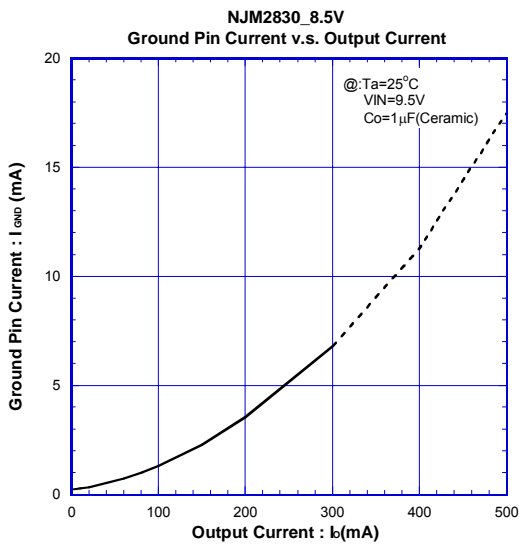
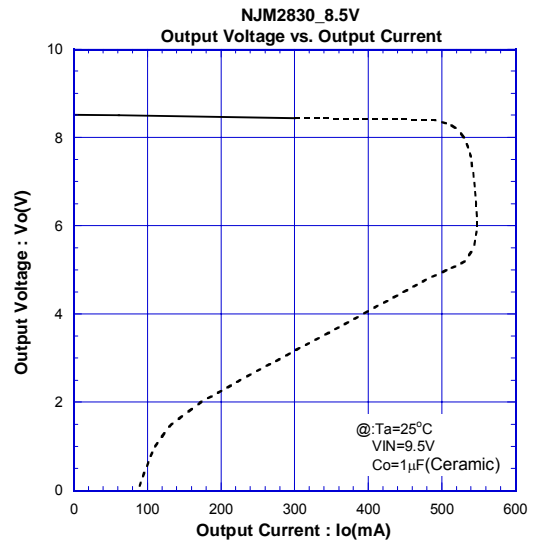
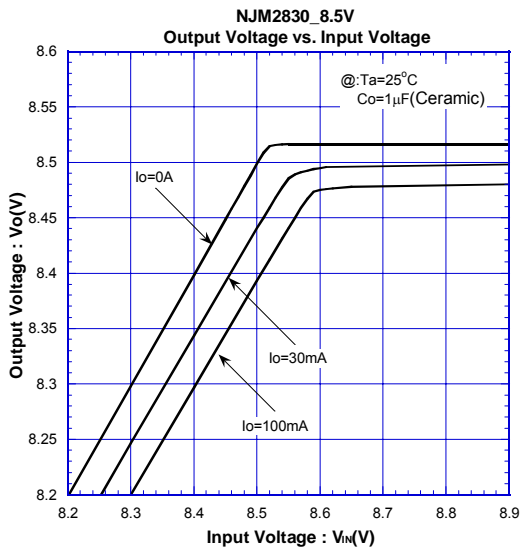
### ● TRANSIENT RESPONSE (3V Version)



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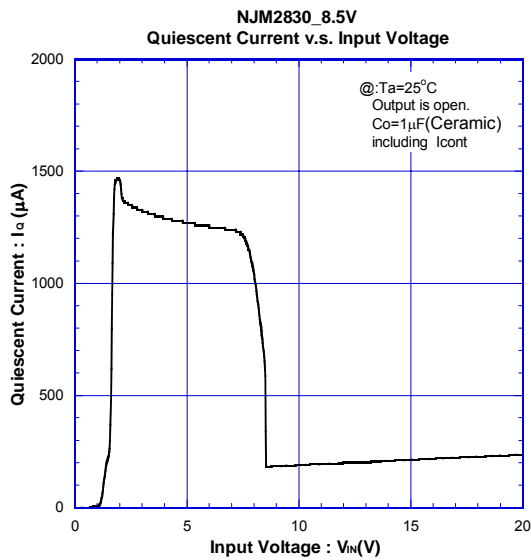
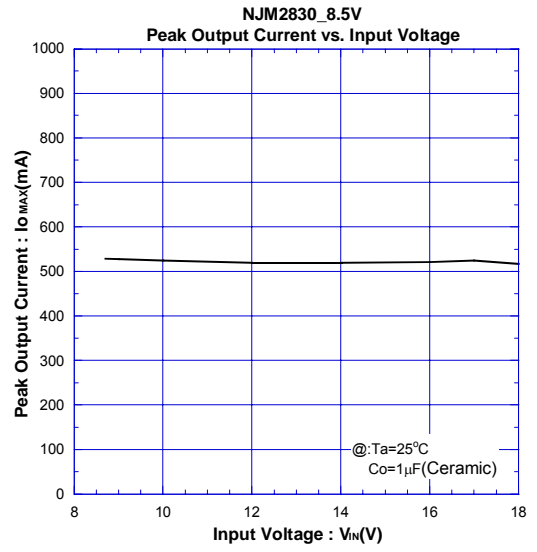
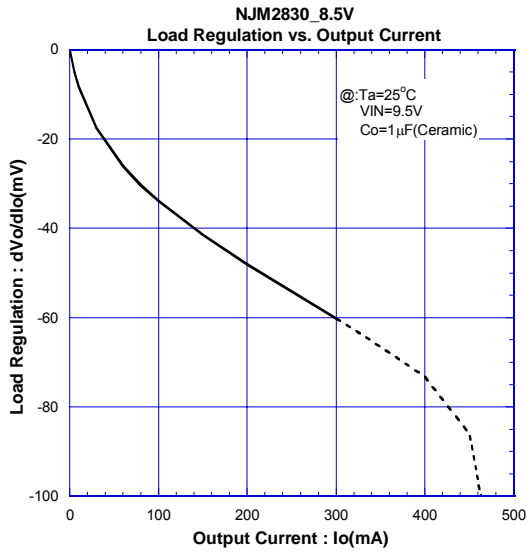
## ■ TYPICAL CHARACTERISTICS

### ● DC CHARACTERISTICS (8.5V Version)



## TYPICAL CHARACTERISTICS

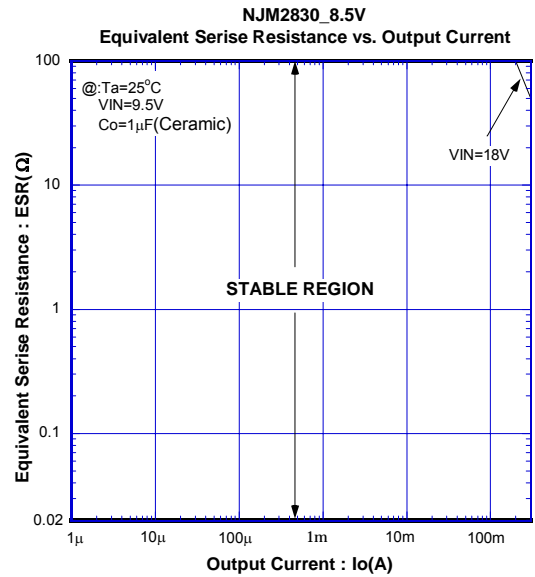
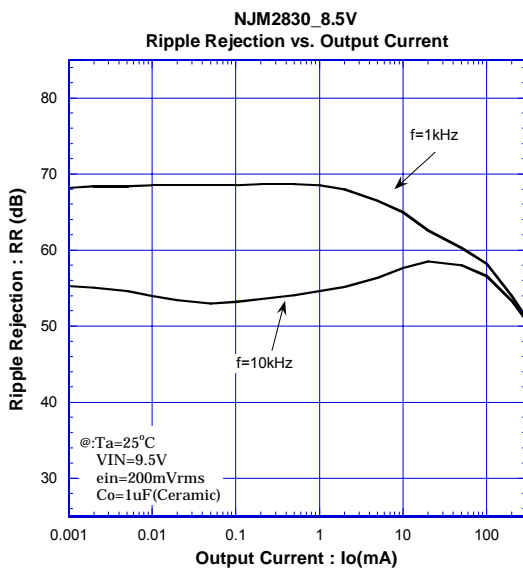
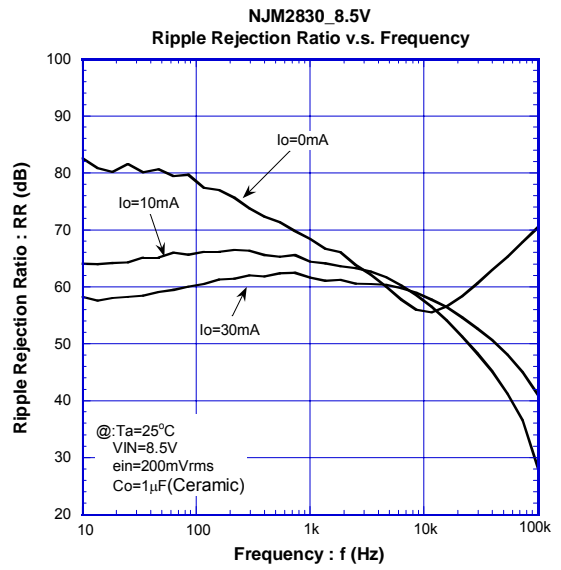
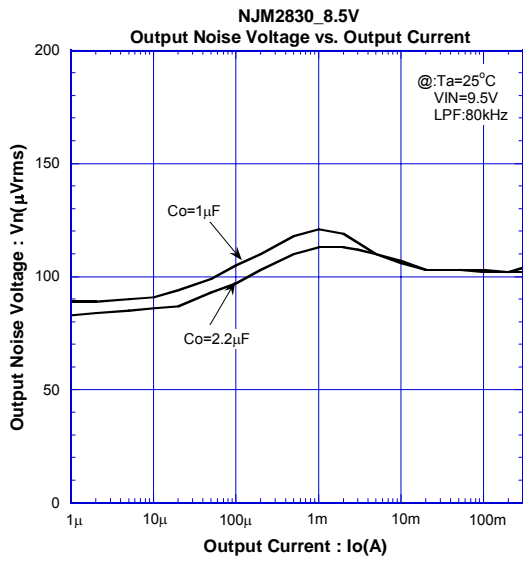
### DC CHARACTERISTICS (8.5V Version)



# NJM2830

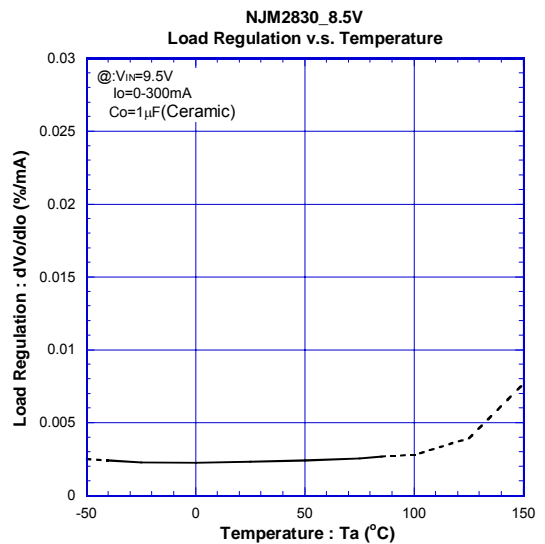
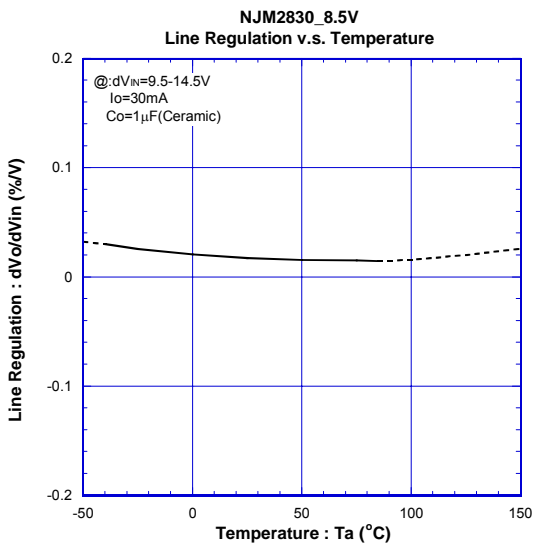
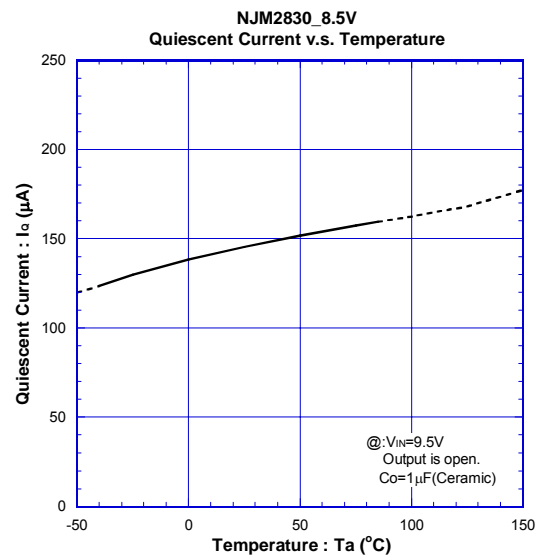
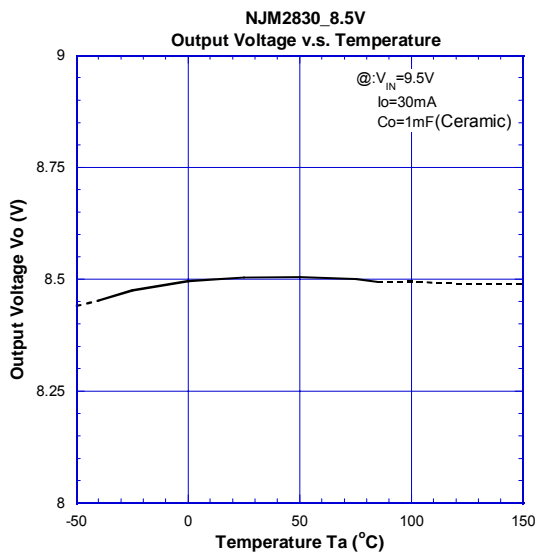
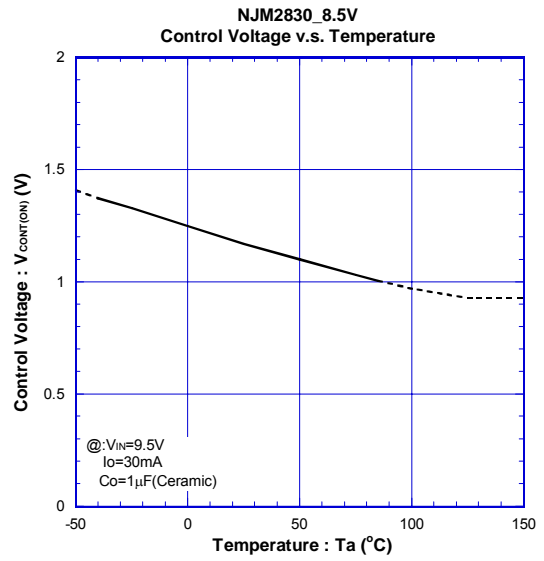
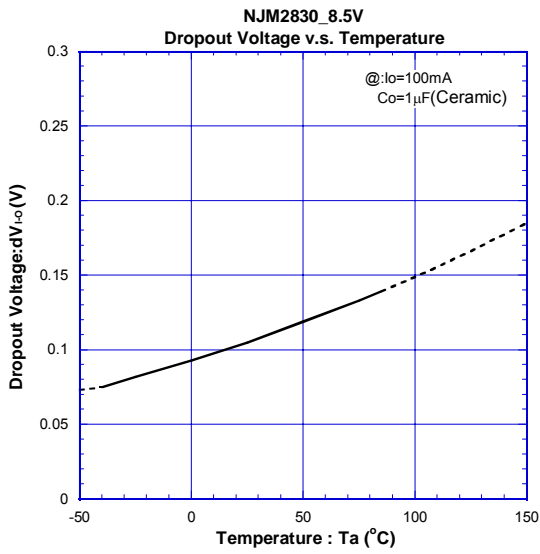
## TYPICAL CHARACTERISTICS

### AC CHARACTERISTICS (8.5V Version)



## ■ TYPICAL CHARACTERISTICS

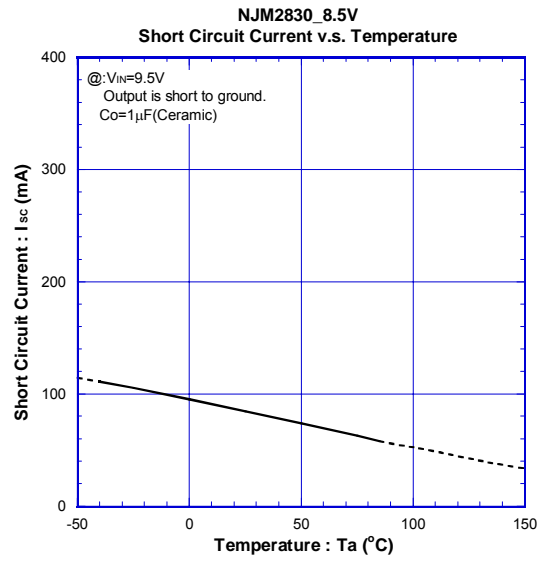
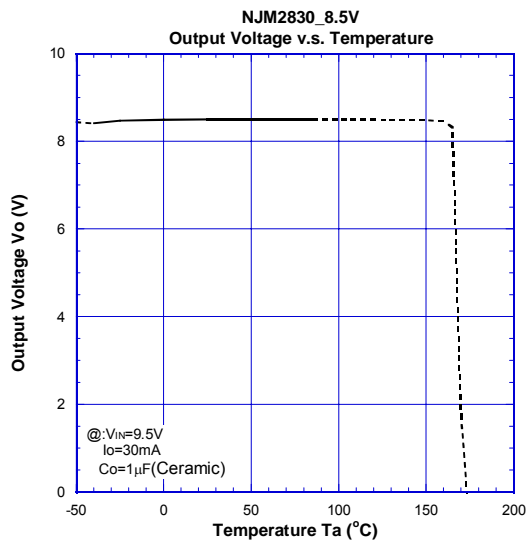
### ● TEMPERATURE CHARACTERISTICS (8.5V Version)



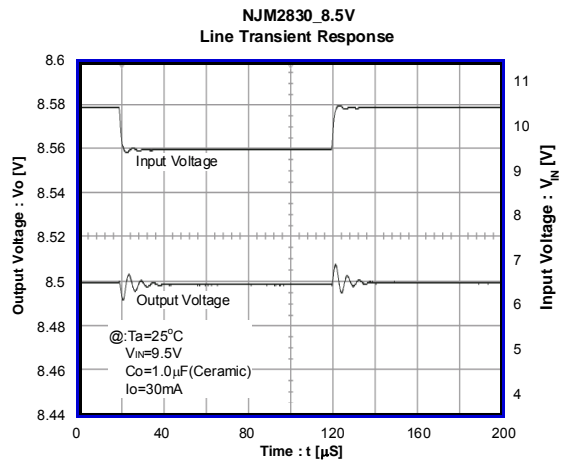
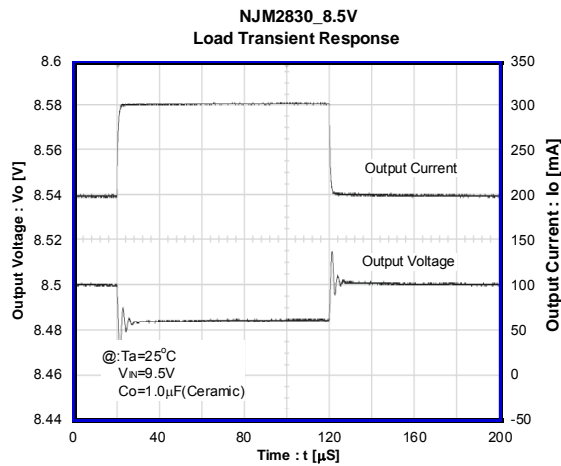
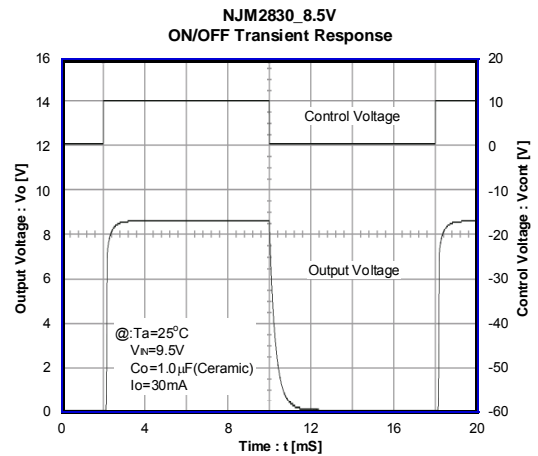
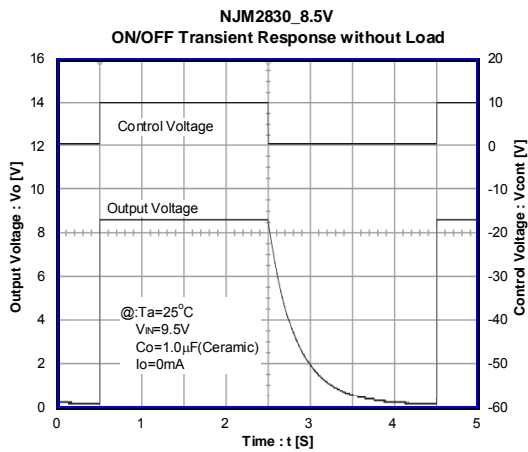
# NJM2830

## ■ TYPICAL CHARACTERISTICS

### ● TEMPERATURE CHARACTERISTICS (8.5V Version)



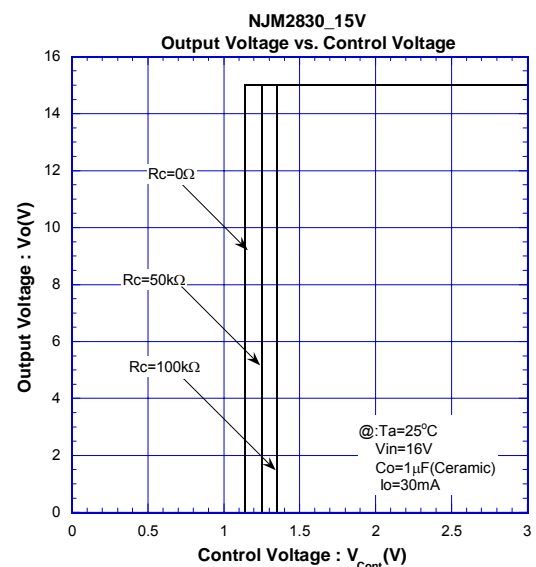
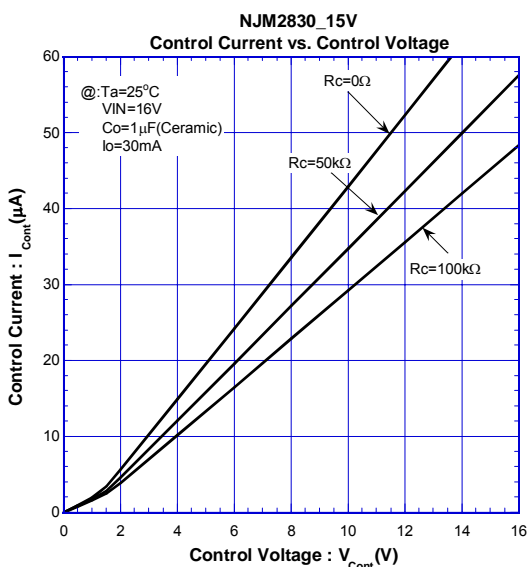
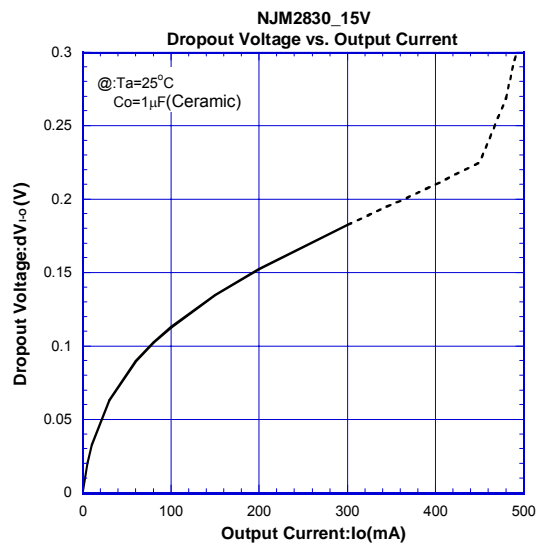
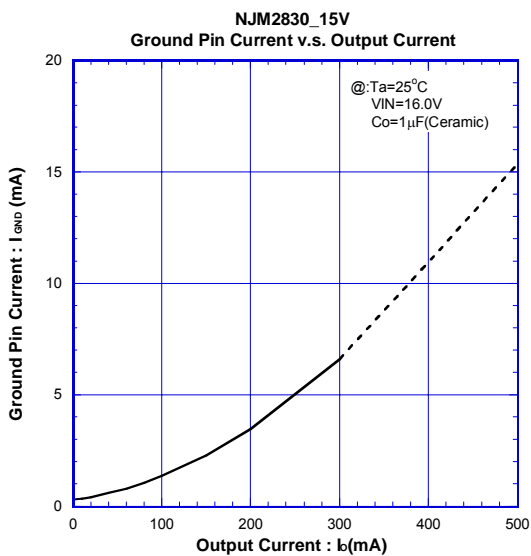
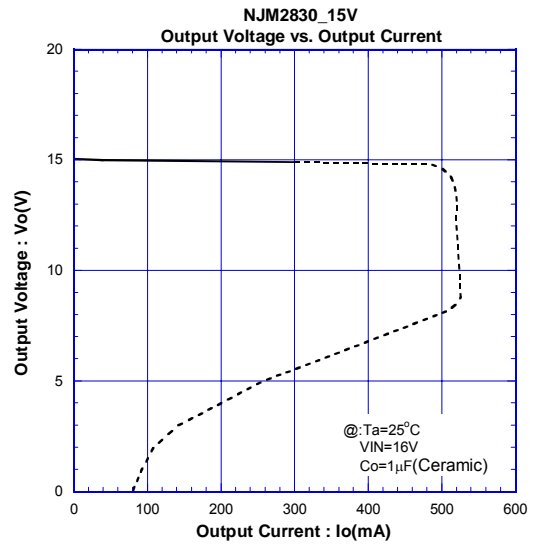
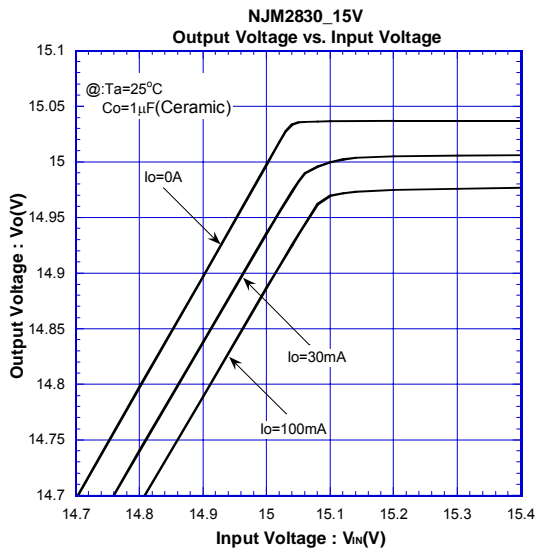
### ● TRANSIENT RESPONSE (8.5V Version)





## ■ TYPICAL CHARACTERISTICS

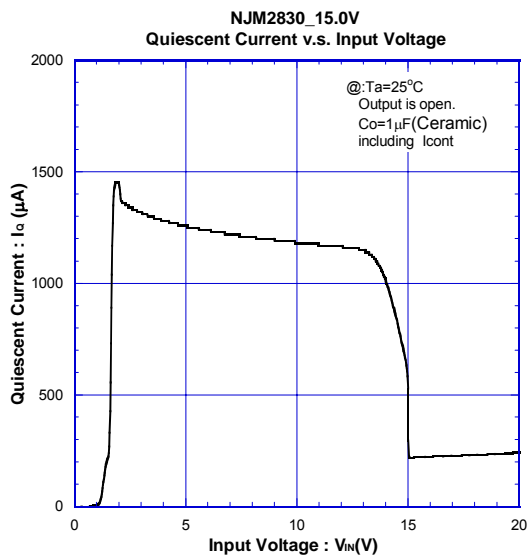
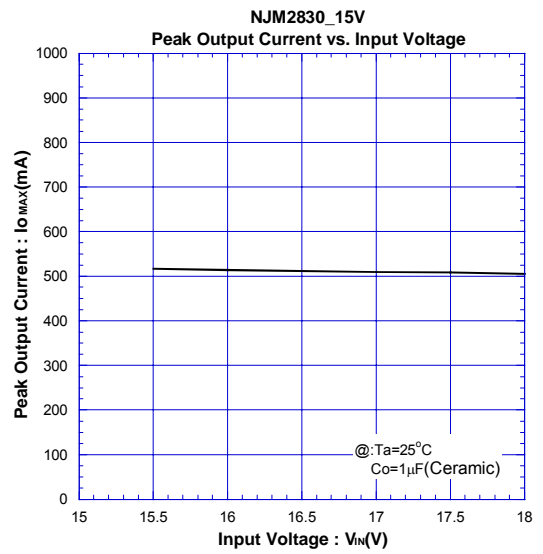
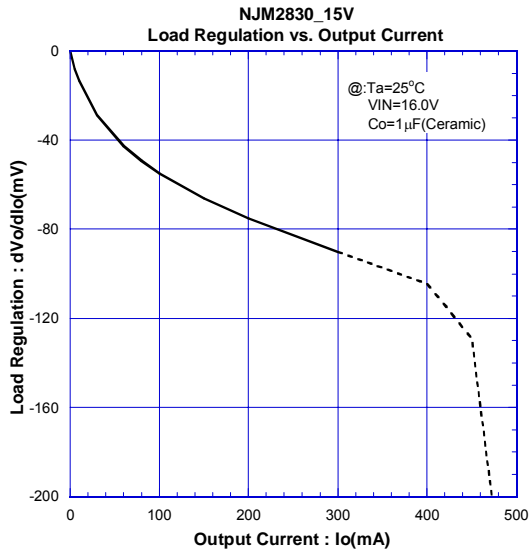
### ● DC CHARACTERISTICS (15V Version)



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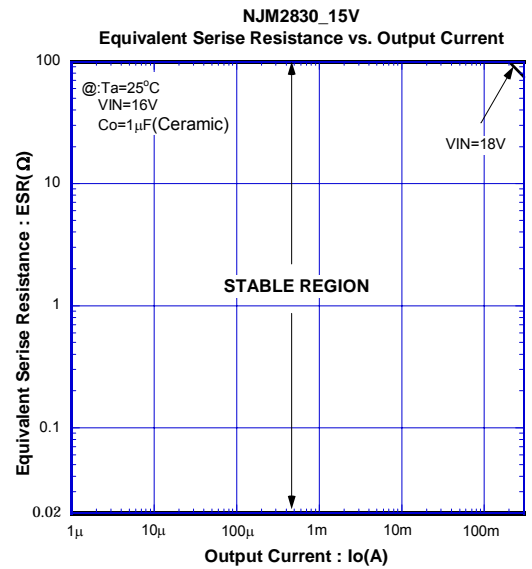
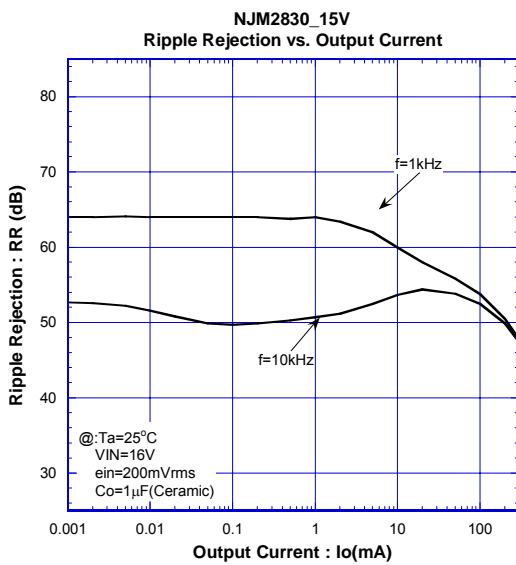
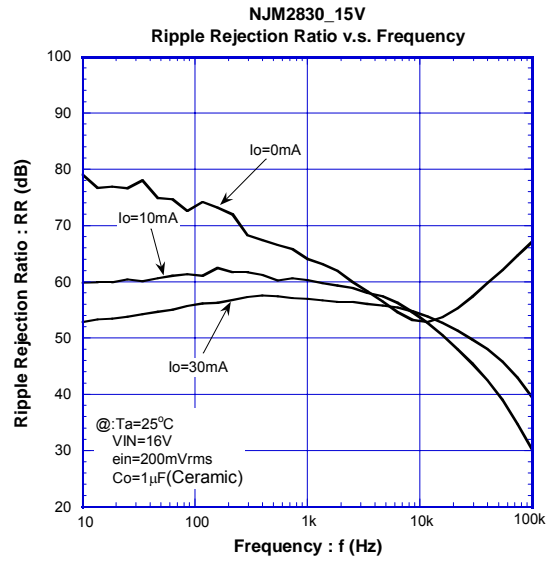
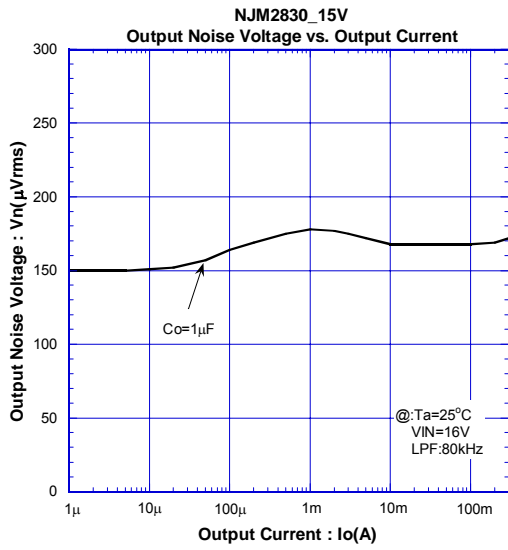
## TYPICAL CHARACTERISTICS

### DC CHARACTERISTICS (15V Version)



## TYPICAL CHARACTERISTICS

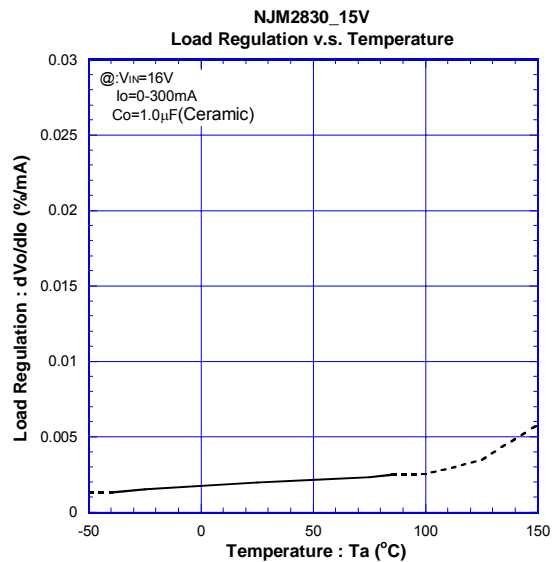
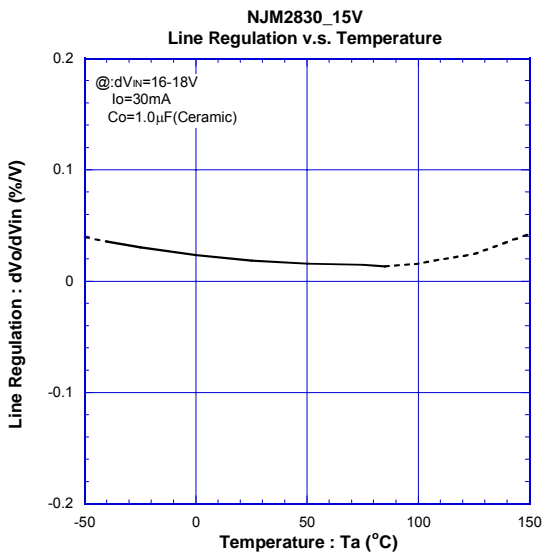
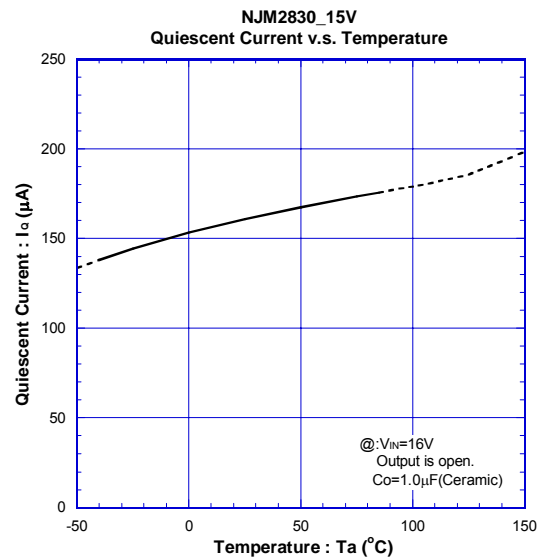
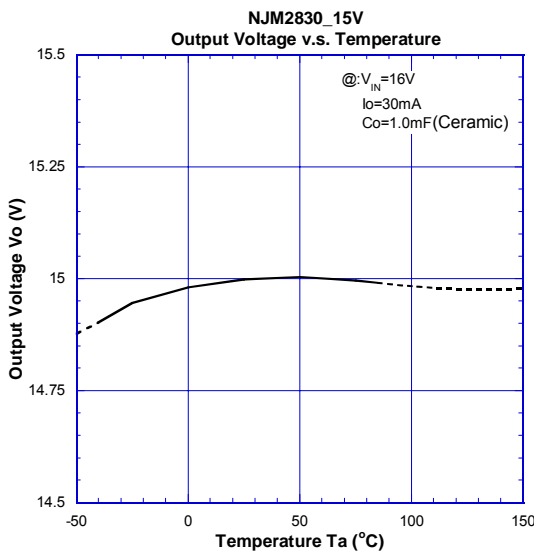
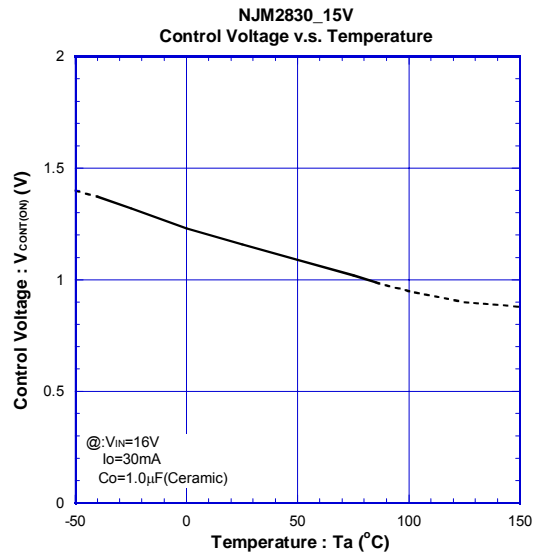
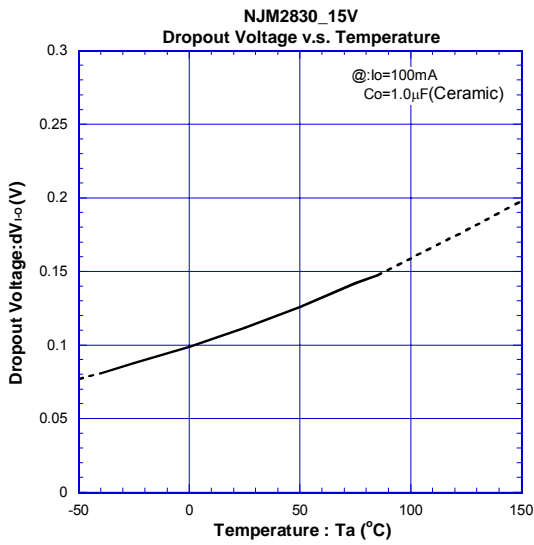
### AC CHARACTERISTICS (15V Version)



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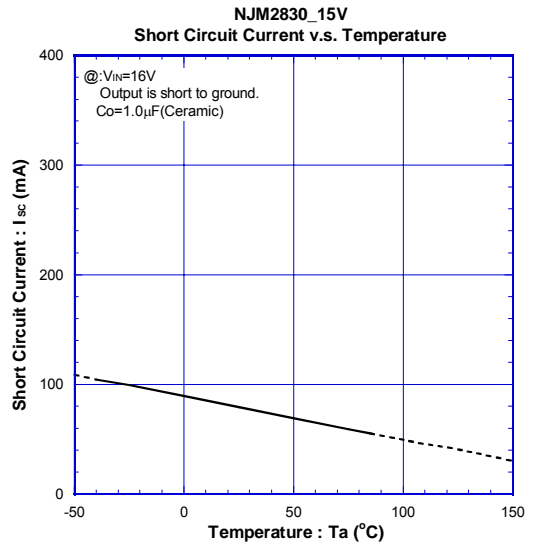
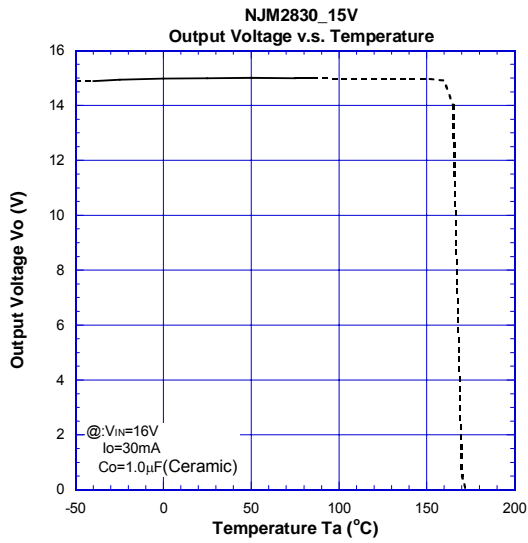
## ■ TYPICAL CHARACTERISTICS

### ● TEMPERATURE CHARACTERISTICS (15V Version)

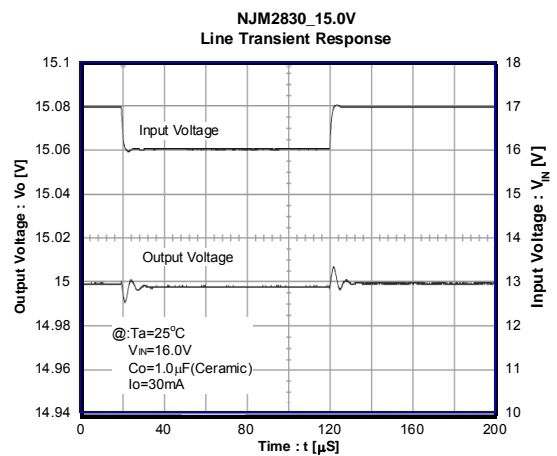
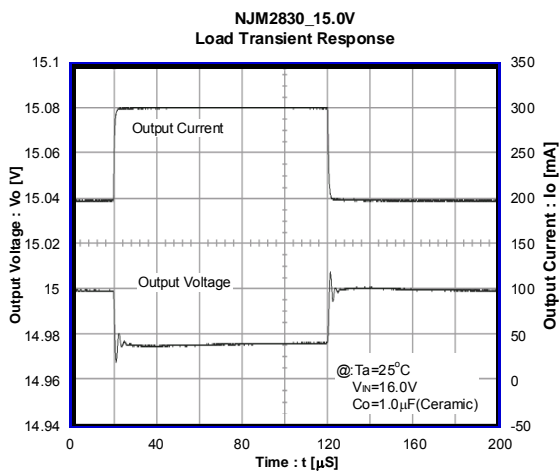
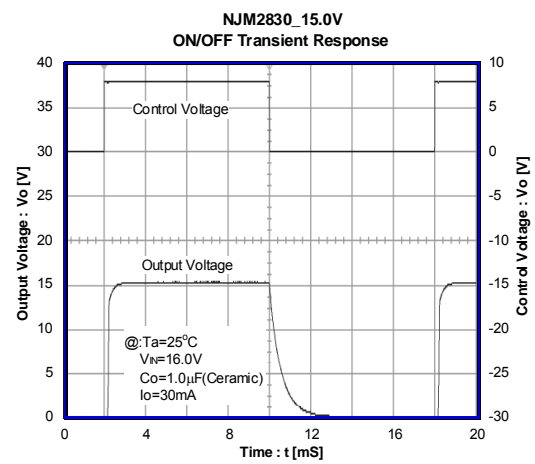
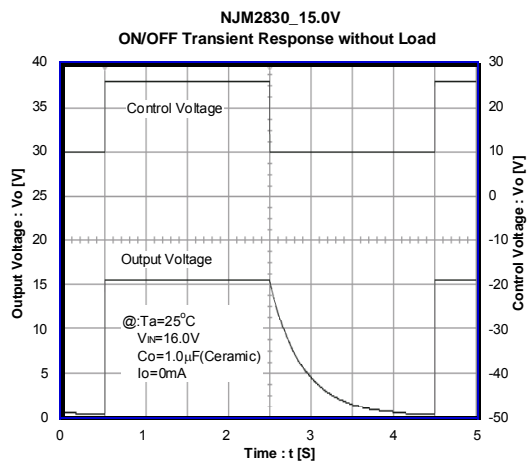


## ■ TYPICAL CHARACTERISTICS

### ● TEMPERATURE CHARACTERISTICS (15V Version)



### ● TRANSIENT RESPONSE (15V Version)



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