

LOW DROPOUT VOLTAGE REGULATOR

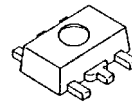
■ GENERAL DESCRIPTION

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.

2.0V to 15.5V output voltage range, 1 μ F small decoupling capacitor, built-in noise bypass capacitor make the NJM2830 suitable for various applications.

■ PACKAGE OUTLINE

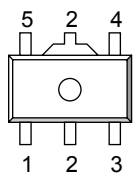


NJM2830U1

■ 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 μ Vrms typ.
- Output capacitor with 1.0 μ 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

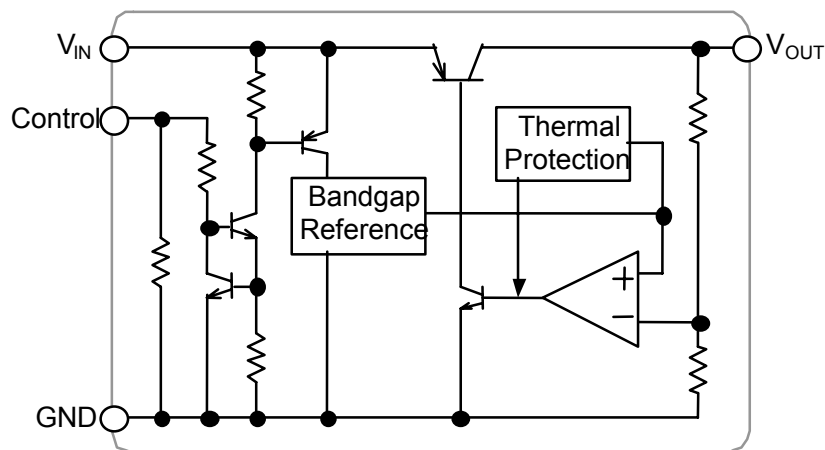
■ PIN CONFIGURATION



NJM2830U1

1. CONTROL
2. GND
3. NC
4. V_{OUT}
5. V_{IN}

■ EQUIVALENT CIRCUIT



NJM2830

■ OUTPUT VOLTAGE

The WHITE column shows applicable Voltage Rank(s)

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

■ 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	Topr	-40~+85	°C
Storage Temperature	Tstg	-40~+150	°C

■ ELECTRICAL CHARACTERISTICS

(V_{IN}=Vo+1V, C_{IN}=0.1μF, Co=1.0μF (4.9V<Vo≤5.5V:Co=2.2μF, 2.9V<Vo≤4.9V:Co=4.7μF, Vo≤2.9V: Co=10μF), Ta=25°C)

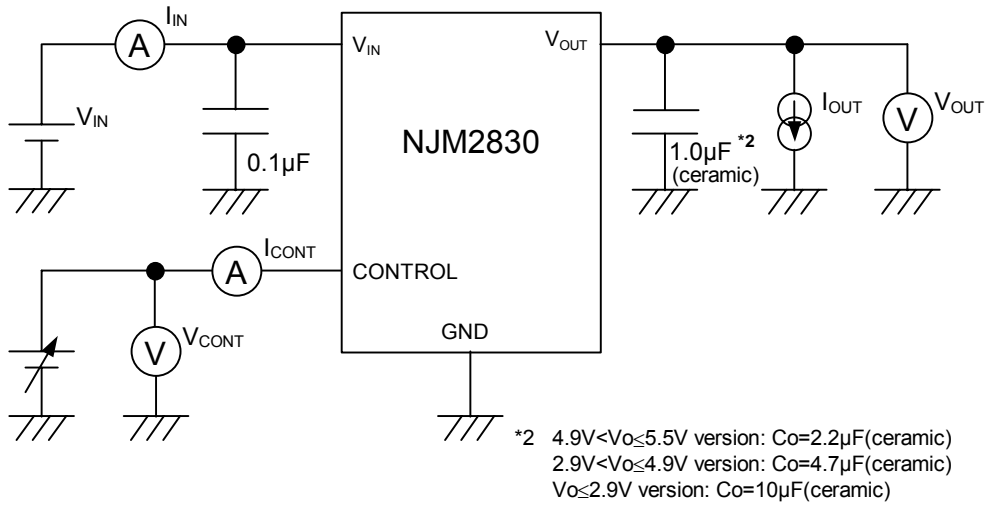
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	Vo	Io=30mA	-1.0%	–	+1.0%	V	
Quiescent Current	I _Q	Io=0mA, except I _{cont}	Vo≤5V Version	–	130	180	μA
			5V<Vo≤10V Version	–	145	195	μA
			10V<Vo≤15V Version	–	160	210	μA
Quiescent Current at Control OFF	I _{Q(OFF)}	V _{CONT} =0V	–	–	100	nA	
Output Current	Io	Vo=0.3V	300	400	–	mA	
Line Regulation	ΔVo/ΔV _{IN}	V _{IN} =Vo+1V ~ Vo+6V(Vo≤12V Version) V _{IN} =Vo+1V ~ 18V(Vo>12V Version), Io=30mA	–	–	0.10	%/V	
Load Regulation	ΔVo/ΔIo	Io=0 ~ 300mA	–	–	0.009	%/mA	
Dropout Voltage(*1)	ΔV _{I-O}	Io=100mA	–	0.10	0.18	V	
Ripple Rejection	RR	e _{in} =200mVrms, f=1kHz, Io=10mA, Vo=3V Version	–	75	–	dB	
Average Temperature Coefficient of Output Voltage	ΔVo/ΔTa	Ta=0 ~ 85°C, Io=10mA	–	± 50	–	ppm/°C	
Output Noise Voltage	V _{NO}	f=10Hz ~ 80kHz, Io=10mA Vo=3V Version	–	50	–	μVrms	
Control Current	I _{CONT}	V _{CONT} =1.6V	–	3	12	μA	
Control Voltage for ON-state	V _{CONT(ON)}		1.6	–	–	V	
Control Voltage for OFF-state	V _{CONT(OFF)}		–	–	0.6	V	
Input Voltage	V _{IN}		–	–	18	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.

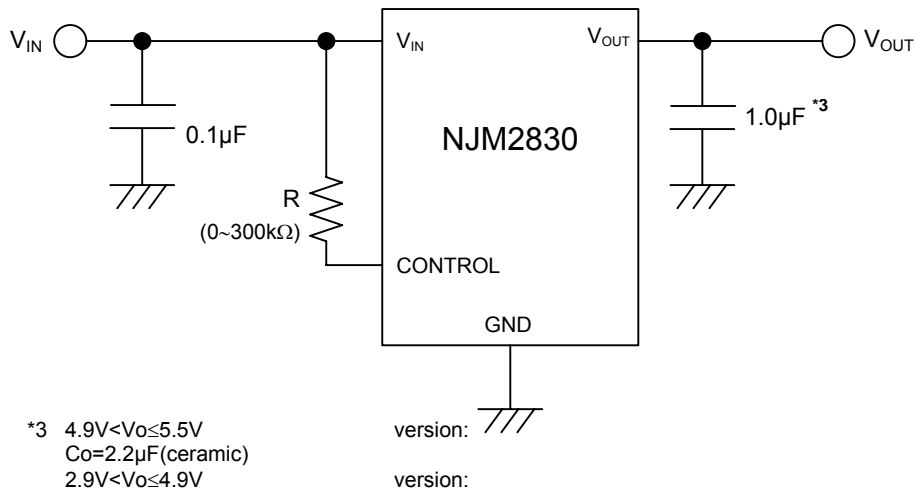
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TEST CIRCUIT



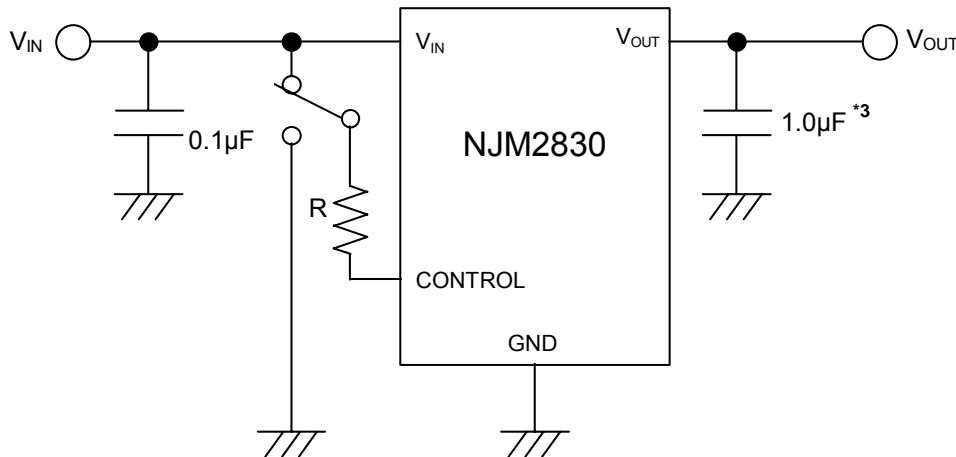
TYPICAL APPLICATIONS

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_o≤5.5V version: C_o=2.2µF(ceramic)
 2.9V<V_o≤4.9V version: C_o=4.7µF(ceramic)
 V_o≤2.9V version: C_o=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_{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.

*Input Capacitance C_{IN}

Input capacitance C_{IN} 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_{IN} value of 0.1µF greater to avoid the problem.

C_{IN} should connect between GND and V_{IN} as short as possible.

*Output Capacitance C_O

Output capacitor (C_o) 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_o; however, use of recommended capacitance or greater value is essential for stable operation.

Use of a smaller C_o may cause excess output noise or oscillation of the regulator due to lack of the phase compensation.

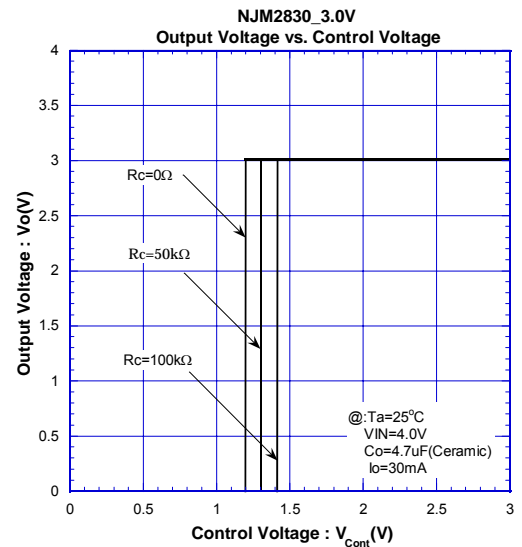
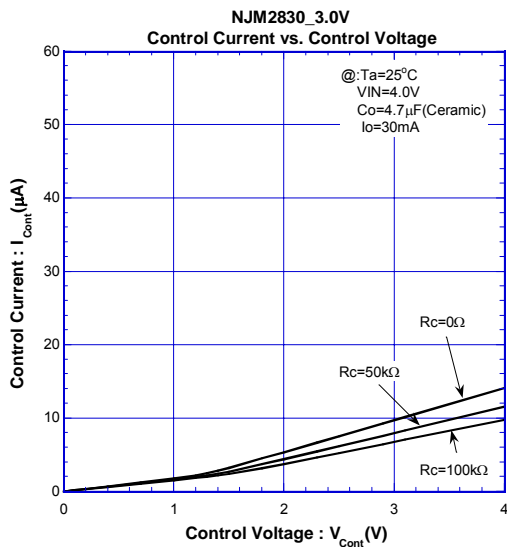
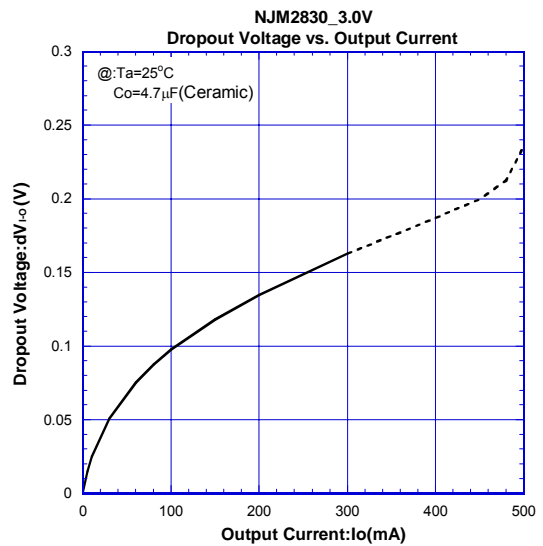
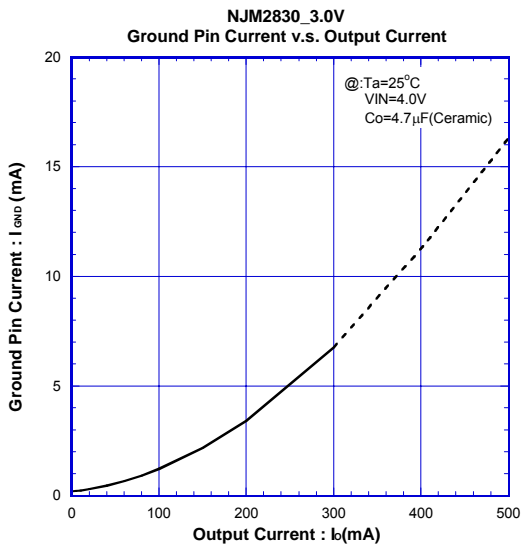
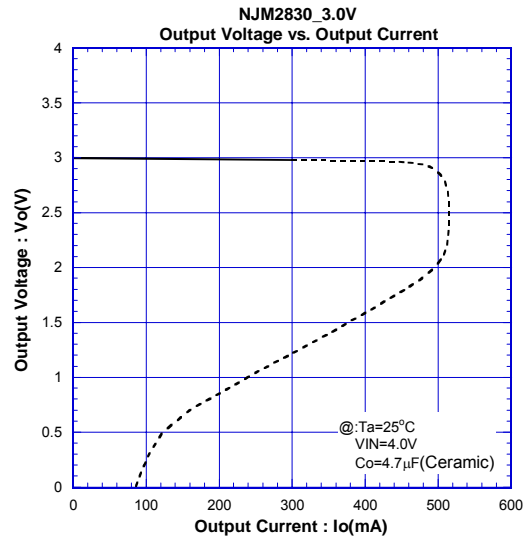
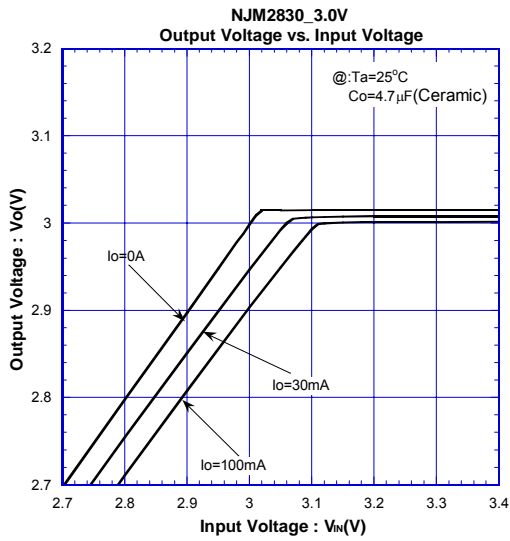
Therefore, use C_o with the recommended capacitance or greater value and connect between V_o terminal and GND terminal with minimal wiring. The recommended capacitance depends on the output voltage. Low voltage regulator requires greater value of the C_o. Thus, check the recommended capacitance for each output voltage.

Use of a greater C_o reduces output noise and ripple output, and also improves transient response of the output voltage against rapid load change.

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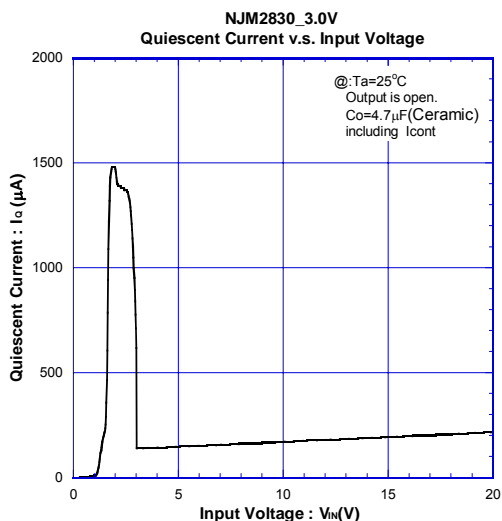
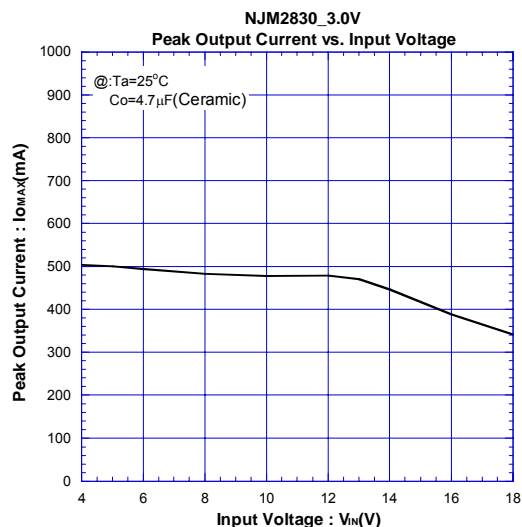
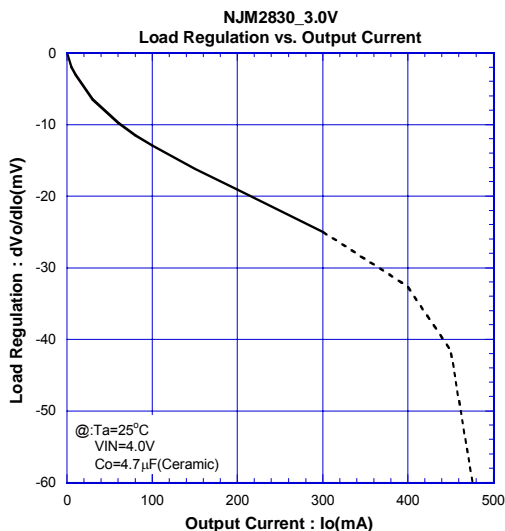
■ TYPICAL CHARACTERISTICS

● DC CHARACTERISTICS (3V Version)



TYPICAL CHARACTERISTICS

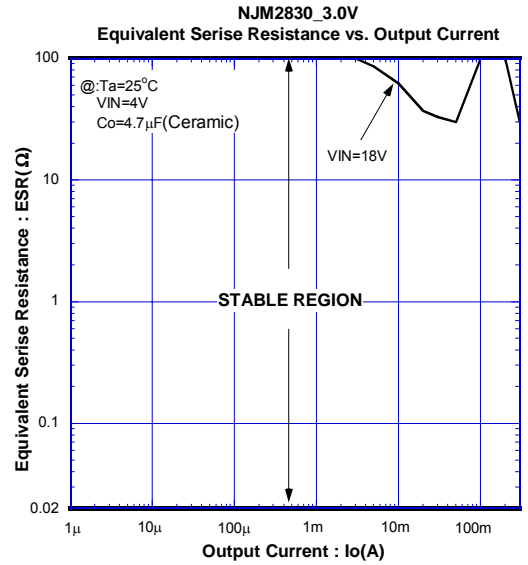
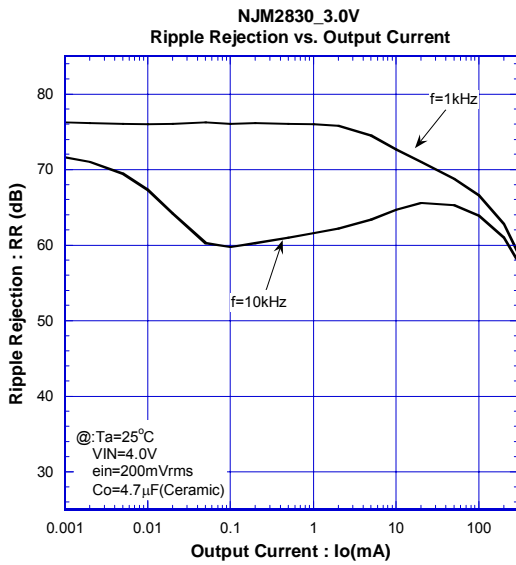
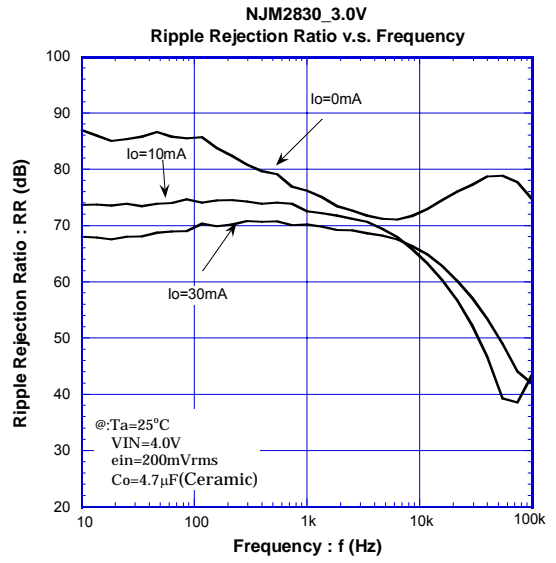
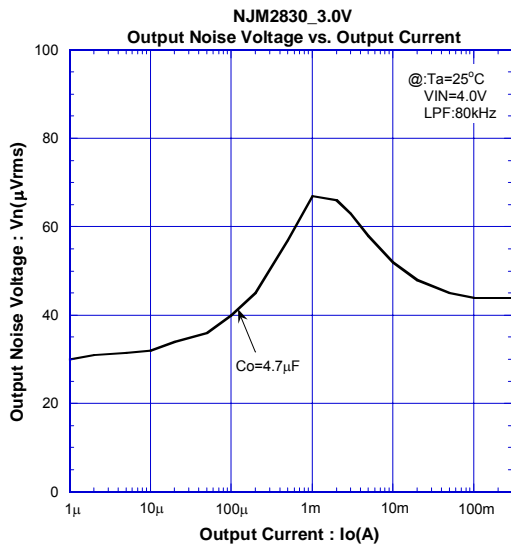
DC CHARACTERISTICS (3V Version)



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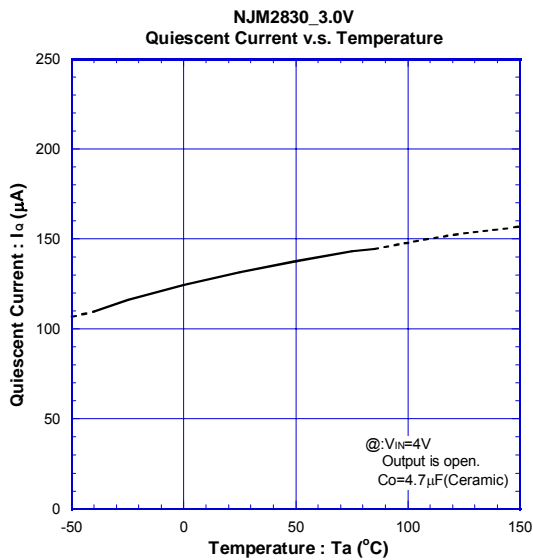
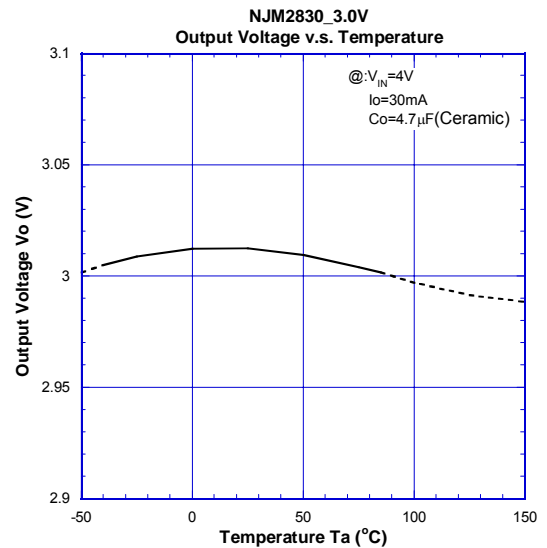
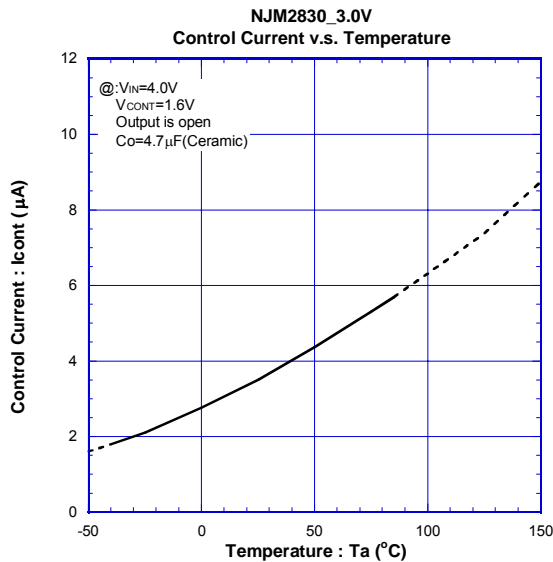
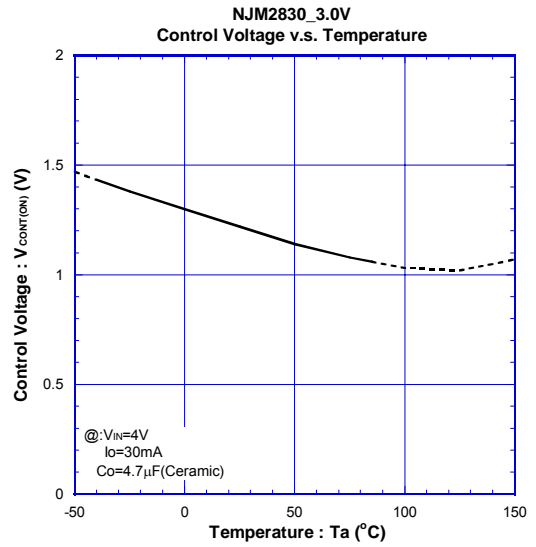
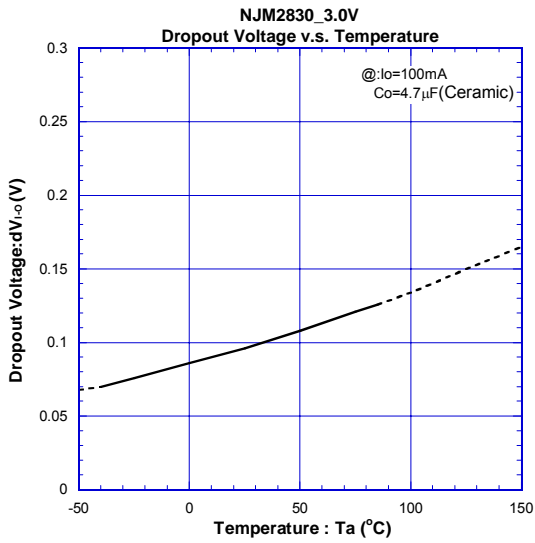
TYPICAL CHARACTERISTICS

AC CHARACTERISTICS (3V Version)



TYPICAL CHARACTERISTICS

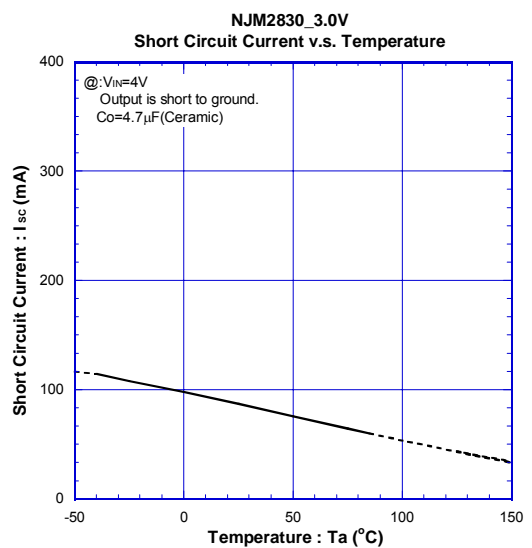
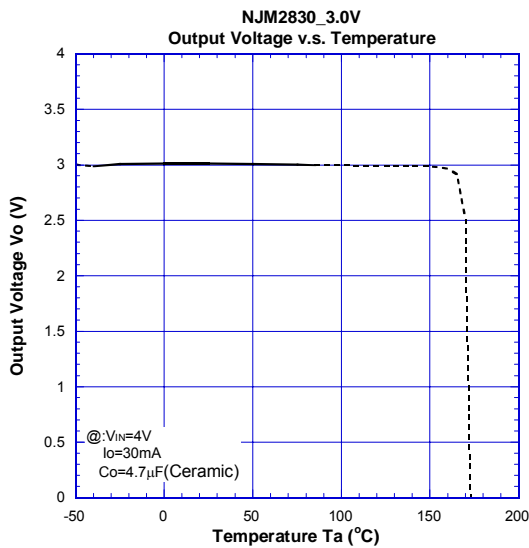
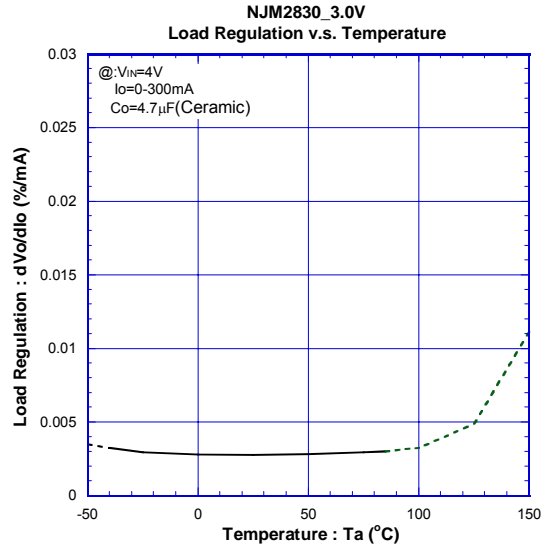
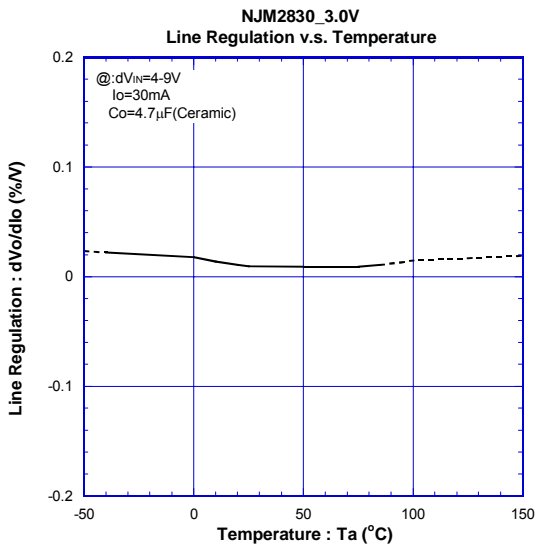
TEMPERATURE CHARACTERISTICS (3V Version)



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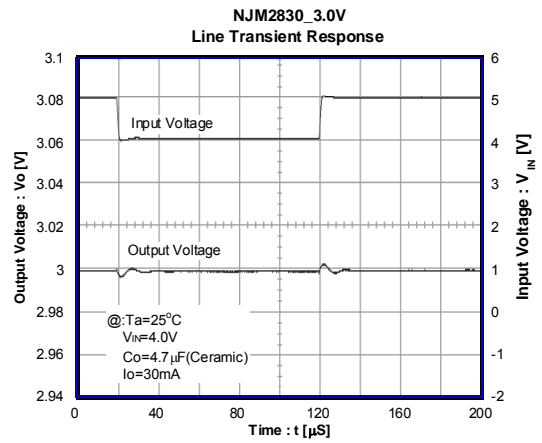
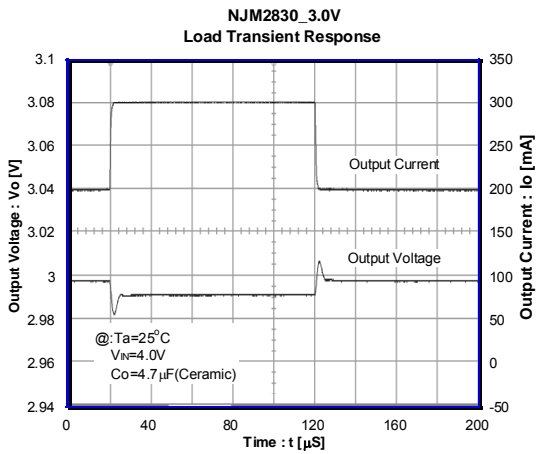
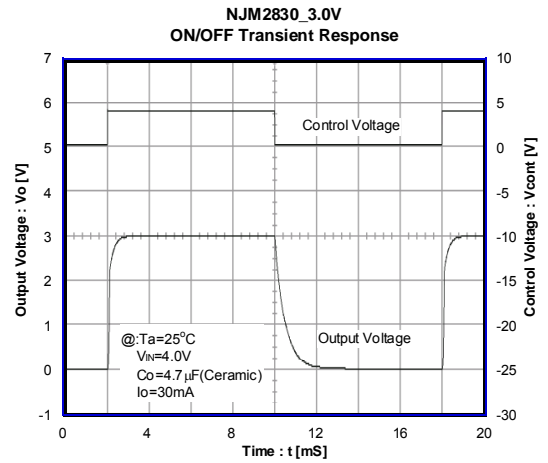
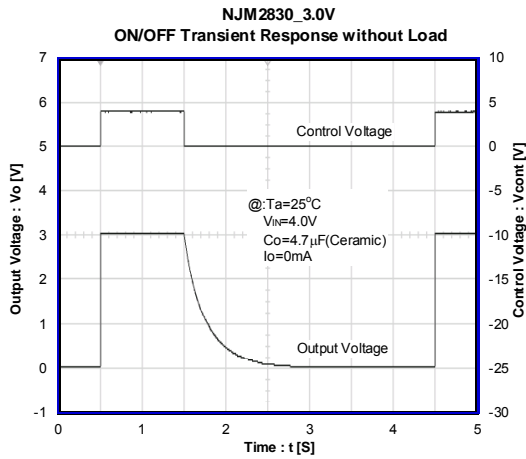
TYPICAL CHARACTERISTICS

TEMPERATURE CHARACTERISTICS (3V Version)



TYPICAL CHARACTERISTICS

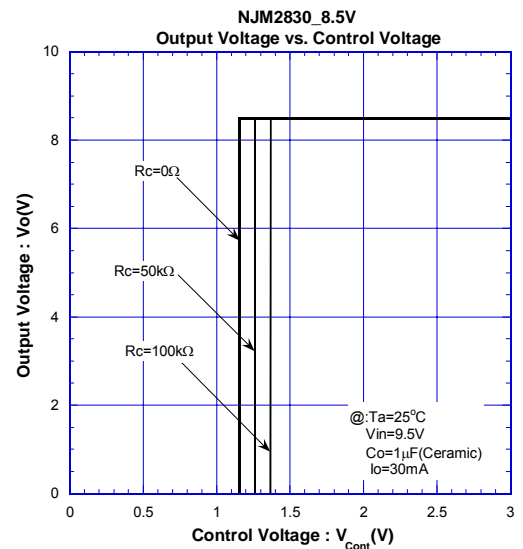
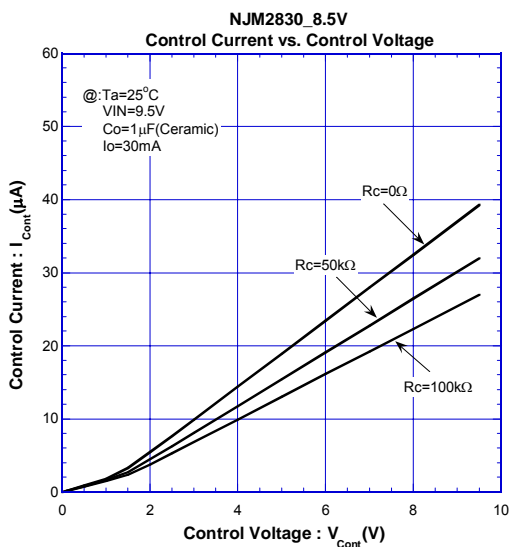
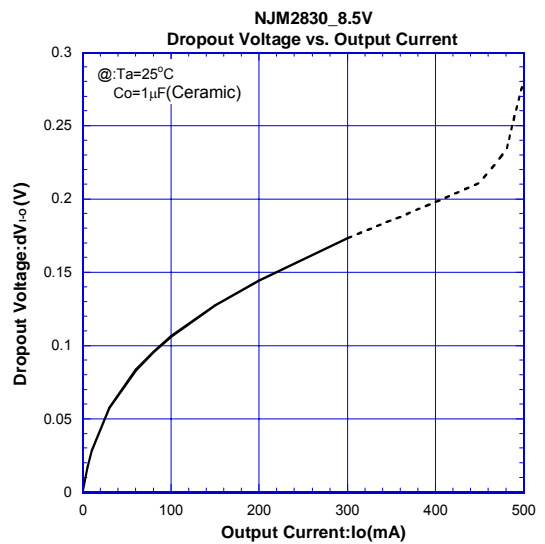
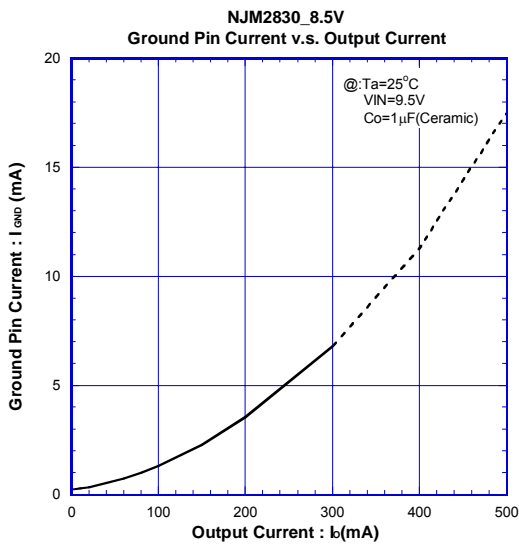
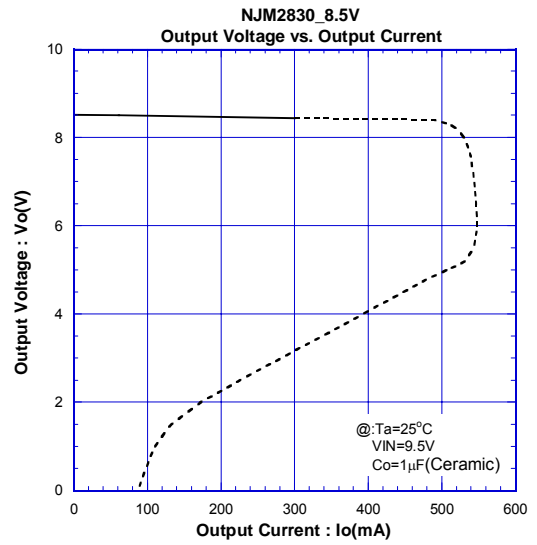
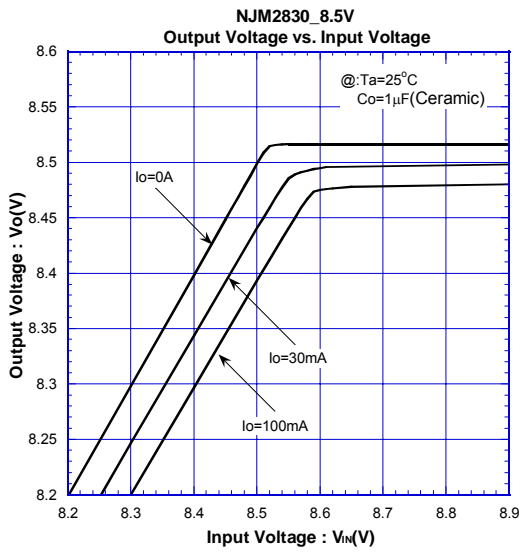
TRANSIENT RESPONSE (3V Version)



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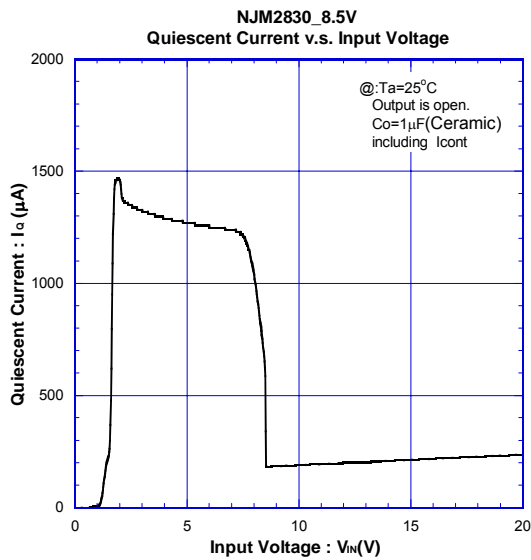
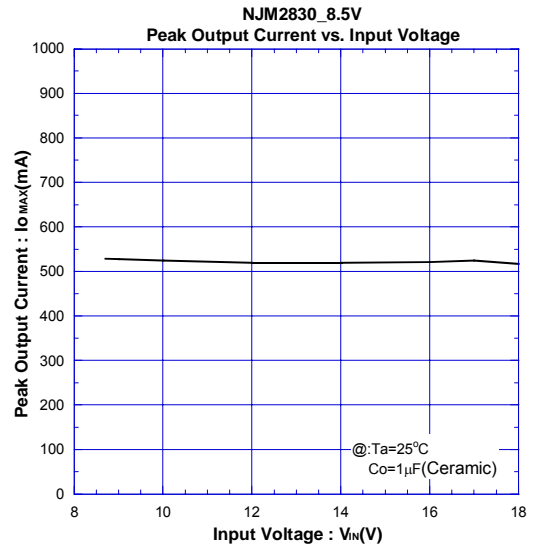
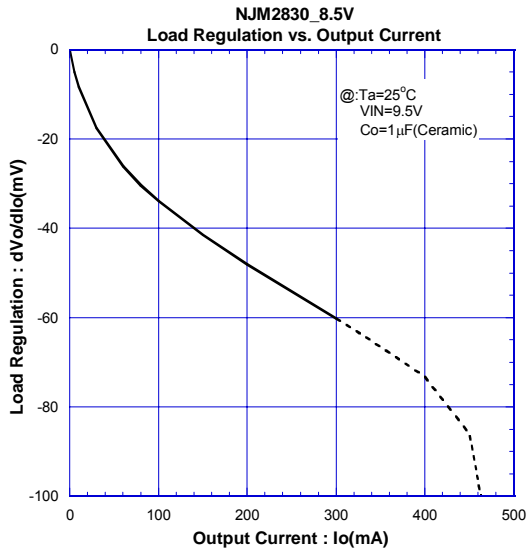
■ TYPICAL CHARACTERISTICS

● DC CHARACTERISTICS (8.5V Version)



TYPICAL CHARACTERISTICS

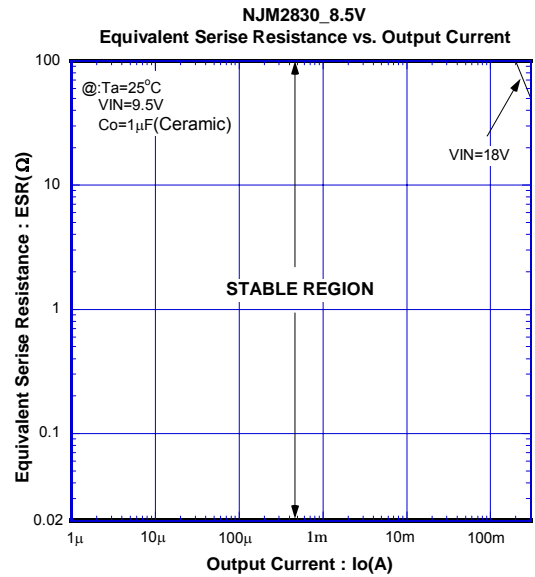
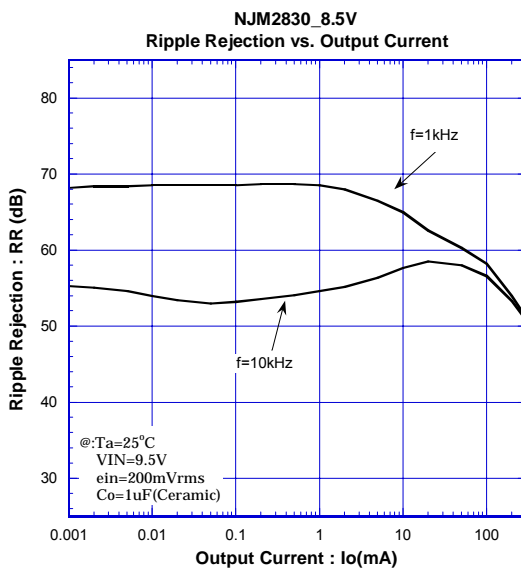
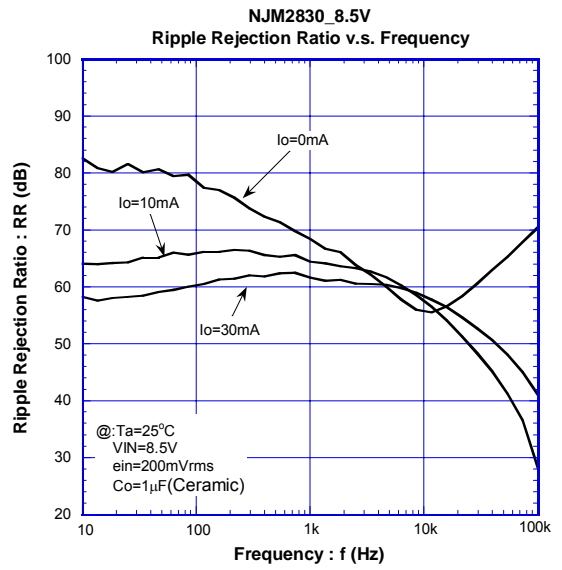
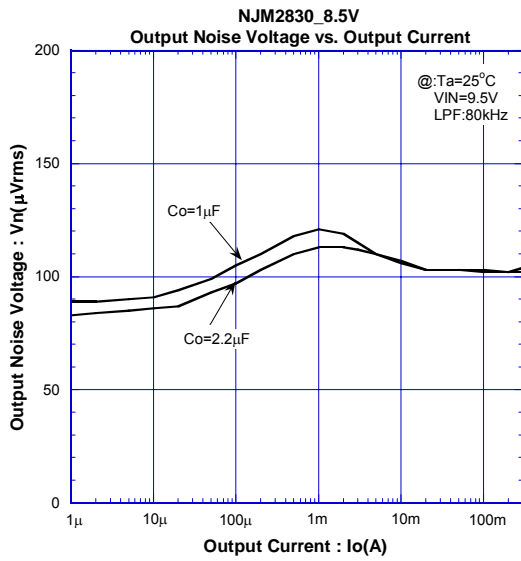
DC CHARACTERISTICS (8.5V Version)



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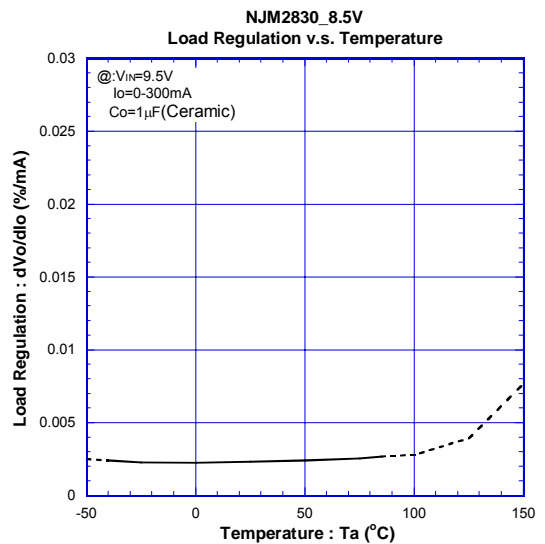
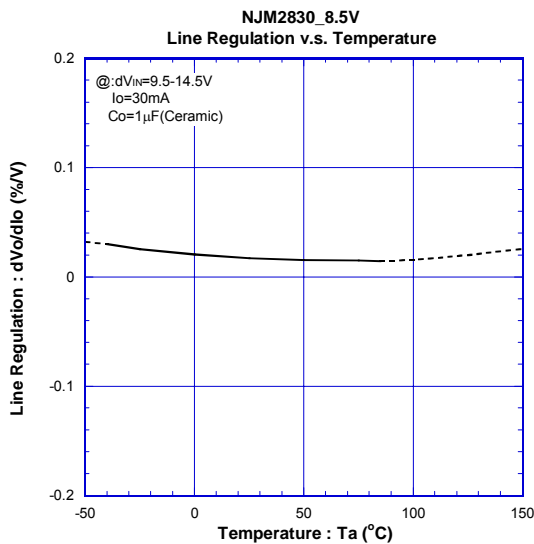
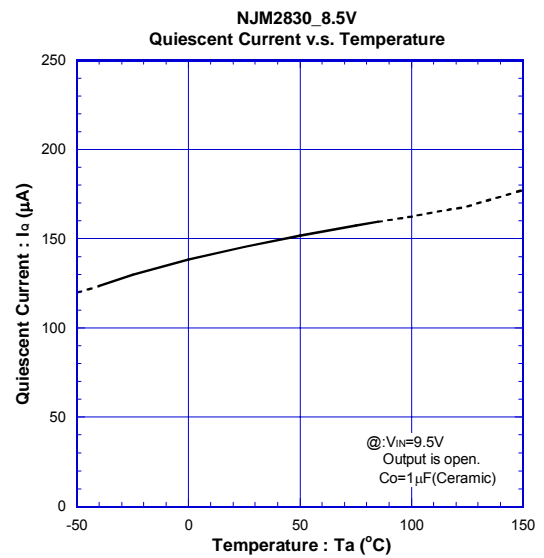
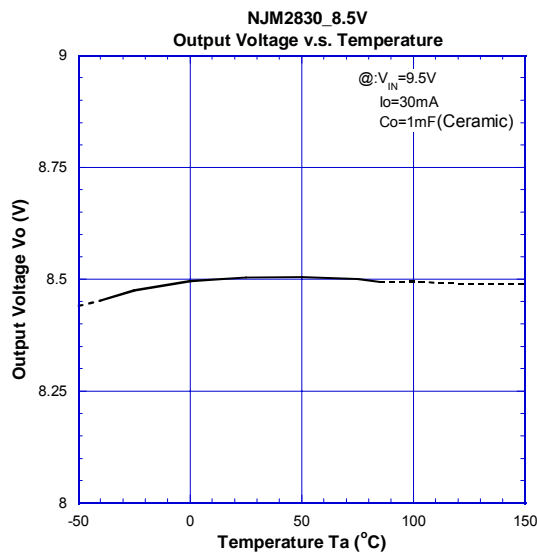
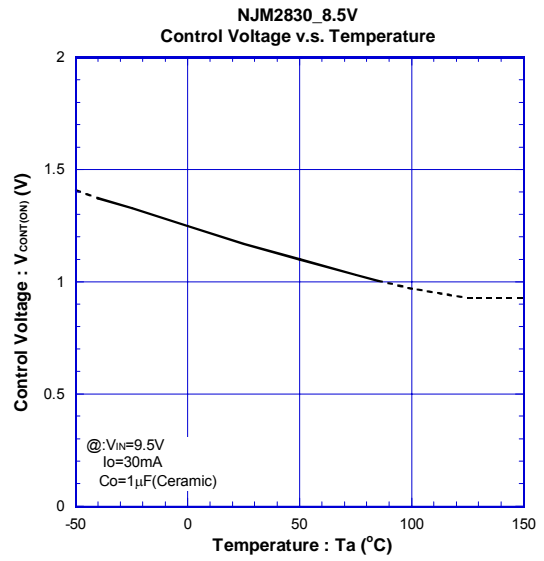
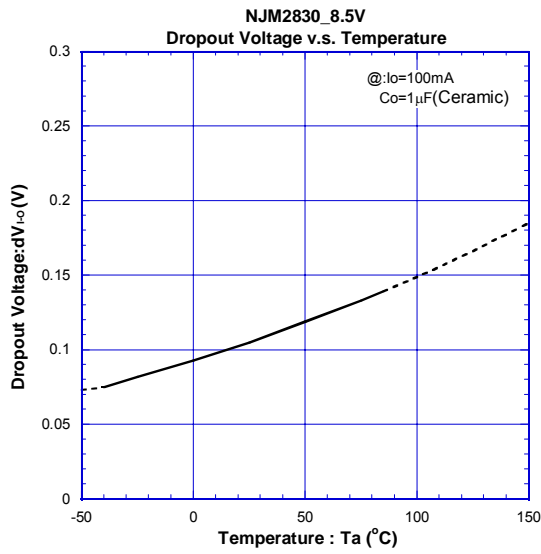
TYPICAL CHARACTERISTICS

AC CHARACTERISTICS (8.5V Version)



■ TYPICAL CHARACTERISTICS

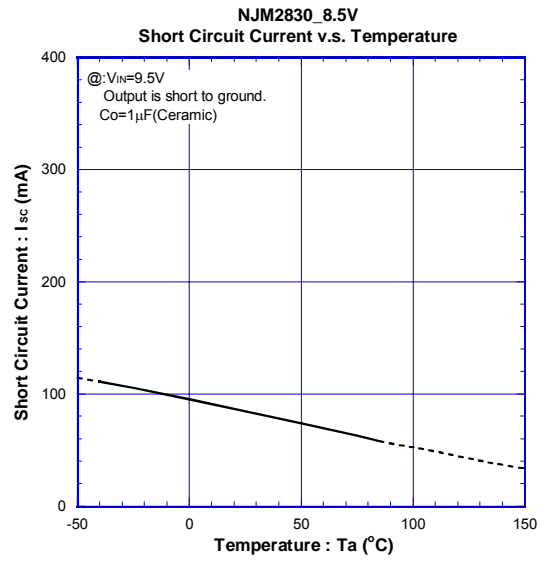
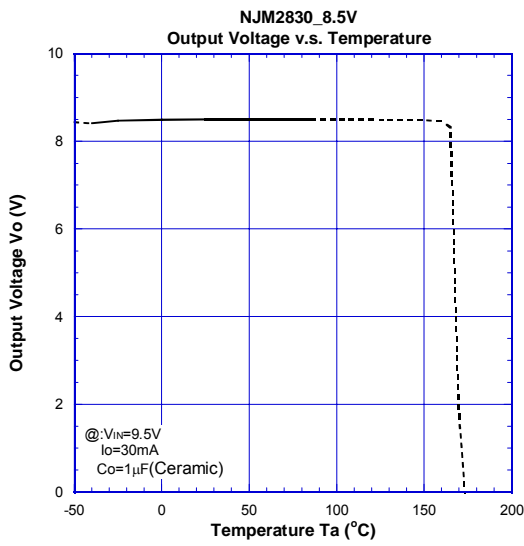
● TEMPERATURE CHARACTERISTICS (8.5V Version)



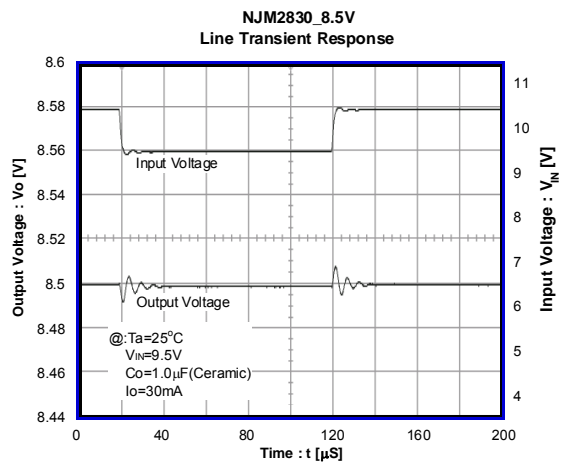
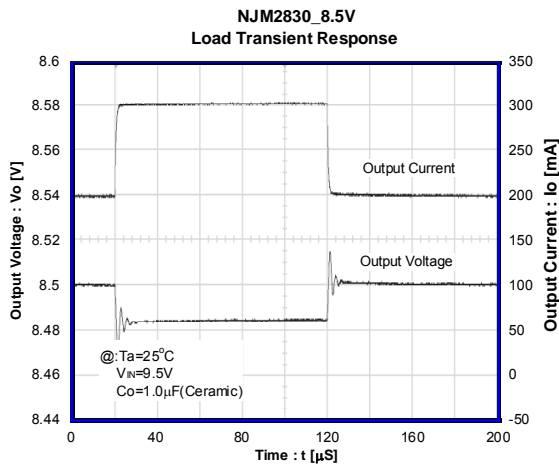
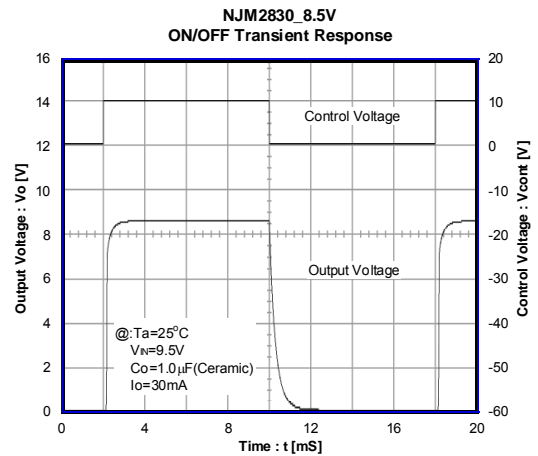
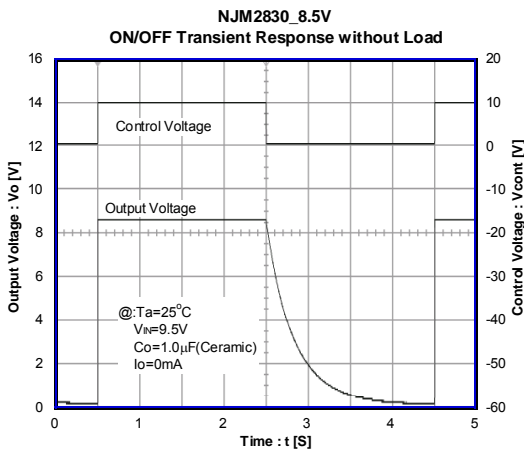
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■ TYPICAL CHARACTERISTICS

● TEMPERATURE CHARACTERISTICS (8.5V Version)

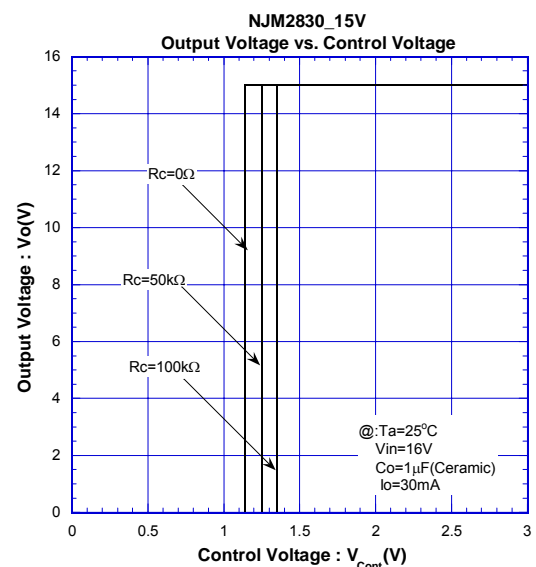
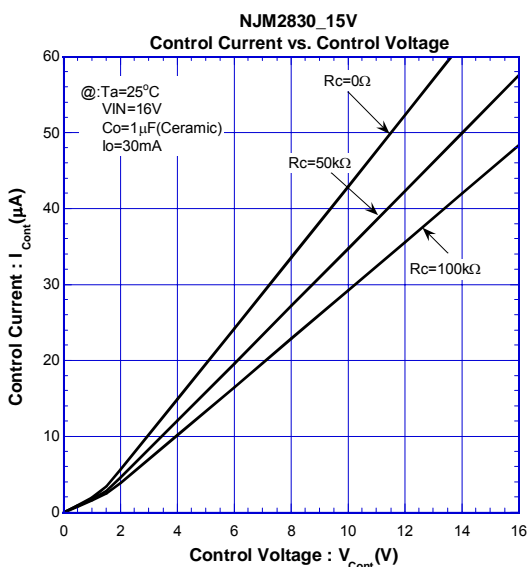
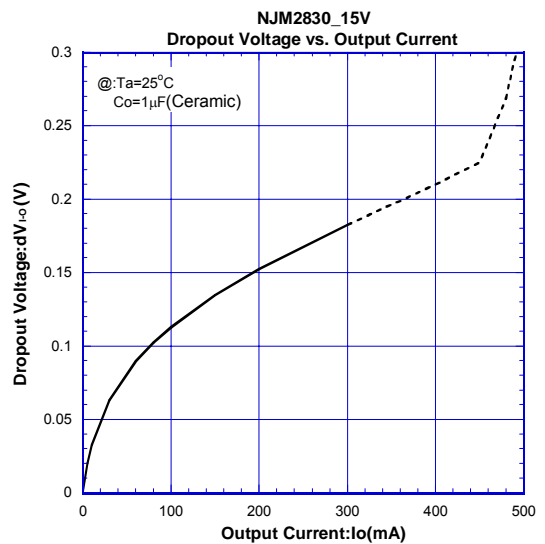
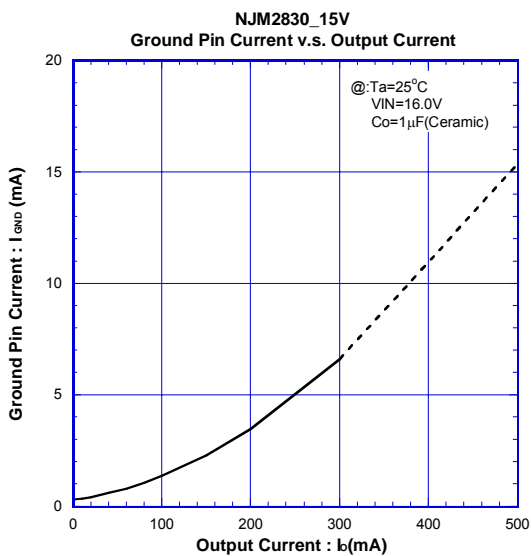
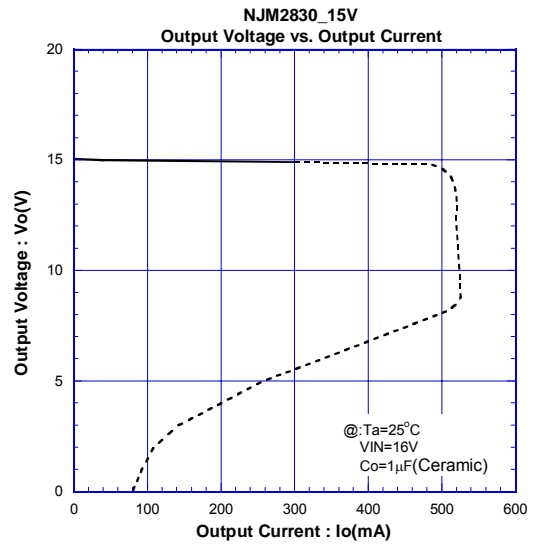
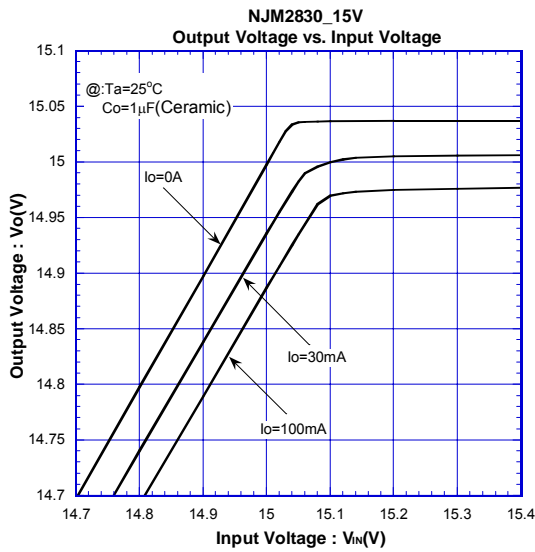


● TRANSIENT RESPONSE (8.5V Version)



■ TYPICAL CHARACTERISTICS

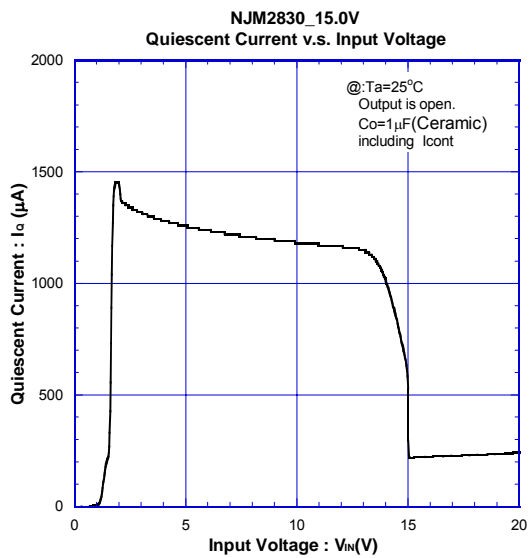
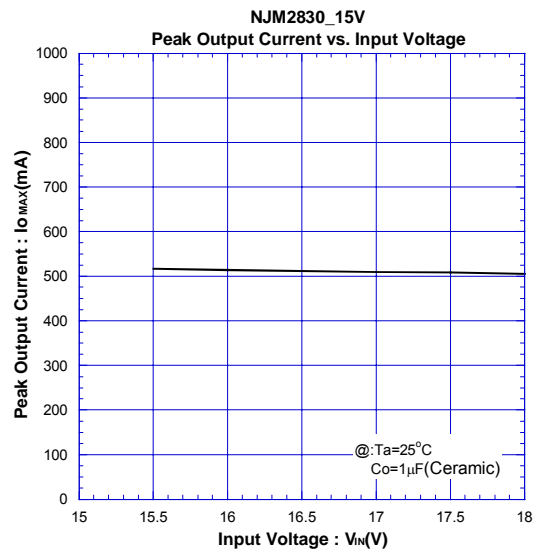
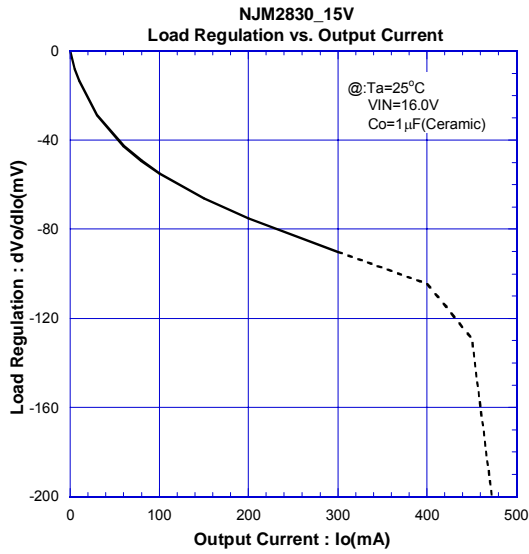
● DC CHARACTERISTICS (15V Version)



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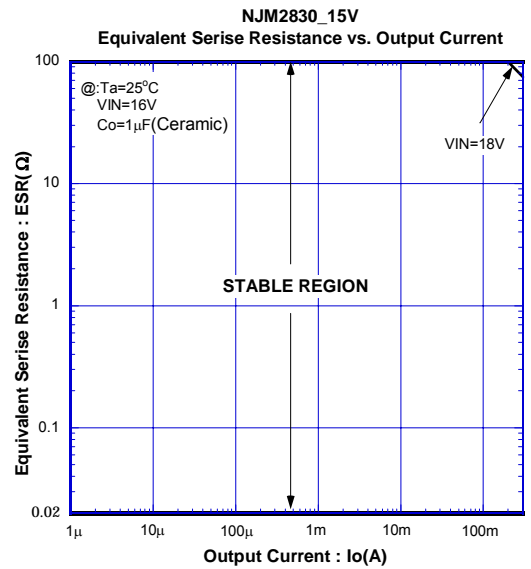
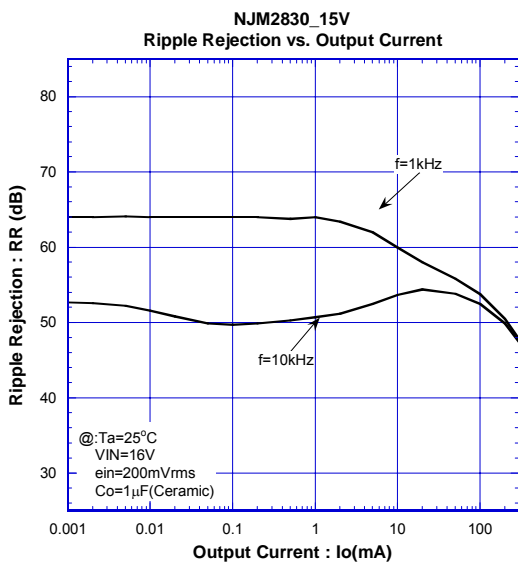
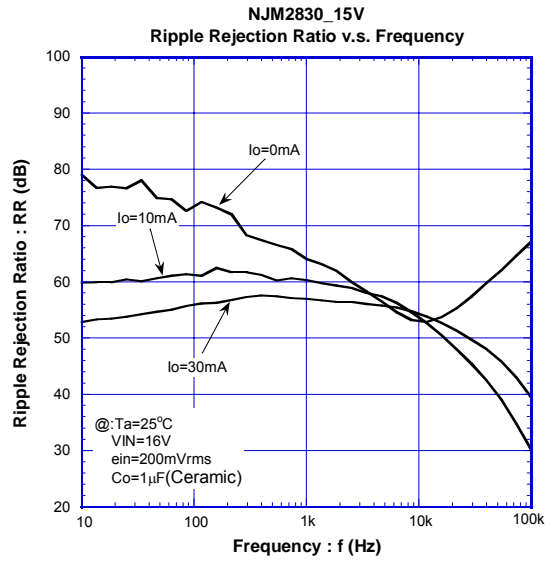
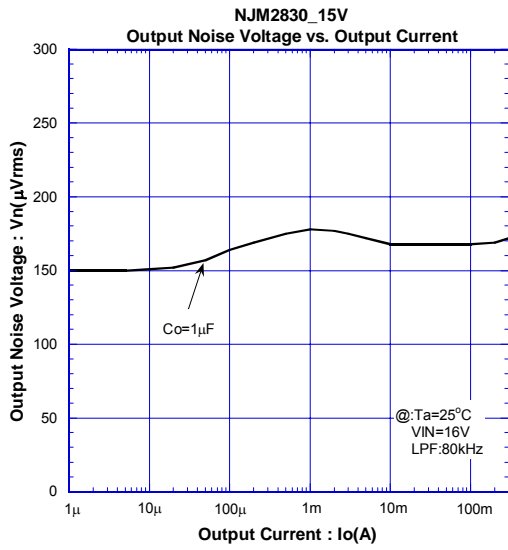
TYPICAL CHARACTERISTICS

DC CHARACTERISTICS (15V Version)



TYPICAL CHARACTERISTICS

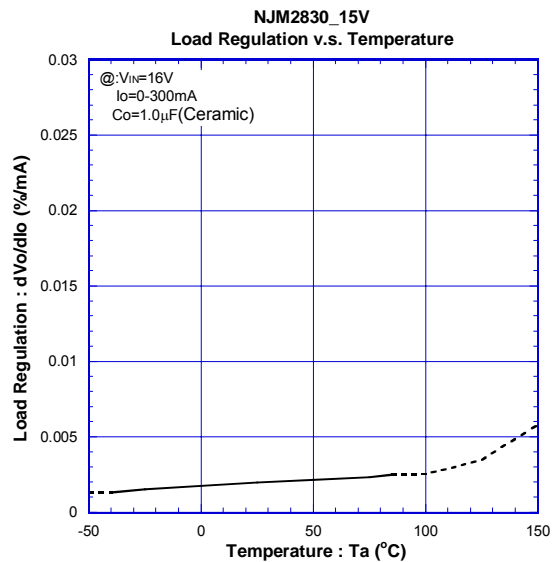
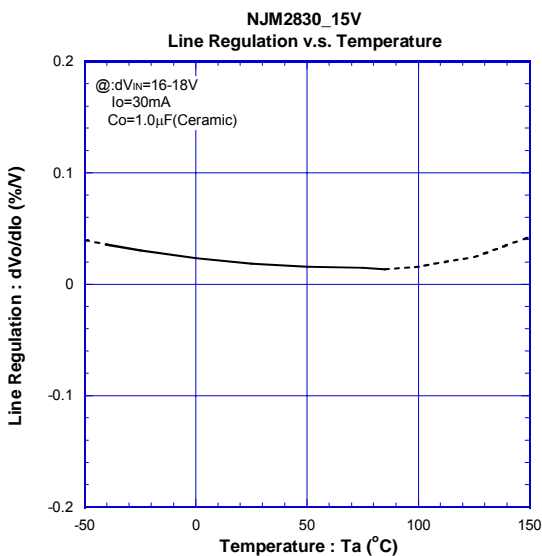
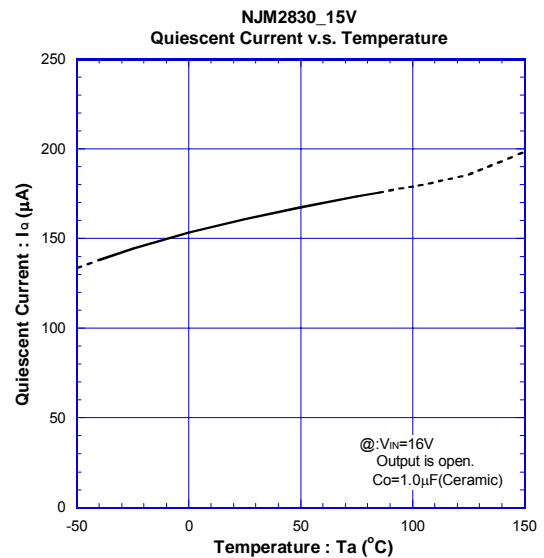
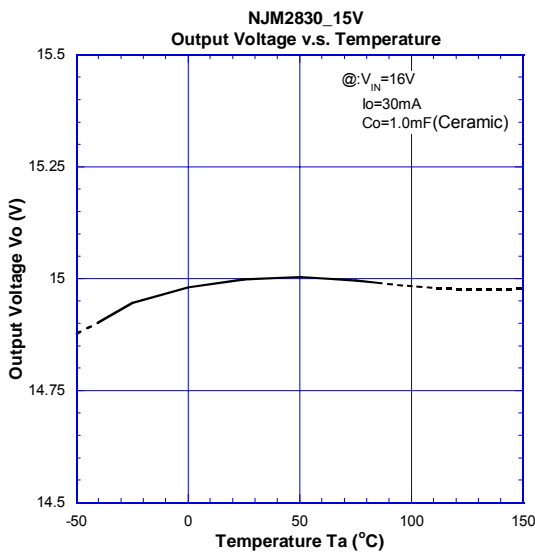
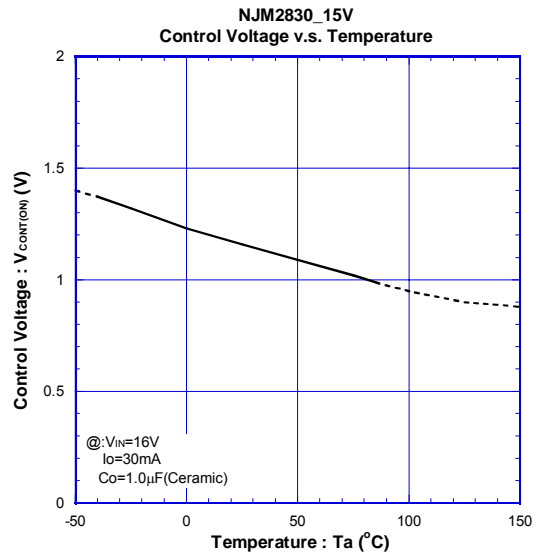
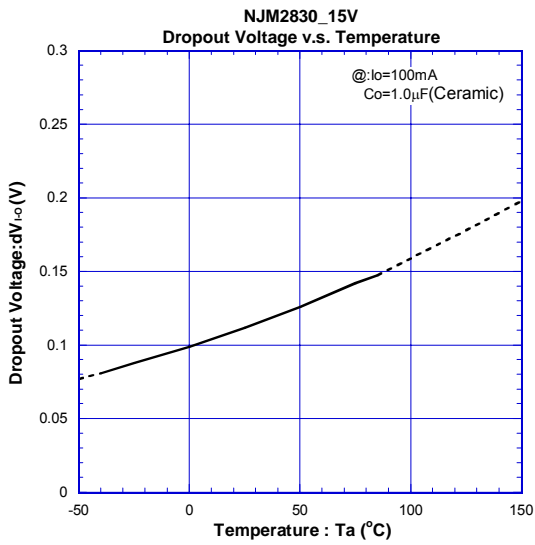
AC CHARACTERISTICS (15V Version)



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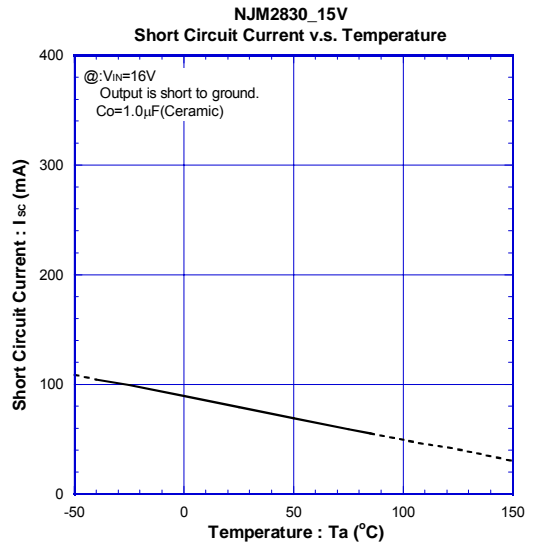
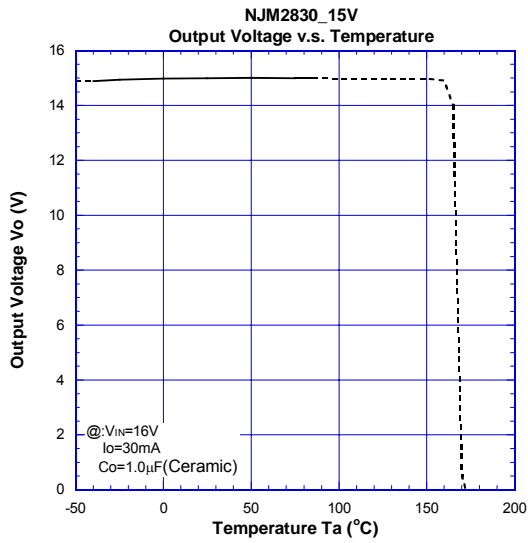
■ TYPICAL CHARACTERISTICS

● TEMPERATURE CHARACTERISTICS (15V Version)

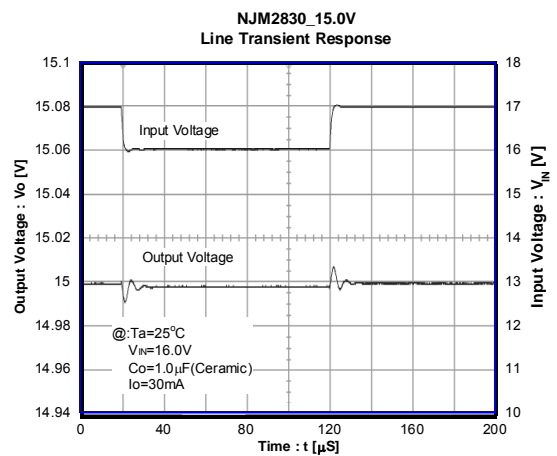
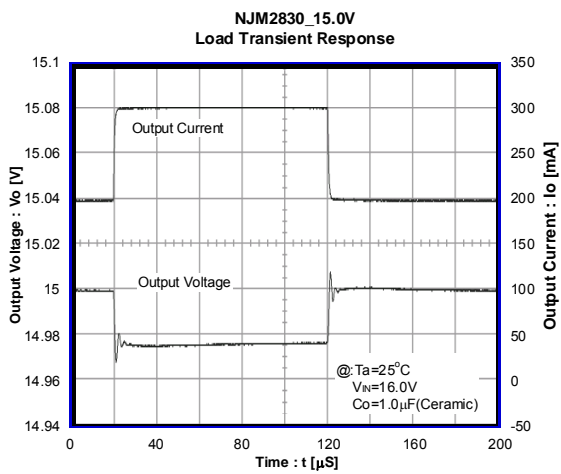
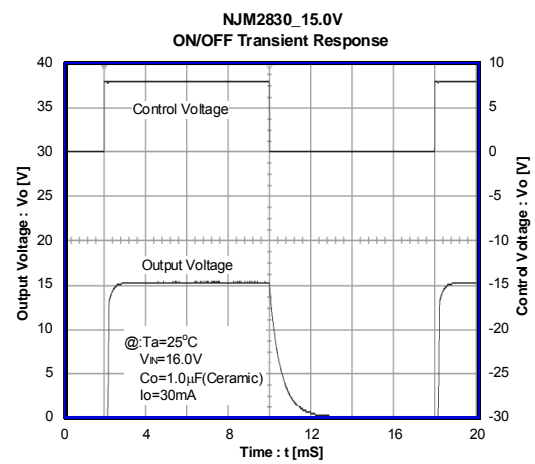
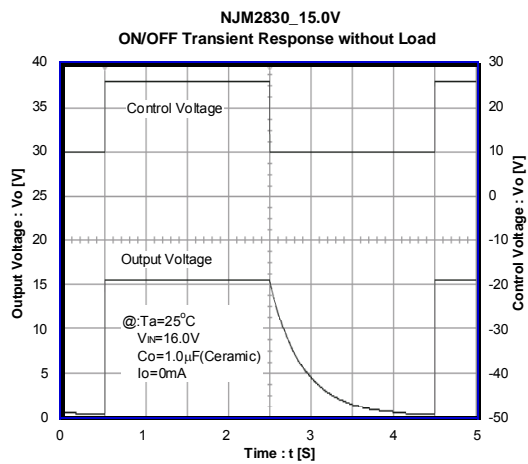


■ TYPICAL CHARACTERISTICS

● TEMPERATURE CHARACTERISTICS (15V Version)



● TRANSIENT RESPONSE (15V Version)



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