

Low Dropout Voltage Regulator

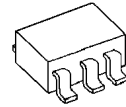
■ GENERAL DESCRIPTION

The NJM2877 is a 150mA output low dropout voltage regulator with ON/OFF control.

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

Small packaging and 0.47 μ F small decoupling capacitor make the NJM2877 suitable for space conscious applications.

■ PACKAGE OUTLINE

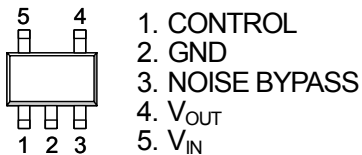


NJM2877F3

■ FEATURES

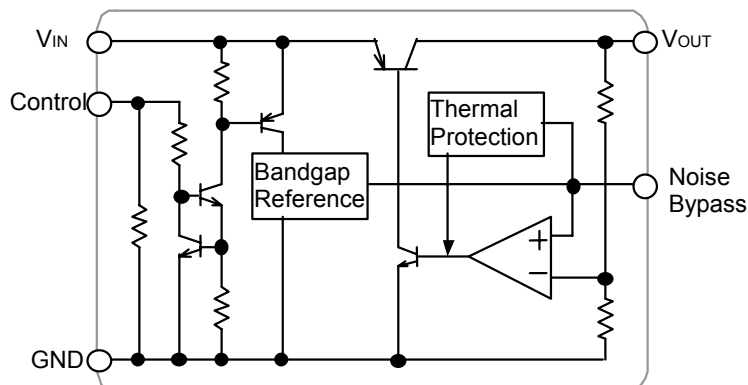
- High Ripple Rejection 75dB typ. (f=1kHz Vo=3V version)
- Output Noise Voltage Vno=30 μ Vrms typ. (Cp=0.01 μ F)
- Output Current Io(max.)=150mA
- High Precision Output Vo \pm 1.0%
- Output capacitor with 0.47 μ F ceramic capacitor(Vo \geq 2.7V Version)
- Low Dropout Voltage 0.10V typ. (Io=60mA)
- ON/OFF Control (Active High)
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limit
- Bipolar Technology
- Package Outline SC-88A

■ PIN CONFIGURATION



NJM2877F3

■ EQUIVALENT CIRCUIT



NJM2877

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■ OUTPUT VOLTAGE RANK LIST

Device Name	V _{OUT}	Device Name	V _{OUT}	Device Name	V _{OUT}
NJM2877F3 -15	1.5V	NJM2877F3 -28	2.8V	NJM2877F3 -355	3.55V
NJM2877F3 -18	1.8V	NJM2877F3 -285	2.85V	NJM2877F3 -36	3.6V
NJM2877F3 -21	2.1V	NJM2877F3 -29	2.9V	NJM2877F3 -04	4.0V
NJM2877F3 -22	2.2V	NJM2877F3 -03	3.0V	NJM2877F3 -42	4.2V
NJM2877F3 -23	2.3V	NJM2877F3 -31	3.1V	NJM2877F3 -45	4.5V
NJM2877F3 -24	2.4V	NJM2877F3 -32	3.2V	NJM2877F3 -46	4.6V
NJM2877F3 -25	2.5V	NJM2877F3 -33	3.3V	NJM2877F3 -48	4.8V
NJM2877F3 -255	2.55V	NJM2877F3 -345	3.45V	NJM2877F3 -05	5.0V

Output voltage options available : 1.5 ~ 5.0V (0.1V step)

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V _{IN}	+10	V
Control Voltage	V _{CONT}	+10(*1)	V
Power Dissipation	P _D	250(*2)	mW
Operating Temperature	T _{opr}	-40 ~ +85	°C
Storage Temperature	T _{stg}	-40 ~ +125	°C

(*1) : When input voltage is less than +10V, 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)

■ Operating voltage

V_{IN}=+2.3 ~ +9V (In case of Vo<2.1V version)

■ ELECTRICAL CHARACTERISTICS

(V_{IN}=Vo+1V, C_{IN}=0.1μF, Co=0.47μF: Vo≥2.7V (Co=1.0μF : 1.8V<Vo≤2.6V, Co=2.2μF : Vo≤1.8V), Cp=0.01μF, Ta=25°C)

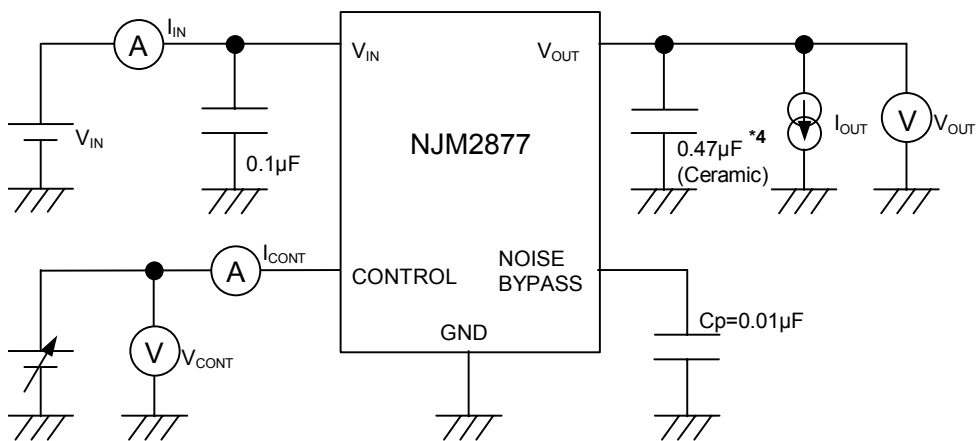
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	Vo	Io=30mA	-1.0%	-	+1.0%	V
Input Voltage	V _{IN}		-	-	9	V
Quiescent Current	I _Q	Io=0mA, except I _{cont}	-	120	180	μA
Quiescent Current at Control OFF	I _{Q(OFF)}	V _{CONT} =0V	-	-	100	nA
Output Current	Io	Vo - 0.3V	150	200	-	mA
Line Regulation	ΔVo/ΔV _{IN}	V _{IN} =Vo+1V ~ Vo+6V, Io=30mA	-	-	0.10	%/V
Load Regulation	ΔVo/ΔIo	Io=0 ~ 100mA	-	-	0.03	%/mA
Dropout Voltage (*3)	ΔV _{L.O}	Io=60mA	-	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	-	30	-	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

(*3): The output voltage excludes under 2.1V.

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.

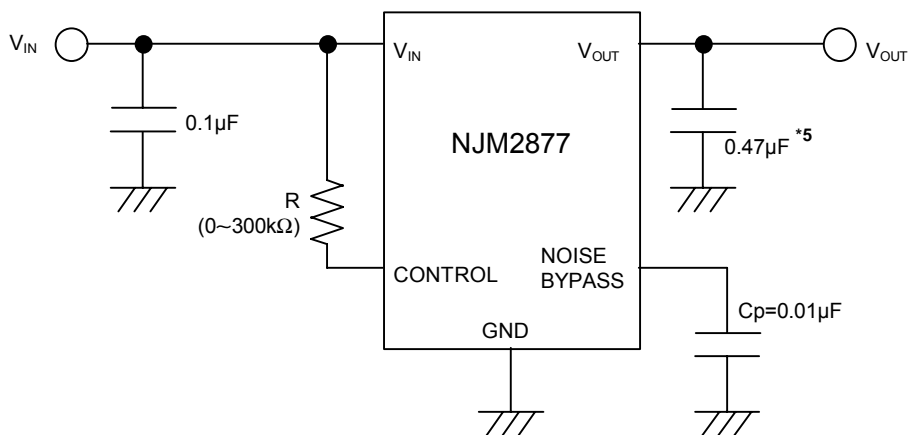
■ TEST CIRCUIT



*4: 1.8V < V_O ≤ 2.6V version: C_O = 1.0µF (Ceramic)
 V_O ≤ 1.8V version: C_O = 2.2µF (Ceramic)

■ TYPICAL APPLICATION

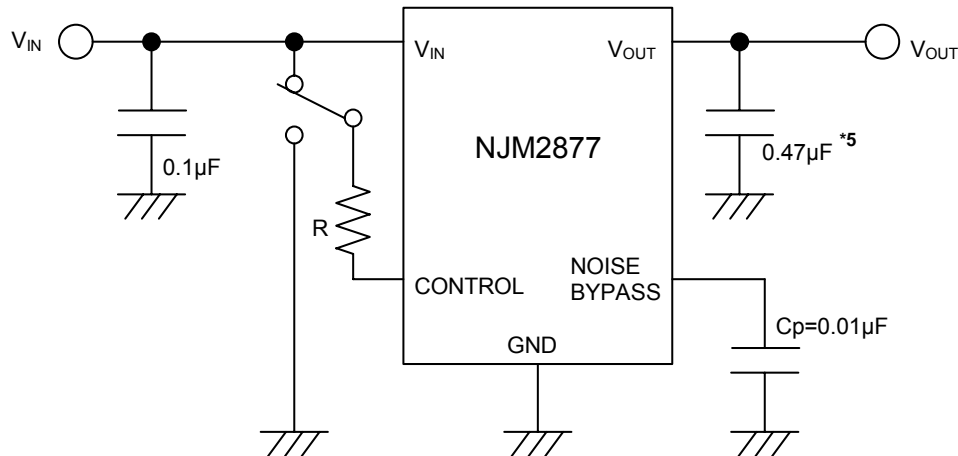
① In the case where ON/OFF Control is not required:



*5: 1.8V < V_O ≤ 2.6V version: C_O = 1.0µF
 V_O ≤ 1.8V version: C_O = 2.2µF

Connect control terminal to V_{IN} terminal

② In use of ON/OFF CONTROL:



*5 : 1.8V < V_o ≤ 2.6V version : $C_o = 1.0\mu\text{F}$
 $V_o \leq 1.8\text{V}$ version : $C_o = 2.2\mu\text{F}$

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 $0.01\mu\text{F}$ greater to avoid the problem.

***Input Capacitance C_{IN}**

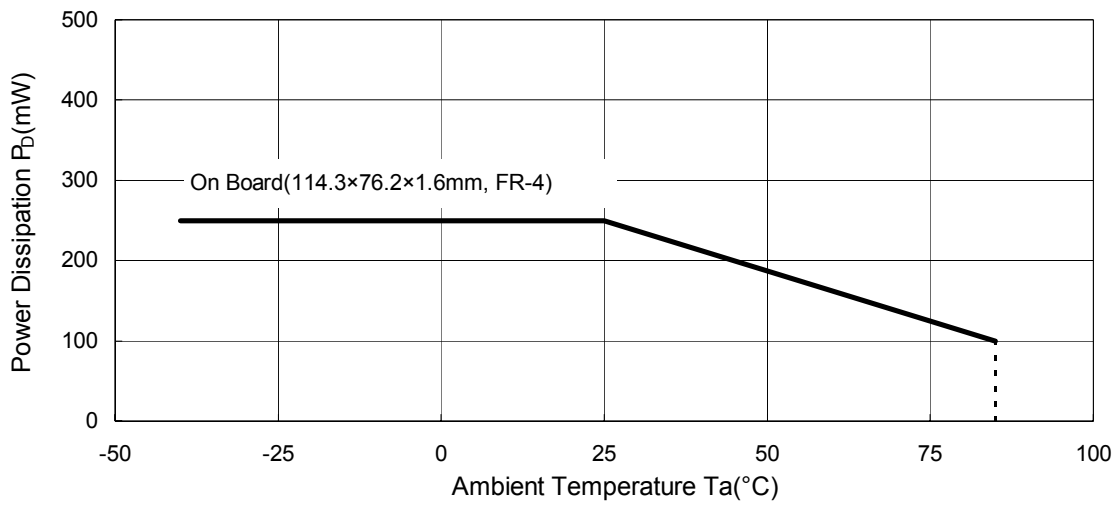
Input Capacitance C_{IN} is required to prevent oscillation and reduce power supply ripple for applications with high power supply impedance or a long power supply line. Use the C_{IN} value of $0.1\mu\text{F}$ greater to avoid the problem. C_{IN} should connect between GND and V_{IN} as short as possible.

***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.

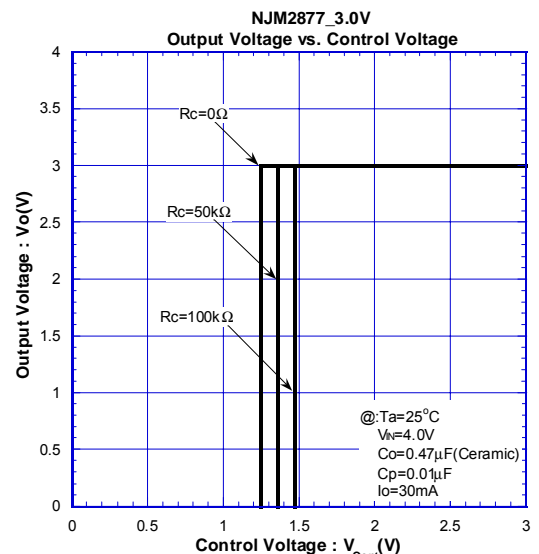
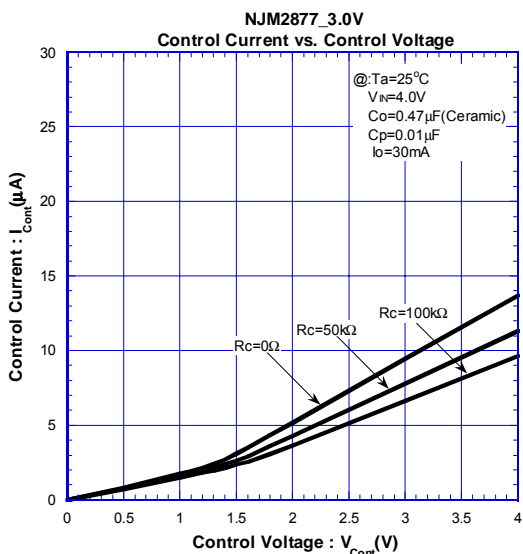
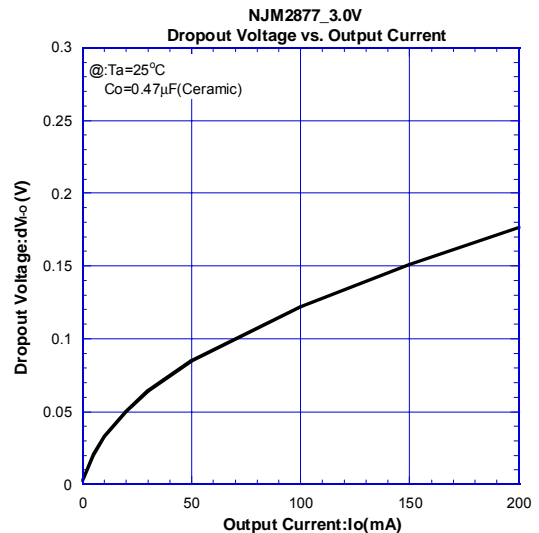
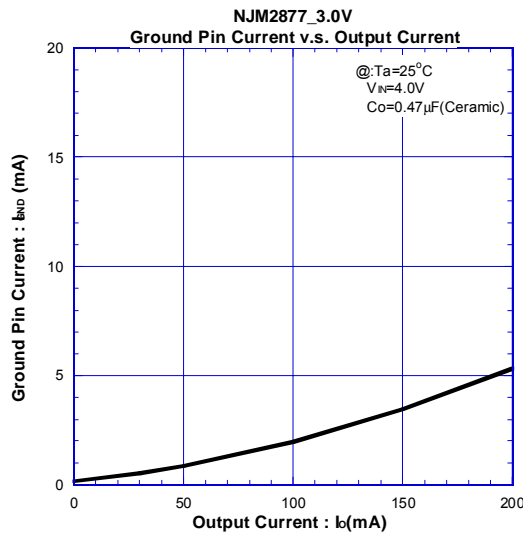
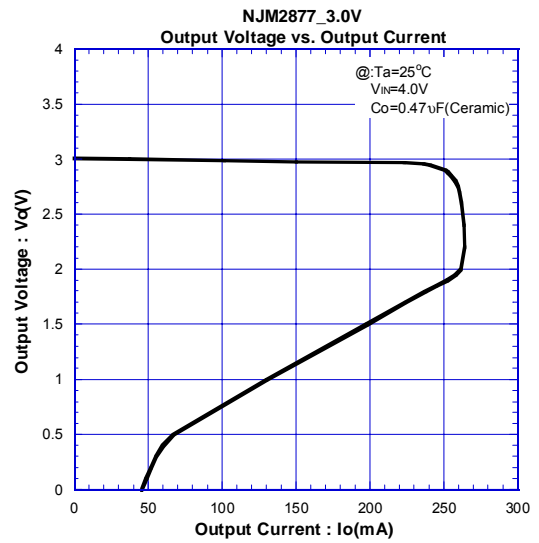
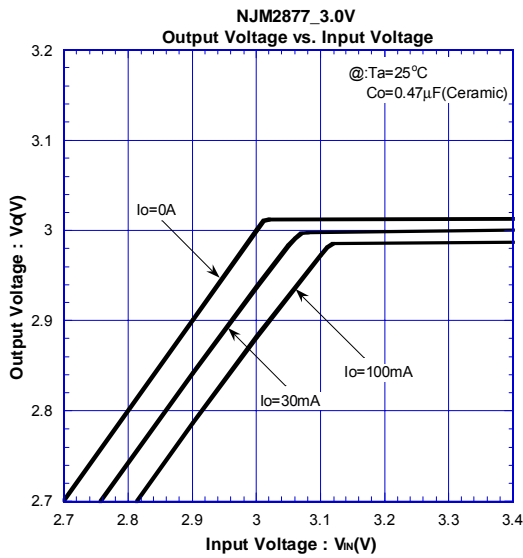
■ POWER DISSIPATION vs. AMBIENT TEMPERATURE (SC-88A)

NJM2877F3 Power Dissipation
($T_{opr} = -40 \sim +85^{\circ}\text{C}$, $T_j = 125^{\circ}\text{C}$)

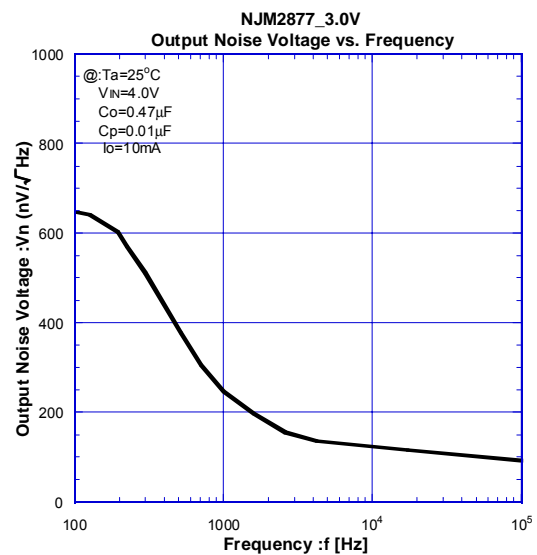
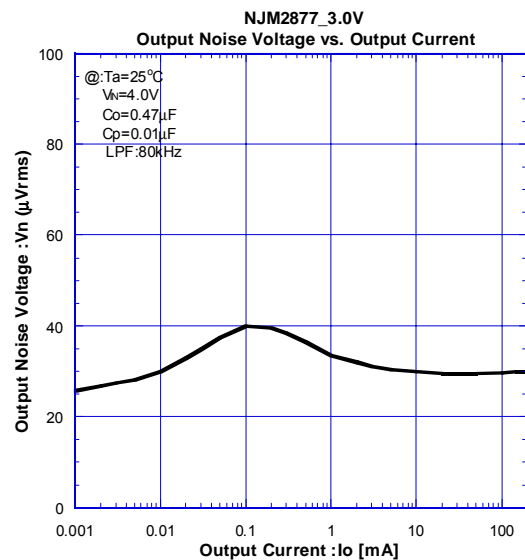
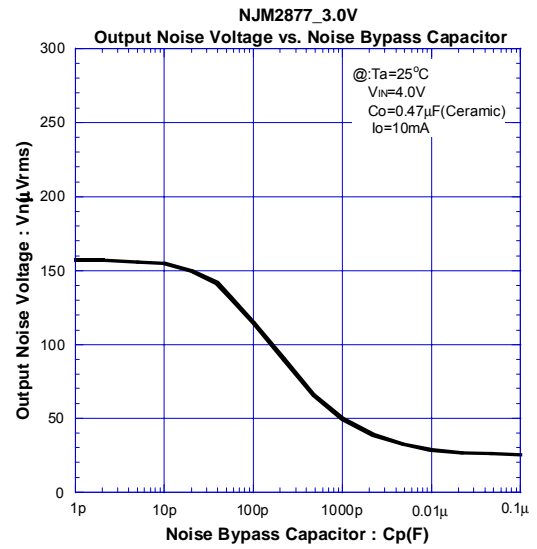
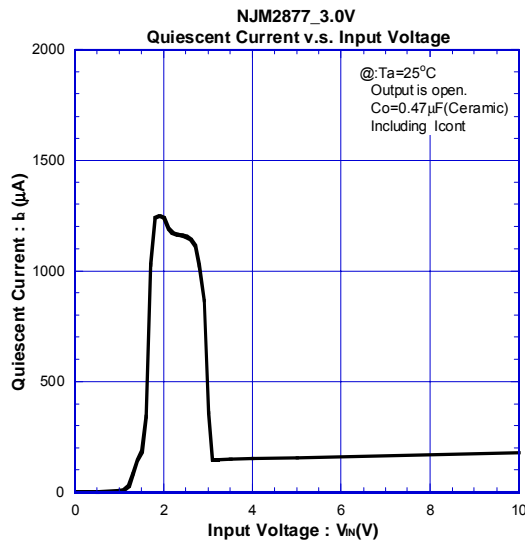
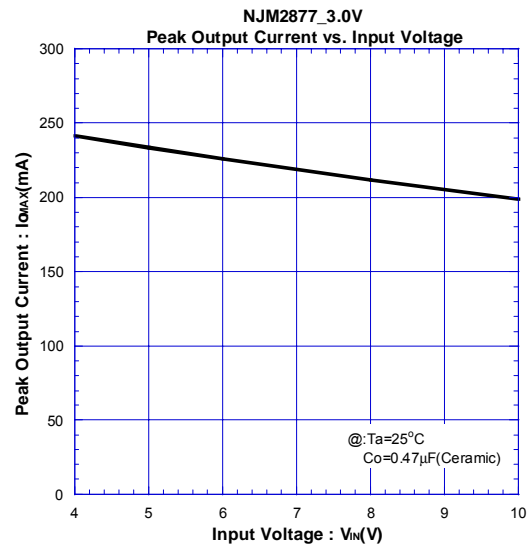
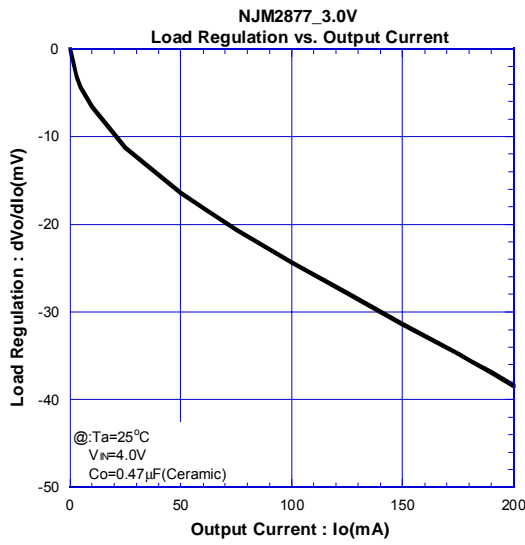


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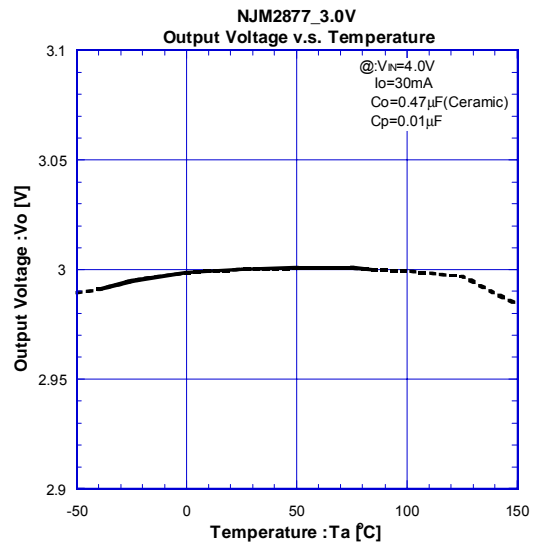
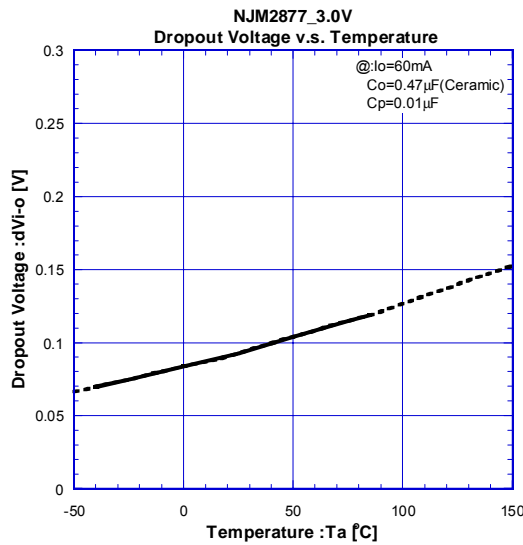
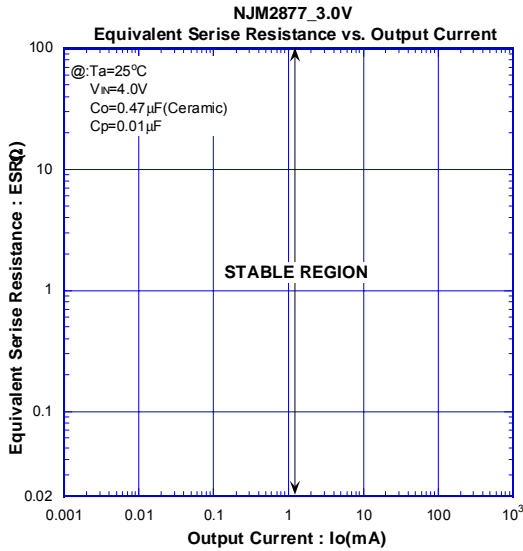
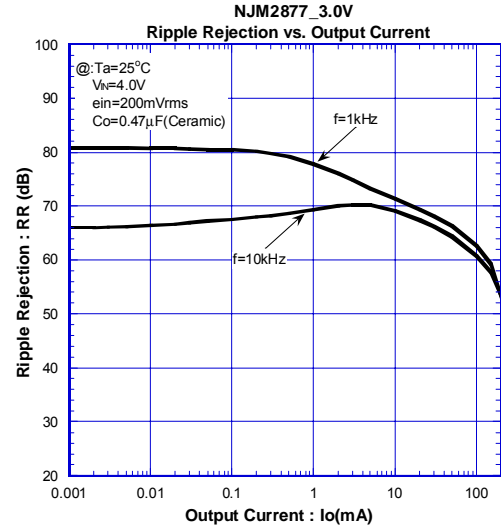
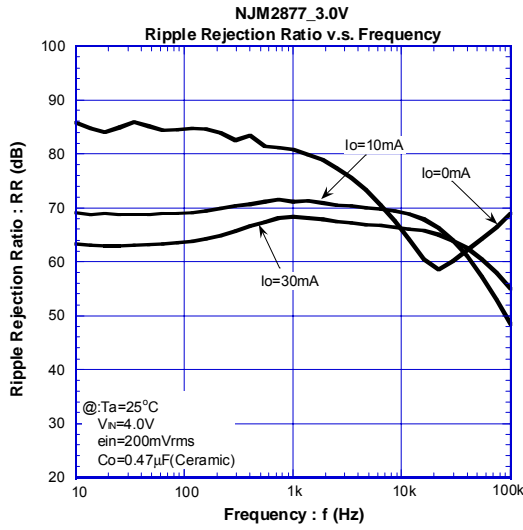
TYPICAL CHARACTERISTICS



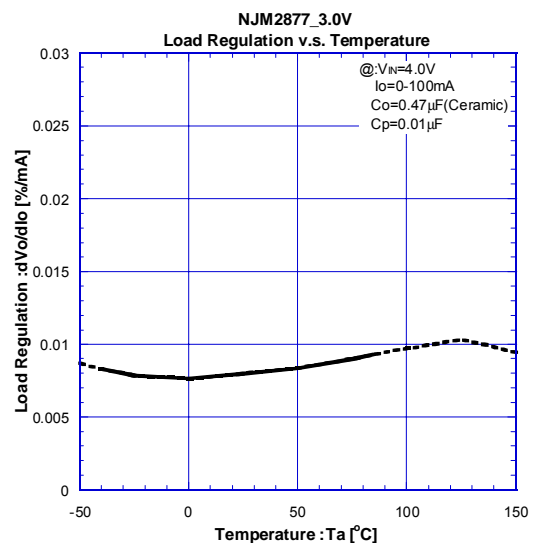
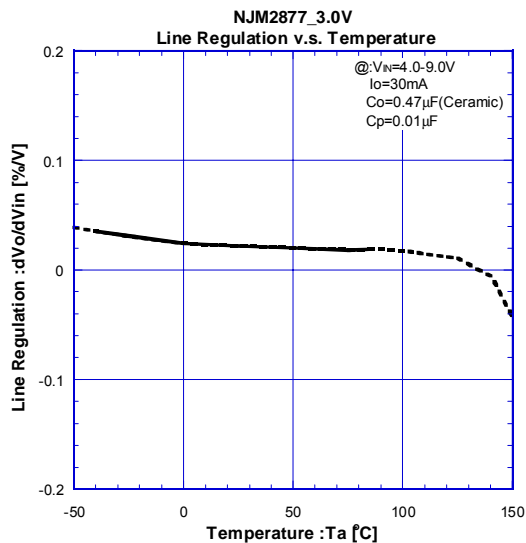
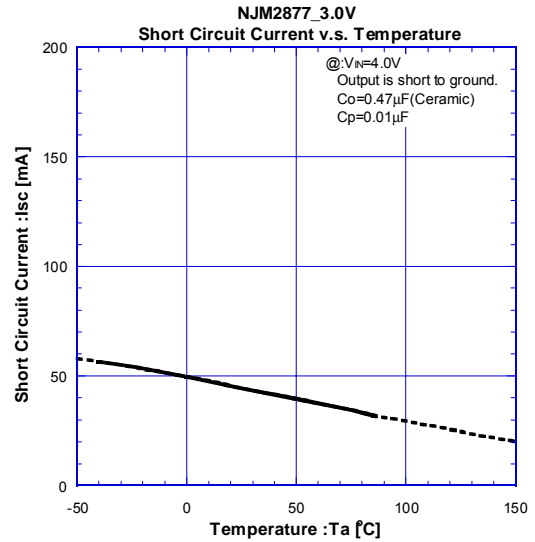
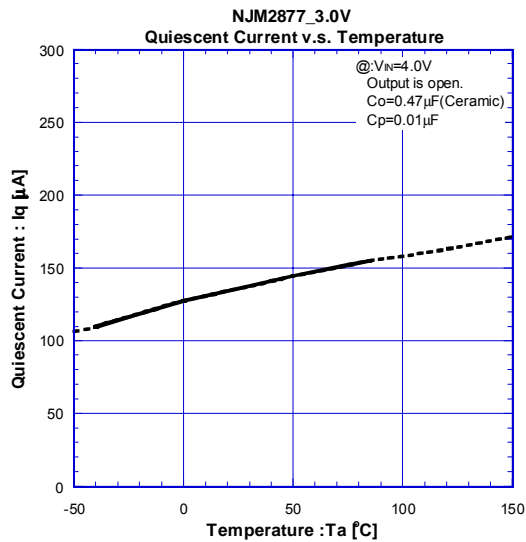
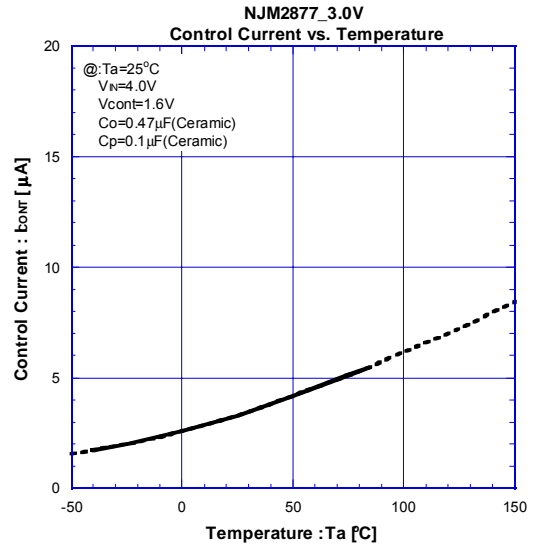
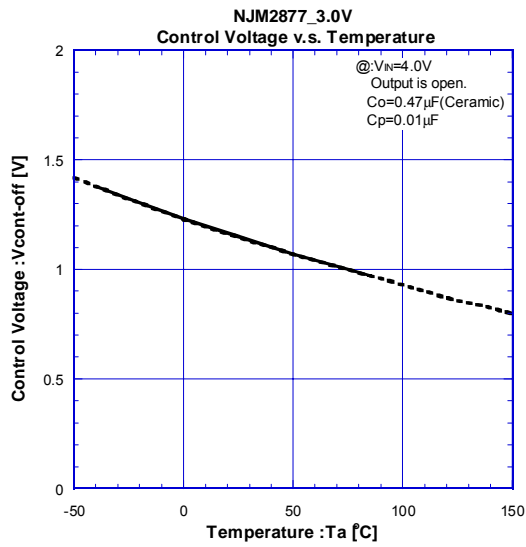
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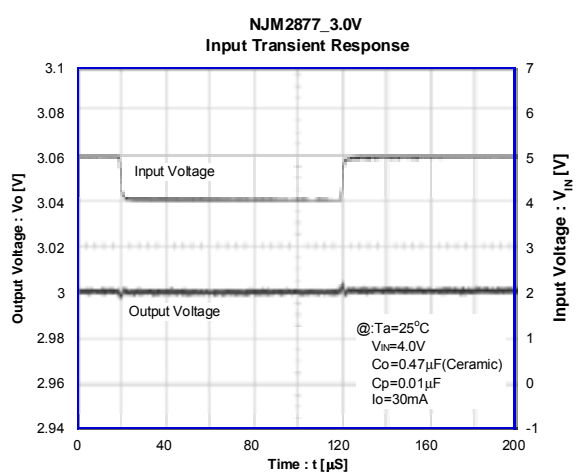
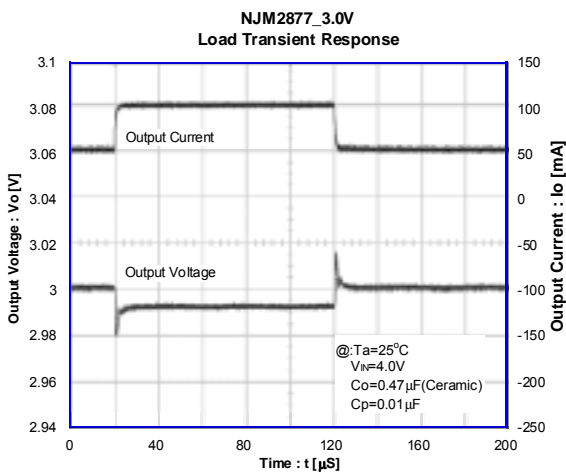
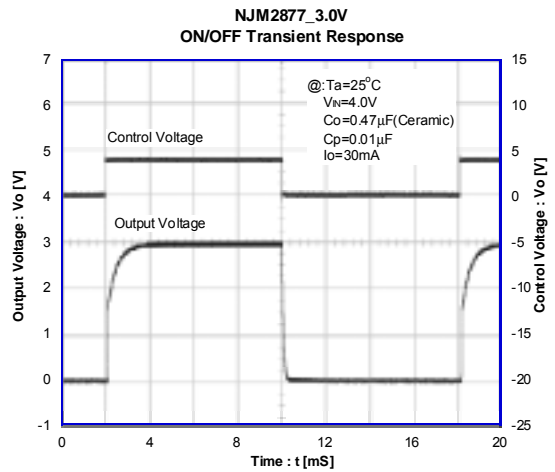
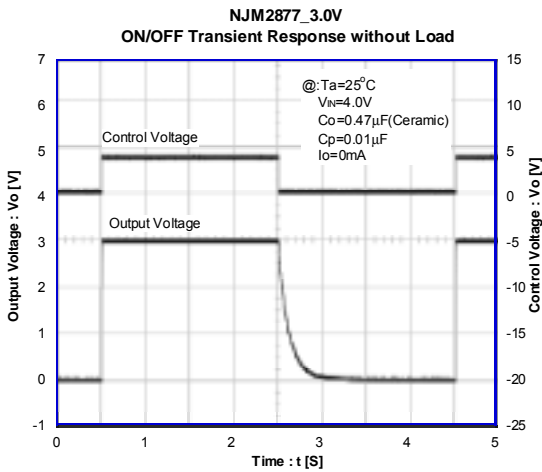
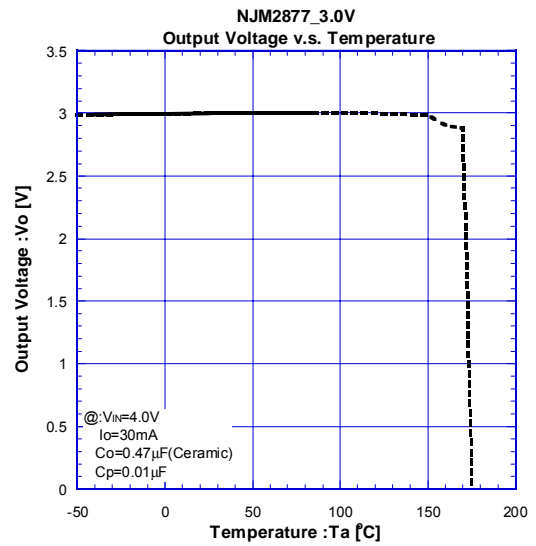
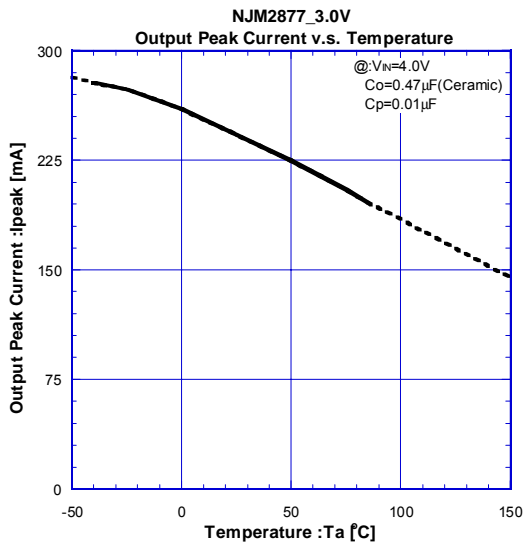
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