Low Dropout Voltage Regulator

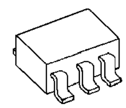
■ GENERAL DESCRIPTION

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 0.47µF small decoupling capacitor make the NJM2877 suitable for space conscious applications.

■ PACKAGE OUTLINE

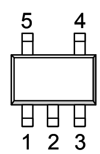


NJM2877F3

■ FEATURES

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

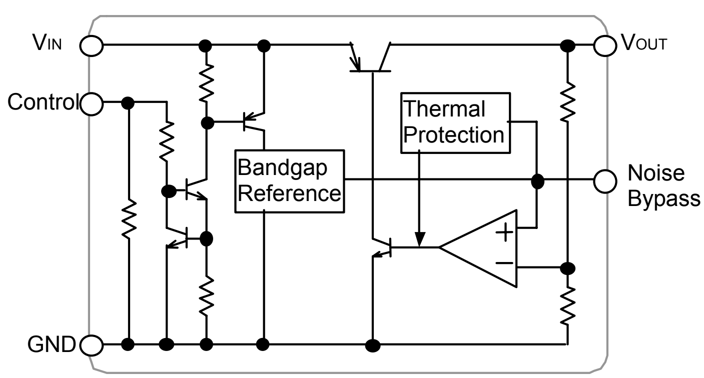
■ PIN CONFIGURATION



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

NJM2877F3

■ EQUIVALENT CIRCUIT



■ OUTPUT VOLTAGE RANK LIST

Device Name	V_{OUT}	Device Name	V_{OUT}	Device Name	V_{OUT}
NJM2877F3 -15	1.5V	NJM2877F3 -285	2.85V	NJM2877F3 -36	3.6V
NJM2877F3 -18	1.8V	NJM2877F3 -29	2.9V	NJM2877F3 -04	4.0V
NJM2877F3 -21	2.1V	NJM2877F3 -03	3.0V	NJM2877F3 -42	4.2V
NJM2877F3 -22	2.2V	NJM2877F3 -31	3.1V	NJM2877F3 -45	4.5V
NJM2877F3 -23	2.3V	NJM2877F3 -32	3.2V	NJM2877F3 -46	4.6V
NJM2877F3 -24	2.4V	NJM2877F3 -33	3.3V	NJM2877F3 –47	4.7V
NJM2877F3 -25	2.5V	NJM2877F3 -345	3.45V	NJM2877F3 -48	4.8V
NJM2877F3 -255	2.55V	NJM2877F3 -35	3.5V	NJM2877F3 -05	5.0V
NJM2877F3 -28	2.8V	NJM2877F3 -355	3.55V		

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	Topr	–40 ~ +85	°C
Storage Temperature	Tstg	–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)

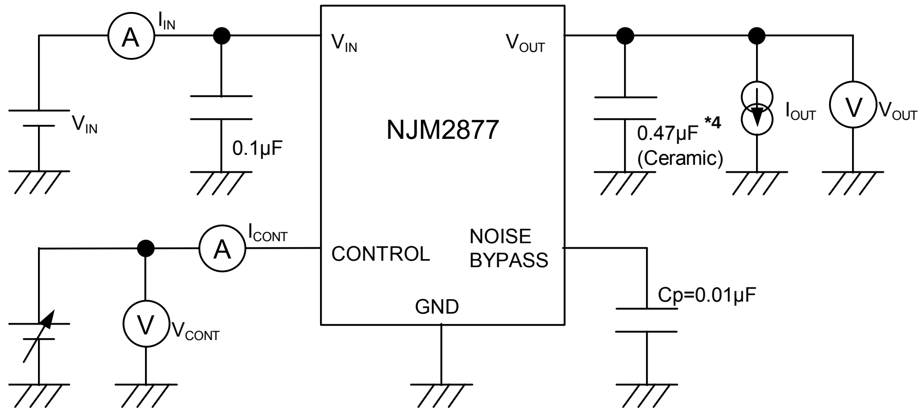
■ ELECTRICAL CHARACTERISTICS

(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 Icont	–	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	$\Delta Vo/\Delta V_{IN}$	V_{IN}=Vo+1V ~ Vo+6V, Io=30mA	–	–	0.10	%/V
Load Regulation	$\Delta Vo/\Delta Io$	Io=0 ~ 100mA	–	–	0.03	%/mA
Dropout Voltage (*3)	ΔV_{I-O}	Io=60mA	–	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	$\Delta Vo/\Delta Ta$	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.

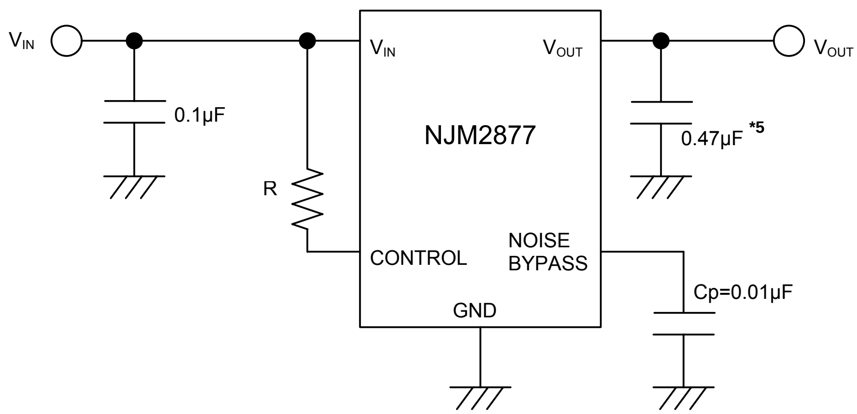
■ TEST CIRCUIT



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

■ TYPICAL APPLICATIONS

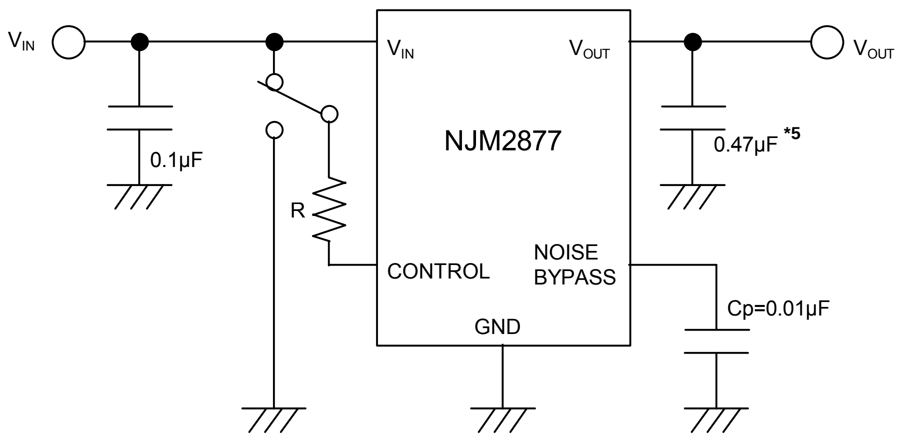
① In the case where ON/OFF Control is not required:



*5: 1.8V<Vo≤2.6V version: Co=1.0µF
Vo≤1.8V version: Co=2.2µF

Connect control terminal to V_{IN} terminal

② In use of ON/OFF CONTROL:



*5 : 1.8V<Vo≤2.6V version : Co=1.0µF
Vo≤1.8V version : Co=2.2µF

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

∗Noise bypass Capacitance Cp

Noise bypass capacitance Cp reduces noise generated by band-gap reference circuit.
Noise level and ripple rejection will be improved when larger Cp is used.
Use of smaller Cp value may cause oscillation.
Use the Cp value of 0.01µF greater to avoid the problem.

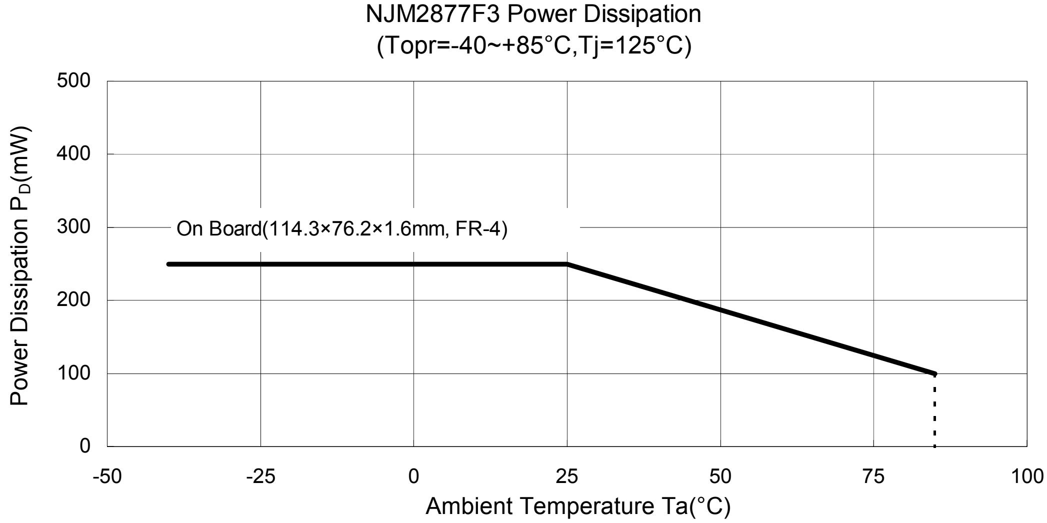
∗Input Capacitance C_{IN}

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 0.1µF greater to avoid the problem.
C_{IN} should connect between GND and V_{IN} as short as possible.

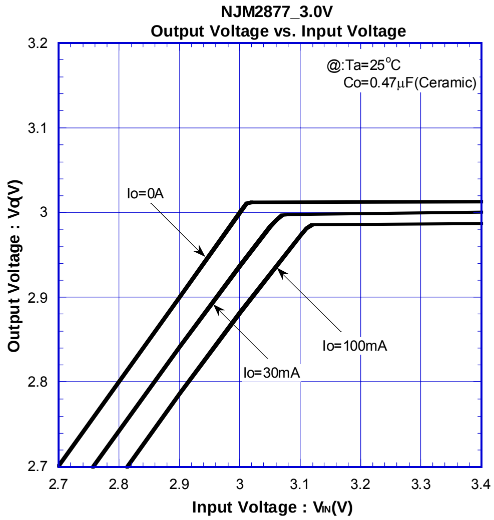
∗In the case of using a resistance "R" between V_{IN} and control.

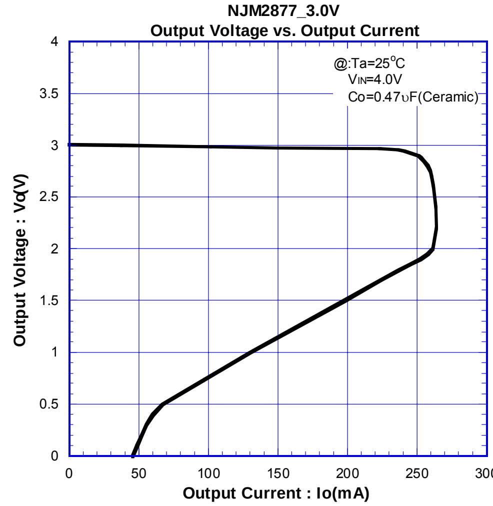
The current flow into the control terminal while the IC is ON state (I_{CONT}) can be reduced when a pull up resistance "R" is inserted between V_{IN} and the control terminal.
The minimum control voltage for ON state ($V_{CONT(ON)}$) is increased due to the voltage drop caused by I_{CONT} and the resistance "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.

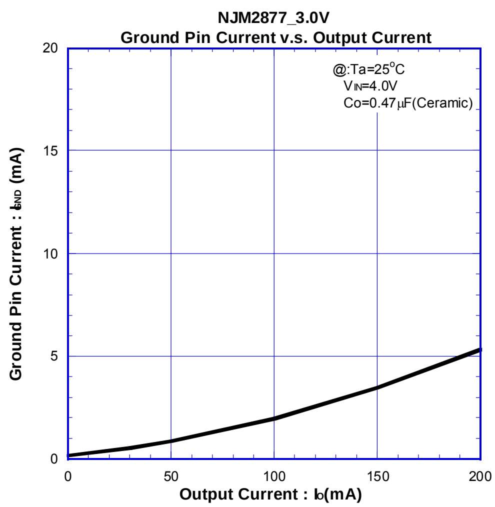
■ POWER DISSIPATION vs. AMBIENT TEMPERATURE (SC-88A)

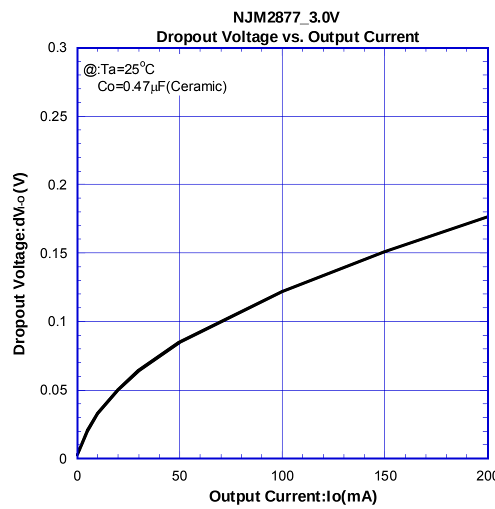


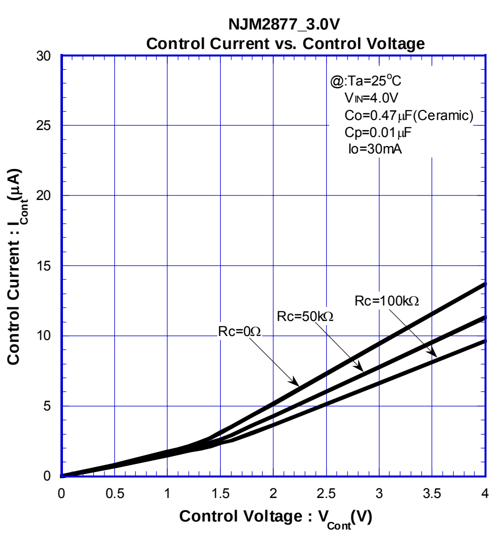
■ TYPICAL CHARACTERISTICS

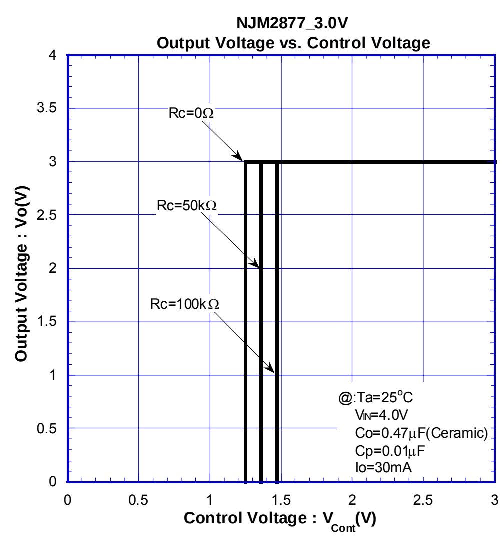




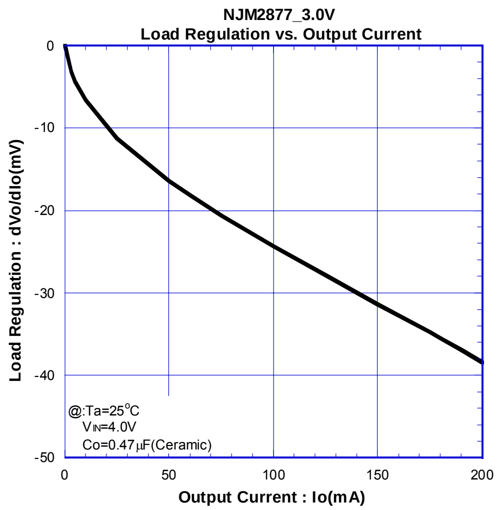


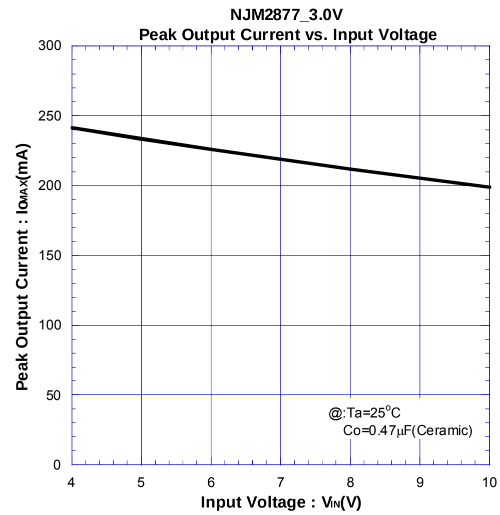


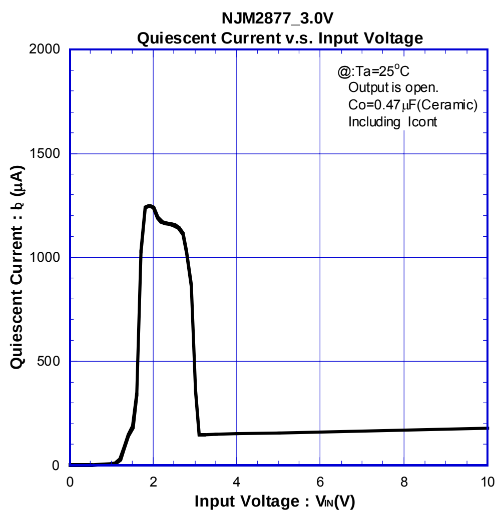


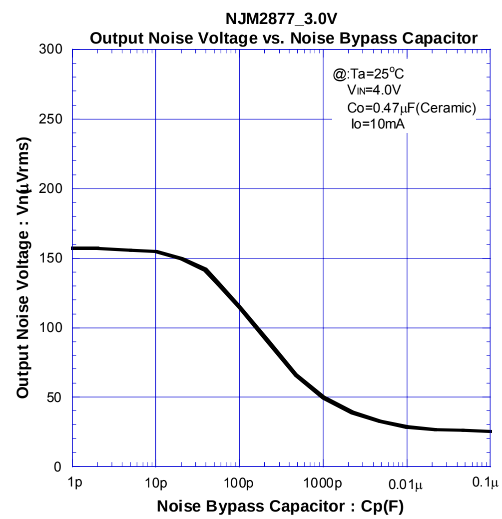


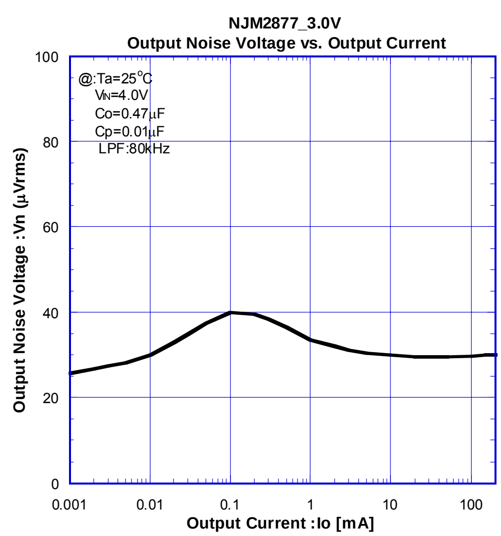
■ TYPICAL CHARACTERISTICS

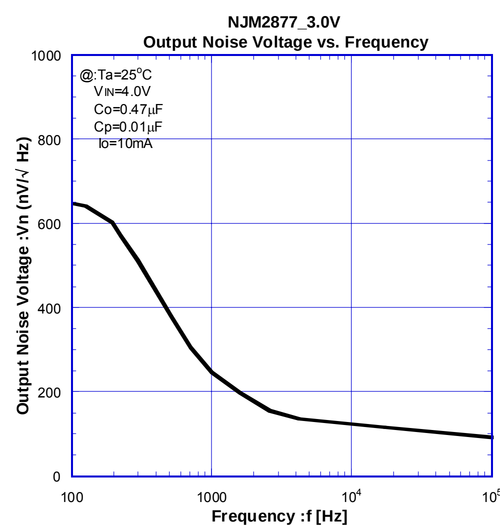




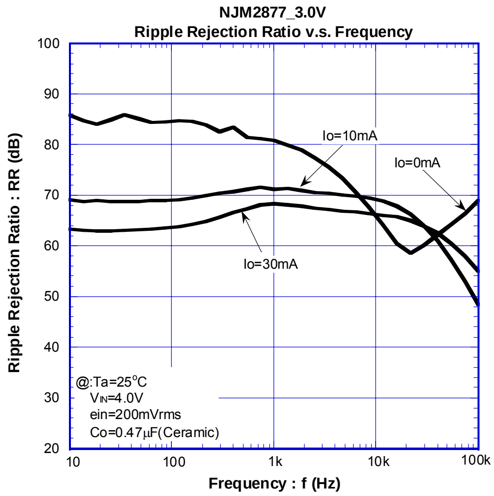


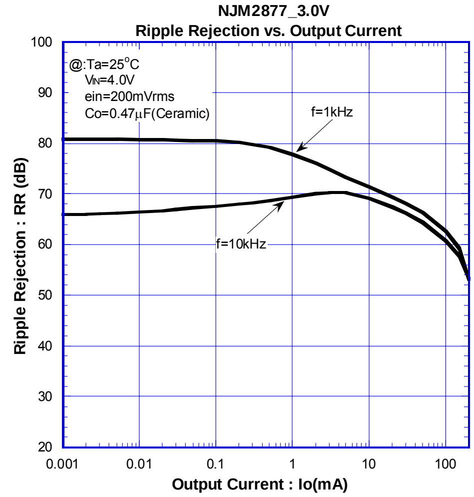


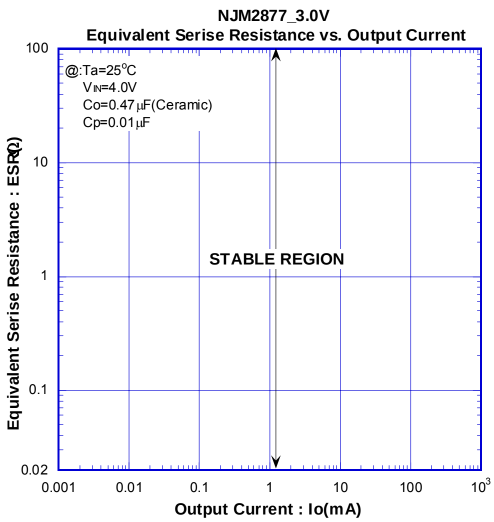


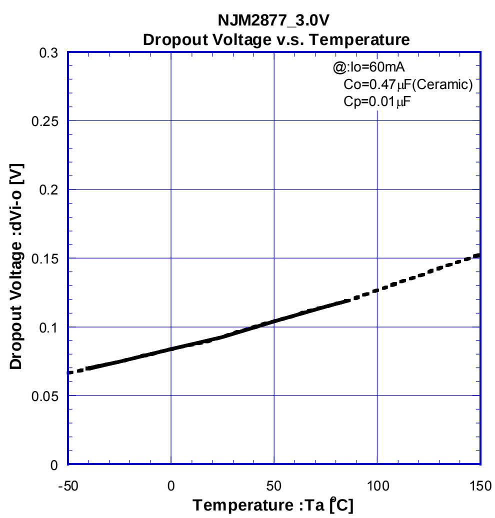


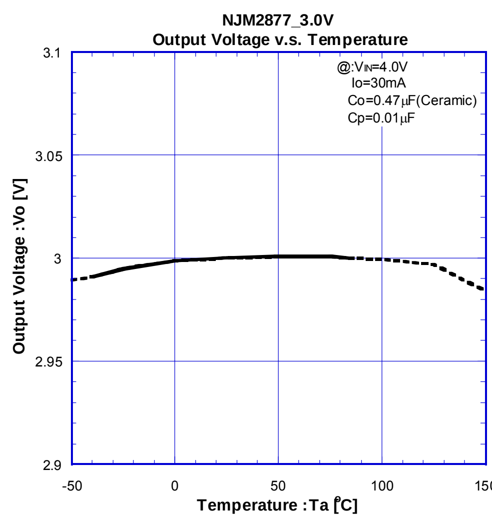
■ TYPICAL CHARACTERISTICS



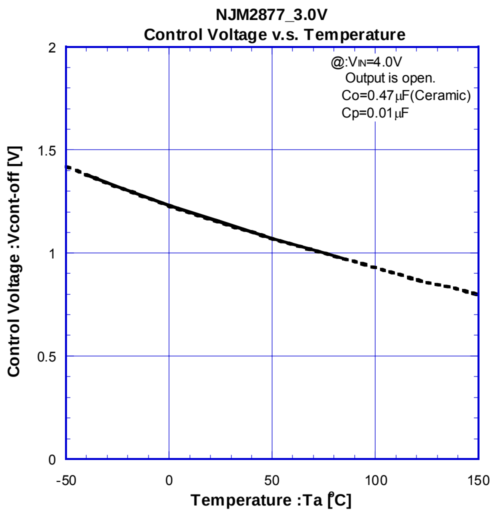


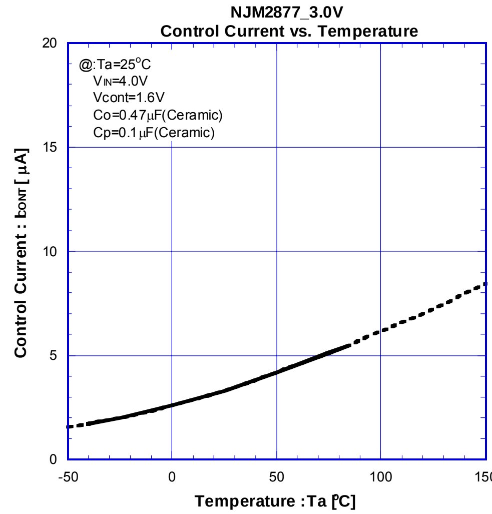


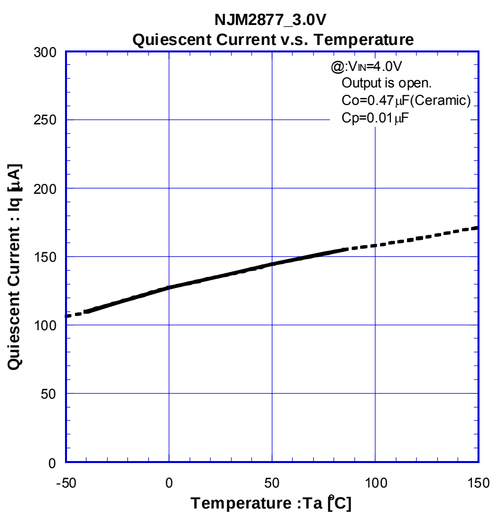


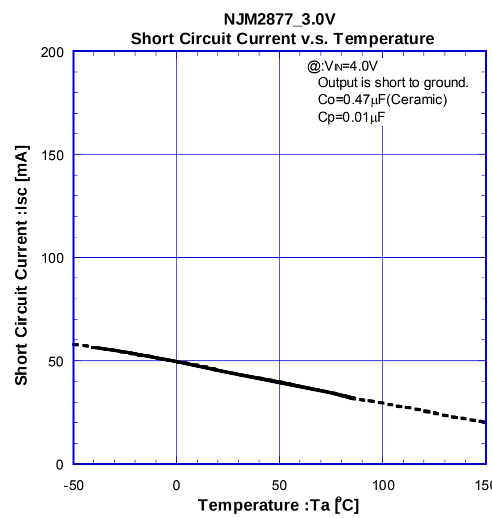


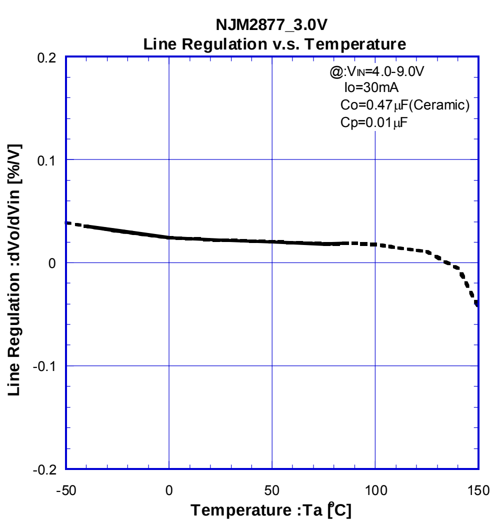
■ TYPICAL CHARACTERISTICS

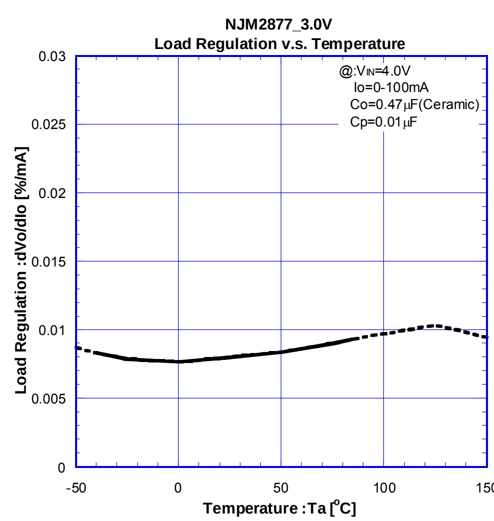




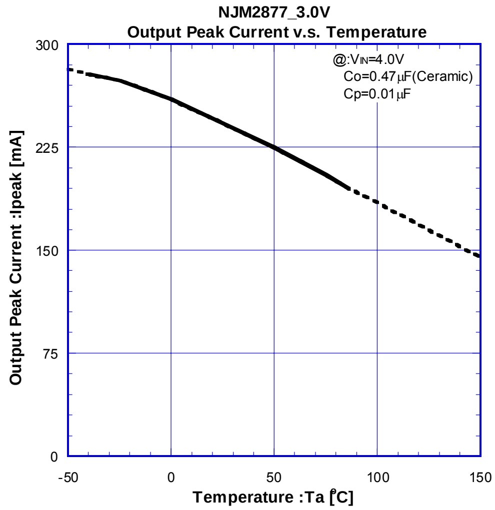


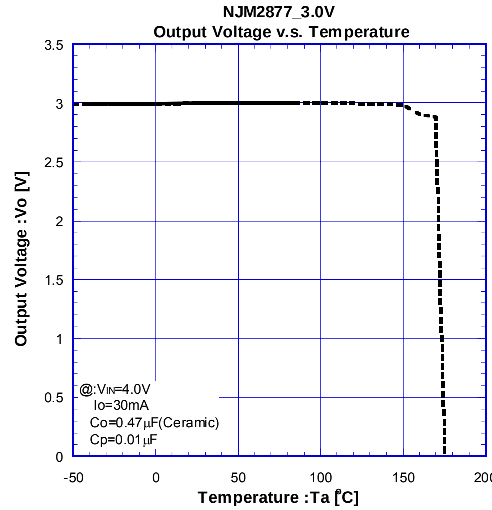


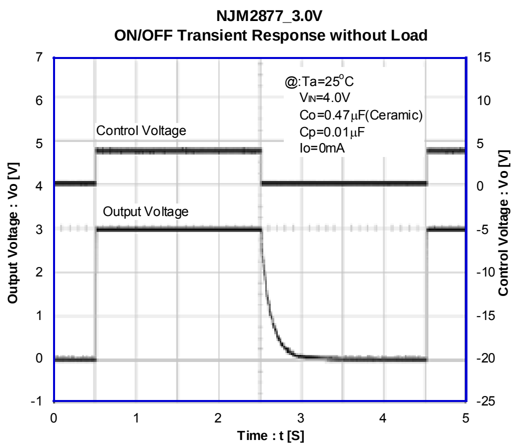


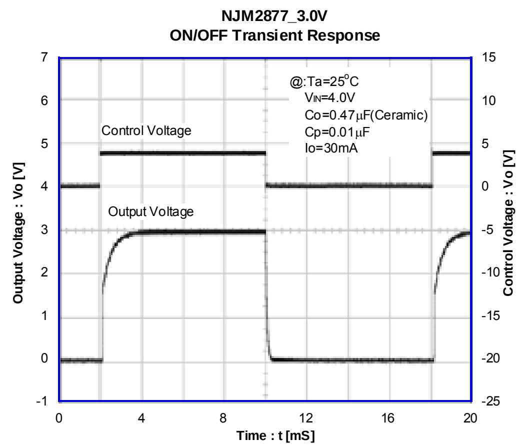


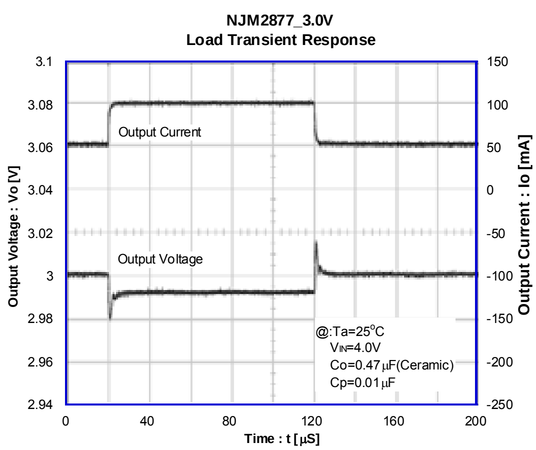
■ TYPICAL CHARACTERISTICS

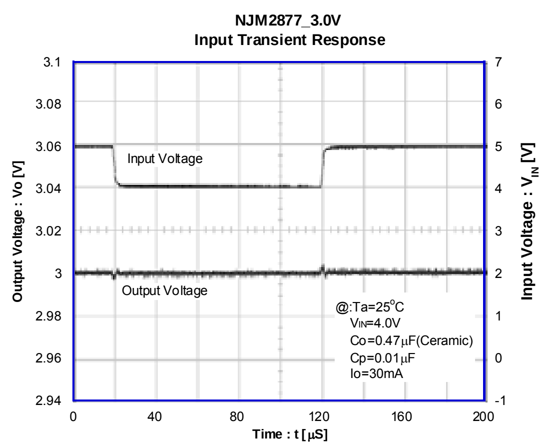












[CAUTION]
The specifications on this databook are only given for information , without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.