Low Dropout Voltage Regulator

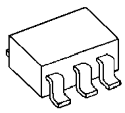
■ GENERAL DESCRIPTION

The NJM2878 is a 150mA output low dropout voltage regulator with ON/OFF control.

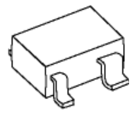
Advanced bipolar technology achieves low noise, high ripple rejection, high accuracy and low quiescent current.

Small packaging (SC-88A/SC82AB), 0.47µF small decoupling capacitor and built-in noise bypass capacitor make the NJM2878 suitable for space conscious applications.

■ PACKAGE OUTLINE



NJM2878F3

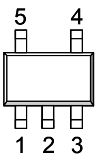


NJM2878F4

■ FEATURES

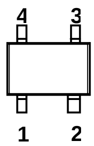
- High Ripple Rejection 75dB typ. (f=1kHz Vo=3V version)
- Output Noise Voltage Vno=45µVrms typ.
- Output Current Io(max.)=150mA
- High Precision Output Vo ±1.0%
- Output capacitor with 0.47µF ceramic capacitor(Vo≥2.7V Version)
- Low Dropout Voltage 0.10V typ. (Io=60mA)
- ON/OFF Control (Active High)
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limit
- Bipolar Technology
- Package Outline SC-88A(NJM2878F3) / SC82AB(NJM2878F4)

■ PIN CONFIGURATION



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

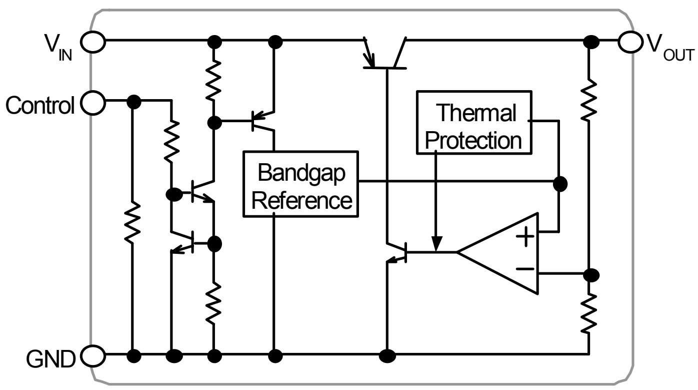
NJM2878F3



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

NJM2878F4

■ EQUIVALENT CIRCUIT



■ OUTPUT VOLTAGE RANK LIST

Device Name	V_{OUT}	Device Name	V_{OUT}
NJM2878F3 / F4 -15	1.5V	NJM2878F3 / F4 - 03	3.0V
NJM2878F3 / F4 -18	1.8V	NJM2878F3 / F4 - 31	3.1V
NJM2878F3 / F4 - 21	2.1V	NJM2878F3 / F4 - 33	3.3V
NJM2878F3 / F4 - 23	2.3V	NJM2878F3 / F4 - 34	3.4V
NJM2878F3 / F4 - 25	2.5V	NJM2878F3 / F4 - 35	3.5V
NJM2878F3 / F4 - 28	2.8V	NJM2878F3 / F4 - 05	5.0V
NJM2878F3 / F4 - 29	2.9V		

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		V
Power Dissipation	P_D	SC88A/SC82AB	250(*1)	mW
Operating Temperature	Topr	–40 ~ +85		°C
Storage Temperature	Tstg	–40 ~ +125		°C

(*1) : Mounted on glass epoxy board based on EIA/JEDEC. (114.3x76.2x1.6mm: 2Layers FR-4)

■ 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), Ta=25°C)

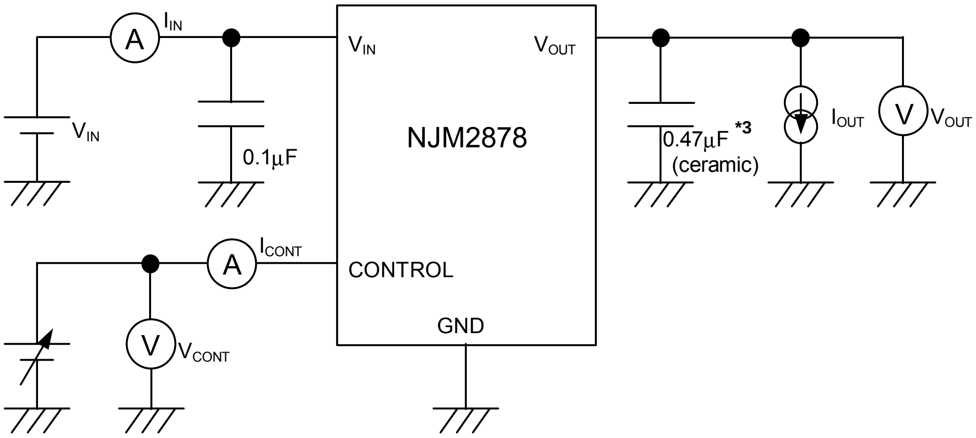
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	Vo	Io=30mA	-1.0%	–	+1.0%	V
Quiescent Current	I_Q	Io=0mA, except Icont	–	140	195	µA
Quiescent Current at Control OFF	$I_{Q(OFF)}$	V_{CONT}=0V	–	–	100	nA
Output Current	Io	Vo - 0.3V	150	200	–	mA
Line Regulation	$\Delta Vo/\Delta V_{IN}$	V_{IN}=Vo+1V ~ Vo+6V(Vo≤3V), V_{IN}=Vo+1V ~ 9V(Vo>3V), Io=30mA	–	–	0.10	%/V
Load Regulation	$\Delta Vo/\Delta Io$	Io=0 ~ 100mA	–	–	0.016	%/mA
Dropout Voltage (*2)	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_{NO1}	f=10Hz~80kHz, Io=10mA, Vo=3V Version	–	45	–	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}		–	–	9	V

(*2): 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.

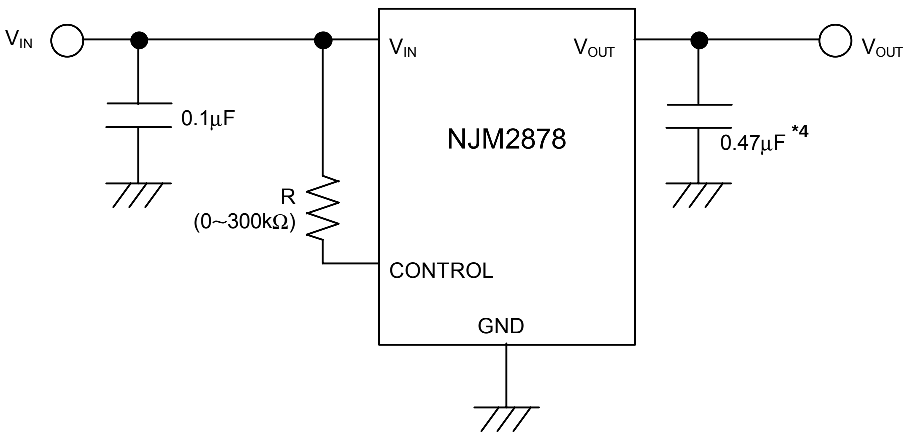
■ TEST CIRCUIT



*3 : 1.8V<Vo≤2.6V version: Co=1.0µF(Ceramic)
Vo≤1.8V version: Co=2.2µF(Ceramic)

■ TYPICAL APPLICATION

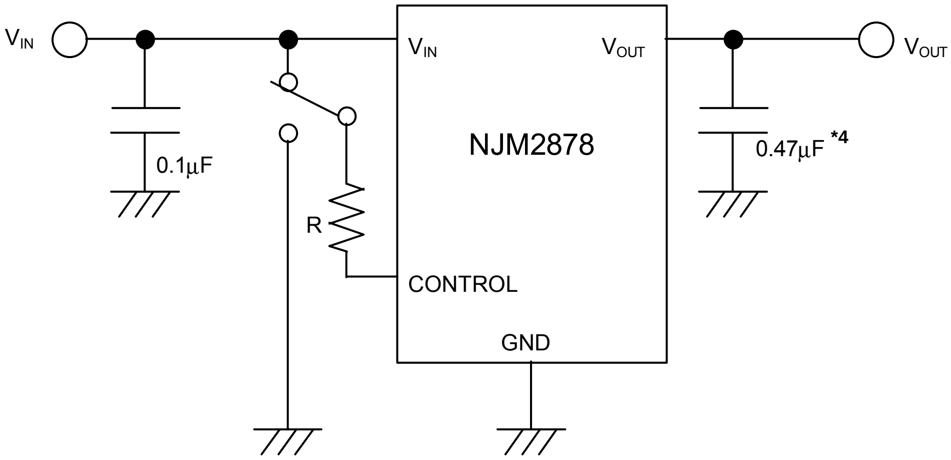
① In the case where ON/OFF Control is not required:



*4 : 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:



*4 : 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.

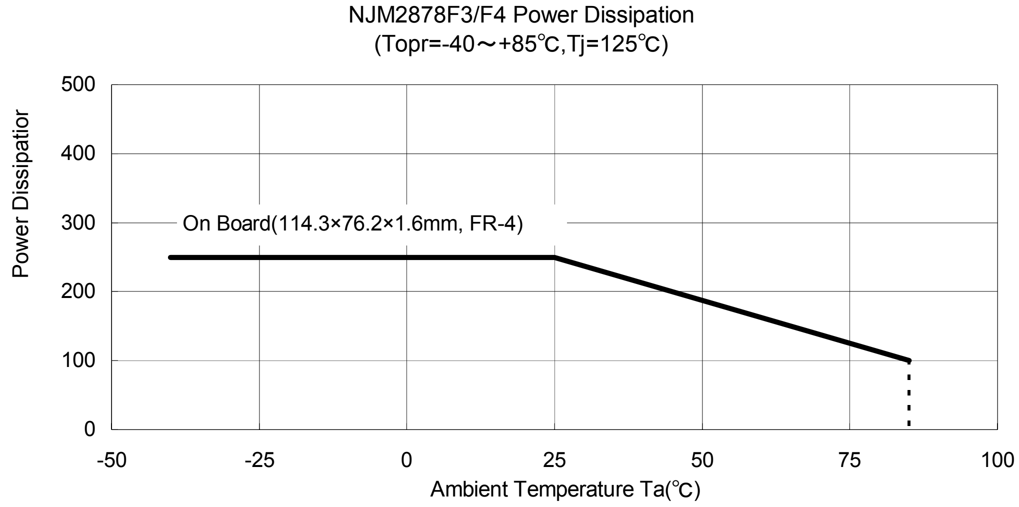
∗Input Capacitance C_{IN}

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.

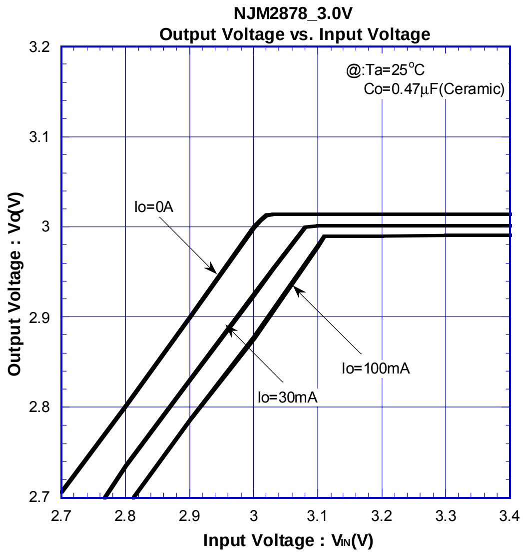
∗In the case of using a resistance "R" between V_{IN} and control.

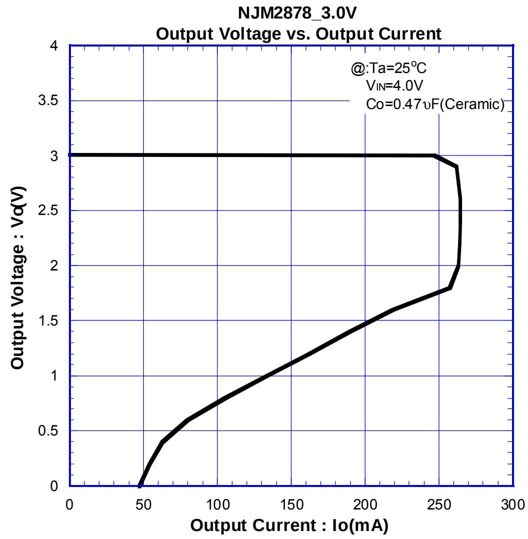
The current flow into the control terminal while the IC is ON state (I_{CONT}) can be reduced when a pull up resistance "R" is inserted between V_{IN} and the control terminal.
The minimum control voltage for ON state ($V_{CONT (ON)}$) is increased due to the voltage drop caused by I_{CONT} and the resistance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

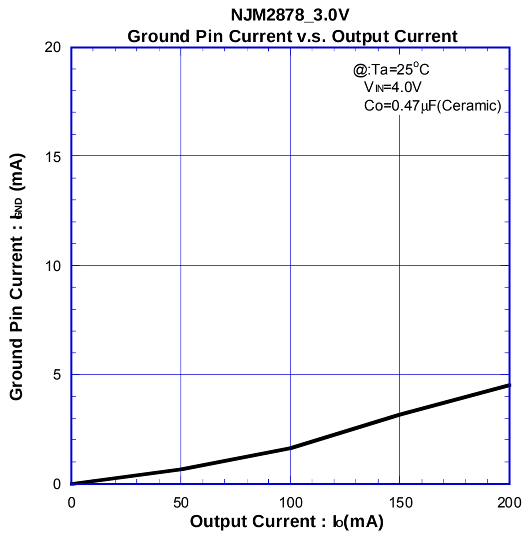
■ POWER DISSIPATION vs. AMBIENT TEMPERATURE (SC-88A/SC82AB)

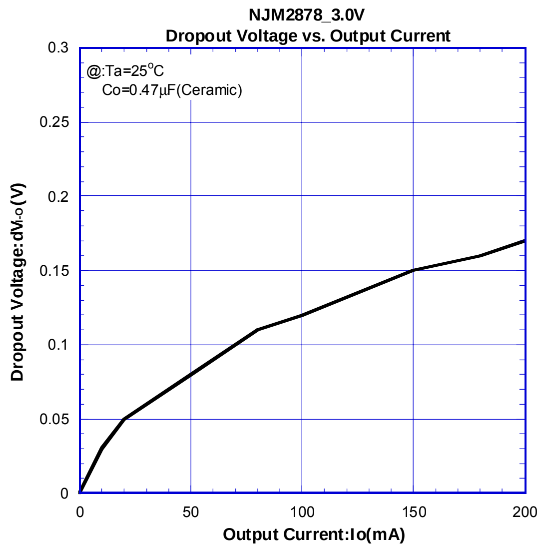


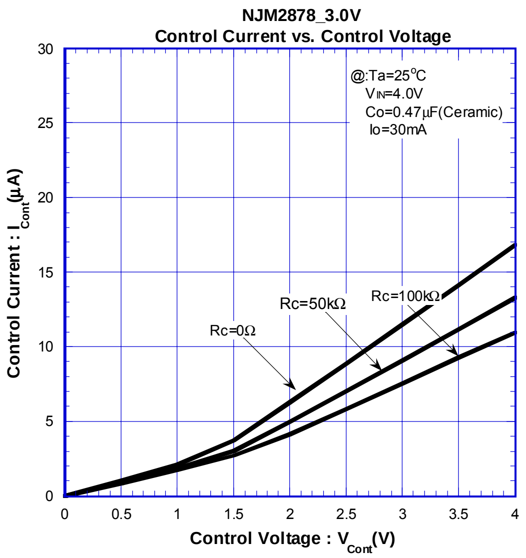
■ TYPICAL CHARACTERISTICS

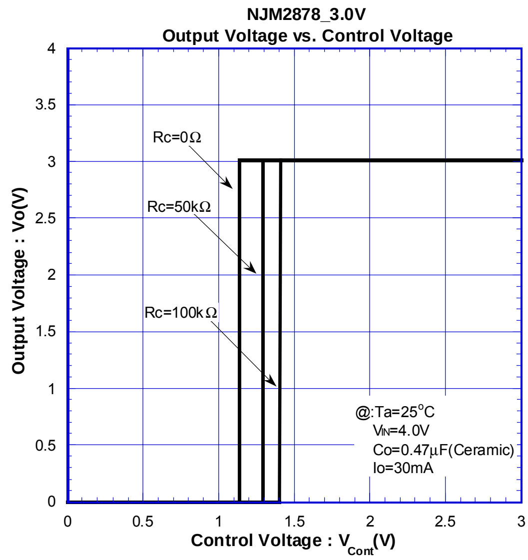












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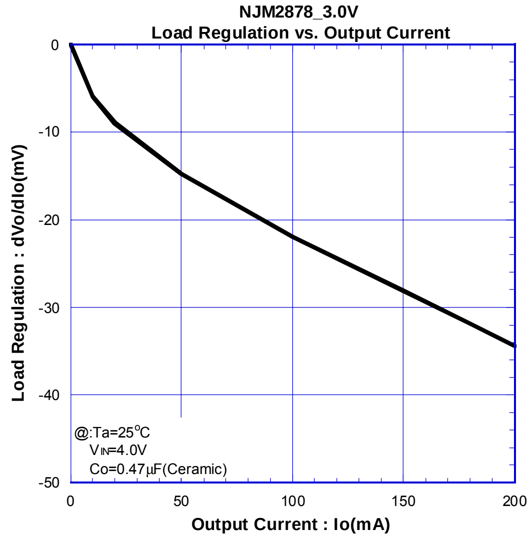

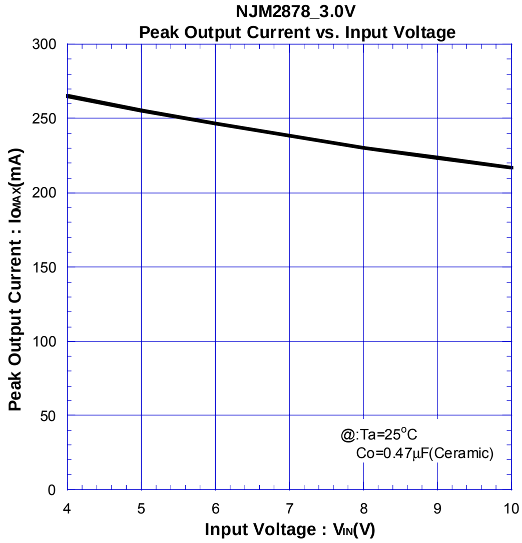

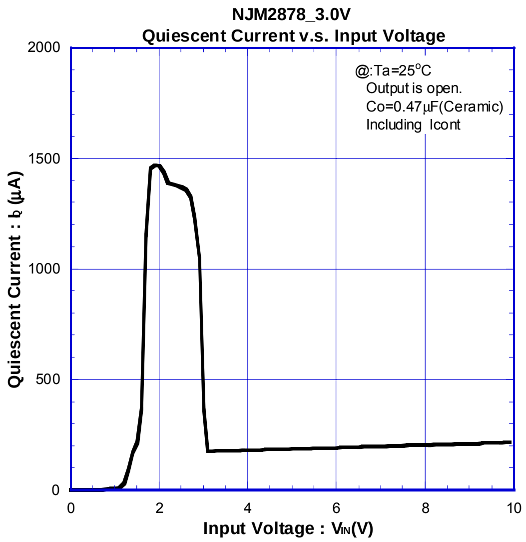

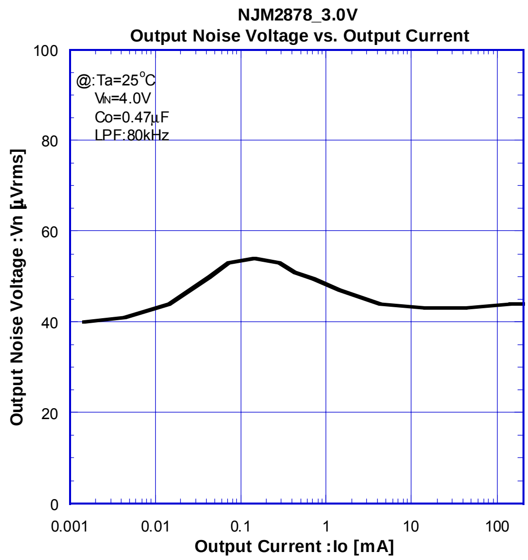

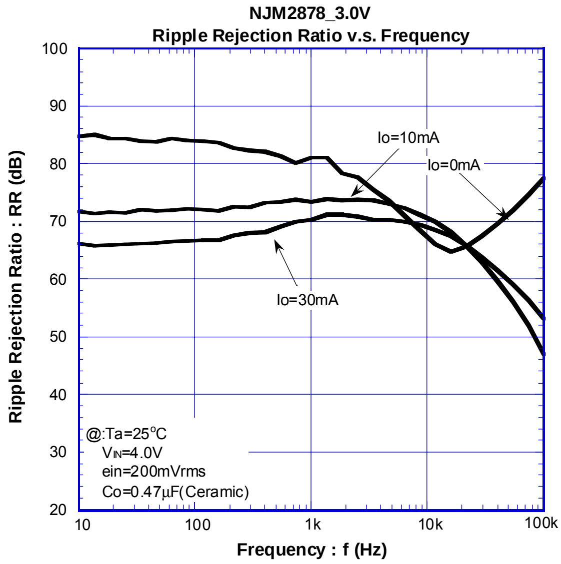

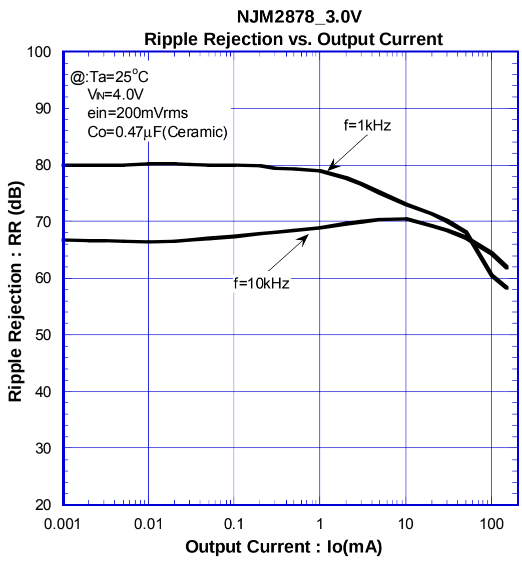

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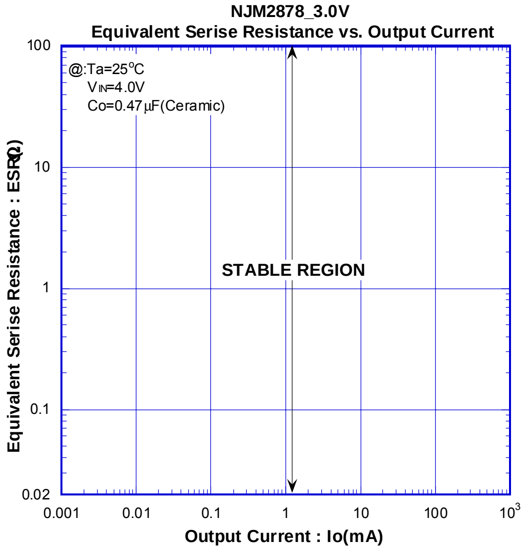

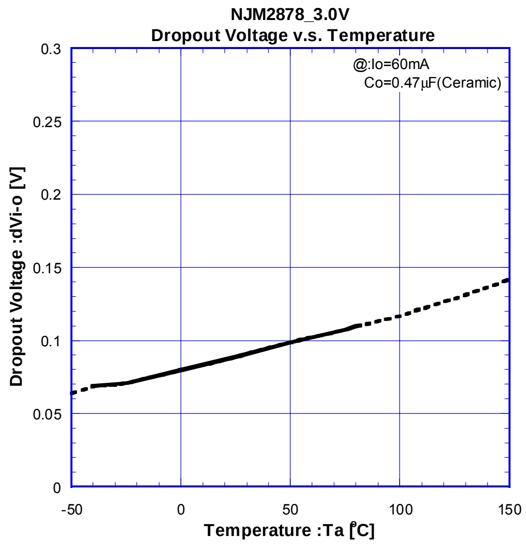

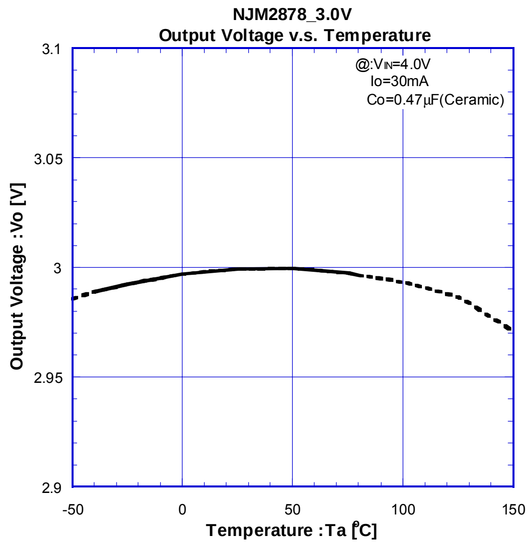

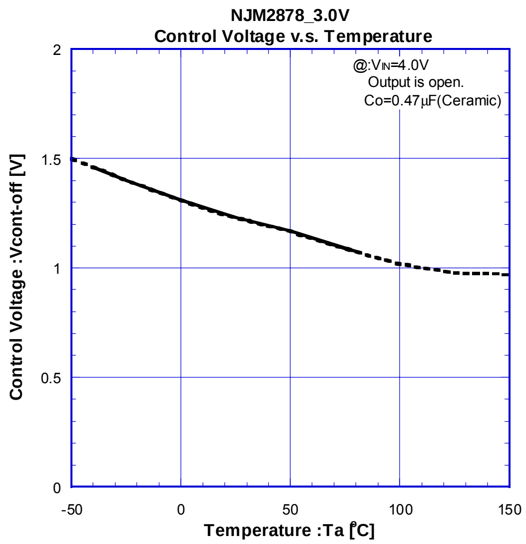

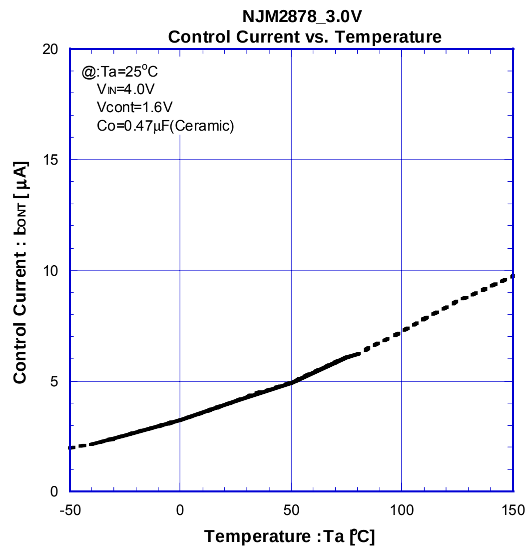

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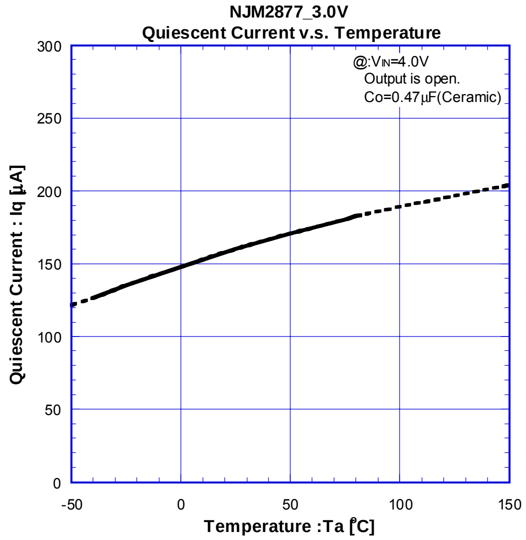

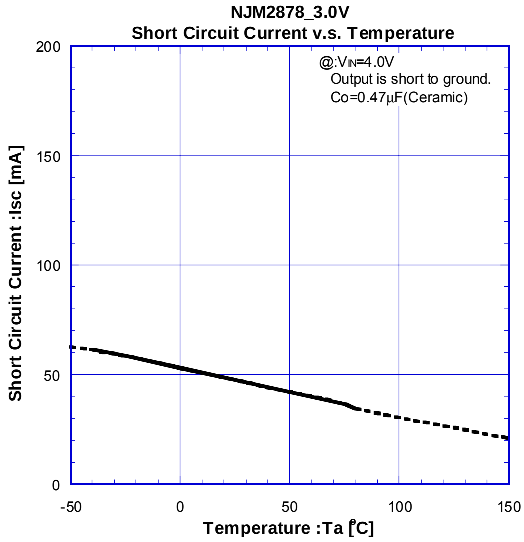

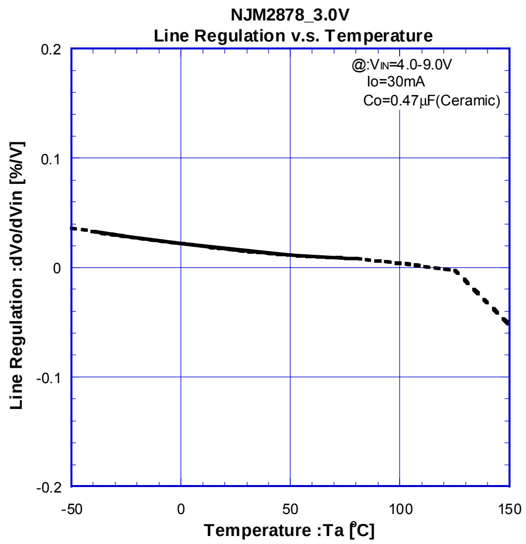

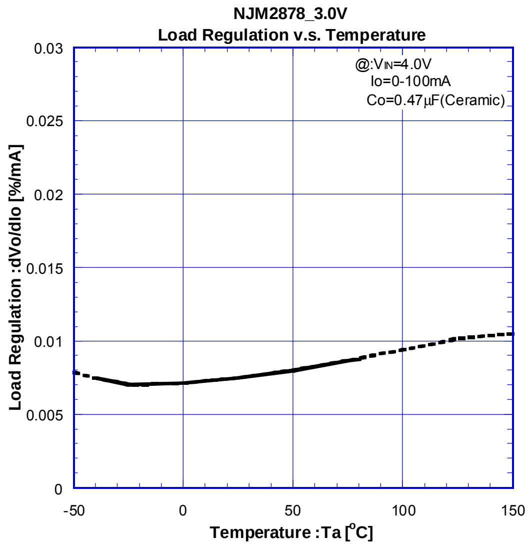

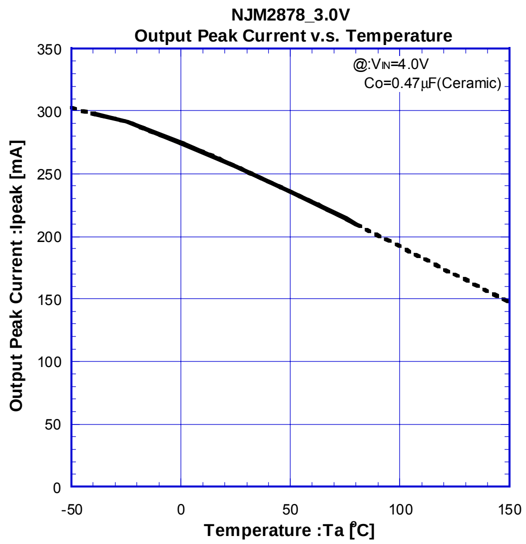

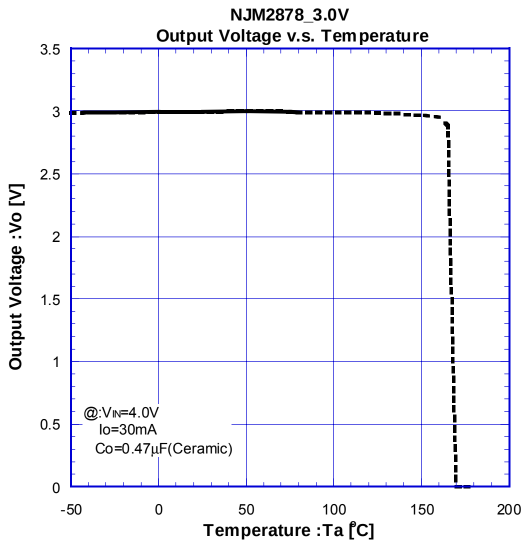

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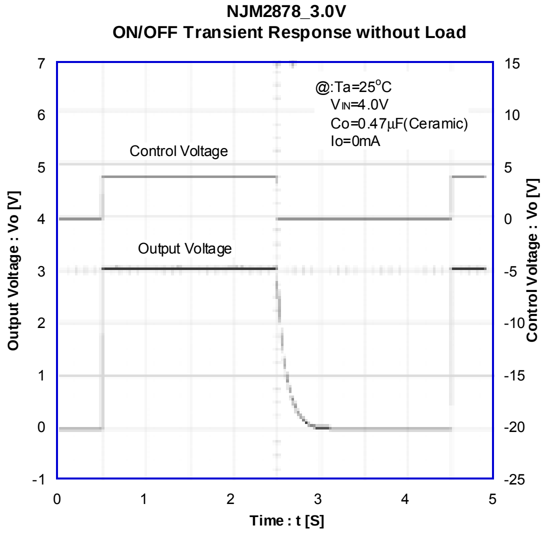

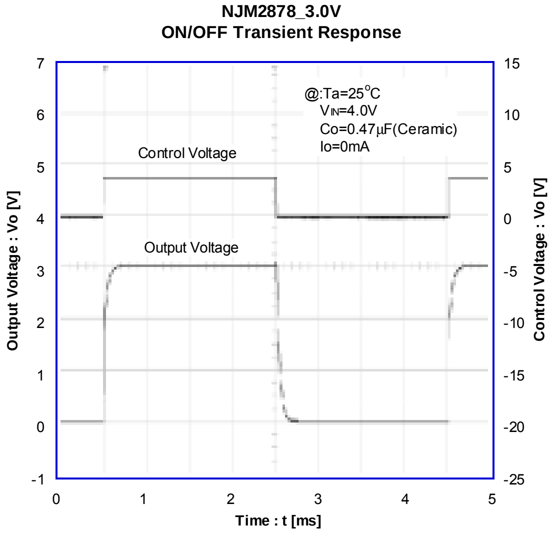

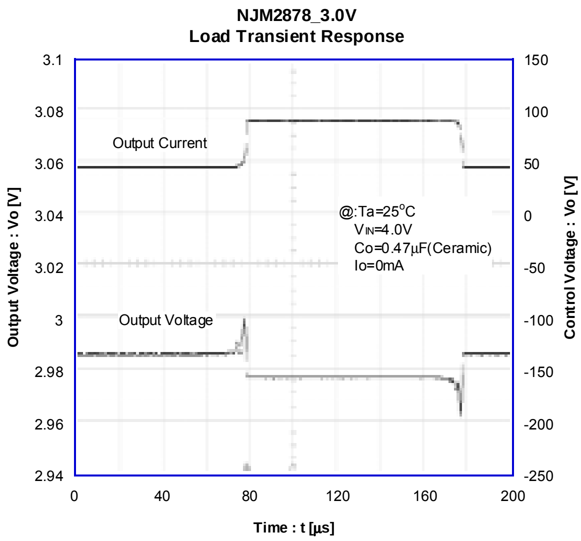

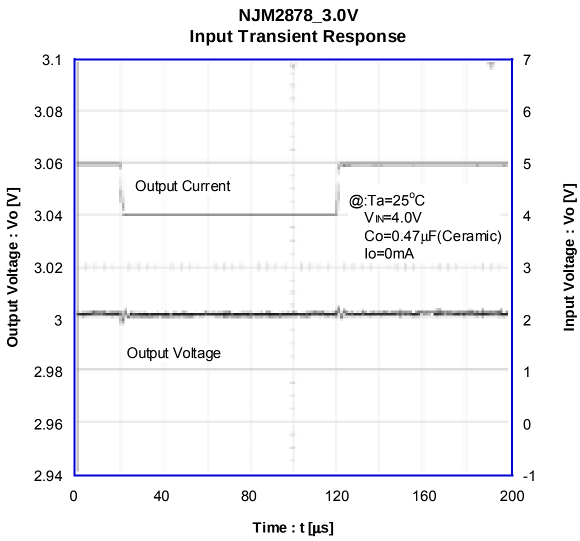

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