ADJUSTABLE LOW DROPOUT VOLTAGE REGULATOR

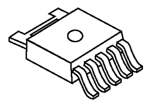
■ GENERAL DESCRIPTION

The NJM2887 is an adjustable low dropout voltage regulator with ON/OFF control.

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

It is suitable for DVD, FAX and Car Audio.

■ PACKAGE OUTLINE

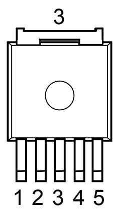


NJM2887DL3

■ FEATURES

- High Ripple Rejection 70dB typ. (f=1kHz,Vo=3V Version)
- Output Noise Voltage Vno=50µVrms typ.
- Output capacitor with 2.2µF ceramic capacitor
- Output Current Io(max.)=500mA
- High Precision Output Vref=1.29V±1.0%
- Low Dropout Voltage 0.18V typ. (Io=300mA)
- ON/OFF Contorol
- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Bipolar Technology
- Package Outline TO-252-5(DL3)

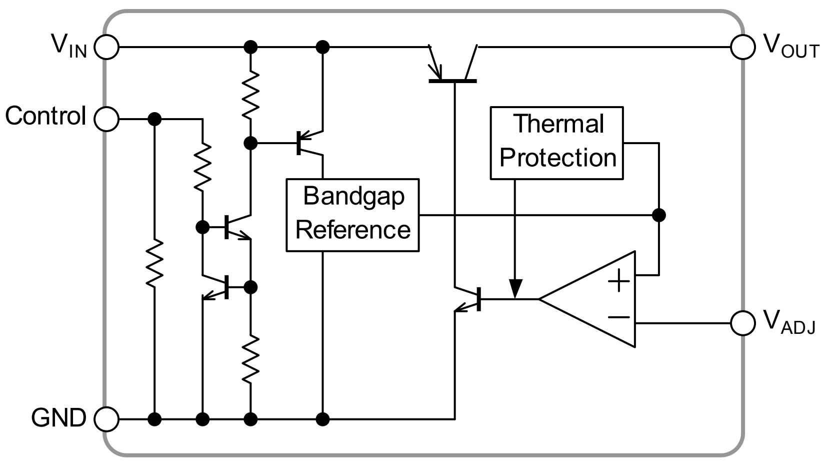
■ PIN CONFIGURATION



NJM2887DL3

PIN FUNCTION
1.CONTROL
2. V_{IN}
3.GND
4.V_{OUT}
5.V_{ADJ}

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	+14	V
Control Voltage	V_{CONT}	+14(*1)	V
Output Adjust Voltage	V_{ADJ}	+4	V
Power Dissipation	P_D	950(*2) 2500(*3)	mW
Operating Temperature	Topr	-40 ~ +85	°C
Storage Temperature	Tstg	-40 ~ +125	°C

(*1): When input voltage is less than +14V, the absolute maximum control voltage is equal to the input voltage.
(*2): Mounted on glass epoxy board. (76.2×114.3×1.6mm: based on EIA/JEDEC standard size, 2Layers, Cu area 100mm^2)
(*3): Mounted on glass epoxy board. (76.2×114.3×1.6mm: based on EIA/JEDEC standard, 4Layers)
(For 4Layers: Applying 74.2×74.2mm inner Cu area and a thermal via hole to a board based on JEDEC standard JESD51-5)

■ Operating Voltage Range

V_{IN}=+2.3V ~ +14.0V

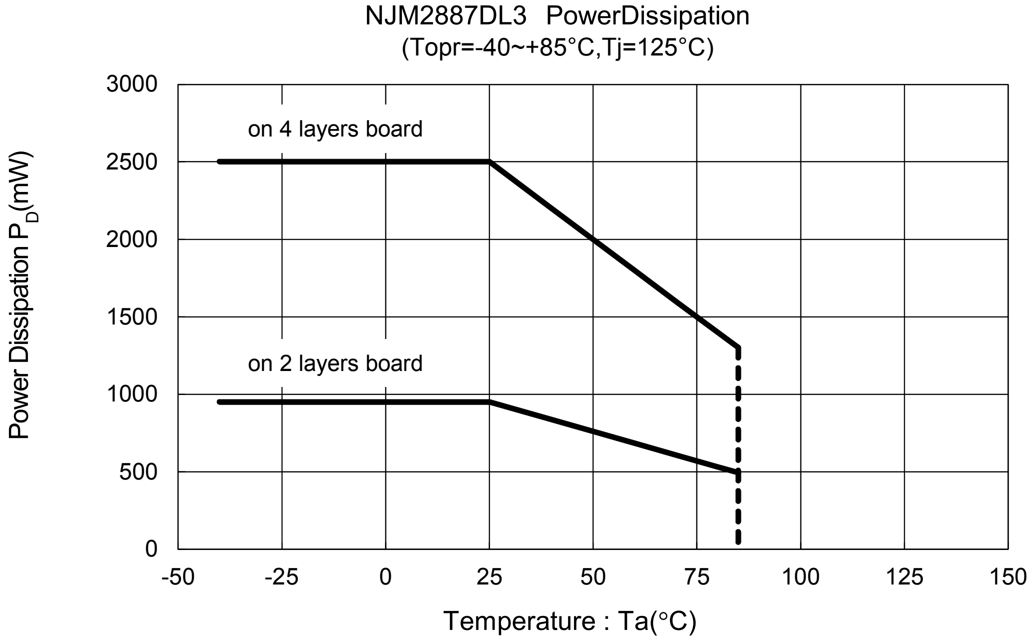
■ ELECTRICAL CHARACTERISTICS

(Unless otherwise noted, V_{IN}=Vo+1V, R1=100kΩ, C_{IN}=0.33µF, Co=2.2µF:Vo (Co=4.7µF: Vo≤2.6V), Ta=25°C)

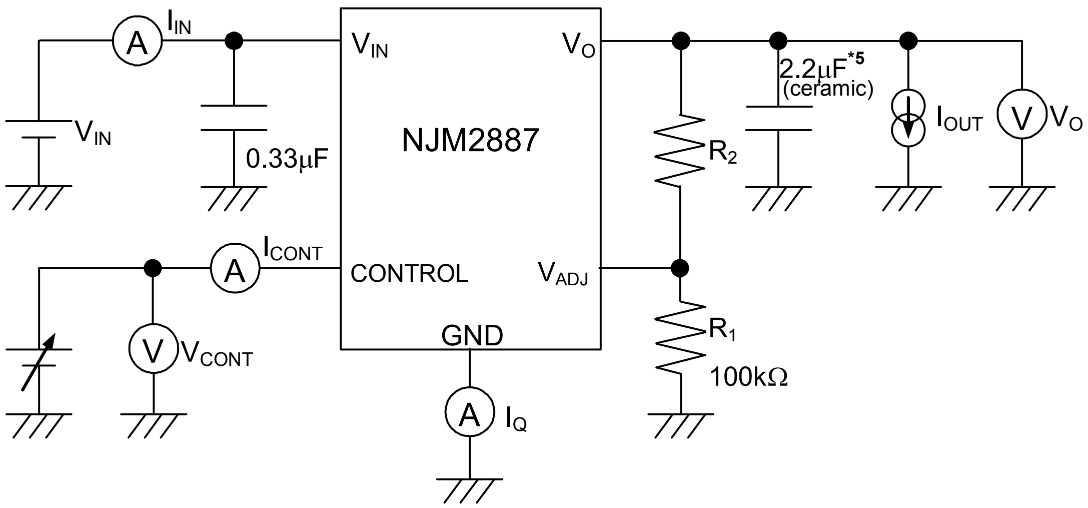
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	Vo	Io=30mA	1.5	-	6	V
Reference Voltage	Vref	Io=30mA	1.277	1.29	1.303	V
Quiescent Current	I_Q	Io=0mA,Vo=3.0V	-	200	300	µA
Quiescent Current at Control OFF	$I_{Q(OFF)}$	V_{CONT}=0V	-	-	100	nA
Output Current	Io	Vo–0.3V	500	650	-	mA
Line Regulation	$\Delta Vo/\Delta V_{IN}$	V_{IN}=Vo+1V ~ Vo+6.0V, Io=30mA	-	-	0.10	%/V
Load Regulation	$\Delta Vo/\Delta Io$	Io=0 ~ 500mA	-	-	0.03	%/mA
Dropout Voltage(*4)	ΔV_{I-O}	Io=300mA	-	0.18	0.28	V
Ripple Rejection	RR	ein=200mVrms,f=1kHz, Io=10mA Vo=3.0V Version	-	70	-	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=3.0V Version	-	50	-	µVrms
Control Voltage for ON-state	$V_{CONT(ON)}$		1.6	-	-	V
Control Voltage for OFF-state	$V_{CONT(OFF)}$		-	-	0.6	V

(*4): Except output voltage less than 2.1V.

■ POWER DISSIPATION VS. AMBIENT TEMPERATURE



■ TEST CIRCUIT



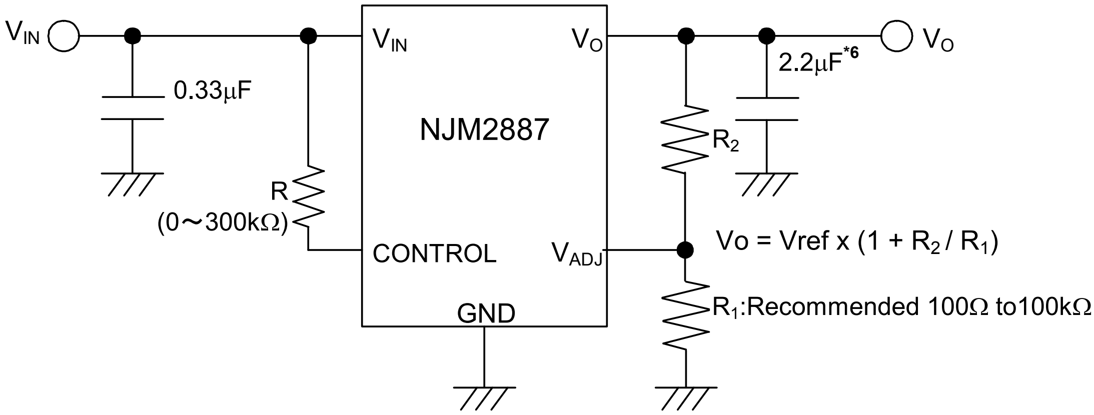
*5 Vo≤2.6V version: Co=4.7μF(ceramic)

$Vo = Vref \times (1 + R_2 / R_1)$

The ceramic capacitor used by the output recommend the B characteristic.

■ TYPICAL APPLICATION

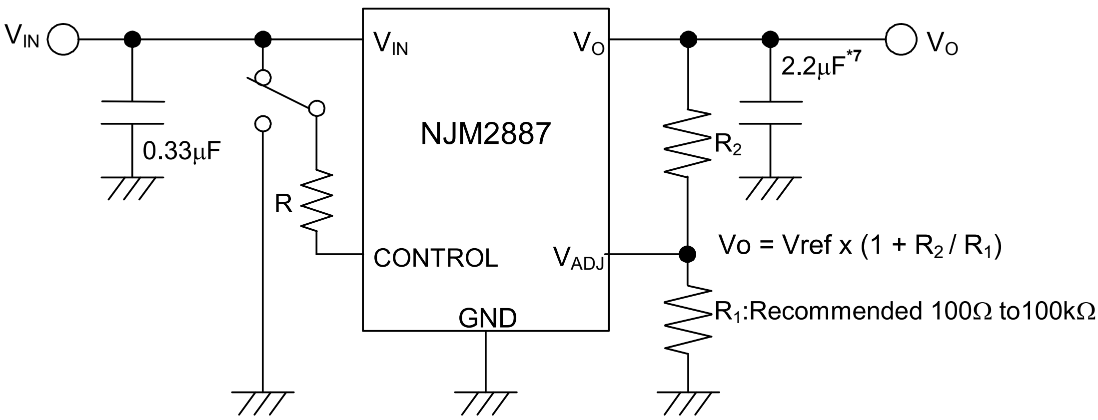
① In the case where ON/OFF Control is not required:



*6 Vo≤2.6V version: Co=4.7µF

Connect control terminal to V_{IN} pin

② In use of ON/OFF CONTROL:



*7 Vo≤2.6V version: Co=4.7µF

State of control pin:

- "H"→ output is enabled.
- "L" or "open" → output is disabled.

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

The current flow into the control pin while the IC is ON state (I_{CONT}) can be reduced when a pull up resistor "R" is inserted between V_{IN} and the control pin.

The minimum control voltage for ON state ($V_{CONT(ON)}$) is increased due to the voltage drop caused by I_{CONT} and the resistor "R". The I_{CONT} is temperature dependence as shown in the "Control Current vs. Temperature" characteristics. Therefore, the resistor "R" should be carefully selected to ensure the control voltage exceeds the $V_{CONT(ON)}$ over the required temperature range.

∗Feedback Resistor "R1".

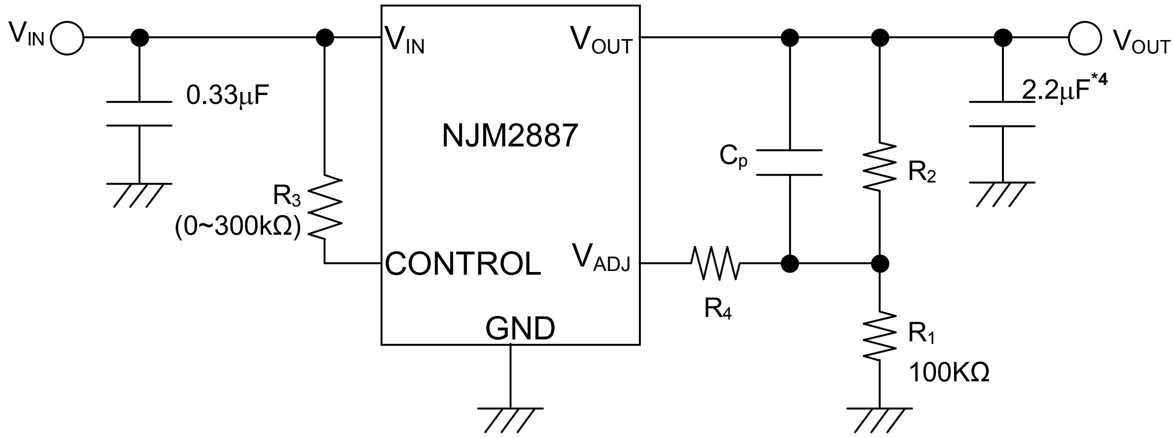
The range of feedback resistor "R1" is recommended from 100Ω to 100kΩ.

When the value of feedback resistor "R1" is large, the output voltage may rise higher than the setting output voltage by leak current from V_{OUT} at high temperature.

On the other hand, a smaller feedback resistor may increases output noise voltage and quiescent current.

Regarding to reduce output noise voltage, refer to next article in addition.

③ Reduction of output noise voltage:



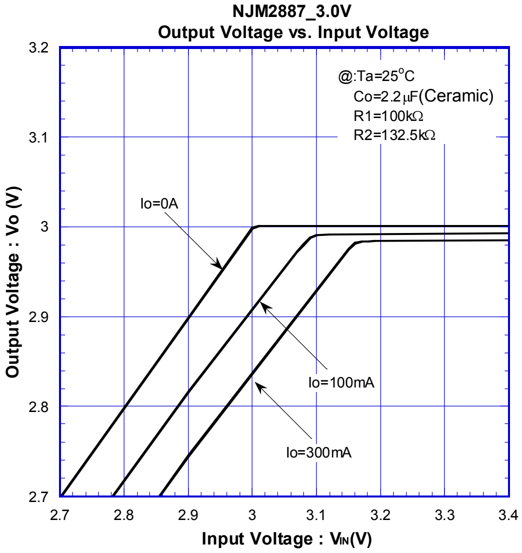
*4 Vo≤2.6V version: Co=4.7µF

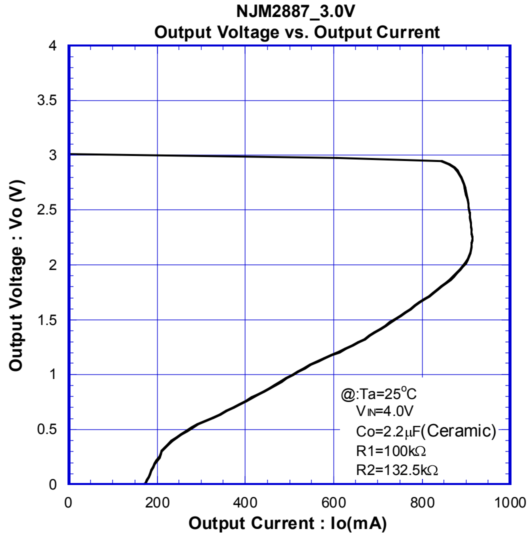
Output feedback resistance: R_1, should connect near V_{ADJ} terminal.
For reduce output noise voltage, connect C_p and R_4 refer to the following table.

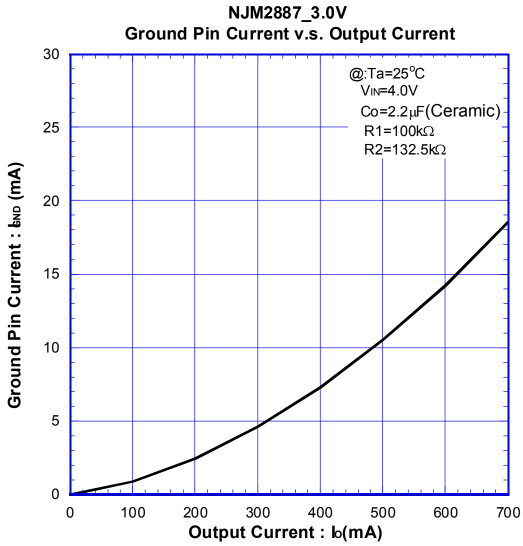
The example of use of Cp and R4

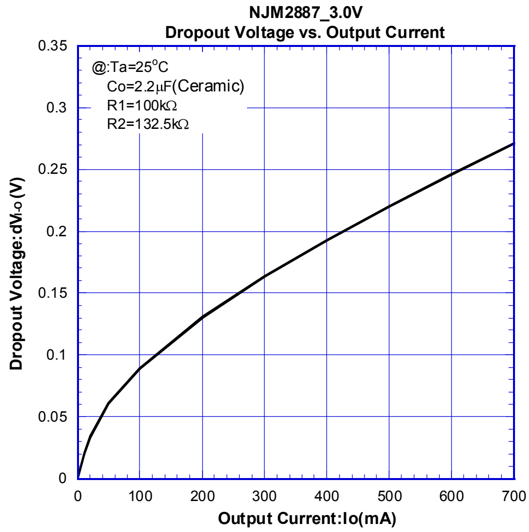
Output capacity value	R_1=10kΩ	R_1=1kΩ	R_1=100Ω	R_4
Co=2.2µF	C_p=100pF	C_p=1nF	C_p=0.01µF	10kΩ or less
Co=4.7µF	C_p=680pF	C_p=6.8nF	C_p=0.068µF	

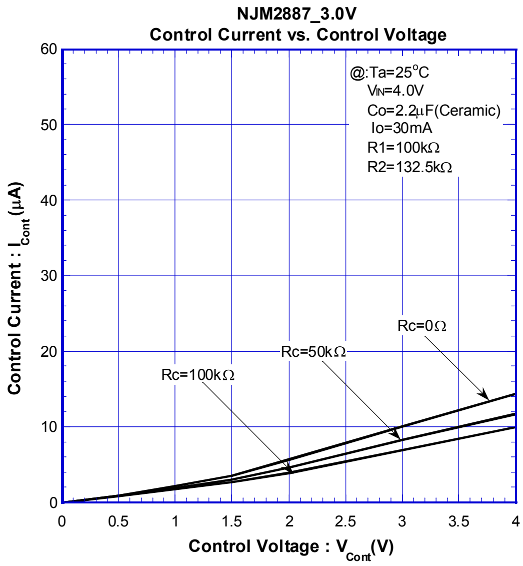
■ ELECTRICAL CHARACTERISTICS

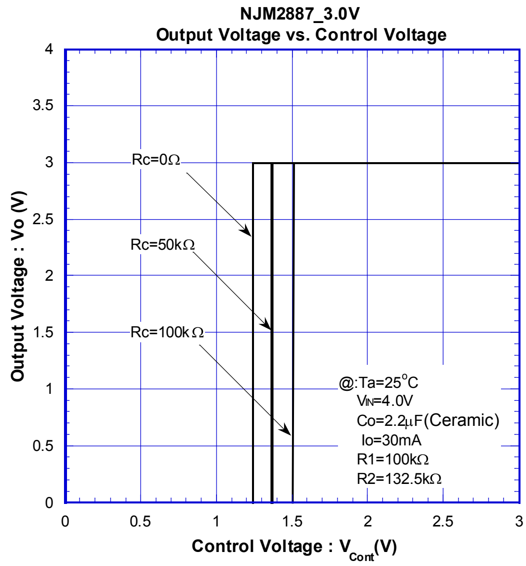












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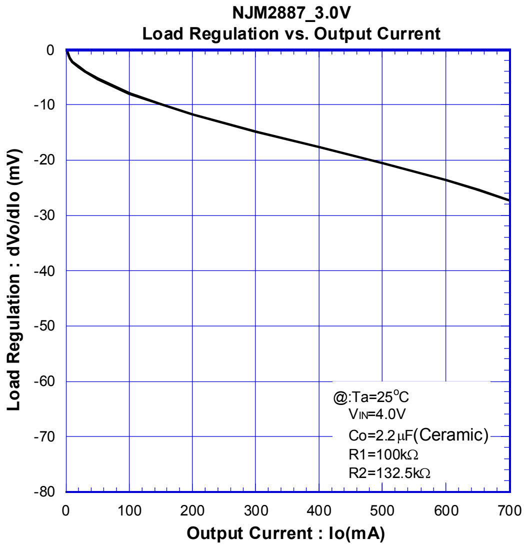

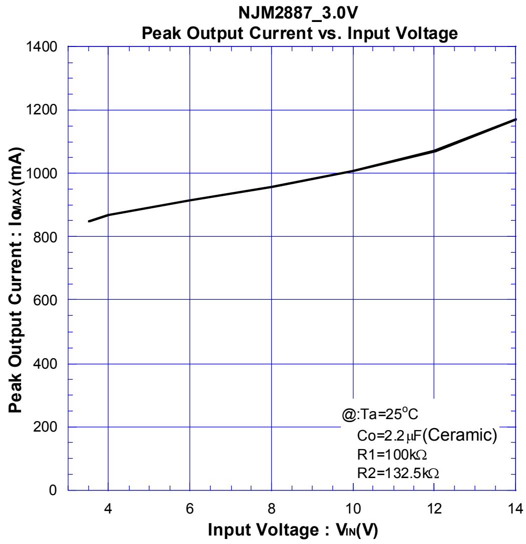

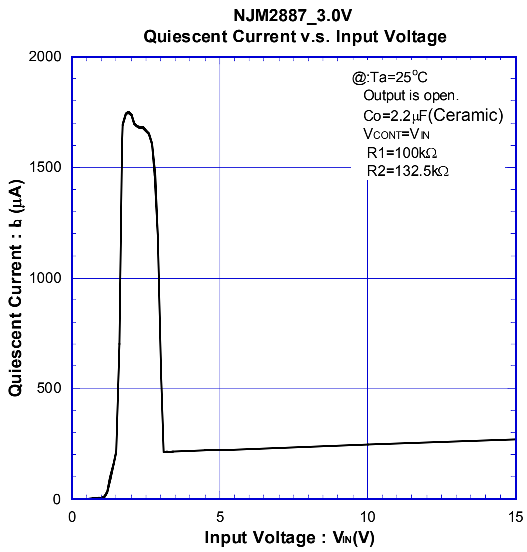

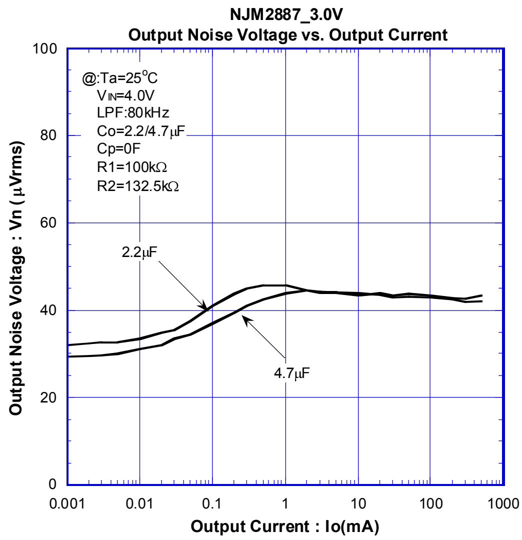

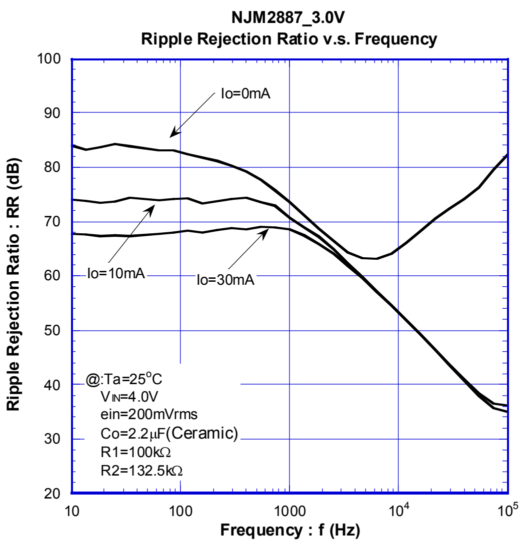

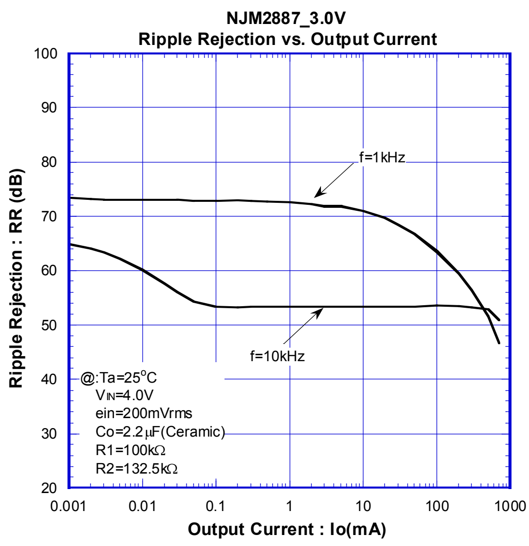

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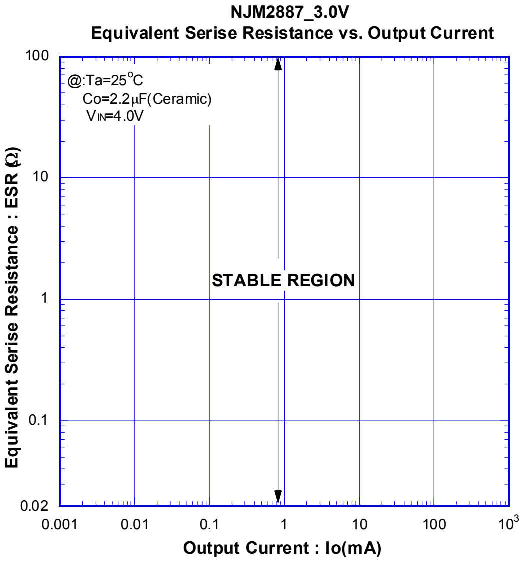

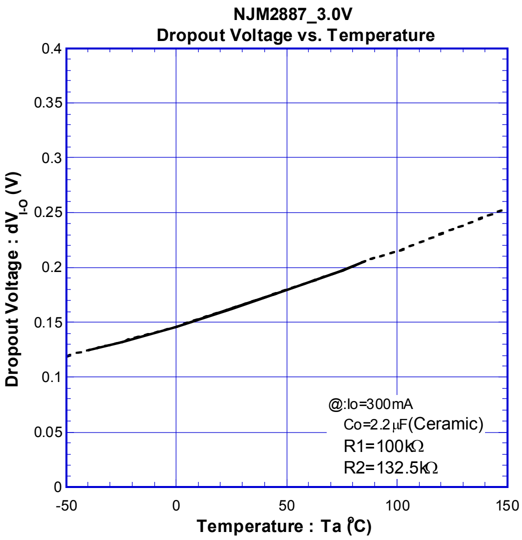

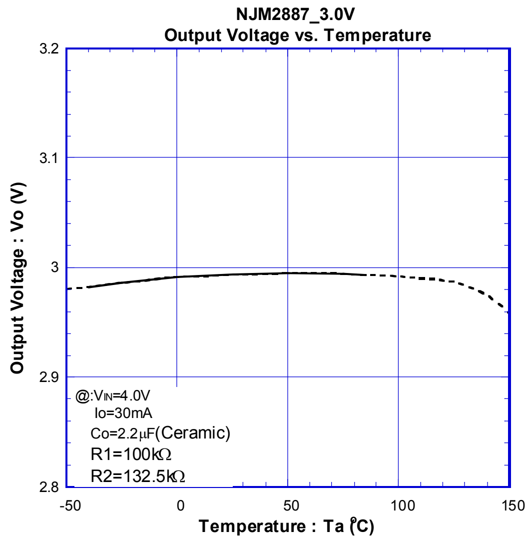

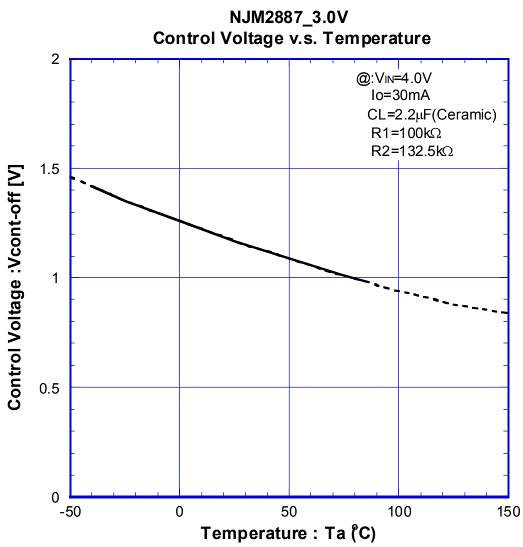

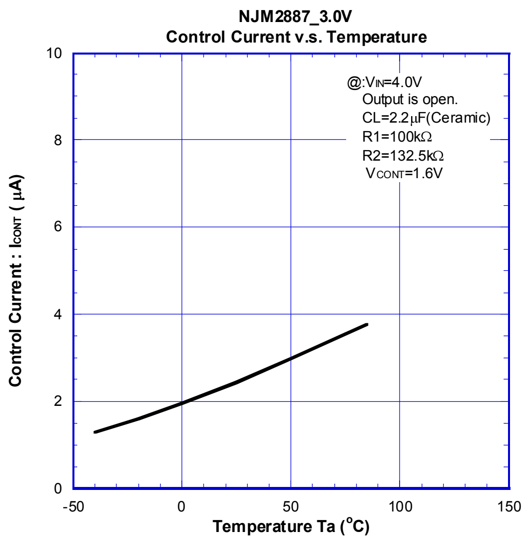

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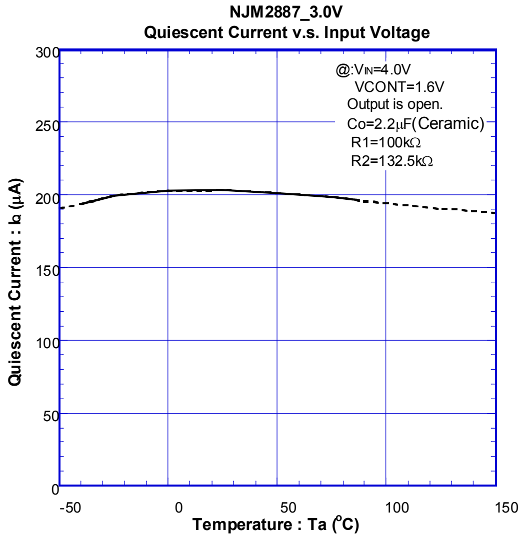

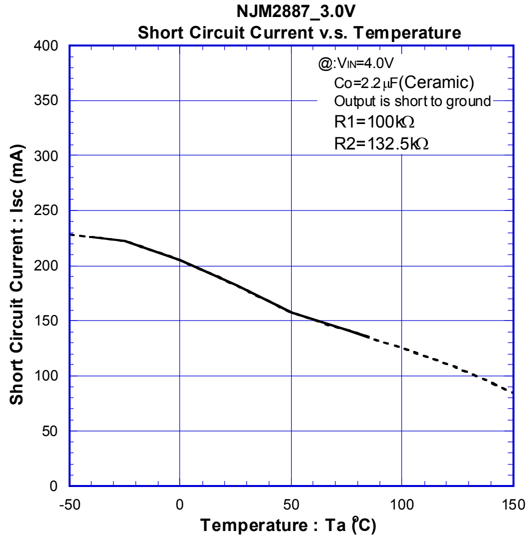

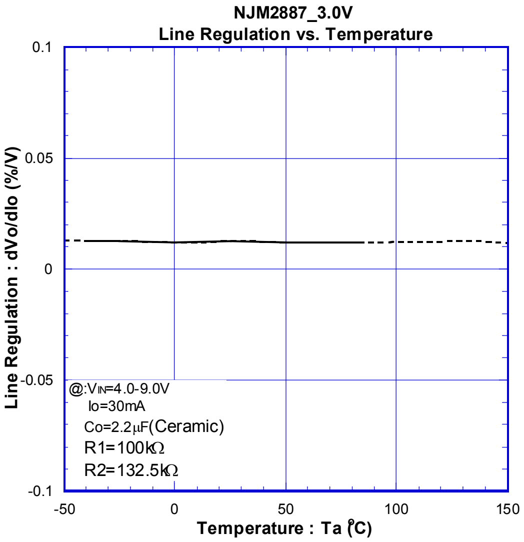

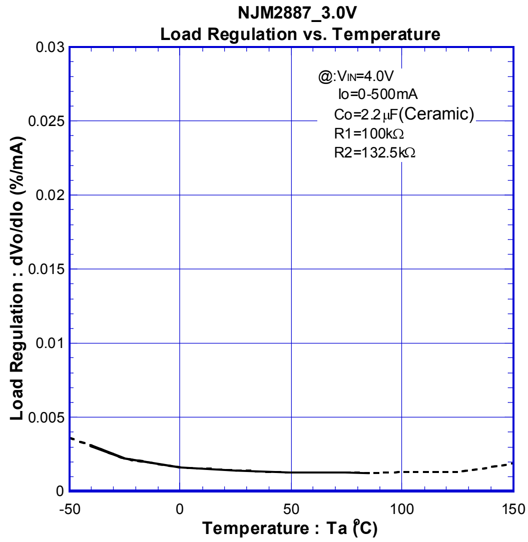

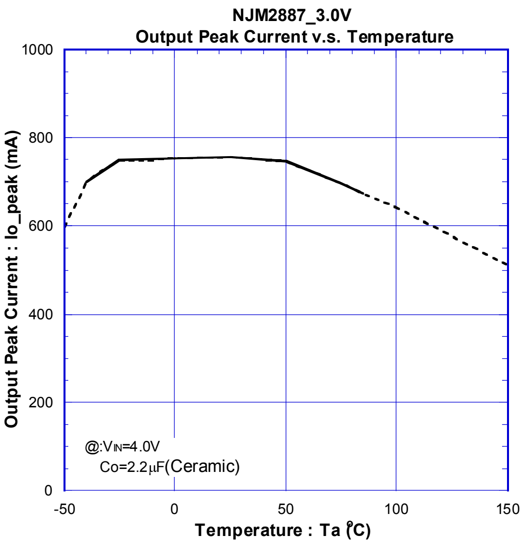

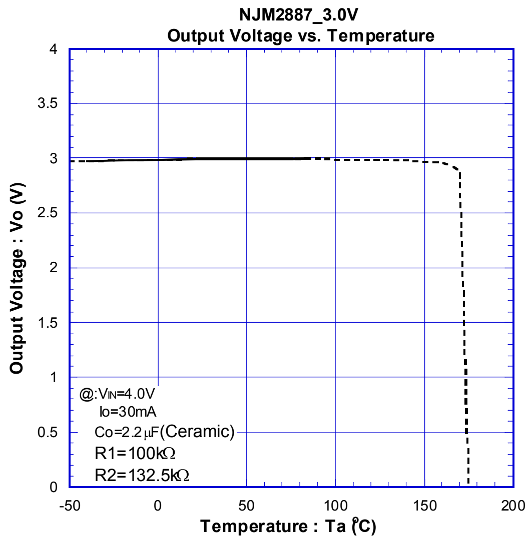

■ ELECTRICAL CHARACTERISTICS