ADJUSTABLE LOW DROPOUT VOLTAGE REGULATOR

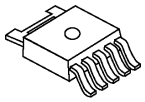
■ GENERAL DESCRIPTION

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

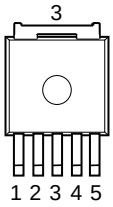


NJM2887DL3

■ 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)

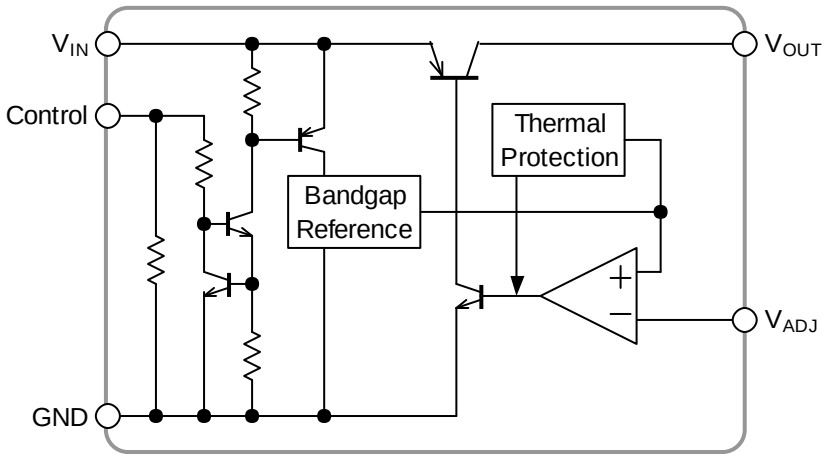
■ PIN CONFIGURATION



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

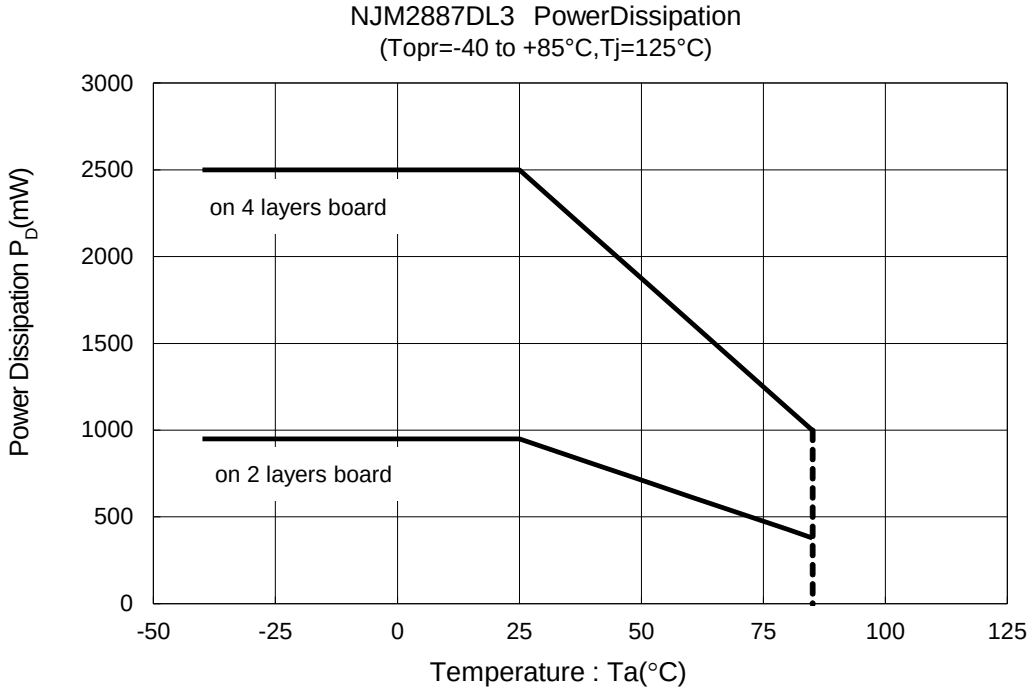
■ ELECTRICAL CHARACTERISTICS

(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)

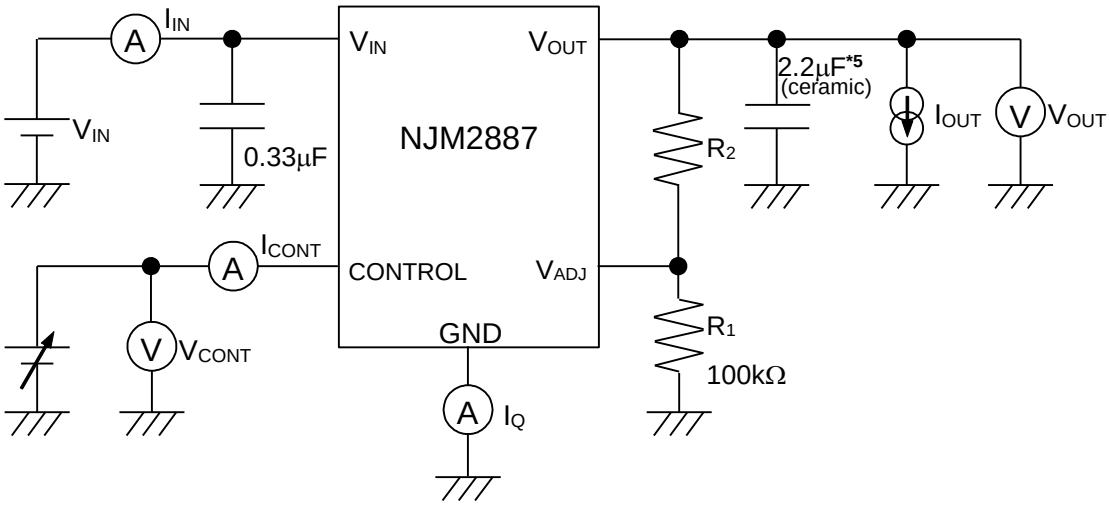
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	Vo	Io=30mA	1.5	-	6	V
Reference Voltage	Vref	Io=30mA	1.277	1.29	1.303	V
Quiescent Current	I_Q	Io=0mA,Vo=3.0V	-	200	300	μA
Quiescent Current at Control OFF	$I_{Q(OFF)}$	V_{CONT}=0V	-	-	100	nA
Output Current	Io	Vo–0.3V	500	650	-	mA
Line Regulation	$\Delta Vo/\Delta V_{IN}$	V_{IN}=Vo+1V ~ Vo+6.0V, Io=30mA	-	-	0.10	%/V
Load Regulation	ΔVo/ΔIo	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	ΔVo/ΔTa	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



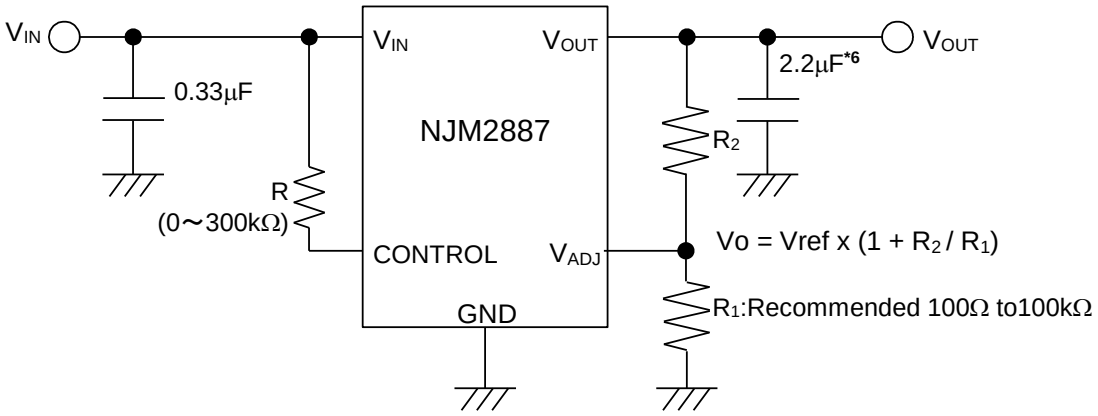
*5 Vo≤2.6V version: Co=4.7μF(ceramic)

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

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

■ TYPICAL APPLICATION

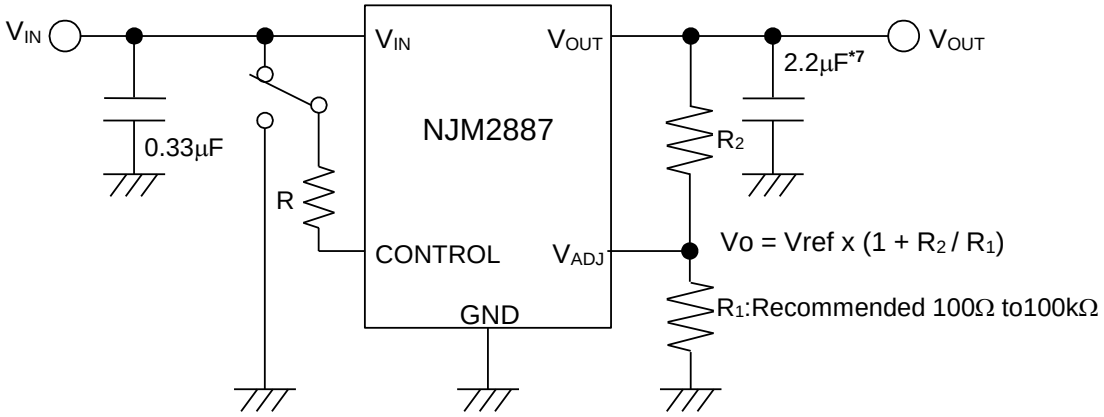
① In the case where ON/OFF Control is not required:



*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".

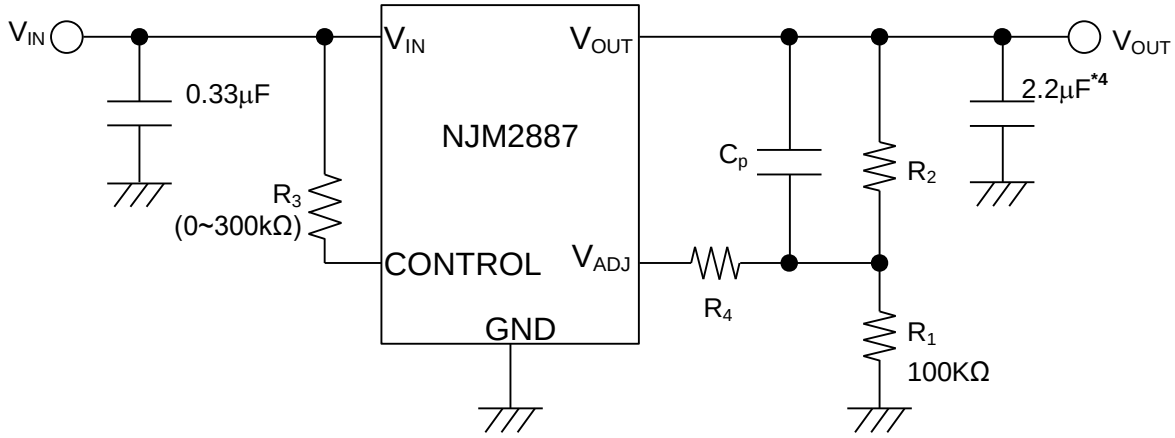
The range of feedback resistor "R1" is recommended from 100Ω to 100kΩ.

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	

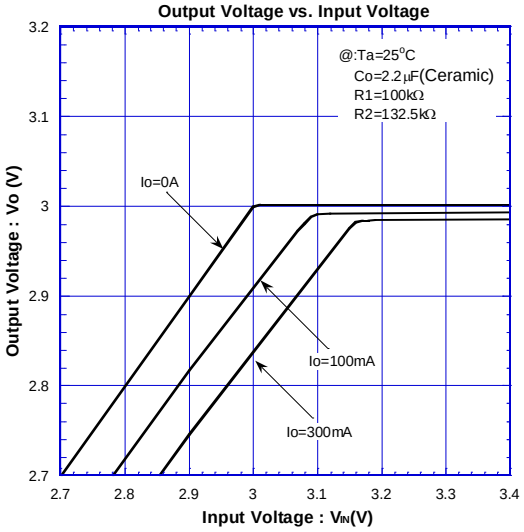
Input Capacitor (C_{IN})
The C_{IN} prevents oscillations and reduce power supply ripple of applications when the power supply impedance is high or power supply line is long. Connecting a 0.33μF or larger C_{IN} between VIN and GND pins as short path as possible.

Output Capacitor (C_O)
C_O is necessary for phase compensation of the internal error amplifier, and the capacitance value and ESR (Equivalent Series Resistance) affect the stability of the regulator. If a C_O less than recommended value or ESR out of the stable operation region is used, the stability of the internal circuit will be reduced and output noise and ringing may increase, or oscillation may occur. For stable operation, connect a 2.2μF(Co=4.7μF: Vo≤2.6V) or larger C_O within the stable operation region (1Ω ≤ ESR ≤ 100Ω) between VOUT and the GND pins as short path as possible. The recommended value varies depending on the output voltage, and especially low output voltage devices may require a large capacitance; therefore, confirm the recommended value for each output voltage. As the capacitance value of C_O increases, output noise and ripple decrease, and the response to output load fluctuations also improves.

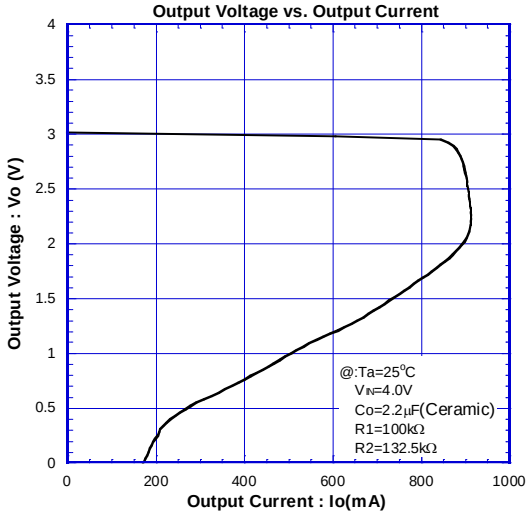
Usually, the capacitance of a capacitor decreases due to characteristic fluctuations such as frequency characteristics, temperature characteristics, and DC bias characteristic. Select the output capacitor considering these characteristic fluctuations in addition to the variations to the nominal value.

■ ELECTRICAL CHARACTERISTICS

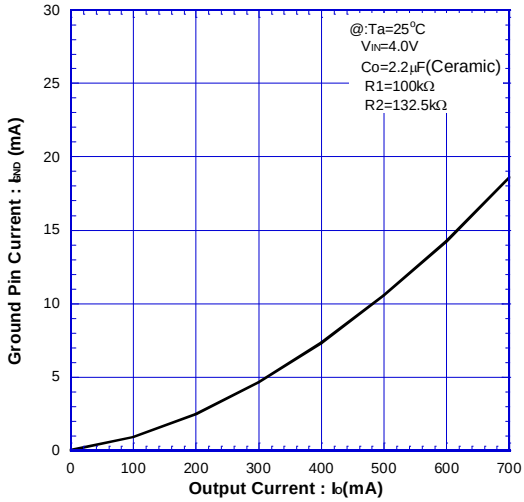
NJM2887_3.0V
Output Voltage vs. Input Voltage



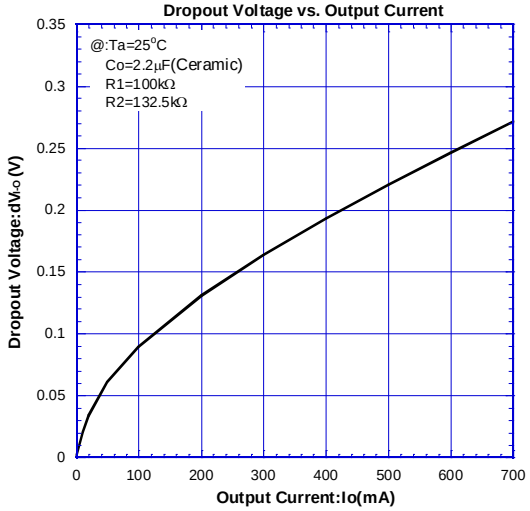
NJM2887_3.0V
Output Voltage vs. Output Current



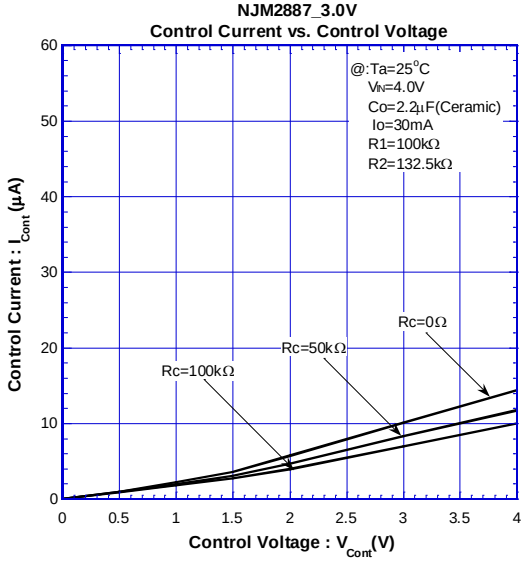
NJM2887_3.0V
Ground Pin Current v.s. Output Current



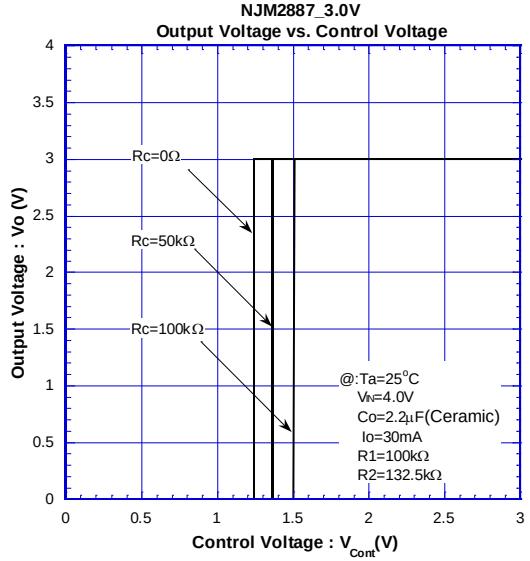
NJM2887_3.0V
Dropout Voltage vs. Output Current



NJM2887_3.0V
Control Current vs. Control Voltage

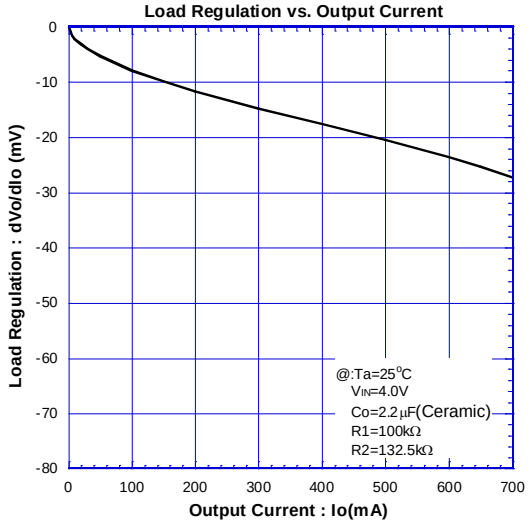


NJM2887_3.0V
Output Voltage vs. Control Voltage

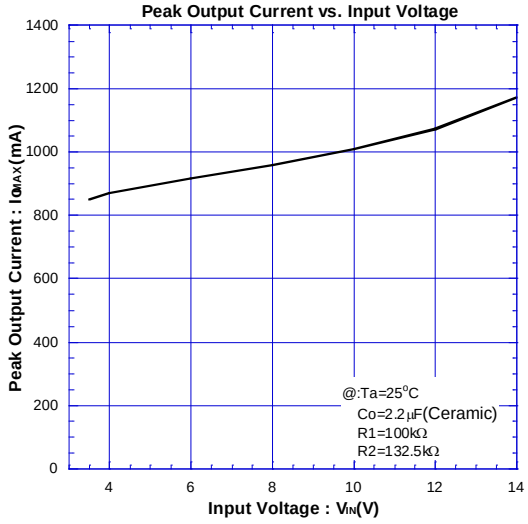


■ ELECTRICAL CHARACTERISTICS

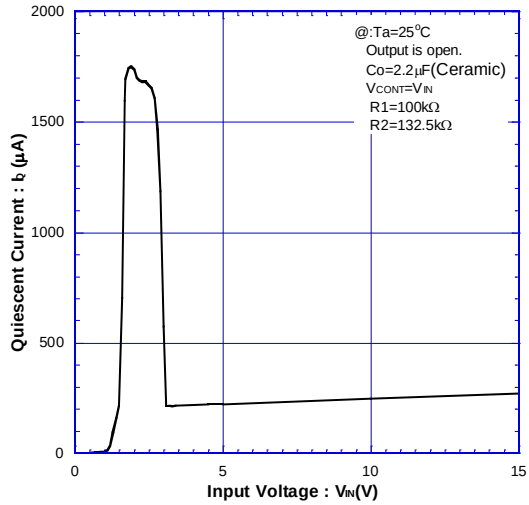
NJM2887_3.0V
Load Regulation vs. Output Current



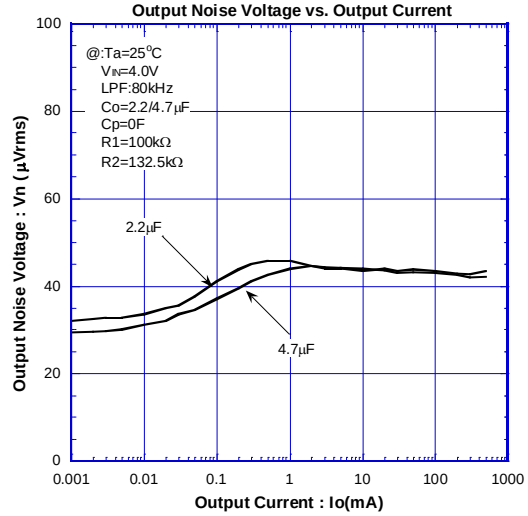
NJM2887_3.0V
Peak Output Current vs. Input Voltage



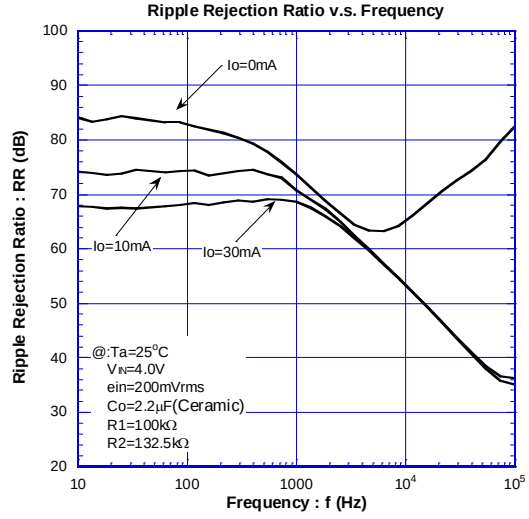
NJM2887_3.0V
Quiescent Current v.s. Input Voltage



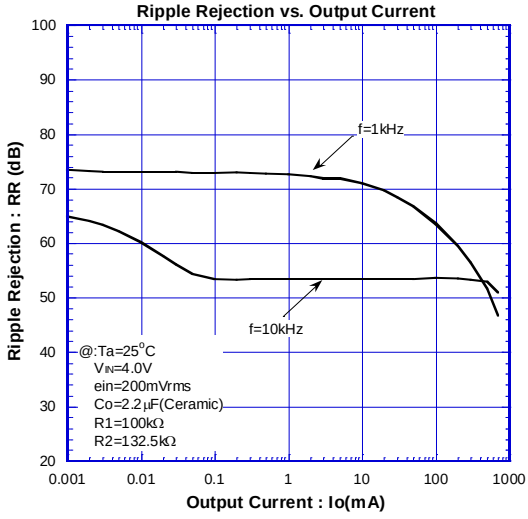
NJM2887_3.0V
Output Noise Voltage vs. Output Current



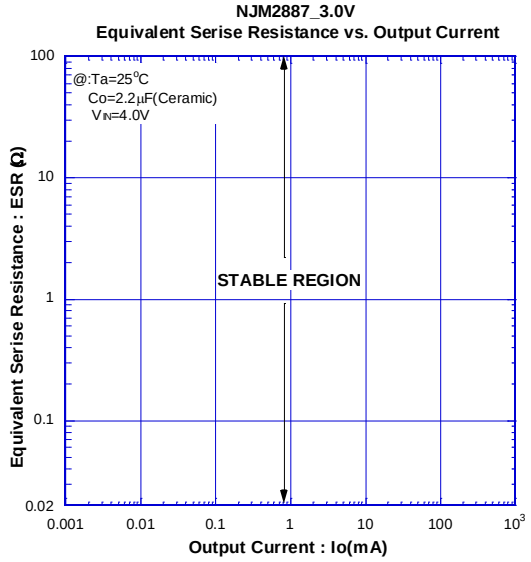
NJM2887_3.0V
Ripple Rejection Ratio v.s. Frequency

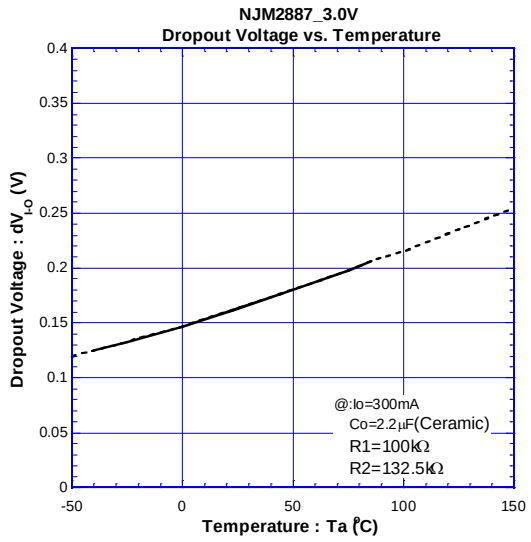


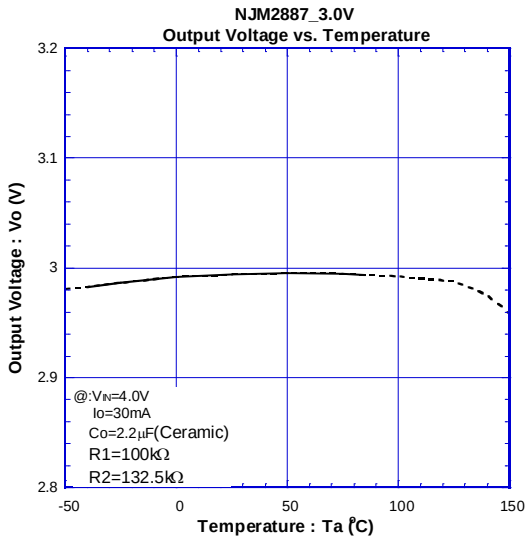
NJM2887_3.0V
Ripple Rejection vs. Output Current

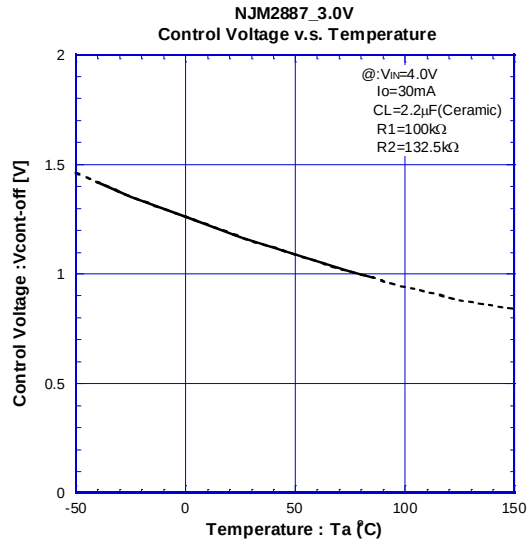


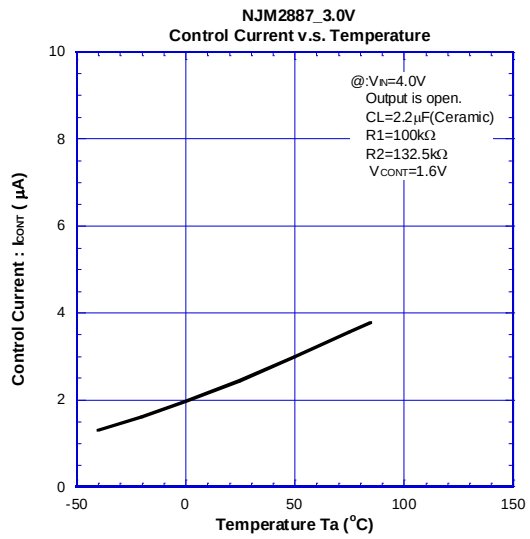
■ ELECTRICAL CHARACTERISTICS











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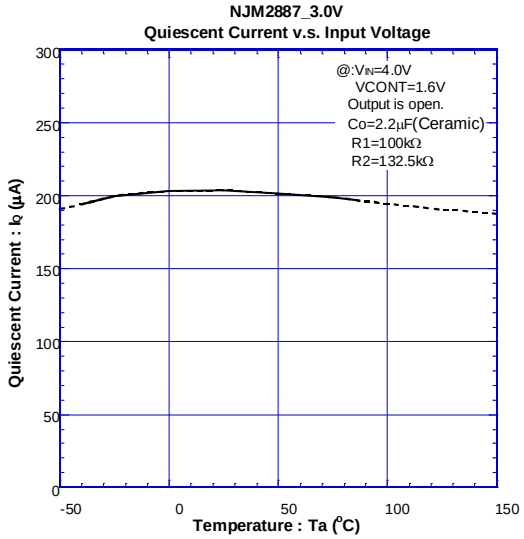
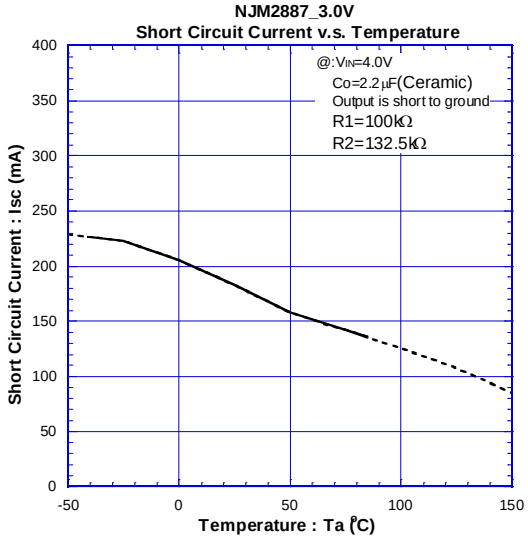
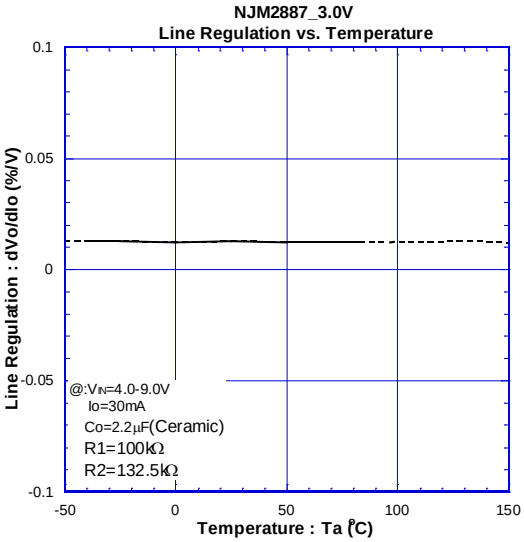
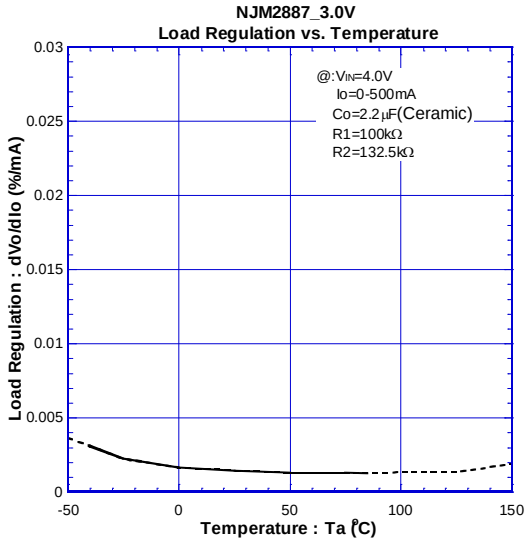
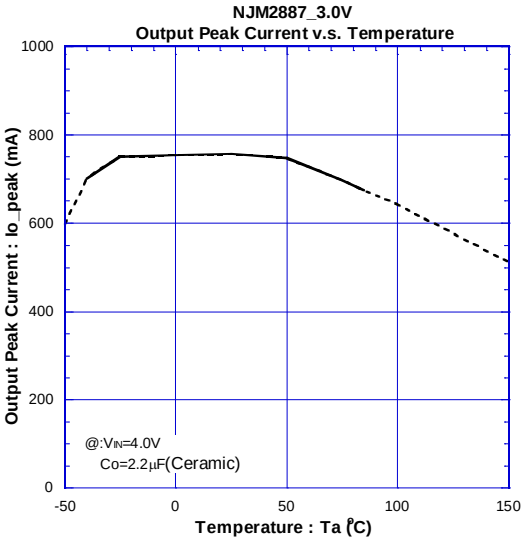
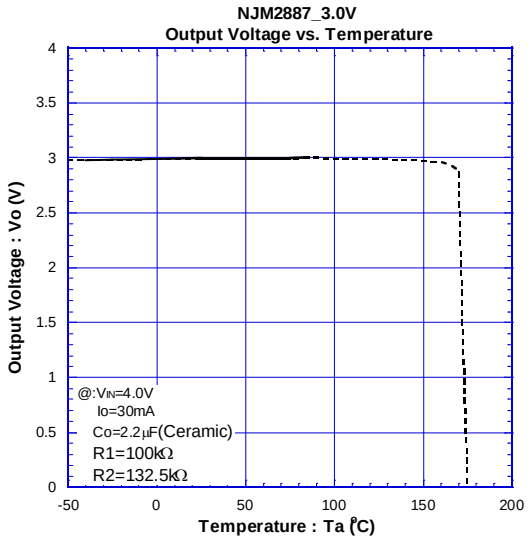




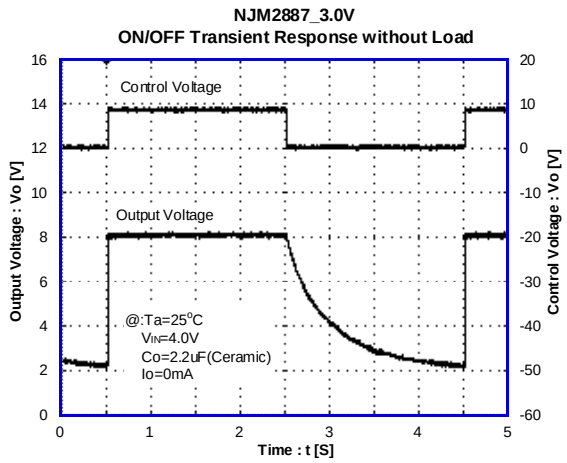


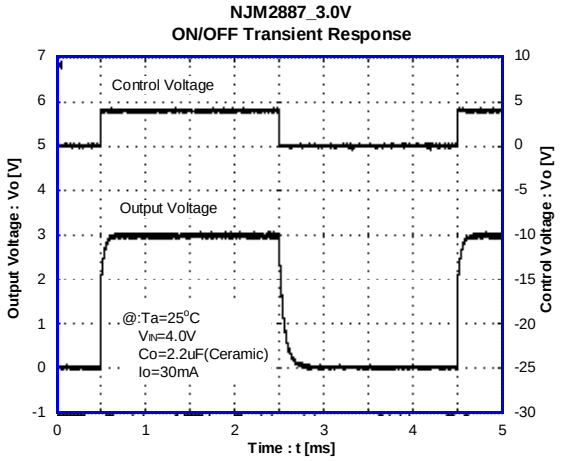


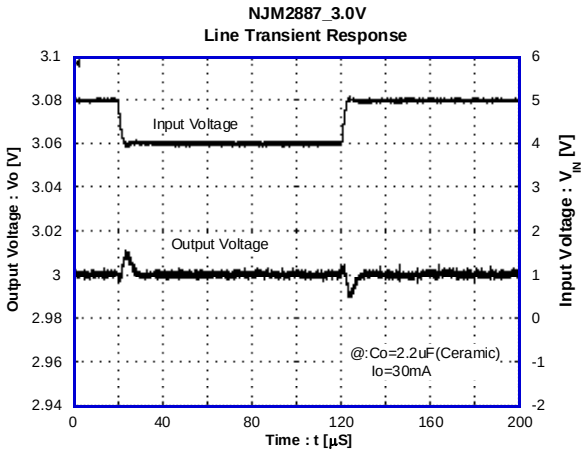


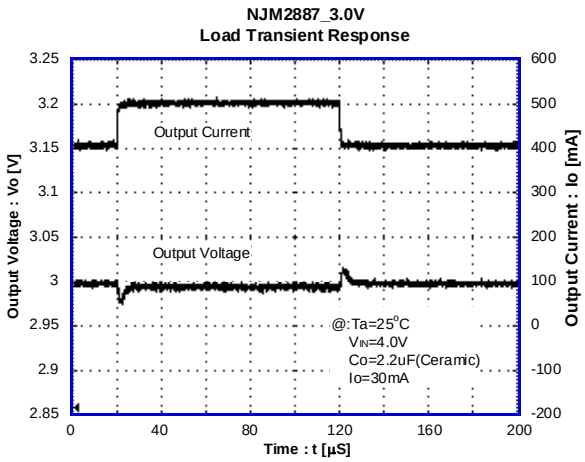


■ ELECTRICAL CHARACTERISTICS









[CAUTION]

1. NJR strives to produce reliable and high quality semiconductors. NJR's semiconductors are intended for specific applications and require proper maintenance and handling. To enhance the performance and service of NJR's semiconductors, the devices, machinery or equipment into which they are integrated should undergo preventative maintenance and inspection at regularly scheduled intervals. Failure to properly maintain equipment and machinery incorporating these products can result in catastrophic system failures

2. The specifications on this datasheet are only given for information without any guarantee as regards either mistakes or omissions. The application circuits in this datasheet are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial property rights.
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   The introduction of external contaminants (e.g. dust, oil or cosmetics) can result in failures of semiconductor products.

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5. Special care is required in designing devices, machinery or equipment which demand high levels of reliability. This is particularly important when designing critical components or systems whose failure can foreseeably result in situations that could adversely affect health or safety. In designing such critical devices, equipment or machinery, careful consideration should be given to amongst other things, their safety design, fail-safe design, back-up and redundancy systems, and diffusion design.

6. The products listed in this datasheet may not be appropriate for use in certain equipment where reliability is critical or where the products may be subjected to extreme conditions. You should consult our sales office before using the products in any of the following types of equipment.

   - Aerospace Equipment
   - Equipment Used in the Deep Sea
   - Power Generator Control Equipment (Nuclear, steam, hydraulic, etc.)
   - Life Maintenance Medical Equipment
   - Fire Alarms / Intruder Detectors
   - Vehicle Control Equipment (Automobile, airplane, railroad, ship, etc.)
   - Various Safety Devices

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8. Warning for handling Gallium and Arsenic (GaAs) Products (Applying to GaAs MMIC, Photo Reflector). These products use Gallium (Ga) and Arsenic (As) which are specified as poisonous chemicals by law. For the prevention of a hazard, do not burn, destroy, or process chemically to make them as gas or power. When the product is disposed of, please follow the related regulation and do not mix this with general industrial waste or household waste.

9. The product specifications and descriptions listed in this datasheet are subject to change at any time, without notice.

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Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

www.entegreci.com

Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

Üreticileri görün

Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

Teklif isteyin

www.entegreci.com | **destek@entegreci.com** | **0850 305 90 34**

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