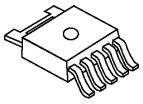
LOW DROPOUT VOLTAGE REGULATOR

■ GENERAL DESCRIPTION

The NJM2886 is low dropout voltage regulator designed for portable application.

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

■ PACKAGE OUTLINE

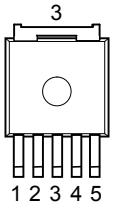


NJM2886DL3

■ FEATURES

- High Ripple Rejection 75dB typ. (f=1kHz,Vo=3V Version)
- Output Noise Voltage Vno=45μVrms typ.
- Output capacitor with 2.2μF ceramic capacitor (Vo≥2.7V)
- Output Current Io(max.)=500mA
- High Precision Output Vo±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)

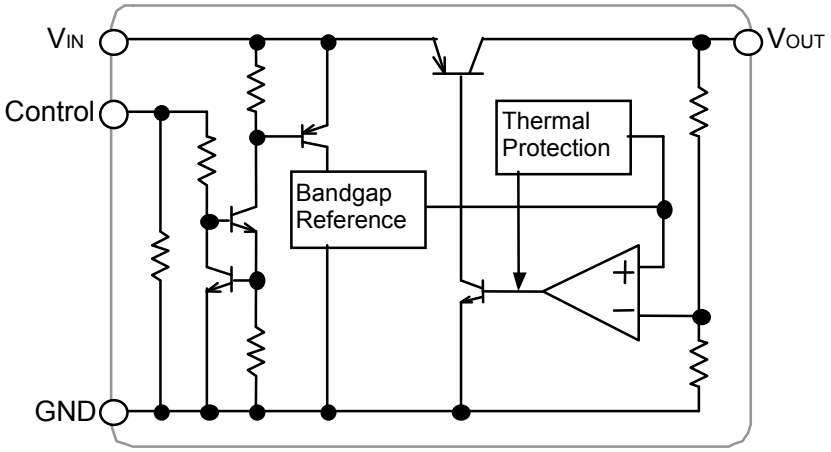
■ PIN CONFIGURATION



NJM2886DL3

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

■ BLOCK DIAGRAM



■ OUTPUT VOLTAGE RANK LIST

Device Name	V_{OUT}	Device Name	V_{OUT}	Device Name	V_{OUT}
NJM2886DL3-15	1.5V	NJM2886DL3-28	2.8V	NJM2886DL3-06	6.0V
NJM2886DL3-18	1.8V	NJM2886DL3-03	3.0V		
NJM2886DL3-19	1.9V	NJM2886DL3-33	3.3V		
NJM2886DL3-21	2.1V	NJM2886DL3-35	3.5V		
NJM2886DL3-25	2.5V	NJM2886DL3-38	3.8V		
NJM2886DL3-26	2.6V	NJM2886DL3-05	5.0V		

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	+14	V
Control Voltae	V_{CONT}	+14(*1)	V
Power Dissipation	P_D	1190(*2) 3125(*3)	mW
Operating Temperature	Topr	–40 ~ +85	°C
Storage Temperature	Tstg	–40 ~ +150	°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/JDEC standard size, 2Layers, Cu area 100mm^2)

(*3): Mounted on glass epoxy board. (76.2 × 114.3 × 1.6mm:based on EIA/JDEC 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

V_{IN}=+2.3V ~ +14.0V (In case of Vo<2.1V)

■ ELECTRICAL CHARACTERISTICS

(V_{IN}=Vo+1V, C_{IN}=0.33μF, Co=2.2μF: Vo≥2.7V (Co=4.7μF: 1.7V<Vo≤2.6V , Co=10μF: Vo≤1.7V), Ta=25°C)

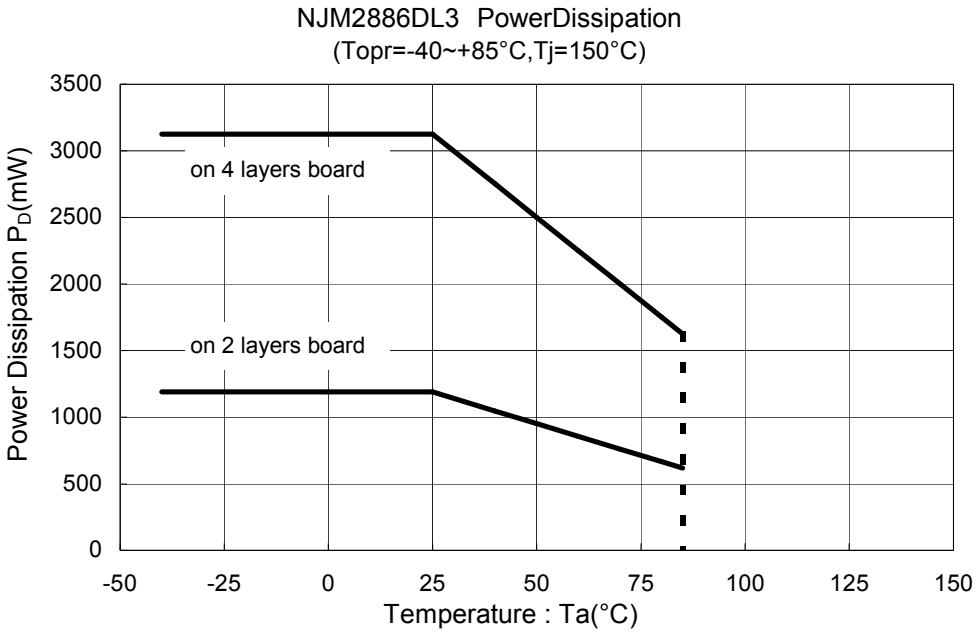
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	Vo	Io=30mA	-1.0%	–	+1.0%	V
Quiescent Current	I_Q	Io=0mA, Vo≤5.0V	–	200	300	μA
		Io=0mA, Vo>5.0V	–	215	315	
Quiescent Current at Control OFF	$I_{Q(OFF)}$	V_{CONT}=0V	–	–	100	nA
Output Current	Io	Vo-0.3V	500	650	-	mA
Line Regulation	$\Delta Vo/\Delta V_{IN}$	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	–	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=3.0V Version	–	45	–	μVrms
Control Voltage for ON-state	$V_{CONT(ON)}$		1.6	–	–	V
Control Voltage for OFF-state	$V_{CONT(OFF)}$		–	–	0.6	V

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

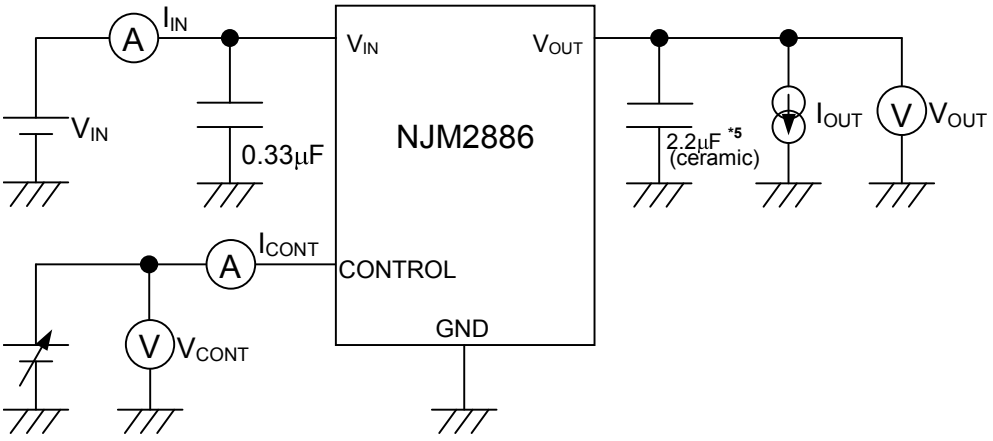
The above specification is a common specification for all output voltages.

Therefore, it may be different from the individual specification for a specific output voltage.

■ POWER DISSIPATION VS. AMBIENT TEMPERATURE



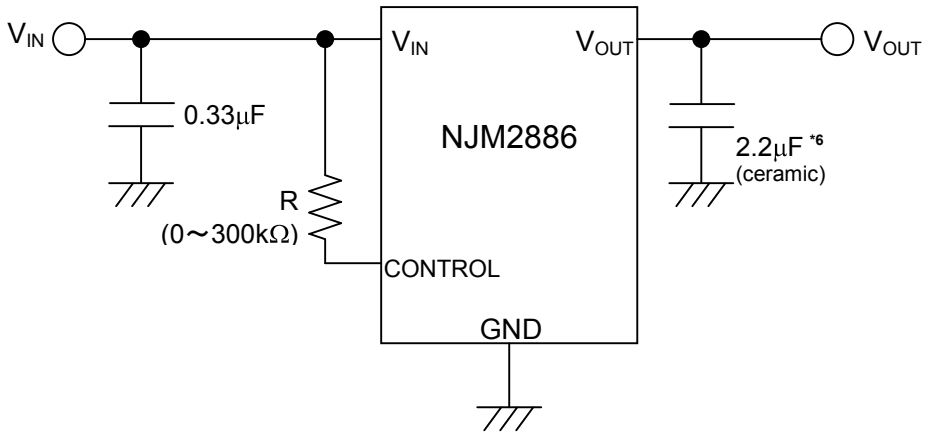
■ TEST CIRCUIT



*5 1.7V<Vo≤2.6V version: Co=4.7μF(ceramic)
Vo≤1.7V version: 10μF(ceramic)

■ TYPICAL APPLICATION

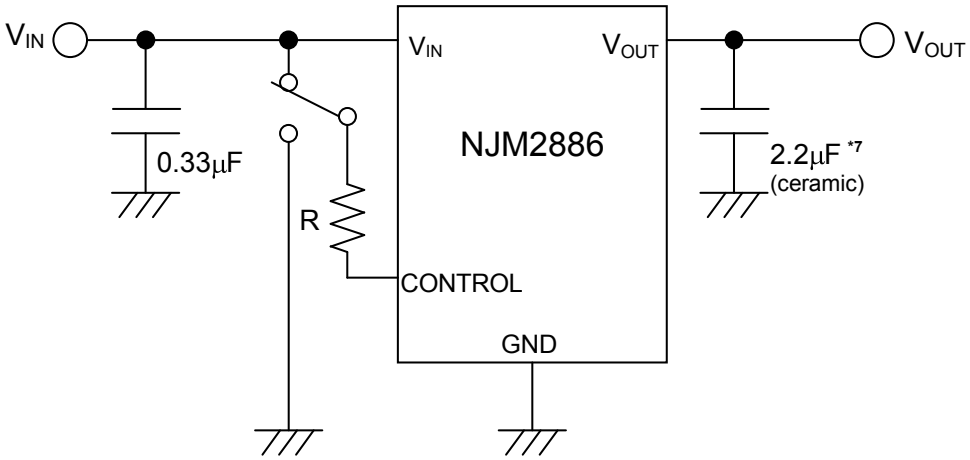
① In the case where ON/OFF Control is not required:



*6 1.7V<Vo≤2.6V version: Co=4.7μF
Vo≤1.7V version: 10μF

Connect control terminal to V_{IN} terminal

② In use of ON/OFF CONTROL:



*7 1.7V<Vo≤2.6V version: Co=4.7μF(ceramic)
Vo≤1.7V version: 10μF(ceramic)

State of control terminal:

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

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

If this resistor is inserted, it can reduce the control current when the control voltage is high.

The applied voltage to control terminal should set to consider voltage drop through the resistor "R" and the minimum control voltage for ON-state.

The $V_{CONT\ (ON)}$ and I_{CONT} have temperature dependence as shown in the "Control Current vs. Temperature" and " Control Voltage vs. Temperature" characteristics. Therefore, the resistance "R" should be selected to consider the temperature characteristics.

*Input Capacitor C_{IN}

Input Capacitor C_{IN} is required to prevent oscillation and reduce power supply ripple for applications when high power supply impedance or a long power supply line.

Therefore, use the recommended C_{IN} value (refer to conditions of ELECTRIC CHARACTERISTIC) or larger and should connect between GND and V_{IN} as shortest path as possible to avoid the problem.

*Output Capacitor C_O

Output capacitor (C_O) will be required for a phase compensation of the internal error amplifier.

The capacitance and the equivalent series resistance (ESR) influence to stable operation of the regulator.

Use of a smaller C_O may cause excess output noise or oscillation of the regulator due to lack of the phase compensation.

On the other hand, Use of a larger C_O reduces output noise and ripple output, and also improves output transient response when rapid load change.

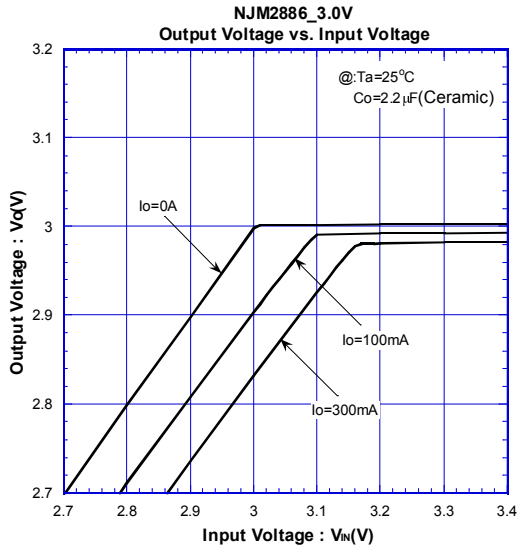
Therefore, use the recommended C_O value (refer to conditions of ELECTRIC CHARACTERISTIC) or larger and should connect between GND and V_{OUT} as shortest path as possible for stable operation

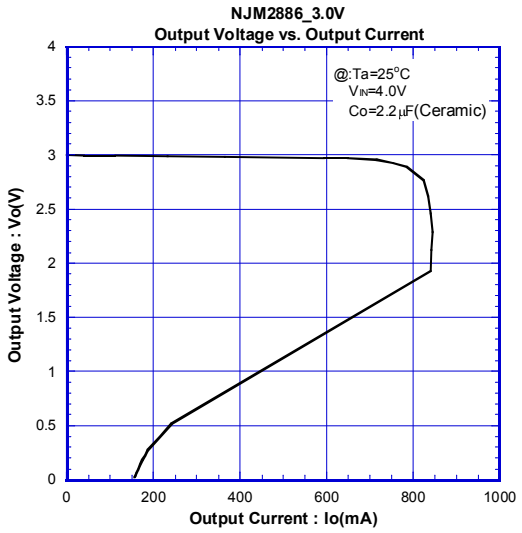
The recommended capacitance depends on the output voltage rank. Especially, low voltage regulator requires larger C_O value.

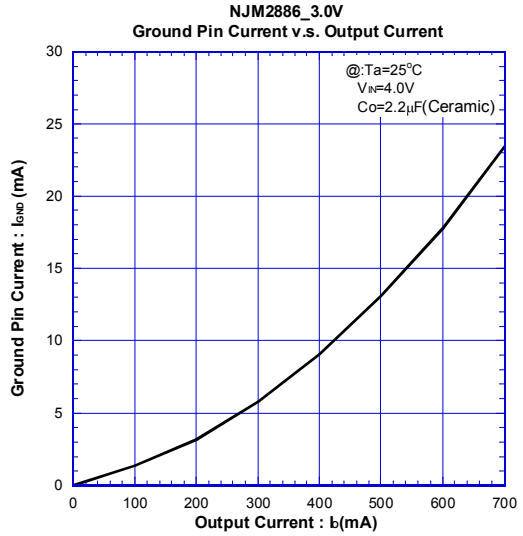
In addition, you should consider varied characteristics of capacitor (a frequency characteristic, a temperature characteristic, a DC bias characteristic and so on) and unevenness peculiar to a capacitor supplier enough.

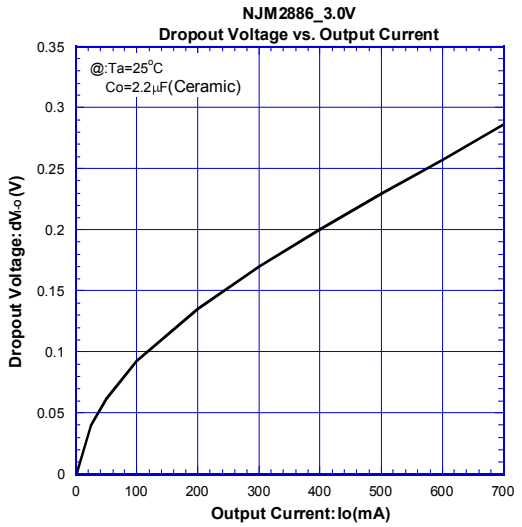
When selecting C_O, recommend that have withstand voltage margin against output voltage and superior temperature characteristic though this product is designed stability works with wide range ESR of capacitor including low ESR products.

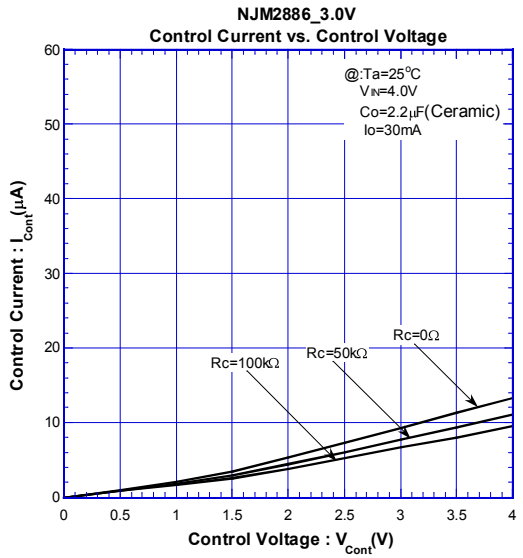
■ ELECTRICAL CHARACTERISTICS

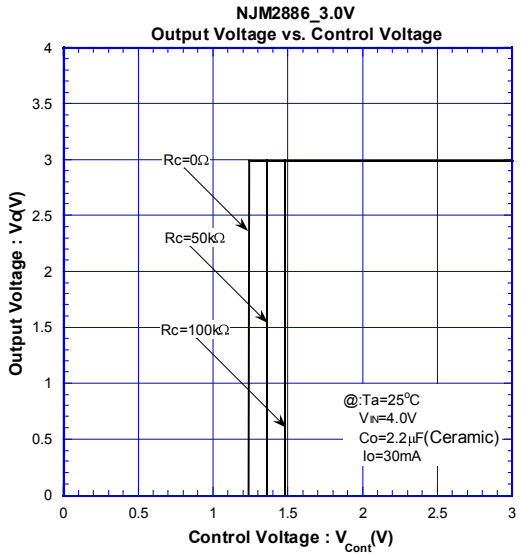












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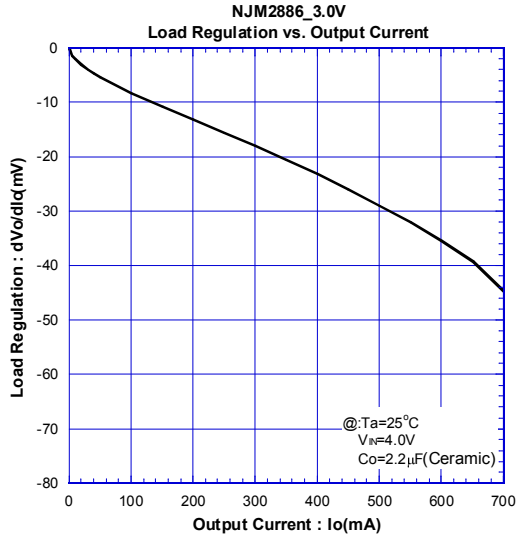

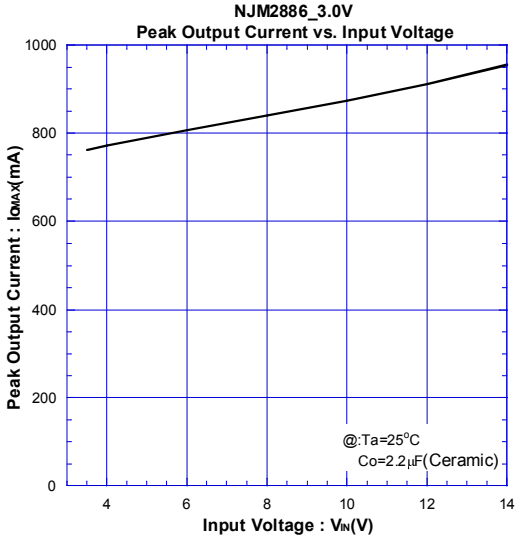

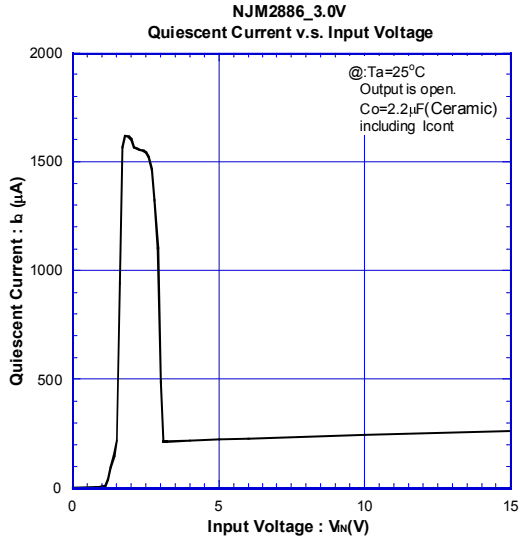

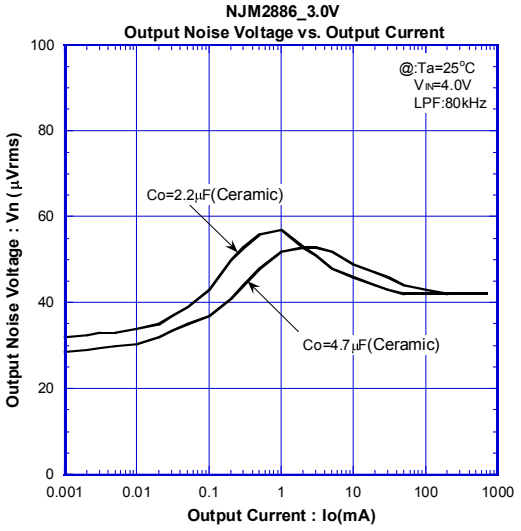

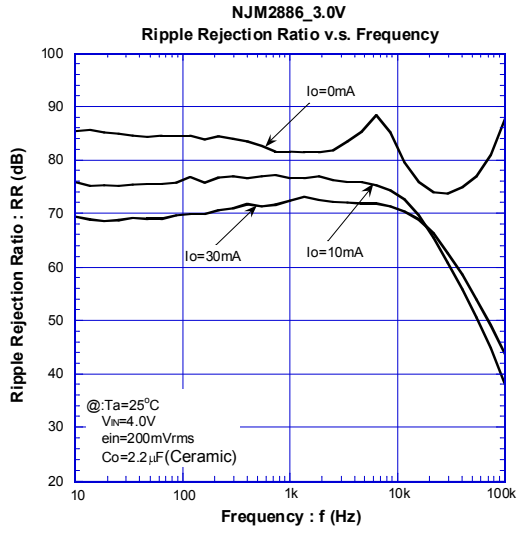

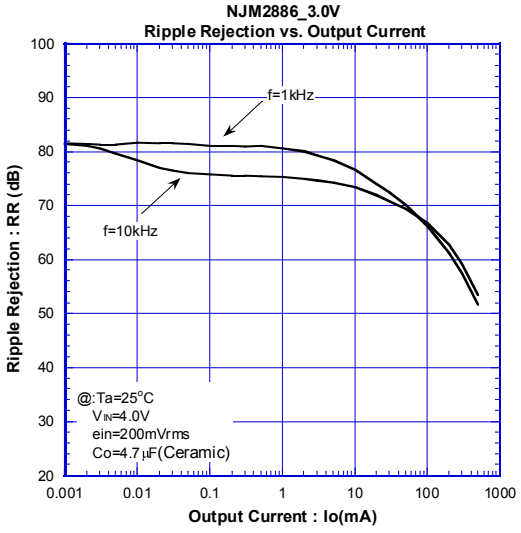

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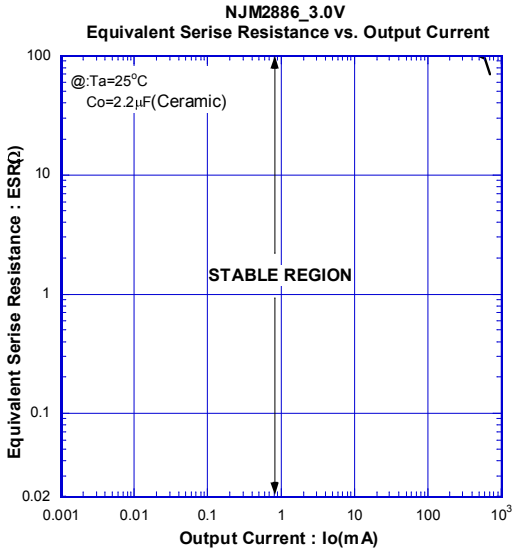

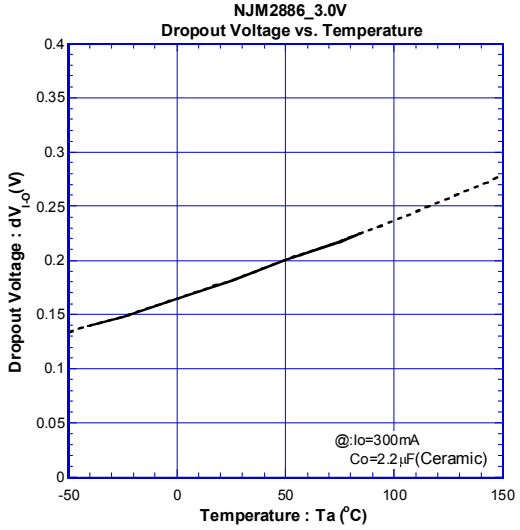

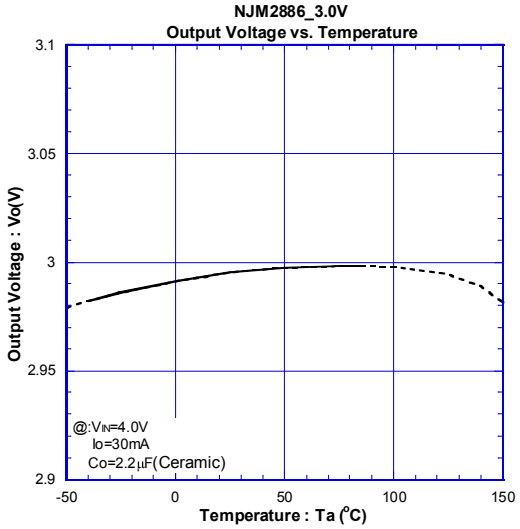

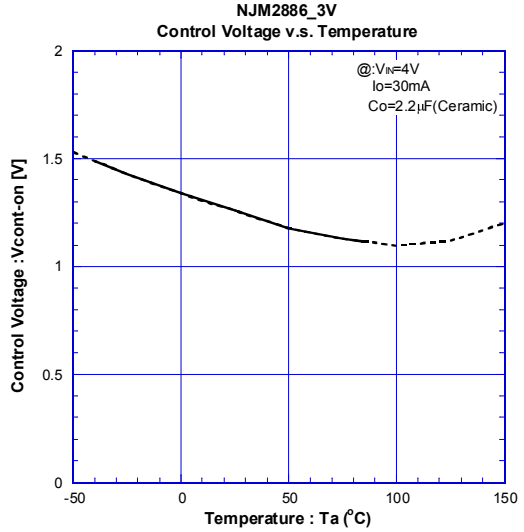

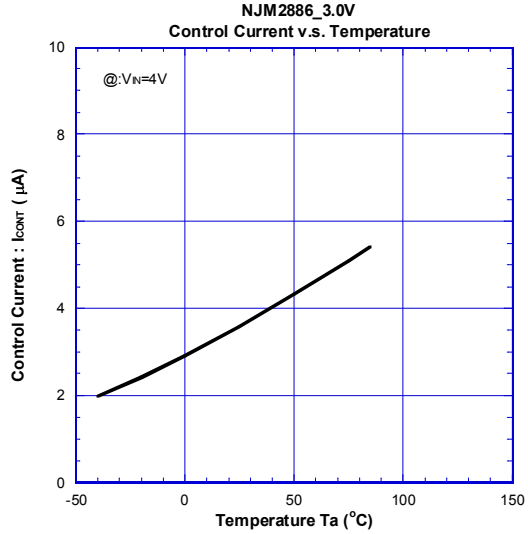

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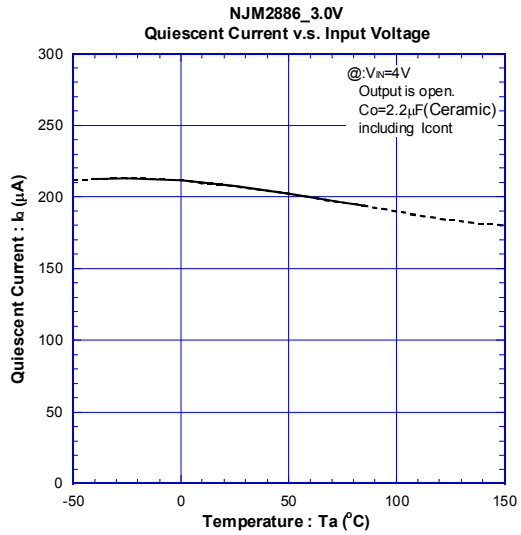
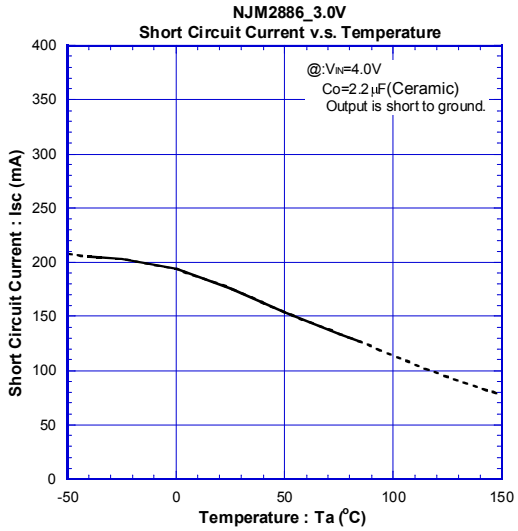
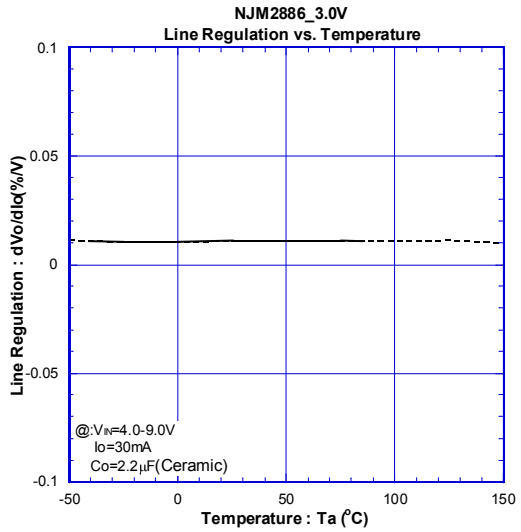
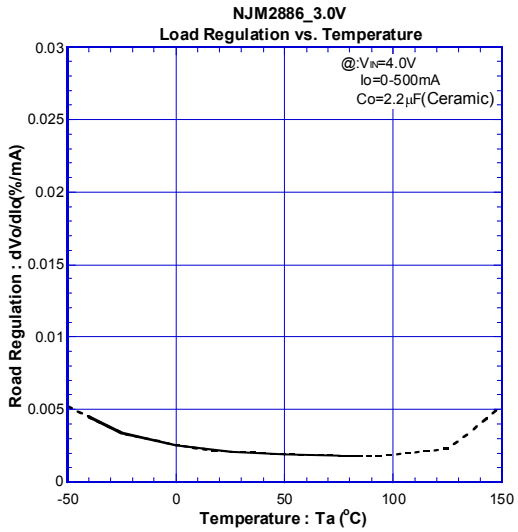
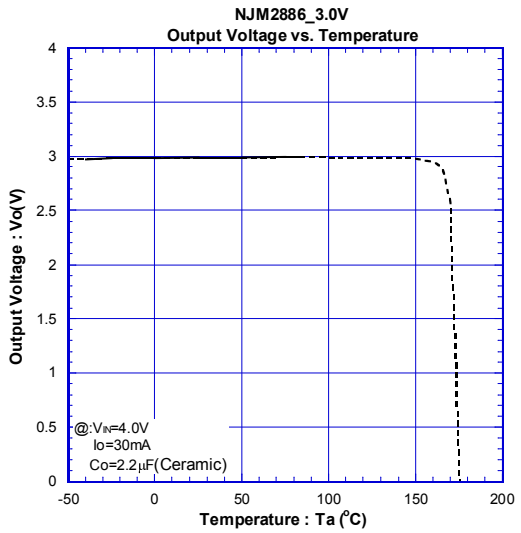




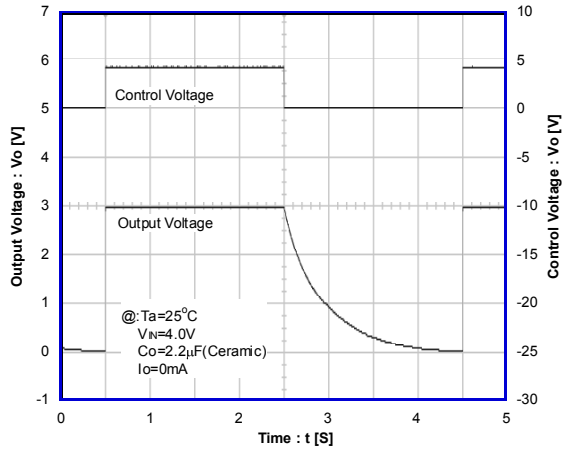




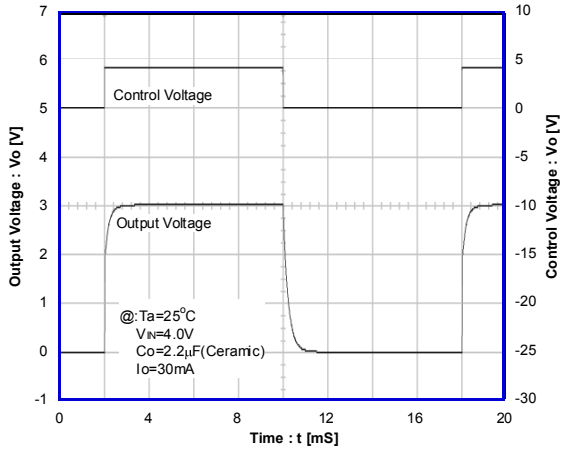


■ ELECTRICAL CHARACTERISTICS

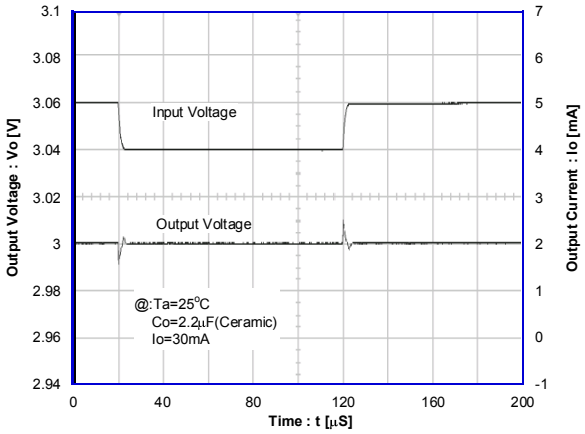
NJM2886_3.0V
ON/OFF Transient Response without load



NJM2886_3.0V
ON/OFF Transient Response



NJM2886_3.0V
Line Transient Response



NJM2886_3.0V
Load Transient Response