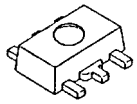
LOW DROPOUT VOLTAGE REGULATOR

■ GENERAL DESCRIPTION

NJM2884 is a low dropout voltage regulator with ON/OFF control. Advanced Bipolar technology achieves low noise, high ripple rejection and low quiescent current.

■ PACKAGE OUTLINE

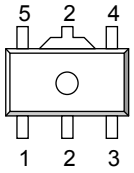


NJM2884U1

■ FEATURES

- High Ripple Rejection 75dB typ. (f=1kHz, Vo=3V Version)
- Low 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=100mA)
- ON/OFF Control
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limit
- Bipolar Technology
- Package Outline SOT-89-5

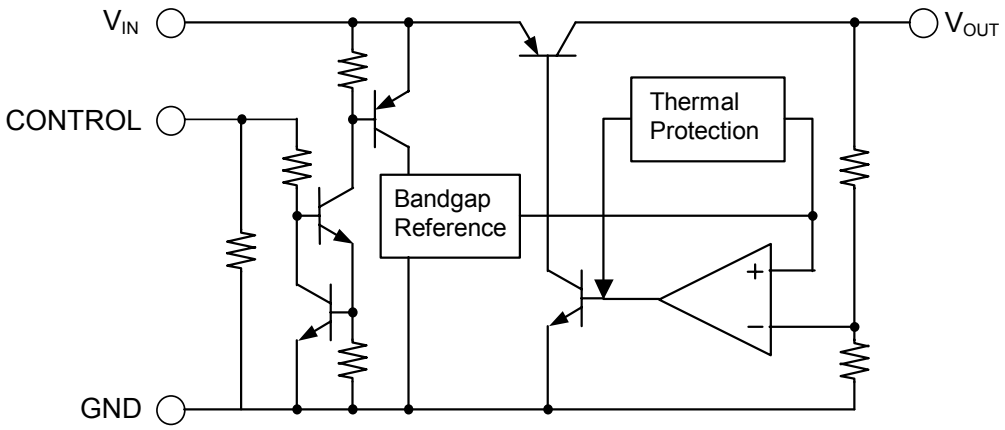
■ PIN CONFIGURATION



NJM2884U1

1. CONTROL(Active High)
2. GND
3. N.C.
4. V_{OUT}
5. V_{IN}

■ EQUIVALENT CIRCUIT



NJM2884U1

■ OUTPUT VOLTAGE RANK LIST

Device Name	V_{OUT}
NJM2884U1-21	2.1V
NJM2884U1-25	2.5V
NJM2884U1-03	3.0V
NJM2884U1-33	3.3V
NJM2884U1-48	4.8V
NJM2884U1-05	5.0V

■ 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	440(*1)	mW
Operating Temperature	Topr	- 40 ~ +85	°C
Storage Temperature	Tstg	- 40 ~ +150	°C

(*1): Device itself.

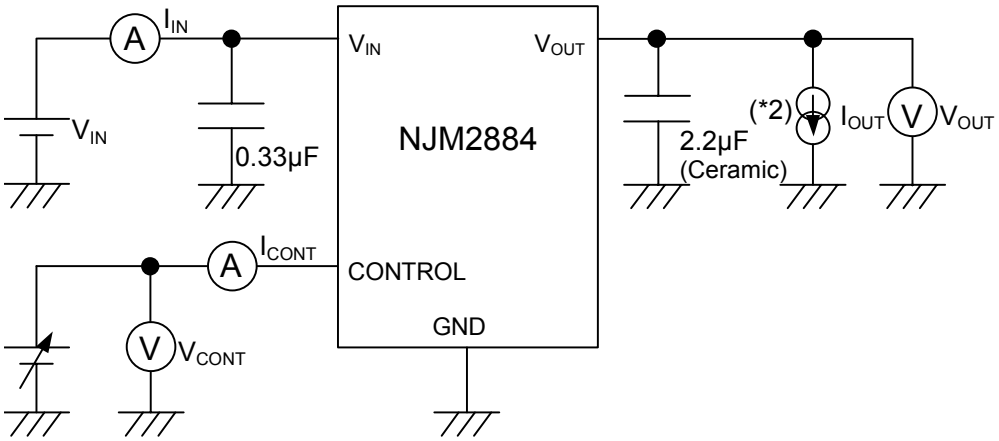
■ ELECTRICAL CHARACTERISTICS

(V_{IN}=Vo+1V, C_{IN}=0.33µF, Co=2.2µF: Vo≥2.7V (Co=4.7µF: Vo≤2.6V), 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	–	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+6V (Vo≤3V Version), V_{IN}=Vo+1V ~ 9V (Vo>3V Version), Io=30mA	–	–	0.10	%/V
Load Regulation	$\Delta Vo/\Delta Io$	Io=0 ~ 500mA	–	–	0.009	%/mA
Dropout Voltage	ΔV_{I-O}	Io=300mA	–	0.18	0.28	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	–	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

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.

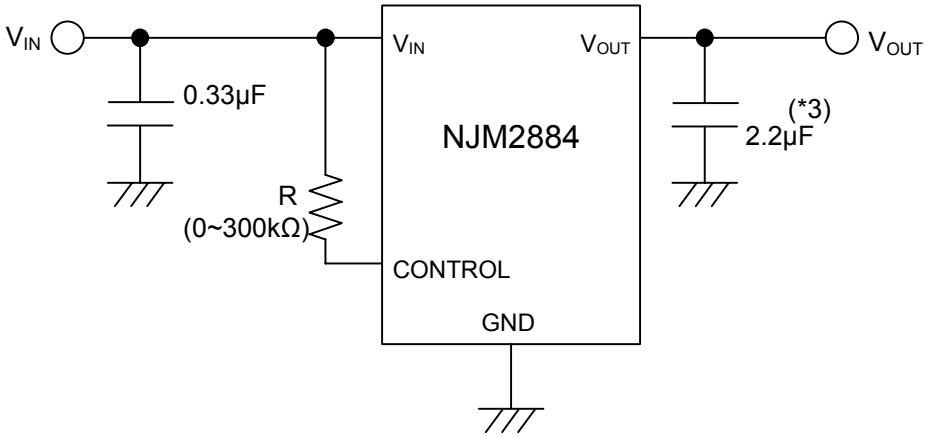
■ TEST CIRCUIT



(*2) Vo ≤ 2.6V version: Co=4.7μF (Ceramic)

■ TYPICAL APPLICATION

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

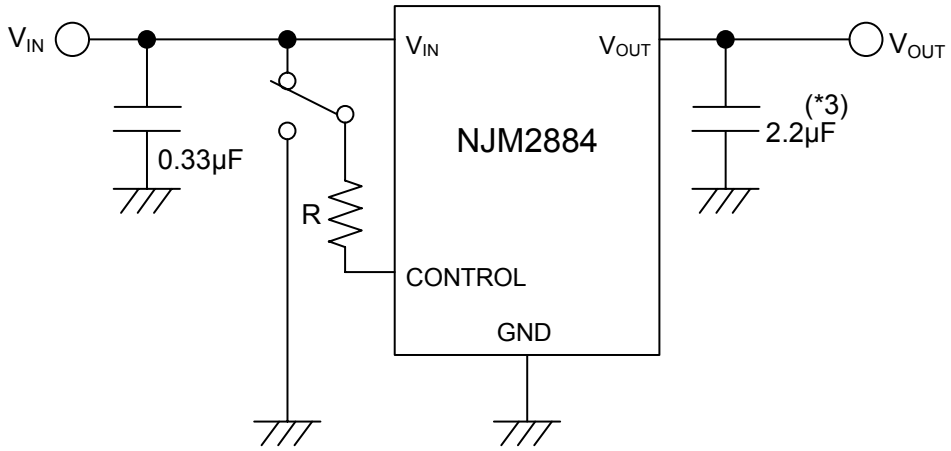


(*3) Vo ≤ 2.6V version: Co=4.7μF

Connect control terminal to V_{IN} terminal

The quiescent current can be reduced by using a resistance “R”. Instead, it increases the minimum operating voltage. For further information, please refer to Figure “Output Voltage vs. Control Voltage”.

② In use of ON/OFF CONTROL:



(*3) Vo ≤ 2.6V version: Co=4.7µF

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 0.33µF greater to avoid the problem.

C_{IN} should connect between GND and V_{IN} as short as possible.

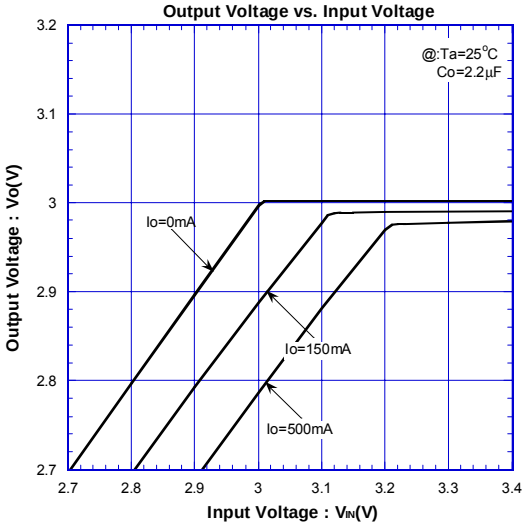
∗In the case of using a resistance "R" between V_{IN} and control.

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.

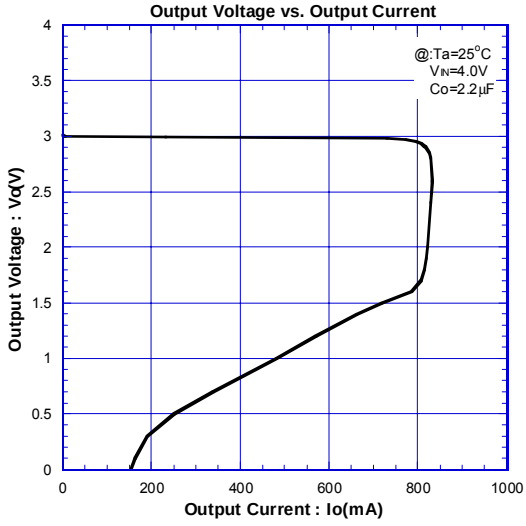
The minimum control voltage for ON state ($V_{CONT\,(ON)}$) is increased due to the voltage drop caused by I_{CONT} and the resistance "R". The I_{CONT} is temperature dependence as shown in the "Control Current vs. Temperature" characteristics. Therefore, the resistance "R" should be carefully selected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

■ TYPICAL CHARACTERISTICS

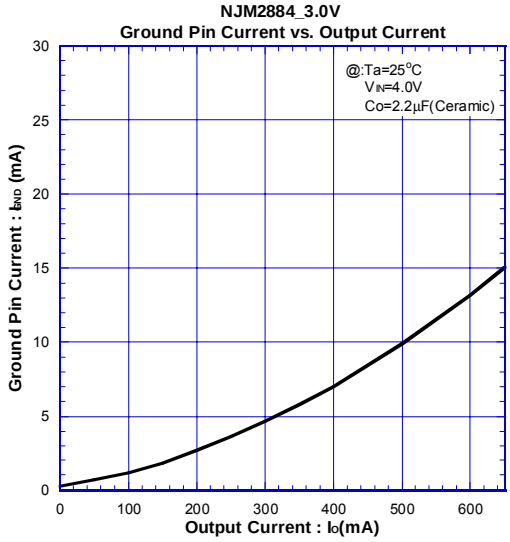
NJM2884_3.0V
Output Voltage vs. Input Voltage



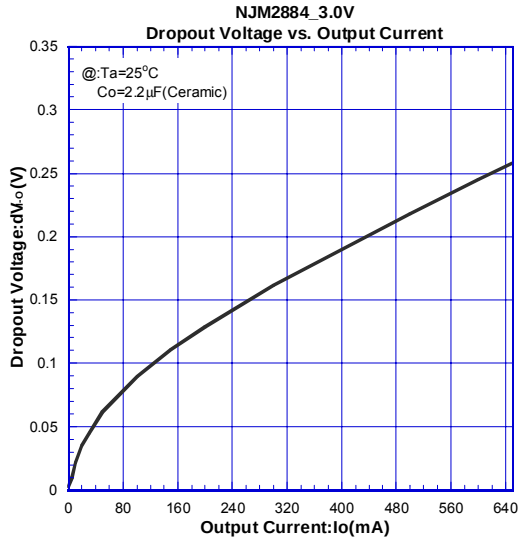
NJM2884_3.0V
Output Voltage vs. Output Current



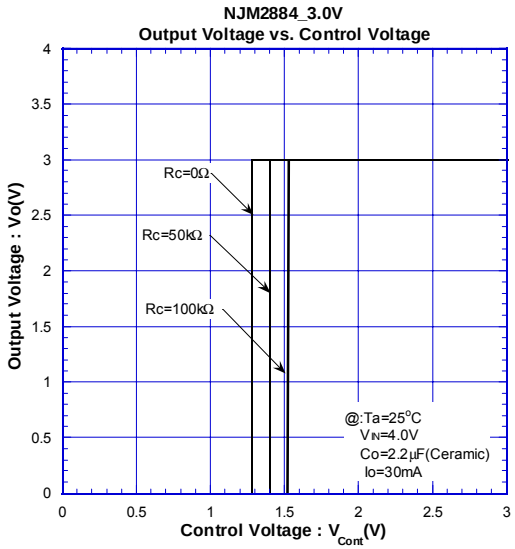
NJM2884_3.0V
Ground Pin Current vs. Output Current



NJM2884_3.0V
Dropout Voltage vs. Output Current

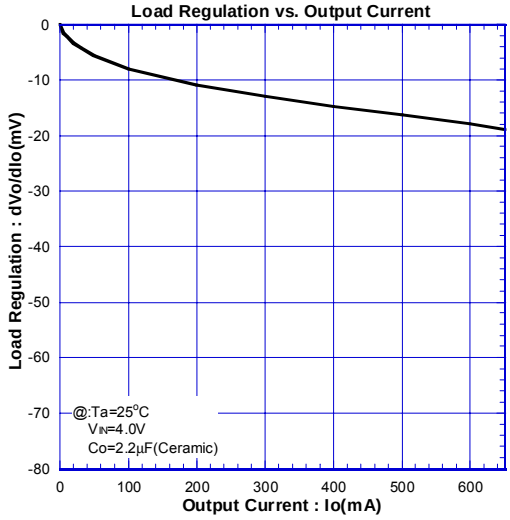


NJM2884_3.0V
Output Voltage vs. Control Voltage

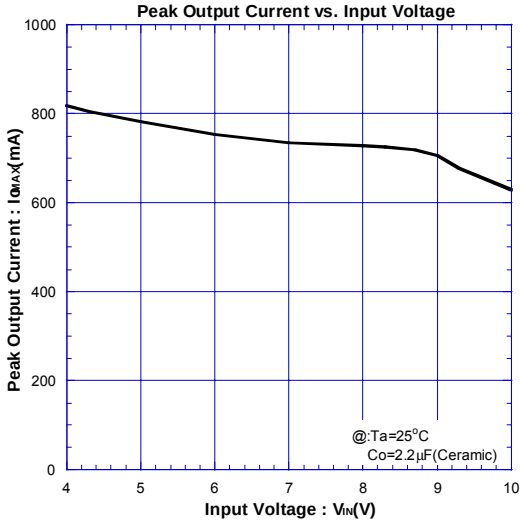


■ TYPICAL CHARACTERISTICS

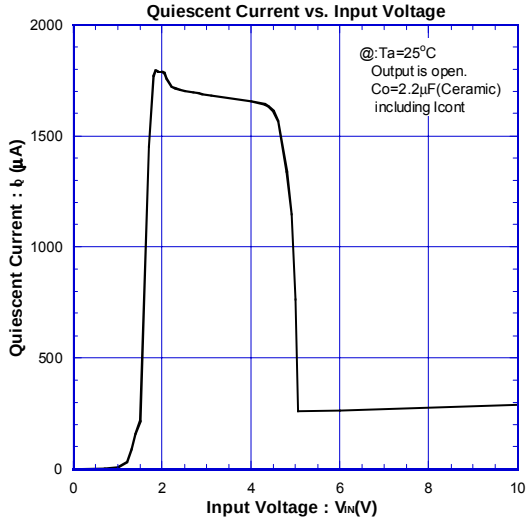
NJM2884_3.0V
Load Regulation vs. Output Current



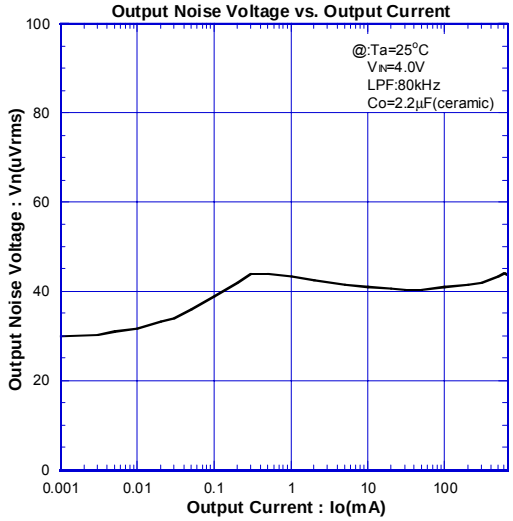
NJM2884_3.0V
Peak Output Current vs. Input Voltage



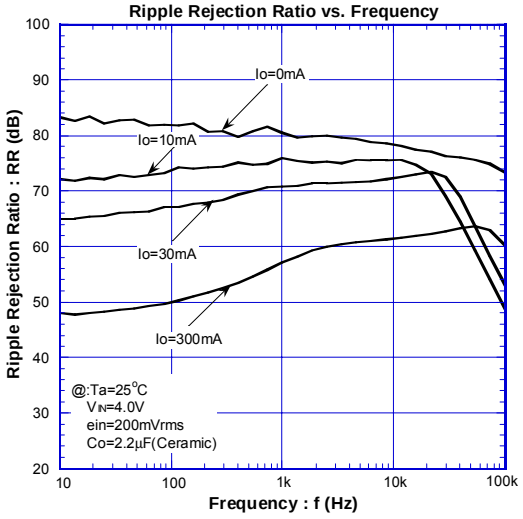
NJM2884_3.0V
Quiescent Current vs. Input Voltage



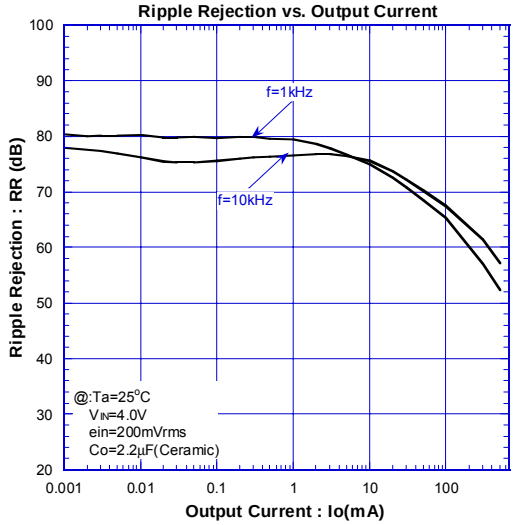
NJM2884_3.0V
Output Noise Voltage vs. Output Current



NJM2884_3.0V
Ripple Rejection Ratio vs. Frequency

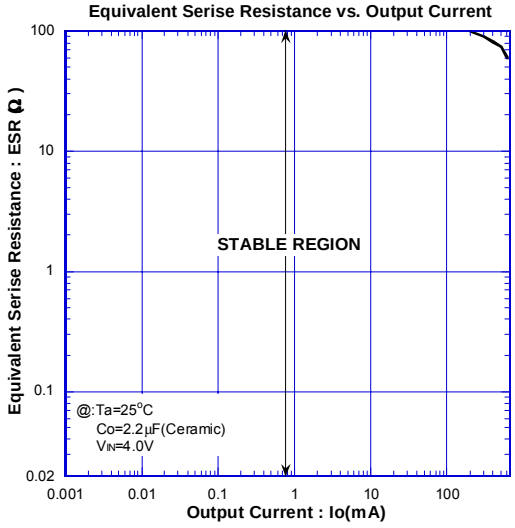


NJM2884_3.0V
Ripple Rejection vs. Output Current

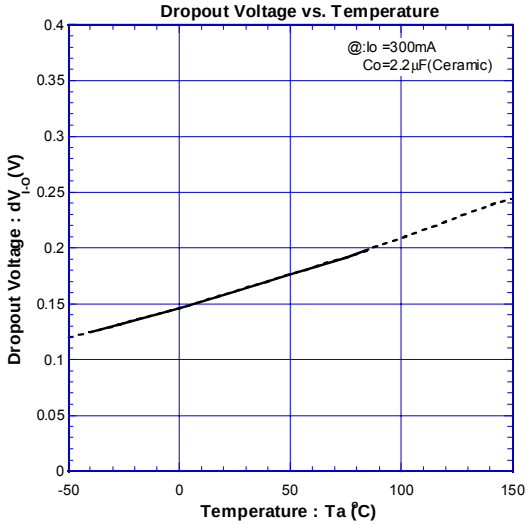


■ TYPICAL CHARACTERISTICS

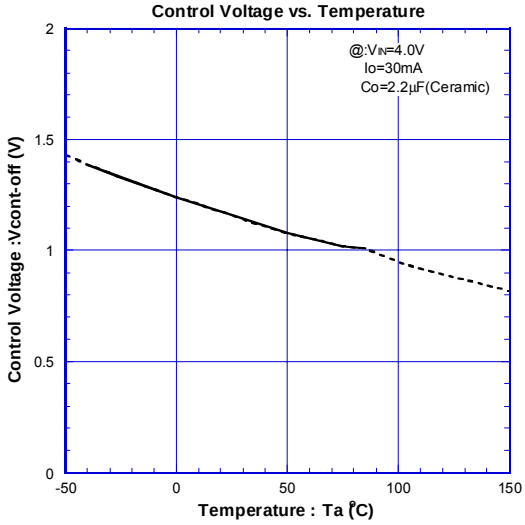
NJM2884_3.0V
Equivalent Serise Resistance vs. Output Current



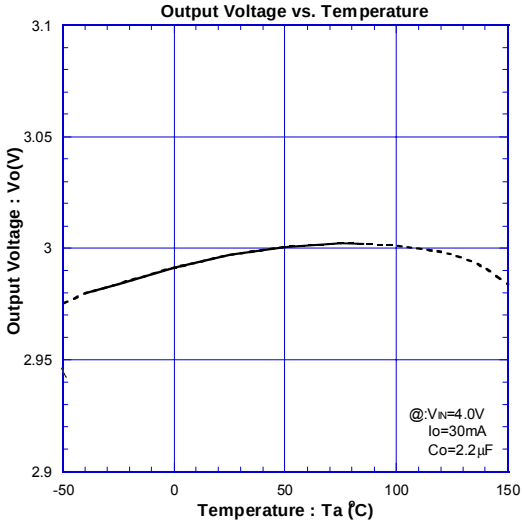
NJM2884_3.0V
Dropout Voltage vs. Temperature



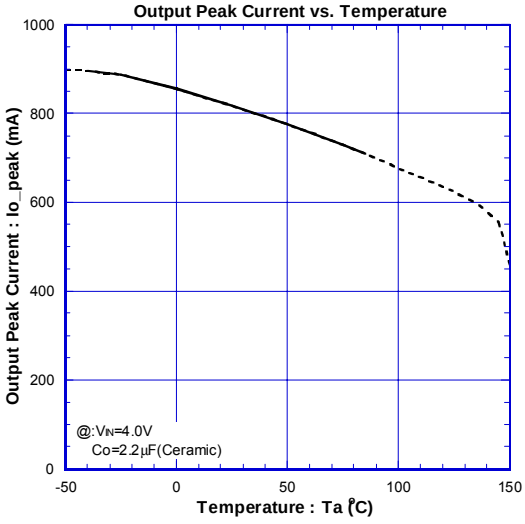
NJM2884_3.0V
Control Voltage vs. Temperature



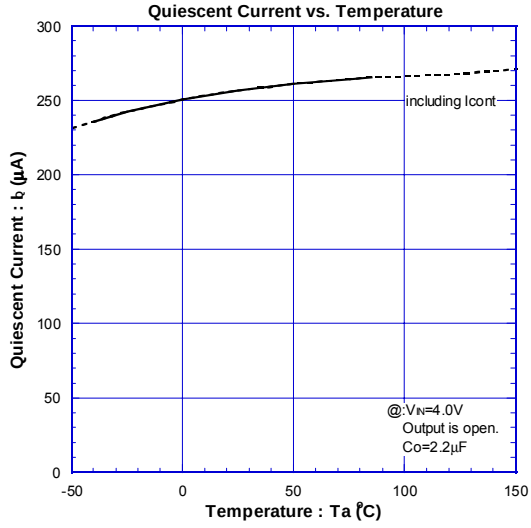
NJM2884_3.0V
Output Voltage vs. Temperature



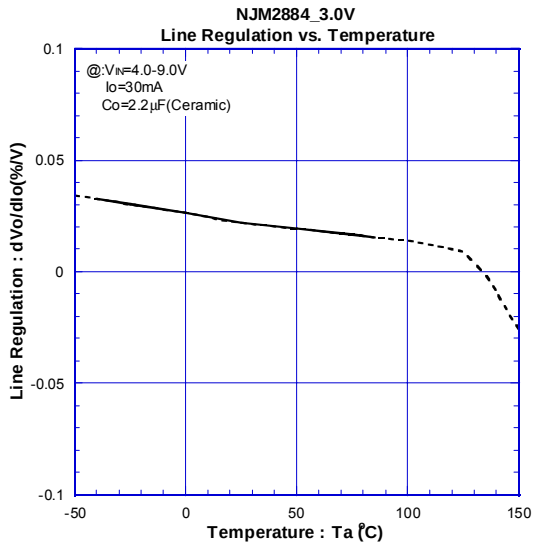
NJM2884_3.0V
Output Peak Current vs. Temperature

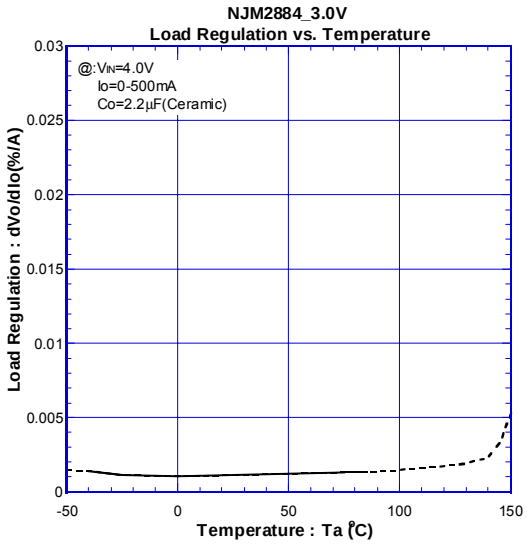


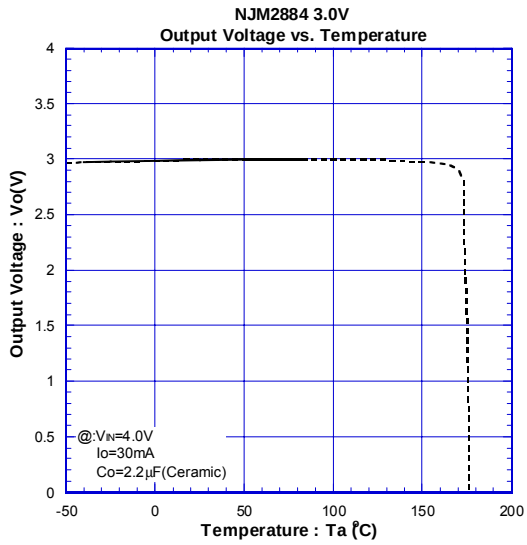
NJM2884_3.0V
Quiescent Current vs. Temperature

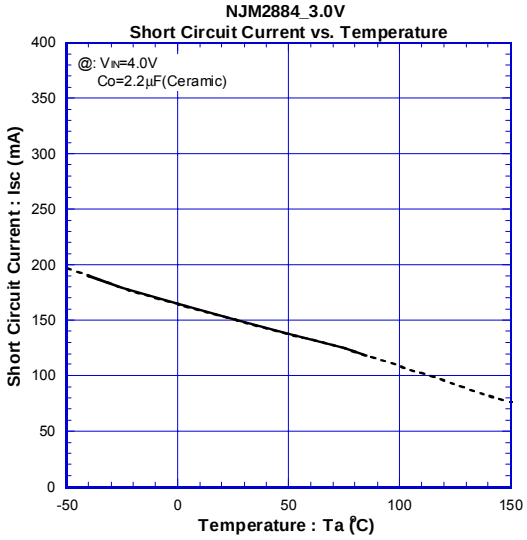


■ TYPICAL CHARACTERISTICS



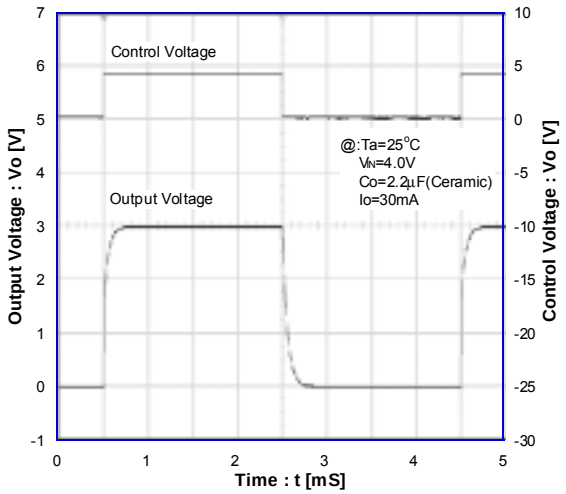




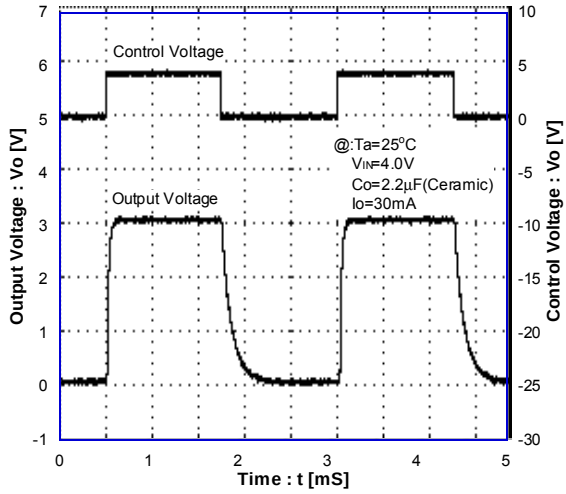


■ TYPICAL CHARACTERISTICS

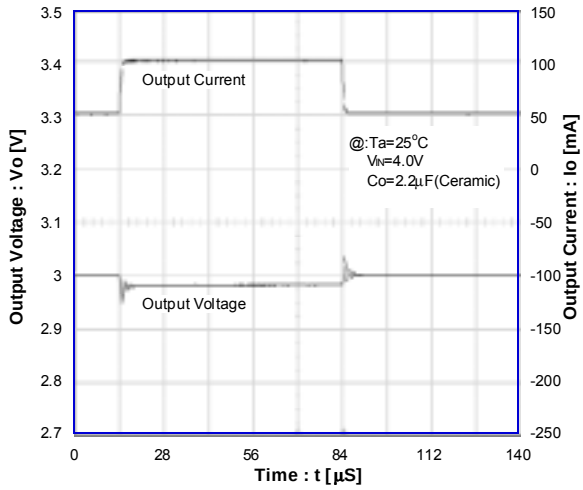
NJM2884_3.0V
ON/OFF Transient Response



NJM2884_3.0V
ON/OFF Transient Response Without Load



NJM2884_3.0V
Load Transient Response



NJM2884_3.0V
Line Transient Response