

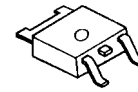
LOW DROPOUT VOLTAGE REGULATOR

■ GENERAL DESCRIPTION

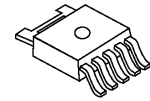
The NJM2845/46 is low dropout voltage regulator. Advanced Bipolar technology achieves low noise, high ripple rejection and low quiescent current.

NJM2845 is 3 terminal type and NJM2846 is ON/OFF control built in type. These product can be selected according to the applications.

■ PACKAGE OUTLINE



NJM2845DL1

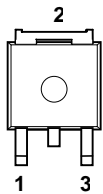


NJM2846DL3

■ FEATURES

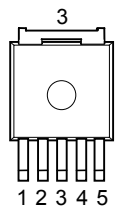
- High Ripple Rejection 75dB typ. (f=1kHz,3V Version)
- Output Noise Voltage $V_{no}=45\mu V_{rms}$ typ. ($V_o=3V$ Version)
- Output capacitor with 2.2 μF ceramic capacitor ($V_o\geq 2.6V$)
- Output Current $I_o(max.)=800mA$
- High Precision Output $V_o \pm 1.0\%$
- Low Dropout Voltage 0.18V typ. ($I_o=500mA$)
- ON/OFF Control (NJM2846)
- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Bipolar Technology
- Package Outline TO-252-3 (NJM2845DL1), TO-252-5 (NJM2846DL3)

■ PIN CONFIGURATION



NJM2845DL1

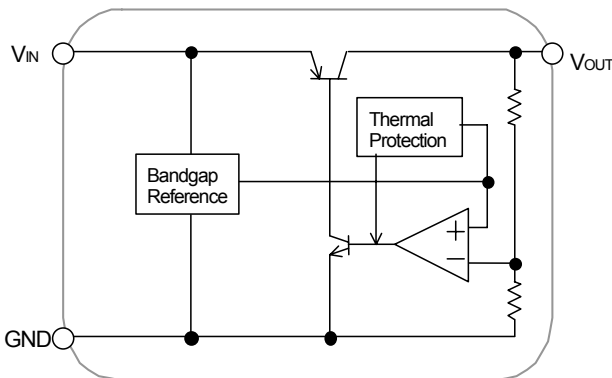
1. V_{IN}
2. GND
3. V_{OUT}



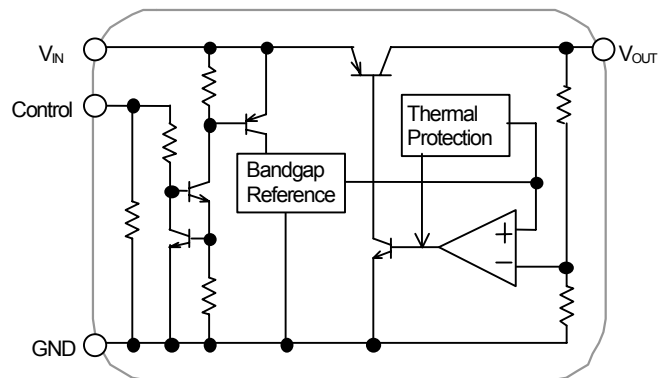
NJM2846DL3

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

■ EQUIVALENT CIRCUIT



NJM2845DL1



NJM2846DL3

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■ OUTPUT VOLTAGE

Device Name	V _{OUT}
NJM284*DL*-15	1.5V
NJM284*DL*-18	1.8V
NJM284*DL*-02	2.0V
NJM284*DL*-22	2.2V
NJM284*DL*-23	2.3V
NJM284*DL*-25	2.5V
NJM284*DL*-03	3.0V
NJM284*DL*-33	3.3V
NJM284*DL*-04	4.0V
NJM284*DL*-05	5.0V

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}	+14	V
Control Voltage	V _{CONT}	+14(*1)	V
Power Dissipation	P _D	10(Tc≤25°C) 1.0(Ta≤25°C)	W
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.

■ Operating voltage

$$V_{IN}=+2.5V(\text{In case of } V_o<2.3V) \sim +(V_o+9V)$$

■ NJM2845

■ ELECTRICAL CHARACTERISTICS

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

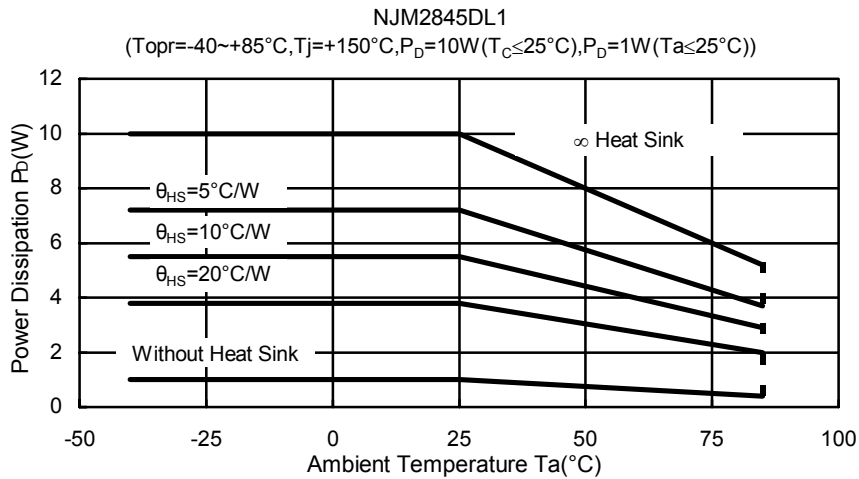
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V _o	I _o =30mA	-1.0%	-	+1.0%	V
Quiescent Current	I _Q	I _o =0mA	-	400	600	μA
Output Current	I _o	V _o - 0.3V	800	1050	-	mA
Line Regulation	ΔV _o /ΔV _{IN}	V _{IN} =V _o +1V ~ V _o +6V, I _o =30mA	-	-	0.10	%/V
Load Regulation	ΔV _o /ΔI _o	I _o =0 ~ 800mA	-	-	0.004	%/mA
Dropout Voltage(*2)	ΔV _{I-O}	I _o =500mA	-	0.18	0.28	V
Ripple Rejection	RR	e _{in} =200mVrms, f=1kHz, I _o =10mA, V _o =3V Version	-	75	-	dB
Average Temperature Coefficient of Output Voltage	ΔV _o /ΔTa	Ta=0 ~ 85°C, I _o =10mA	-	± 50	-	ppm/°C
Output Noise Voltage	V _{NO}	f=10Hz ~ 80kHz, I _o =10mA, V _o =3V Version	-	45	-	μVrms

(*2): The output voltage excludes under 2.3V.

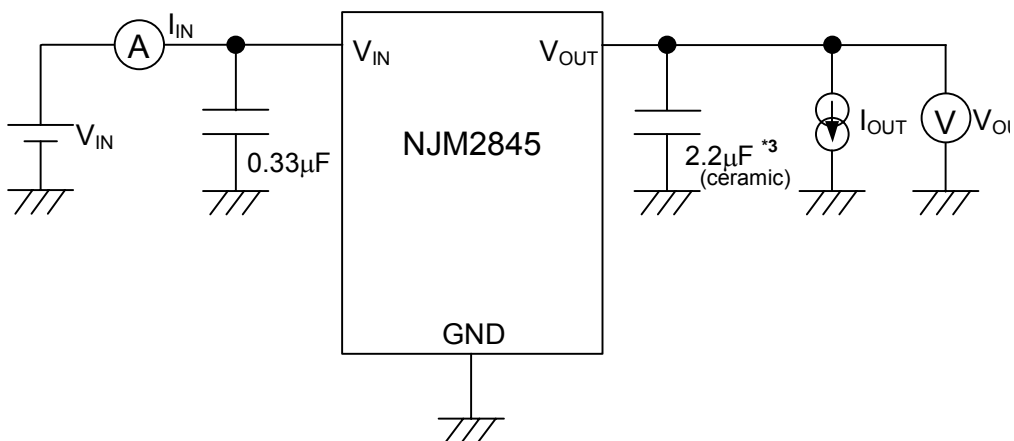
The above specification is a common specification for all output voltages.

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

POWER DISSIPATION vs. AMBIENT TEMPERATURE

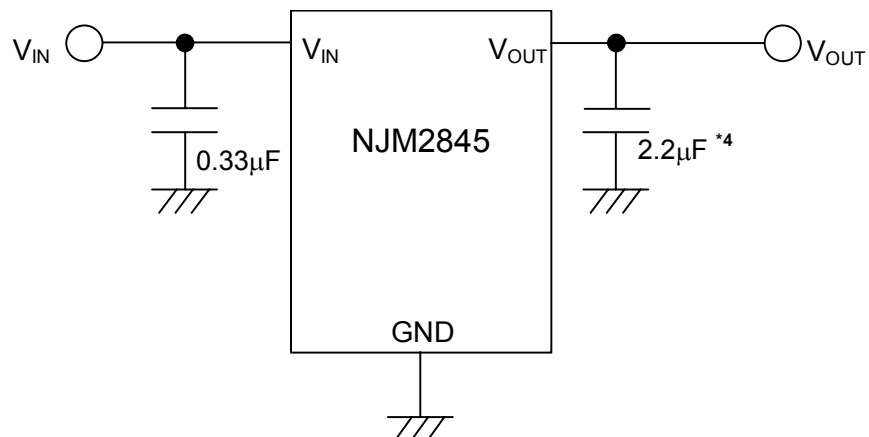


TEST CIRCUIT



*3 1.7V < $V_o \leq 2.6\text{V}$ version: $C_o = 4.7\mu\text{F}$, $V_o \leq 1.7\text{V}$: $C_o = 10\mu\text{F}$ (ceramic)

TYPICAL APPLICATION



*4 1.7V < $V_o \leq 2.6\text{V}$ version: $C_o = 4.7\mu\text{F}$, $V_o \leq 1.7\text{V}$: $C_o = 10\mu\text{F}$

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■ NJM2846

■ ELECTRICAL CHARACTERISTICS

($V_{IN}=V_o+1V$, $C_{IN}=0.33\mu F$, $C_o=2.2\mu F$ (1.7V< V_o ≤2.6V version: $C_o=4.7\mu F$, V_o ≤1.7V: $C_o=10\mu F$), $T_a=25^\circ C$)

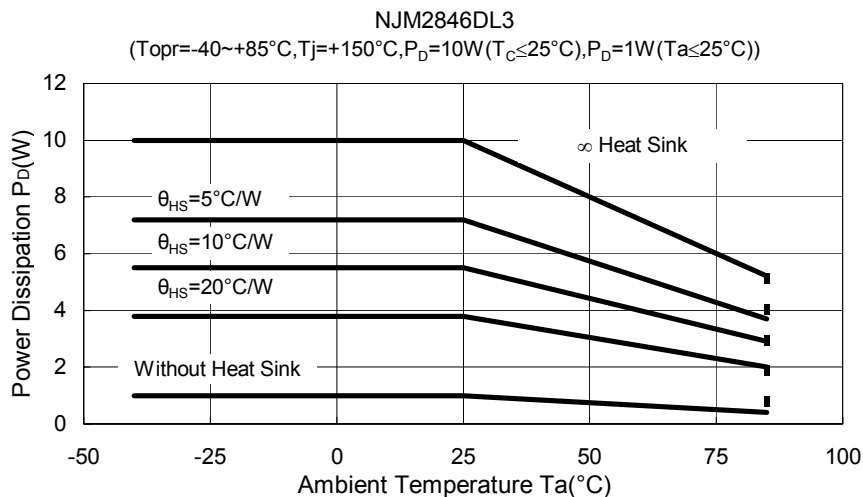
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_o	$I_o=30mA$	-1.0%	-	+1.0%	V
Quiescent Current	I_Q	$I_o=0mA$	-	400	600	μA
Quiescent Current at Control OFF	$I_{Q(OFF)}$	$V_{CONT}=0V$	-	-	100	nA
Line Regulation	I_o	$V_o - 0.3V$	800	1050	-	mA
Line Regulation	$\Delta V_o/\Delta V_{IN}$	$V_{IN}=V_o+1V \sim V_o+6V$, $I_o=30mA$	-	-	0.10	%/V
Load Regulation	$\Delta V_o/\Delta I_o$	$I_o=0 \sim 800mA$	-	-	0.004	%/mA
Dropout Voltage(*5)	ΔV_{I-O}	$I_o=500mA$	-	0.18	0.28	V
Ripple Rejection	RR	$e_{in}=200mV_{rms}$, $f=1kHz$, $I_o=10mA$, $V_o=3V$ Version	-	75	-	dB
Average Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T_a$	$T_a=0 \sim 85^\circ C$, $I_o=10mA$	-	± 50	-	ppm/ $^\circ C$
Output Noise Voltage	V_{NO}	$f=10Hz \sim 80kHz$, $I_o=10mA$, $V_o=3V$ Version	-	45	-	μV_{rms}
Control Current	I_{CONT}	$V_{CONT}=1.6V$, $I_o=0mA$	-	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

(*5): The output voltage excludes under 2.3V.

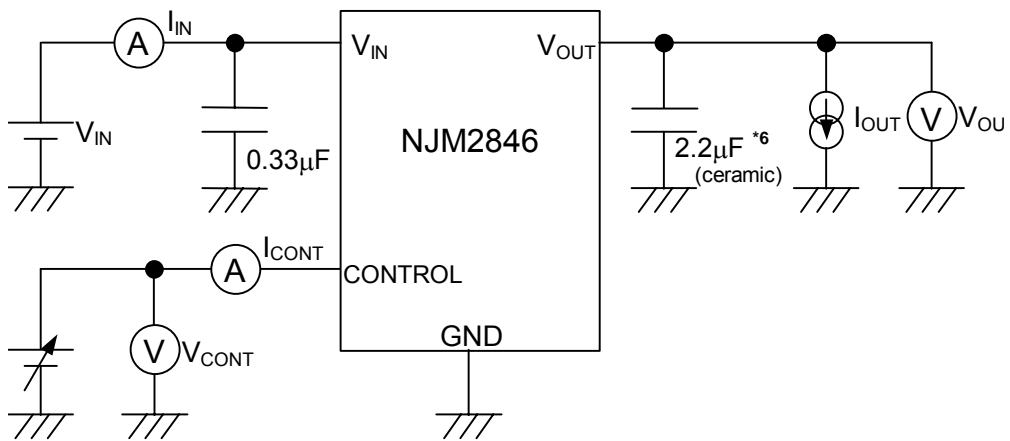
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Therefore, it may be different from the individual specification for a specific output voltage.

■ POWER DISSIPATION vs. AMBIENT TEMPERATURE



■ TEST CIRCUIT

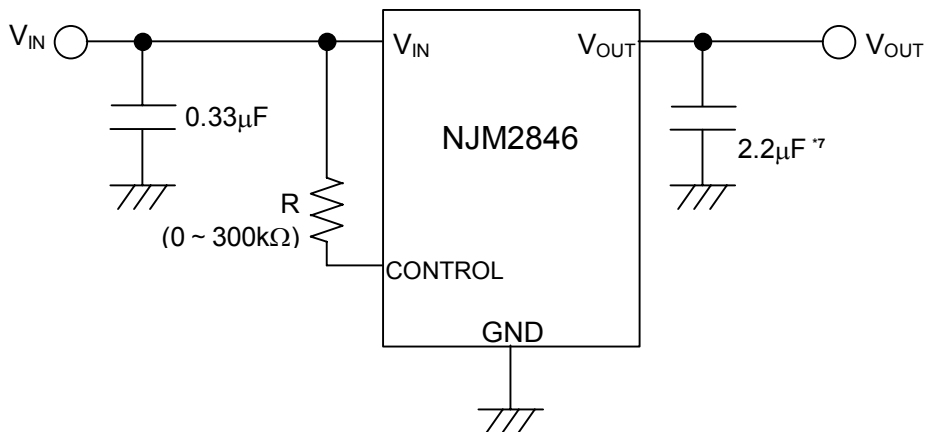


*6 $1.7V < V_o \leq 2.6V$ version: $C_o = 4.7\mu F$, $V_o \leq 1.7V$: $C_o = 10\mu F$

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■ TYPICAL APPLICATIONS

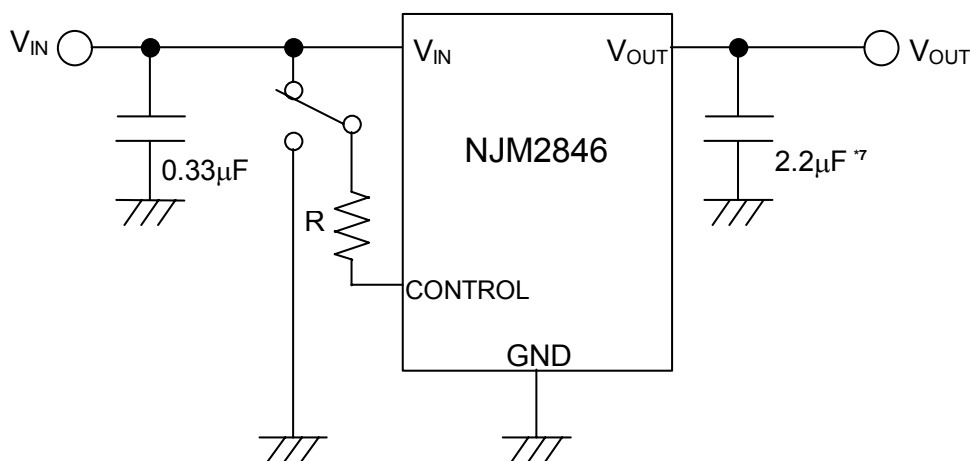
① In the case where ON/OFF Control is not required:



*7 1.7V<V_O≤2.6V version: C_O=4.7µF, V_O≤1.7V: C_O=10µF

Connect control terminal to V_{IN} terminal

② In use of ON/OFF CONTROL:



*7 1.7V<V_O≤2.6V version: C_O=4.7µF, V_O≤1.7V: C_O=10µF

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.

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.

*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 0.33 μ F greater to avoid the problem.

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

*Output Capacitance C_O

Output capacitor (C_O) is required for a phase compensation of the internal error amplifier. The capacitance and the equivalent series resistance (ESR) influences stability of the regulator.

This product is designed to work with a low ESR capacitor for the C_O ; however, use of recommended capacitance or greater value is essential for stable operation.

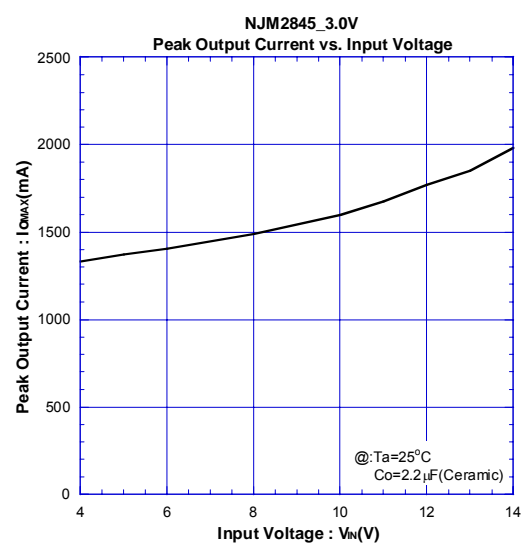
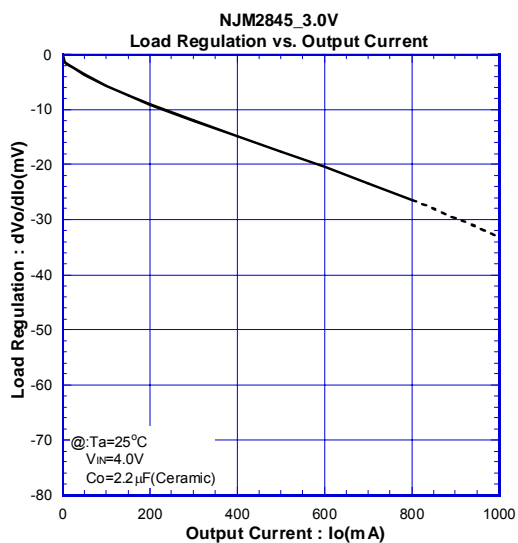
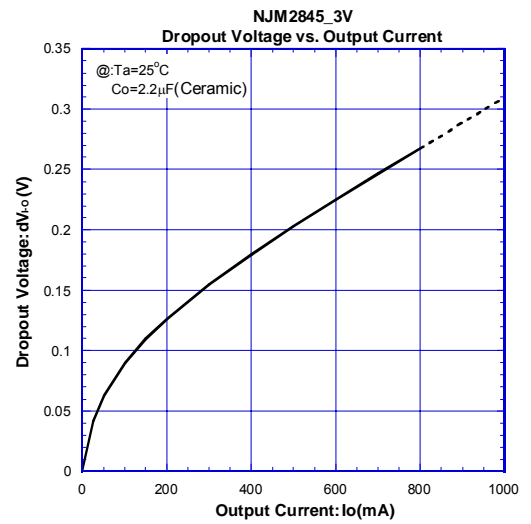
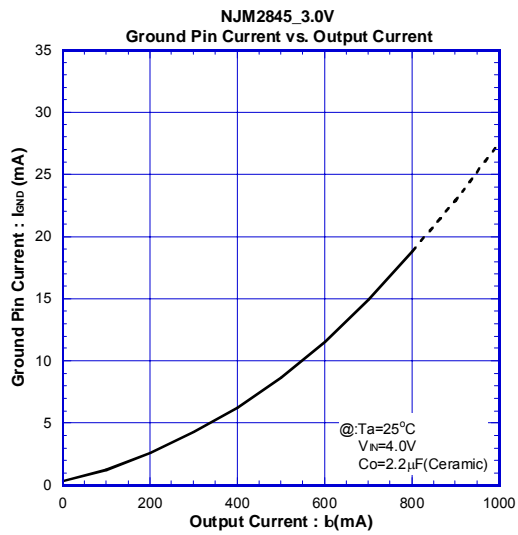
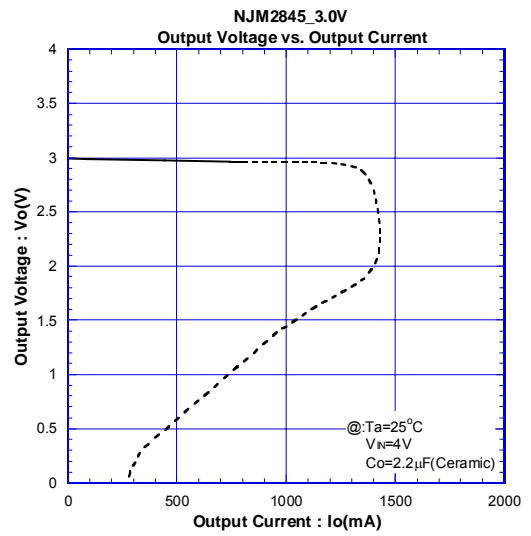
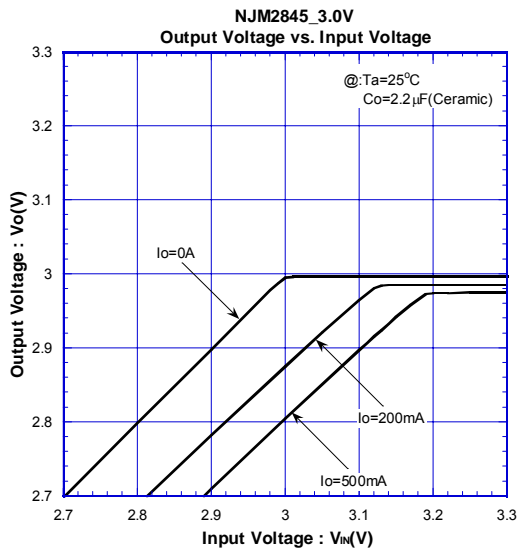
Use of a smaller C_O may cause excess output noise or oscillation of the regulator due to lack of the phase compensation.

Therefore, use C_O with the recommended capacitance or greater value and connect between V_O terminal and GND terminal with minimal wiring. The recommended capacitance depends on the output voltage. Low voltage regulator requires greater value of the C_O . Thus, check the recommended capacitance for each output voltage.

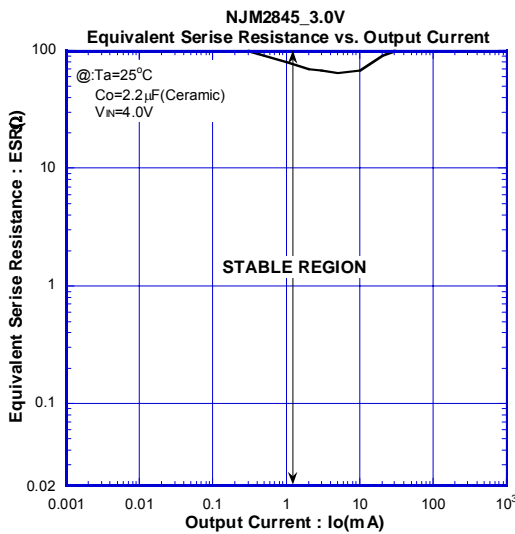
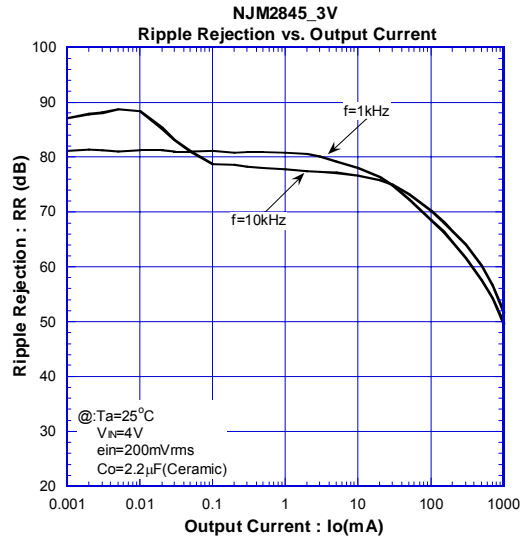
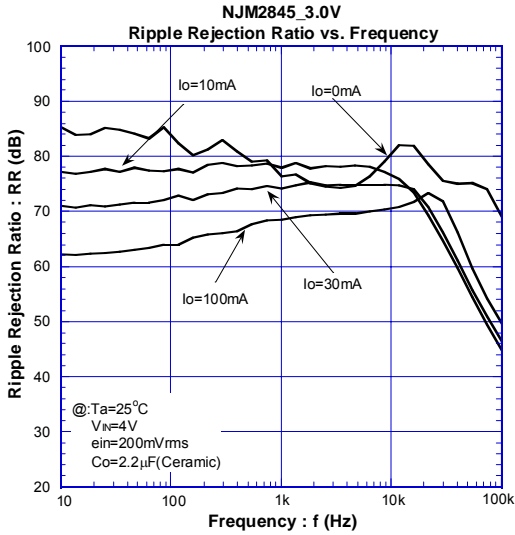
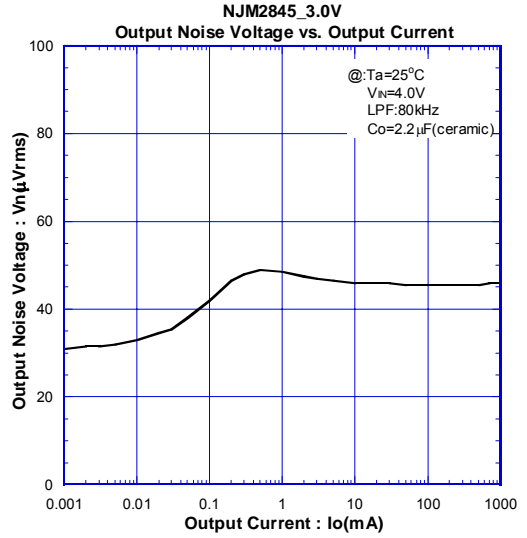
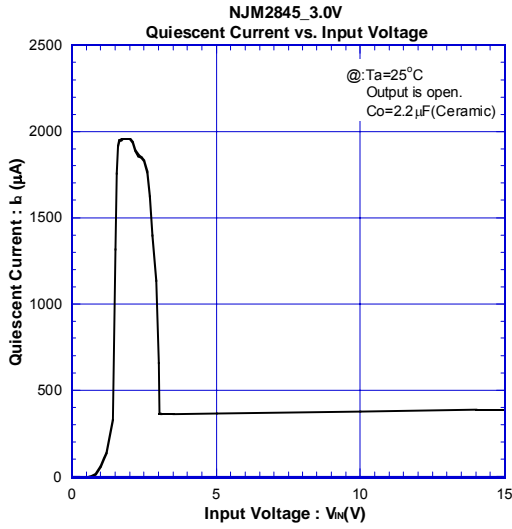
Use of a greater C_O reduces output noise and ripple output, and also improves transient response of the output voltage against rapid load change.

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■ TYPICAL CHARACTERISTICS (NJM2845)

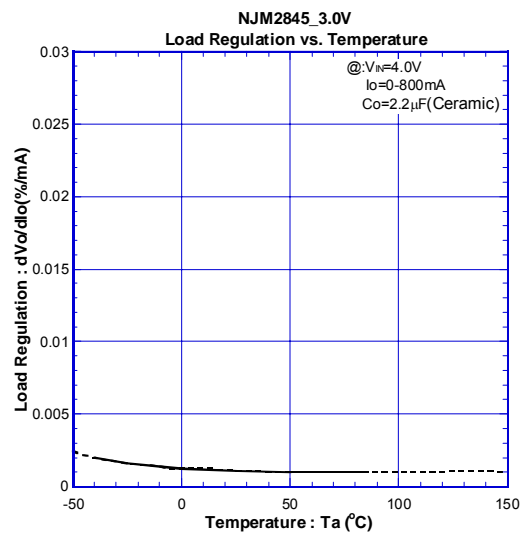
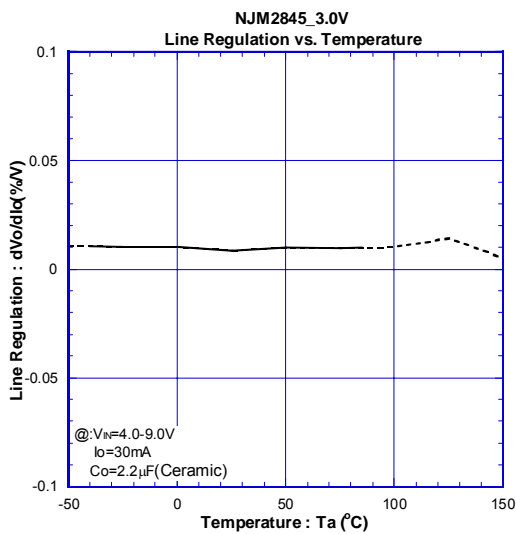
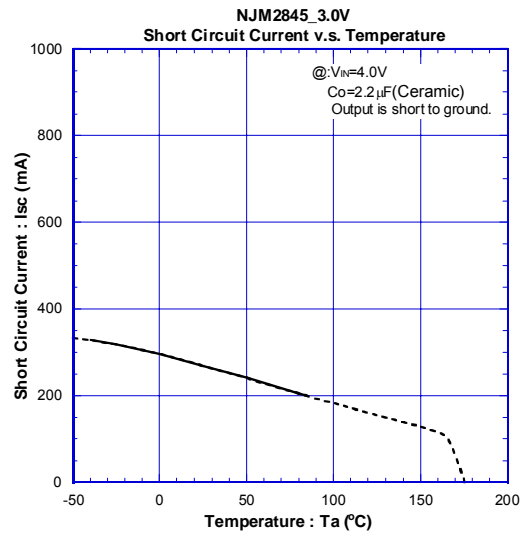
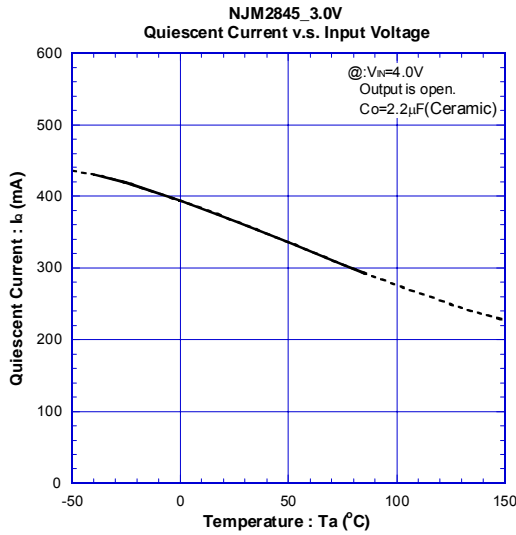
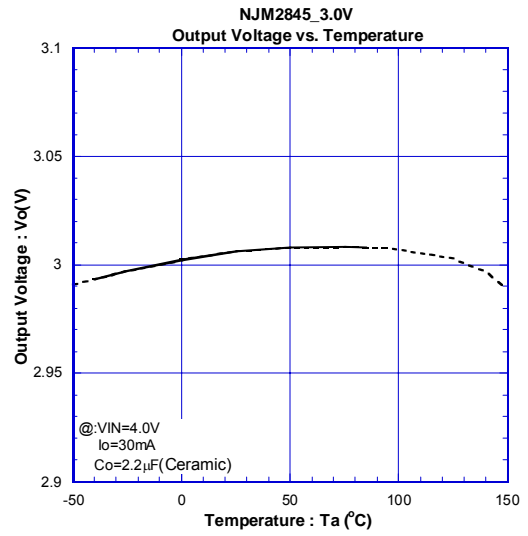
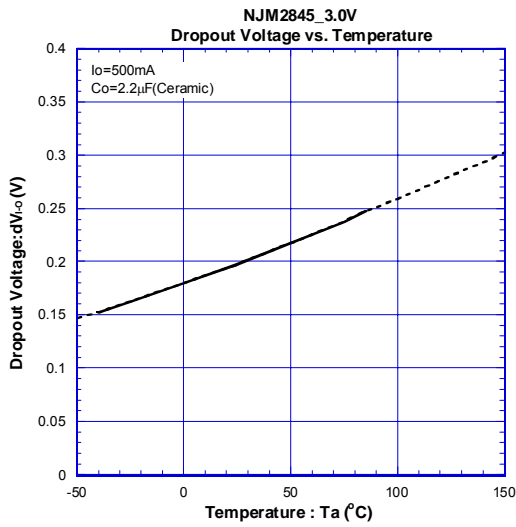


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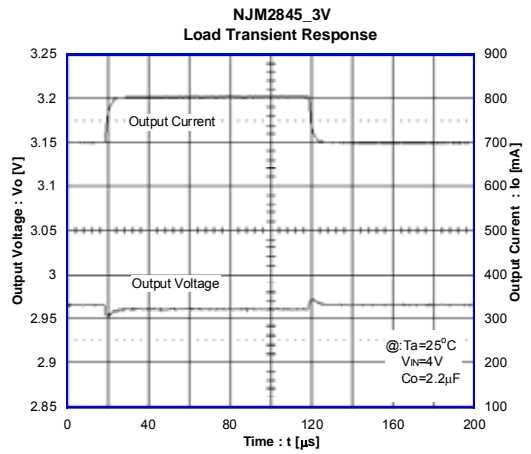
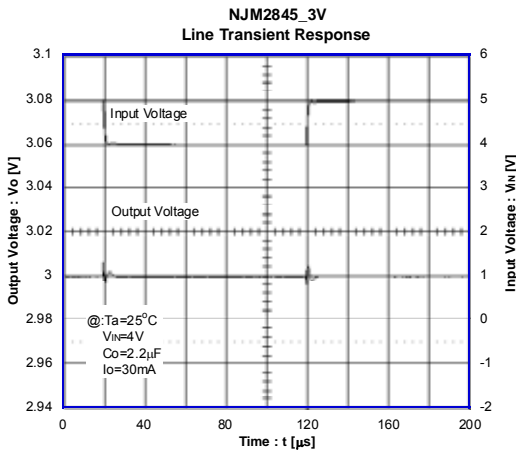
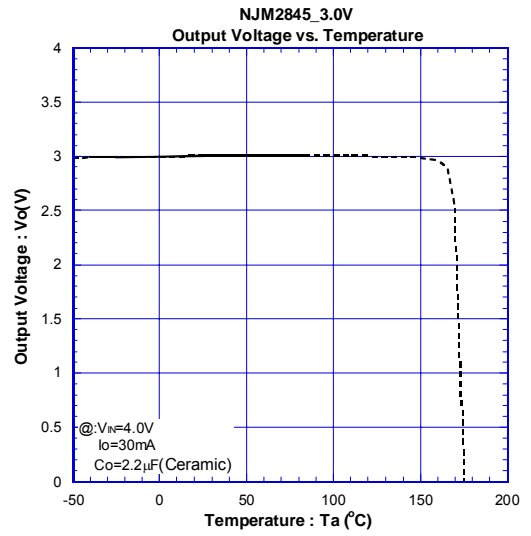
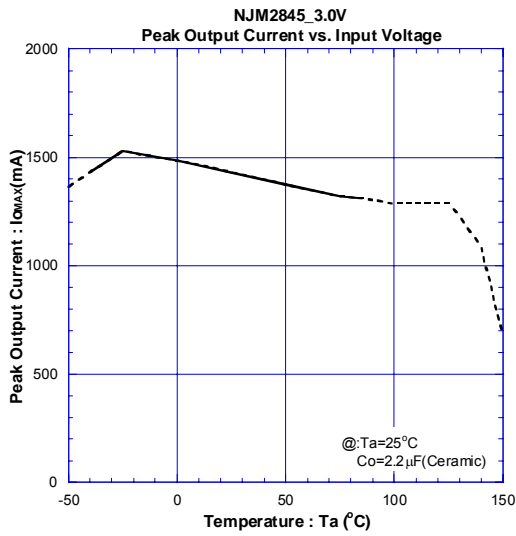


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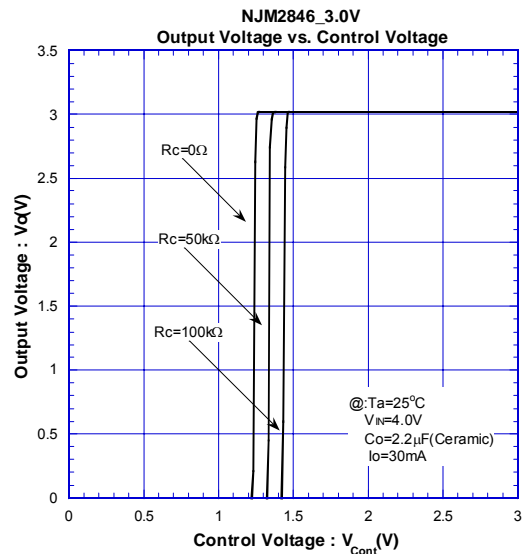
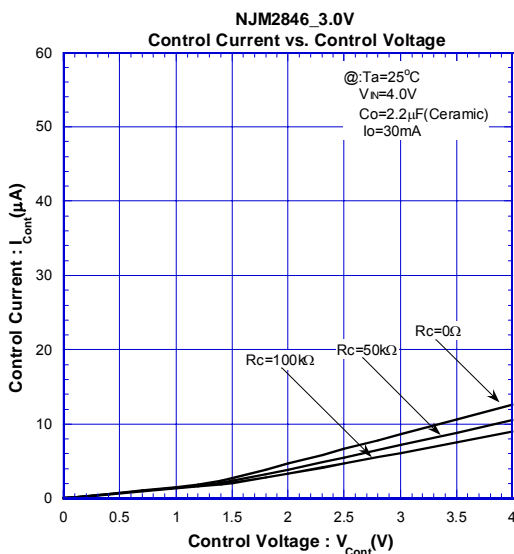
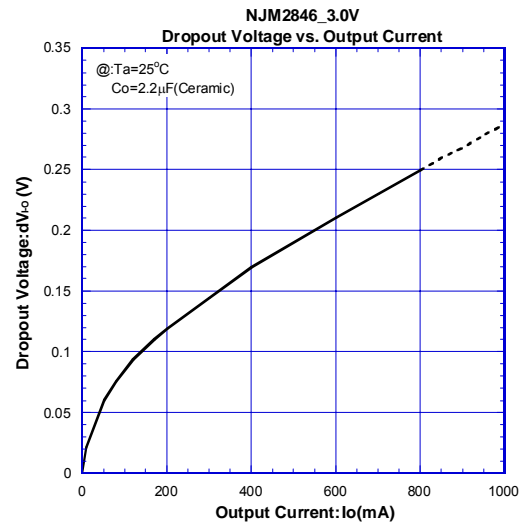
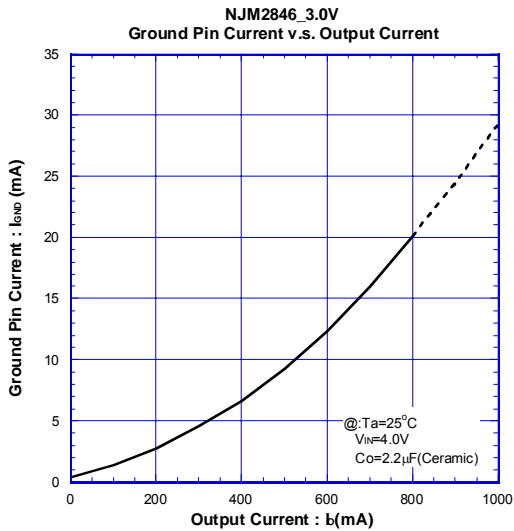
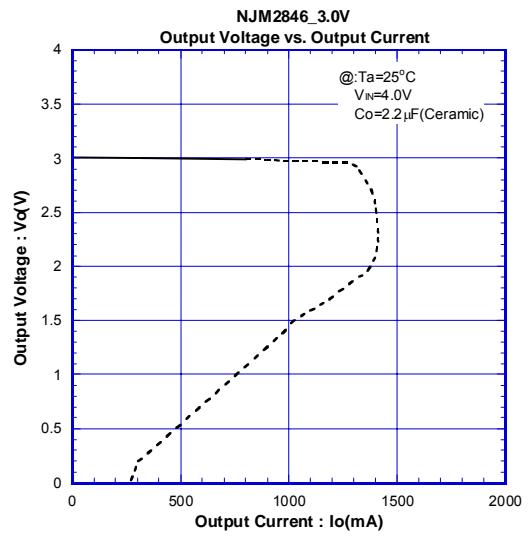
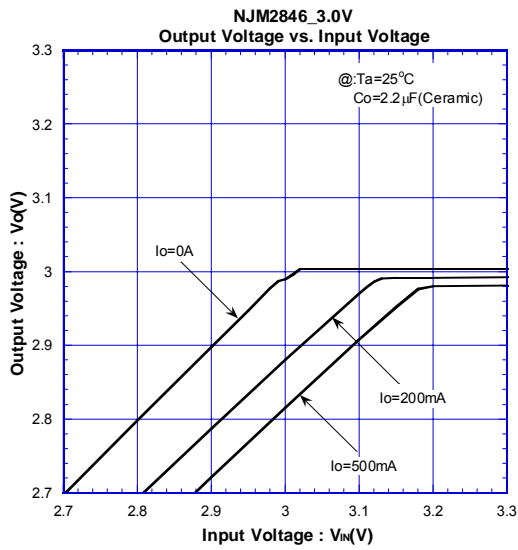


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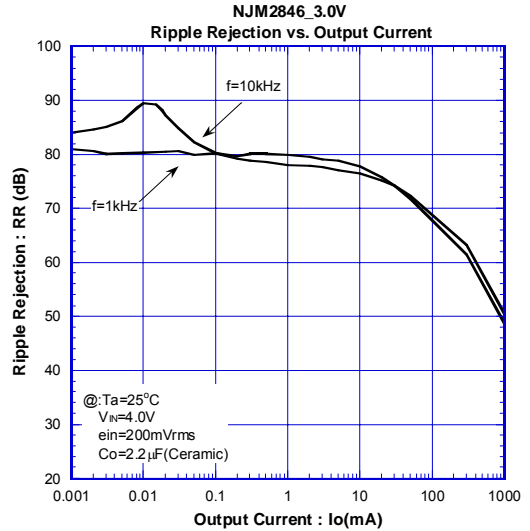
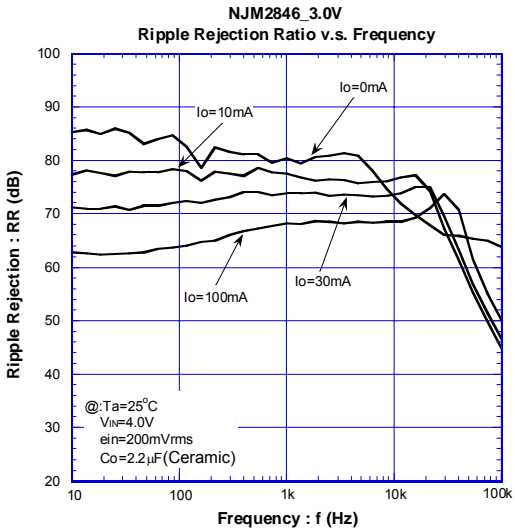
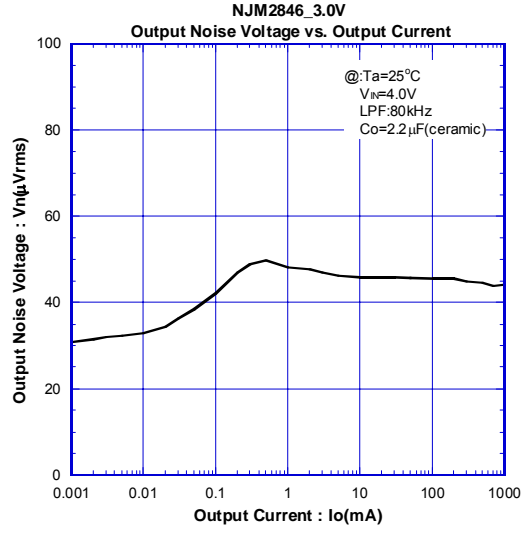
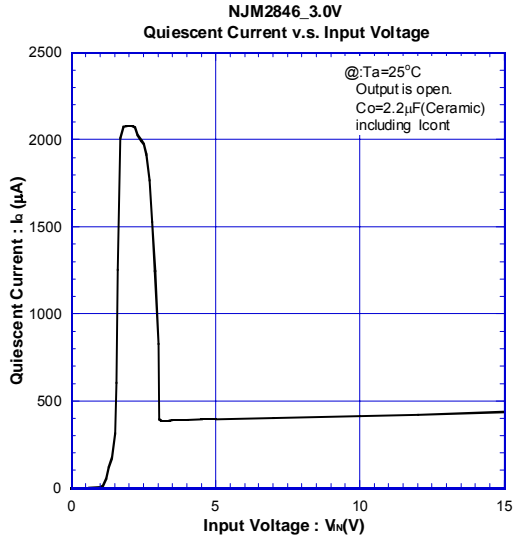
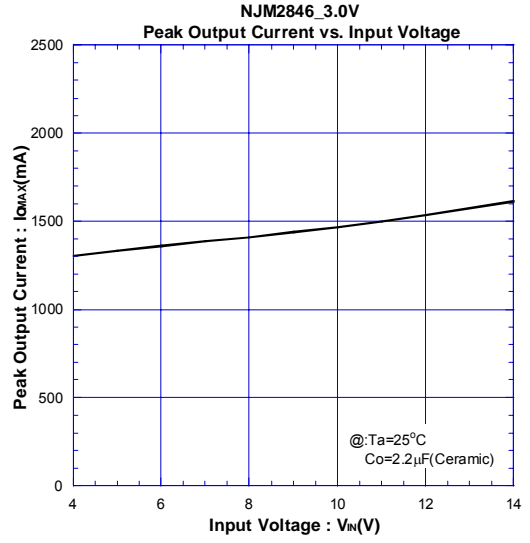
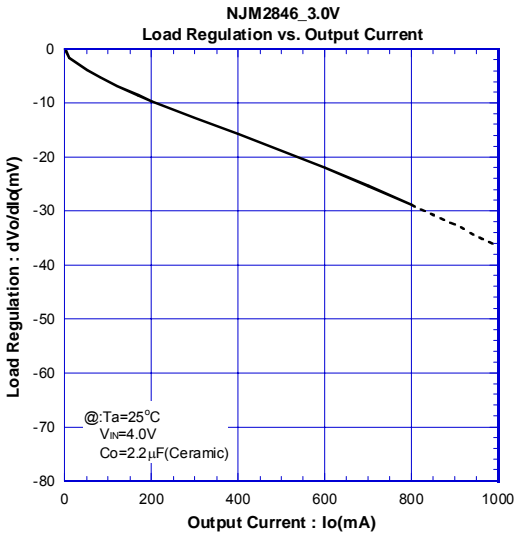


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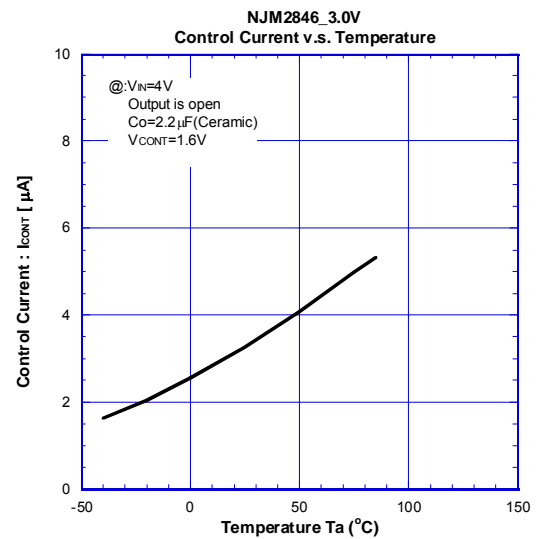
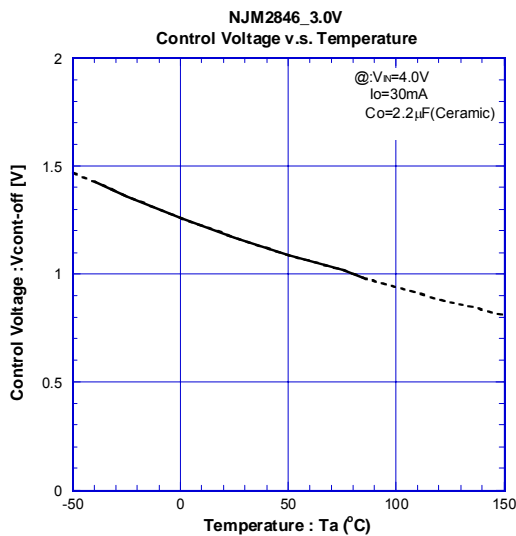
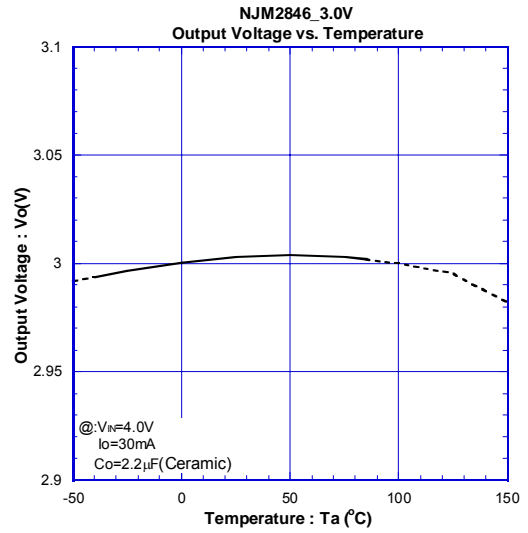
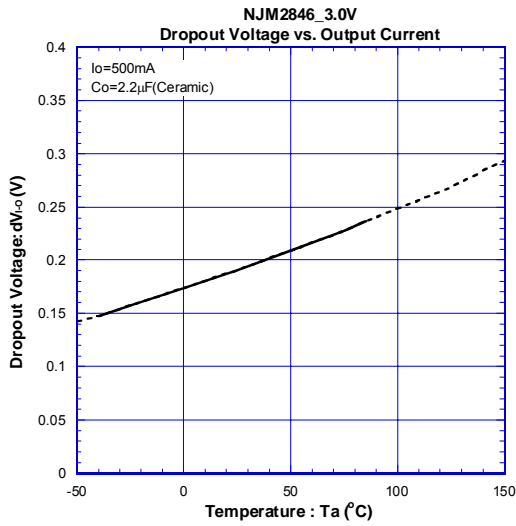
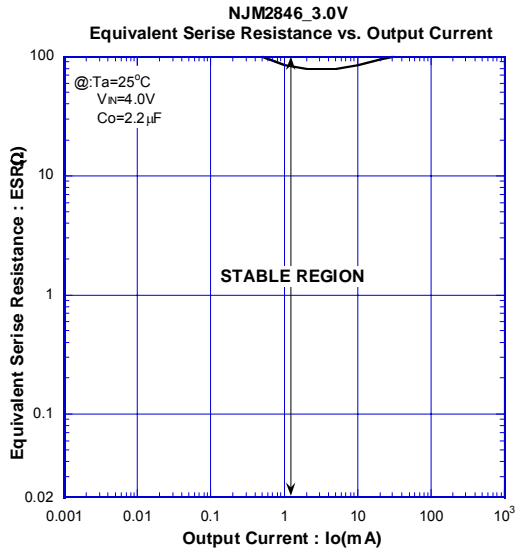


■ TYPICAL CHARACTERISTICS (NJM2846)

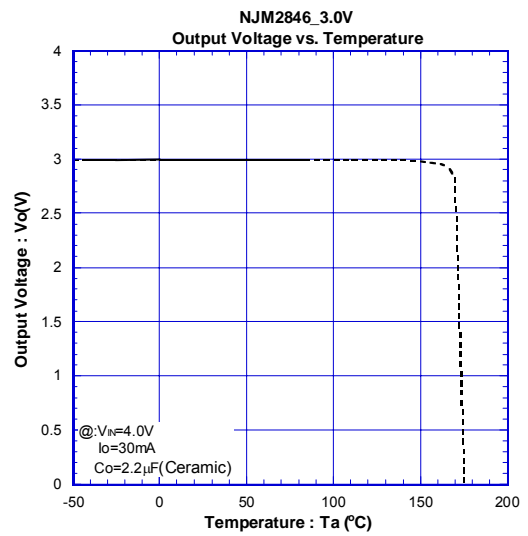
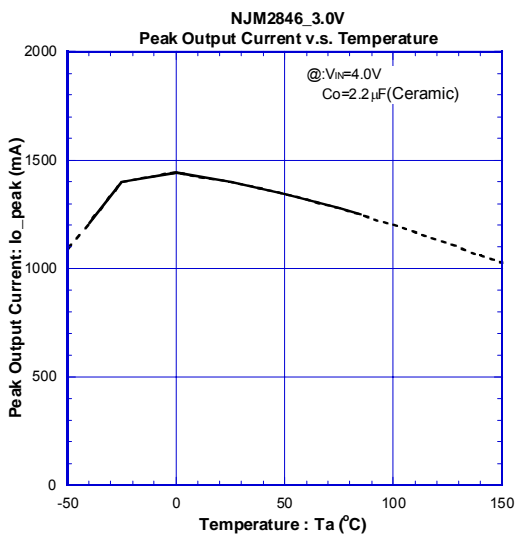
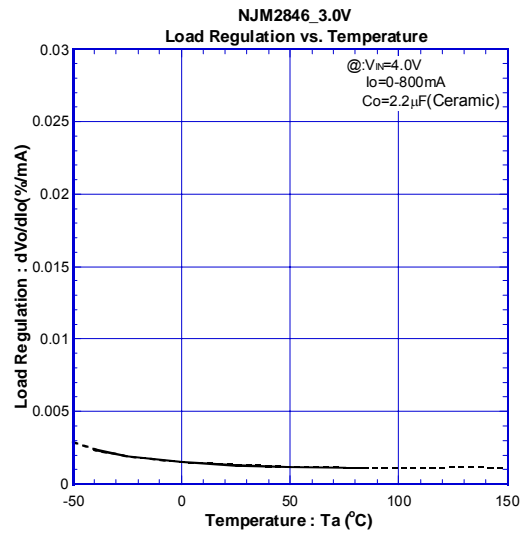
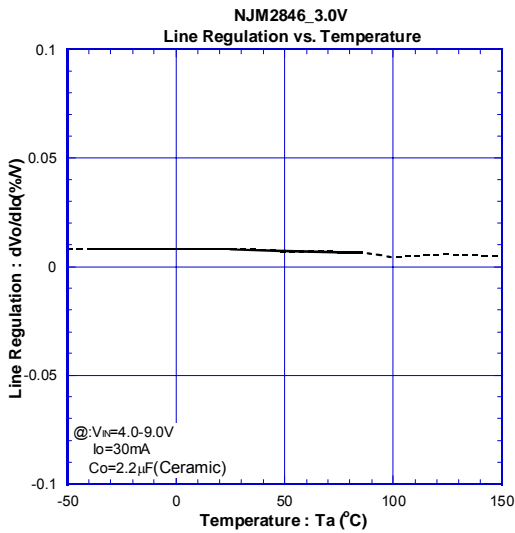
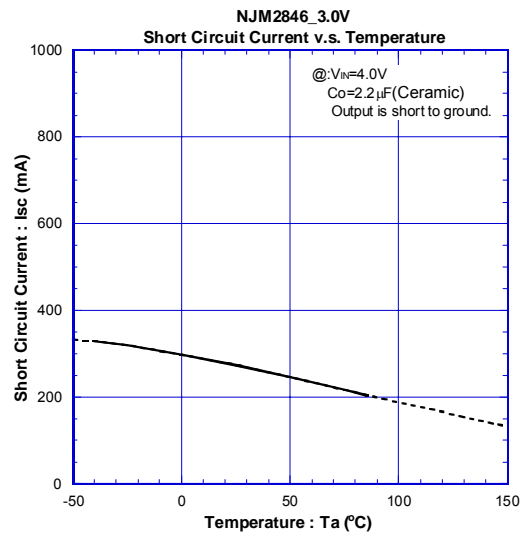
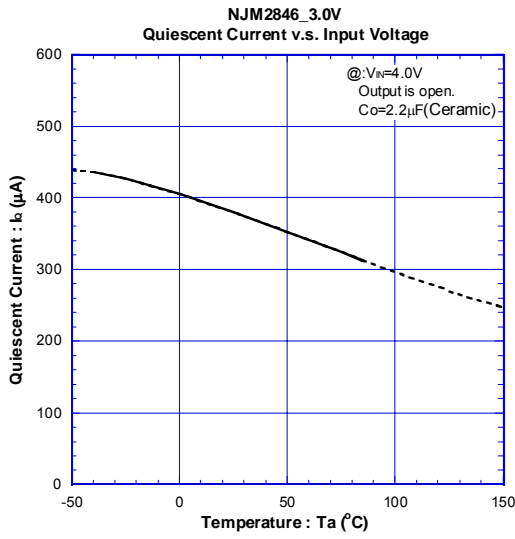


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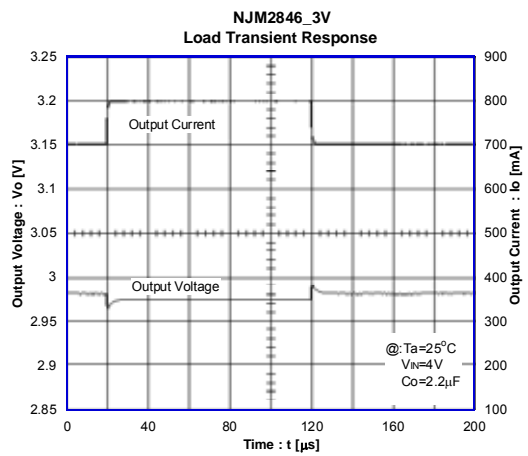
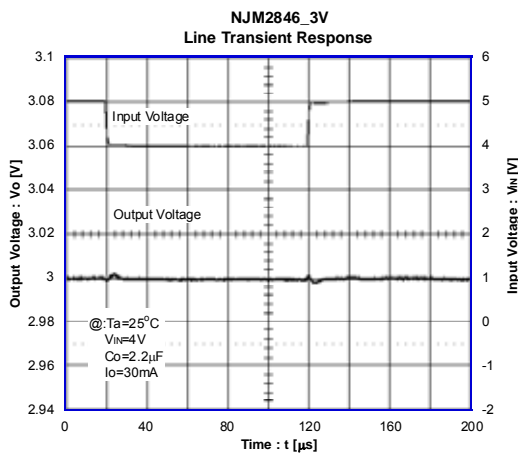
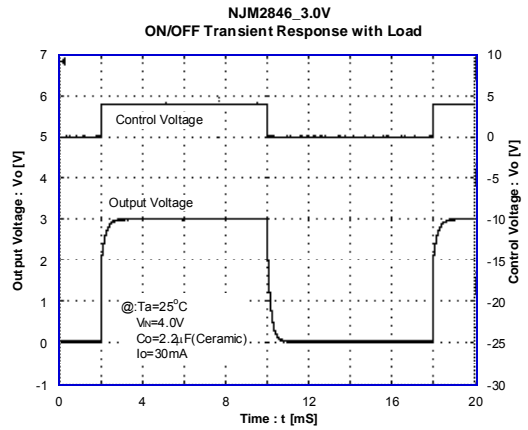
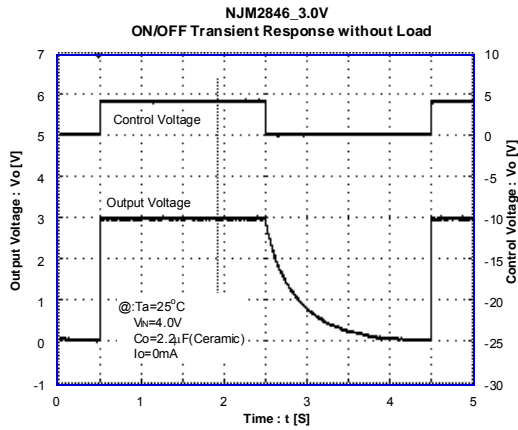


■ TYPICAL CHARACTERISTICS (NJM2846)



NJM2845/46



■ TYPICAL CHARACTERISTICS (NJM2846)



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