

LOW DROPOUT VOLTAGE REGULATOR

■ GENERAL DESCRIPTION

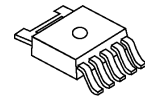
The NJM2817 is a low dropout voltage regulator with ON/OFF control.

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

It delivers up to 5V/3A output power with the maximum input voltage of 8V.

The NJM2817 is suitable for audio/video and digital applications.

■ PACKAGE OUTLINE

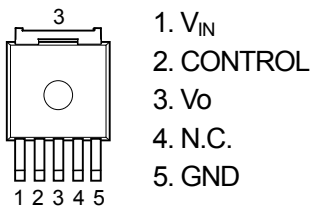


NJM2817DL3

■ FEATURES

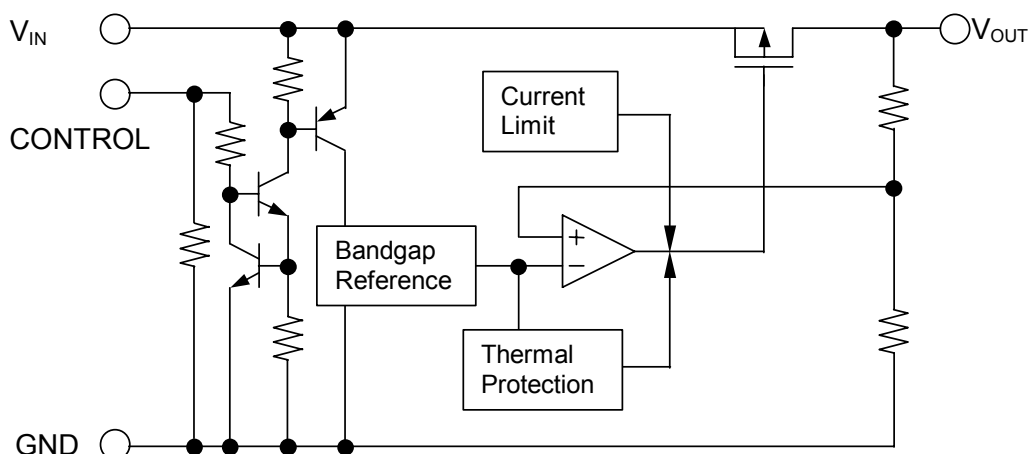
- High Ripple Rejection 65dB typ. (f=1kHz,3V Version)
- Output Noise Voltage $V_{no}=42\mu V_{rms}$ typ. ($V_o=3V$ Version)
- Output capacitor with 4.7 μF ceramic capacitor ($V_o\geq 2.1V$)
- Output Current $I_o(max.)=3.0A$
- High Precision Output $V_o \pm 1.0\%$
- Low Dropout Voltage 0.12V typ. ($I_o=1.5A, 3.0V$ Version)
- ON/OFF Control
- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Package Outline TO-252-5

■ PIN CONFIGURATION



NJM2817DL3

■ EQUIVALENT CIRCUIT



■ OUTPUT VOLTAGE RANK LIST

Device Name	V _{OUT}
NJM2817DL3-18	1.8V
NJM2817DL3-21	2.1V
NJM2817DL3-03	3.0V
NJM2817DL3-05	5.0V

Output voltage options available : 1.8 ~ 5.0V (0.1V step)

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V _{IN}	+8	V
Control Voltage	V _{CONT}	+8	V
Power Dissipation	P _D	1190(*1) 3125(*2)	mW
Operating Temperature	Topr	-40 ~ +85	°C
Storage Temperature	Tstg	-40 ~ +150	°C

(*1) : Mounted on glass epoxy board. (76.2×114.3×1.6mm:EIA/JDEC standard size, 2Layers, copper area 100mm²)

(*2) : Mounted on glass epoxy board. (76.2×114.3×1.6mm:EIA/JDEC standard size, 4Layers,

(4Layers inner foil : 74.2 x 74.2mm Applying thermal via holes to a board based on JEDEC standard JESD51-5)

■ OPERATING VOLTAGE

V_{IN}=V_O + ΔV_{I-O} ~ +7V (In case of 2.1V ≤ V_O ≤ 5.0V version)

V_{IN}=2.3V ~ +7V (In case of V_O < 2.1V version)

■ ELECTRICAL CHARACTERISTICS

(V_{IN}=V_O+1V, C_{IN}=4.7μF(C_{IN}=10μF:Vo<2.1V), Co=4.7μF(Co=33μF : Vo<2.1V), Ta=25°C)

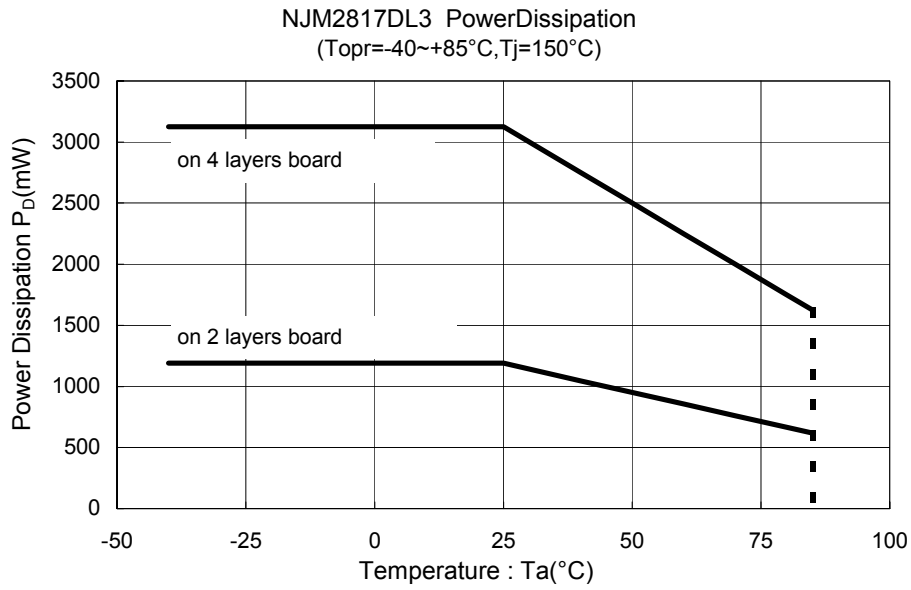
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V _O	I _O =100mA	-1.0%	-	+1.0%	V	
Quiescent Current	I _Q	I _O =0mA, except I _{CONT}	-	700	1200	μA	
Quiescent Current at Control OFF	I _{Q(OFF)}	V _{CONT} =0V	-	-	1	μA	
Output Current	I _O	V _O x 0.9V	3	5	-	A	
Line Regulation	ΔV _O /ΔV _{IN}	V _{IN} =V _O +1V ~ 7V, I _O =100mA	-	0.01	0.05	%/V	
Load Regulation	ΔV _O /ΔI _O	I _O =0 ~ 3.0A	-	0.05	0.3	%/A	
Dropout Voltage(*2)	ΔV _{I-O}	I _O =1.0A	2.1V ≤ V _O < 2.5V	-	0.16	0.27	V
			2.5V ≤ V _O < 2.8V	-	0.13	0.22	
			2.8V ≤ V _O < 3.4V	-	0.12	0.20	
			3.4V ≤ V _O ≤ 5.0V	-	0.11	0.18	
Ripple Rejection	RR	e _{in} =200mVrms, f=1kHz, I _O =100mA, V _O =3V Version	-	65	-	dB	
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔTa	Ta=0 ~ 85°C, I _O =100mA	-	± 50	-	ppm/°C	
Output Noise Voltage	V _{NO}	f=10Hz ~ 80kHz, I _O =100mA, V _O =3V Version	-	42	-	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	
Minimum Input Voltage	V _{IN(MIN.)}	Vo<2.1V	I _O ≤1.5A, V _O ×0.96	2.3	-	-	V
			1.5A<I _O ≤2.0A, V _O ×0.96	2.4	-	-	V

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

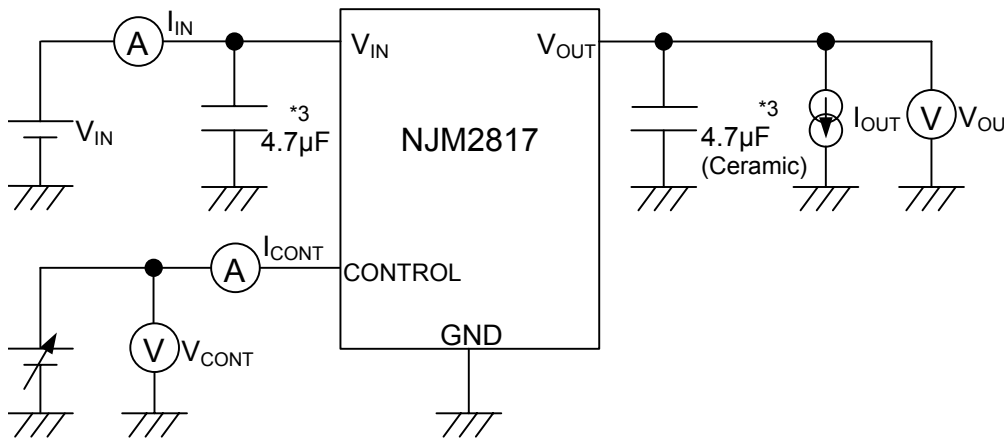
The above specification is a common specification for all output voltages.

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

POWER DISSIPATION vs. AMBIENT TEMPERATURE



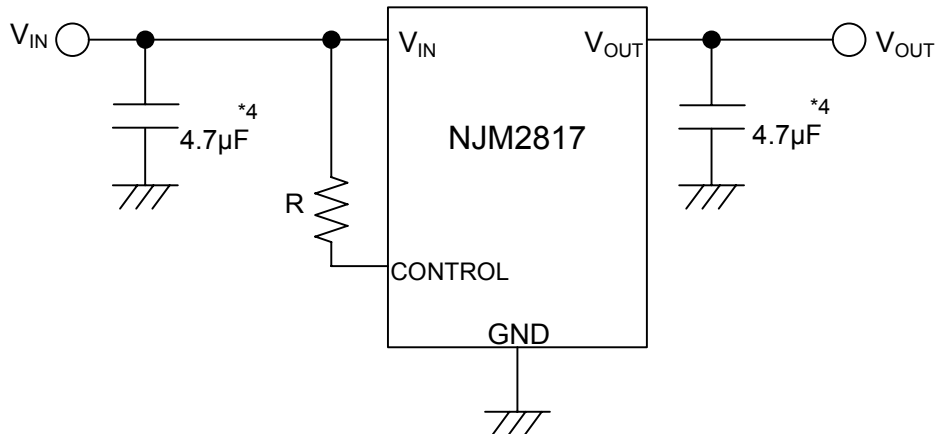
TEST CIRCUIT



*3 : $V_o < 2.1\text{V}$ version : $C_{IN}=10\mu\text{F}$
 $V_o < 2.1\text{V}$ version : $C_o=33\mu\text{F}$ (Ceramic)

■ TYPICAL APPLICATION

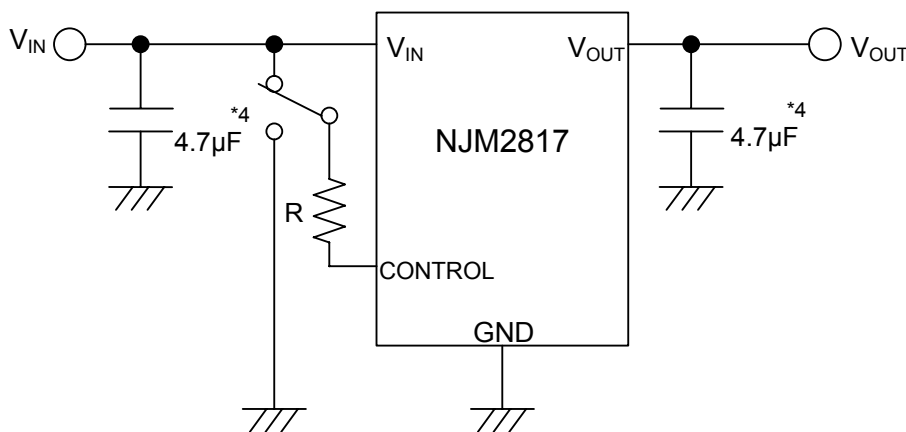
① In the case where ON/OFF Control is not required:



*4 : $V_o < 2.1V$ version : $C_{IN}=10\mu F$
 $V_o < 2.1V$ version : $C_o=33\mu F$

Connect control terminal to V_{IN} terminal

② In use of ON/OFF CONTROL:



*4 : $V_o < 2.1V$ version : $C_{IN}=10\mu F$
 $V_o < 2.1V$ version : $C_o=33\mu F$

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 4.7 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) influence stability of the regulator.

If use a smaller C_O , it 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.

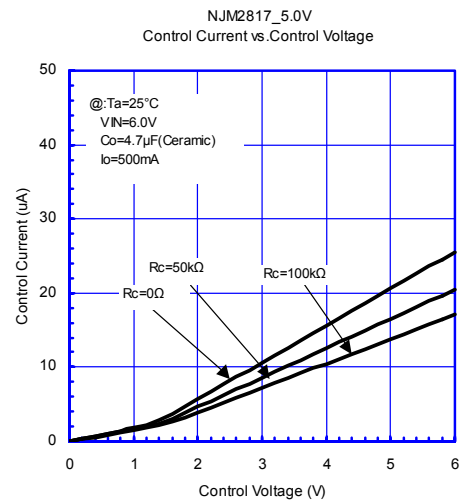
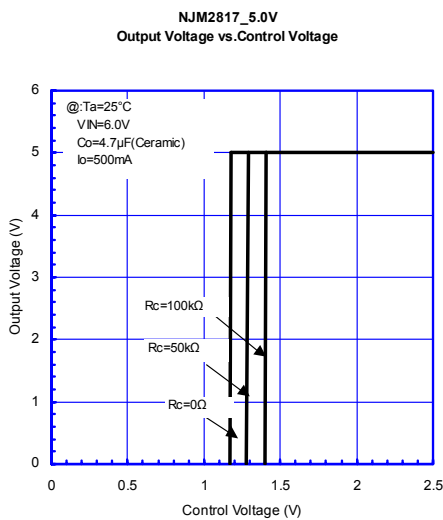
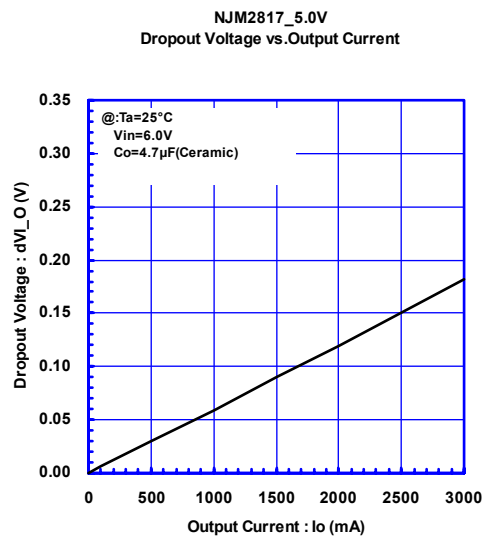
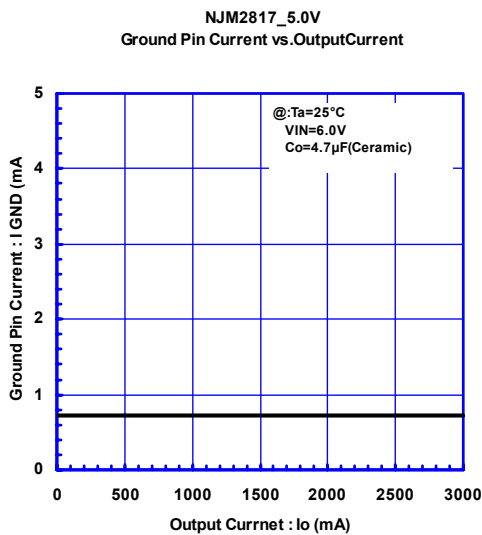
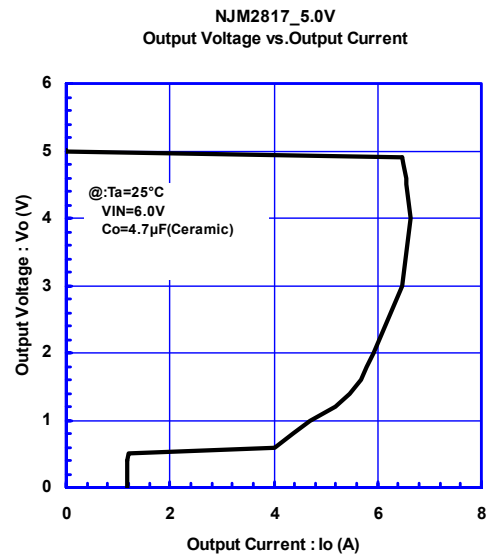
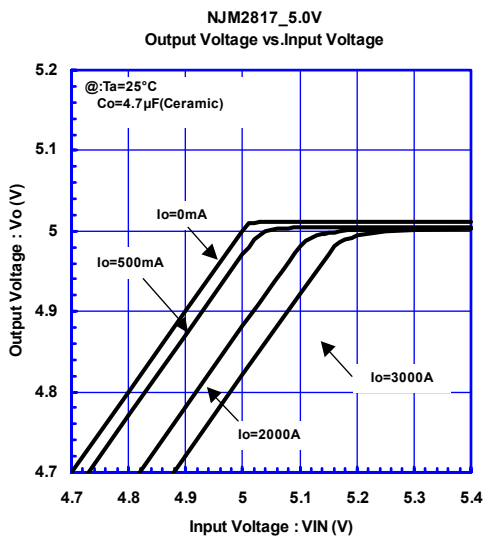
The recommended capacitance depends on the output voltage. Low voltage regulator requires greater value of the C_O . Thus, check the recommended capacitance for each output voltage.

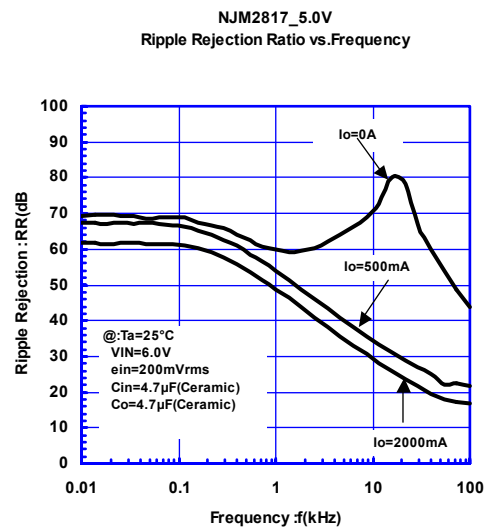
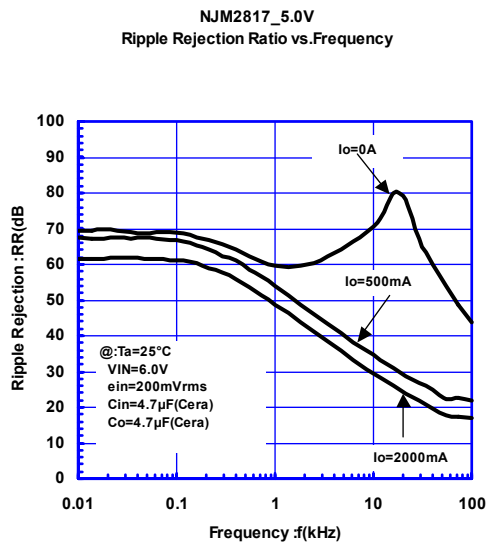
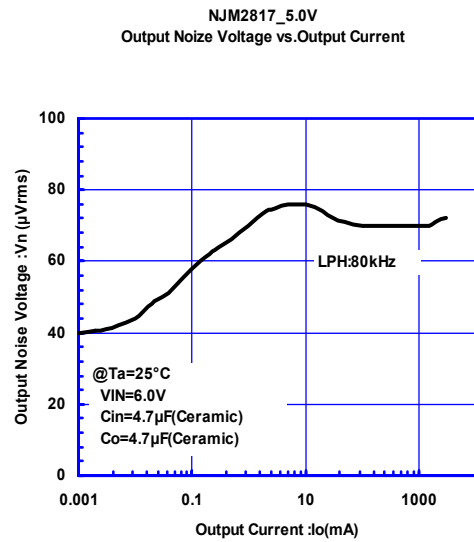
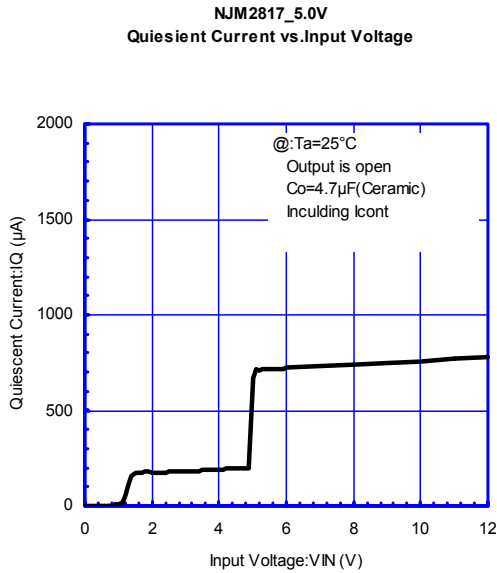
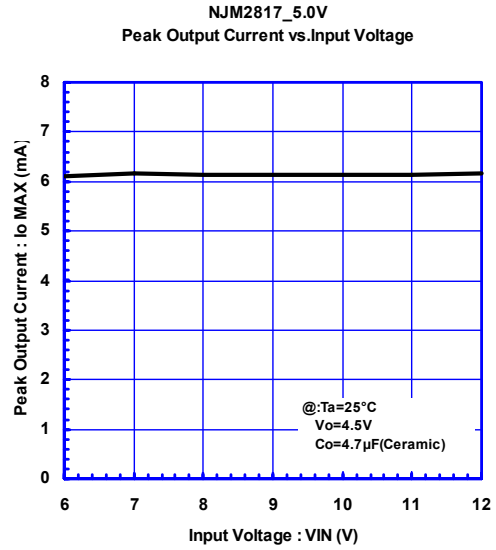
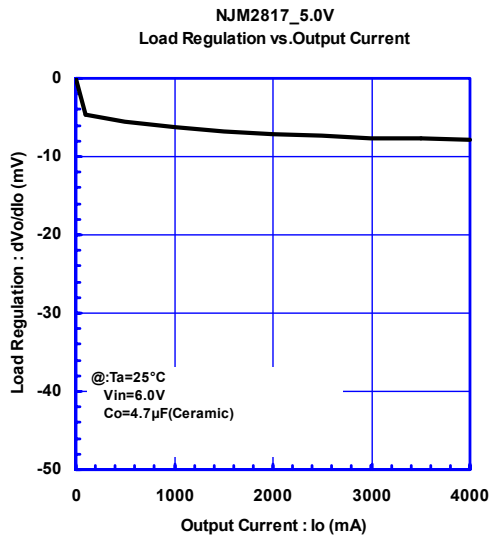
Use of a greater C_O reduces output noise and ripple output, and also improves transient response of the output voltage against rapid load change.

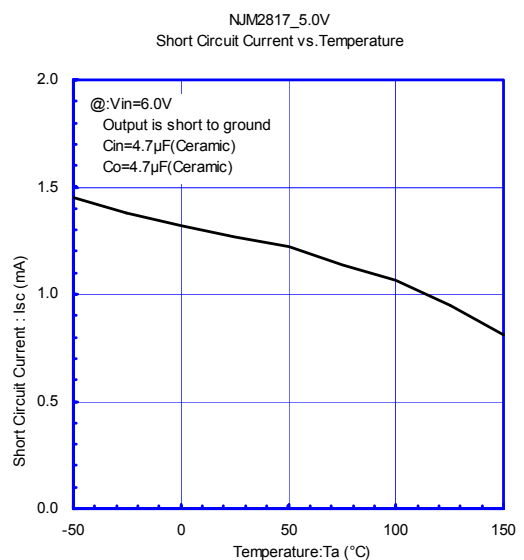
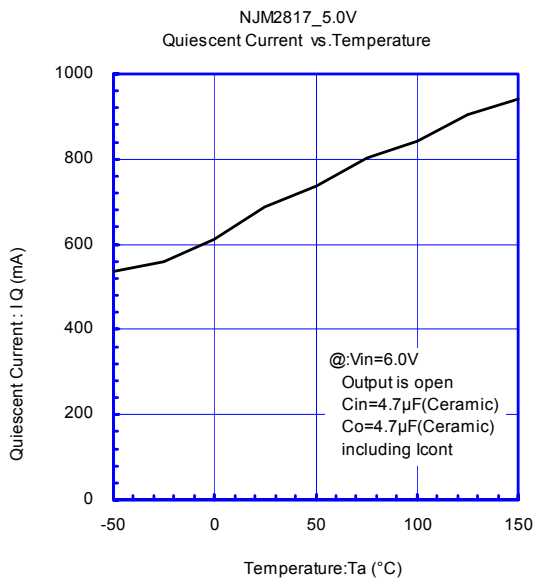
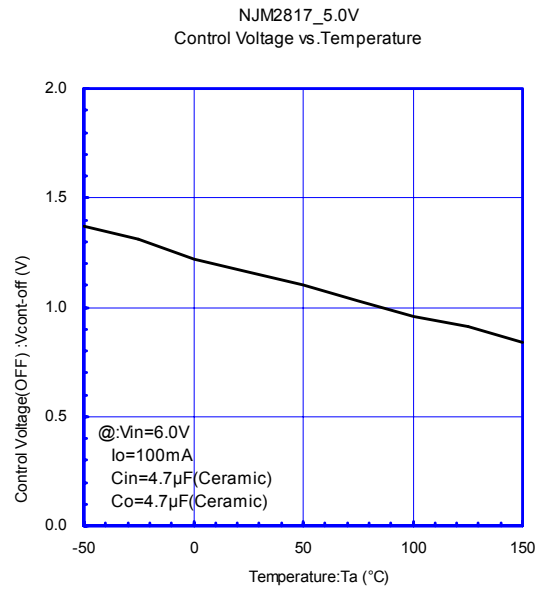
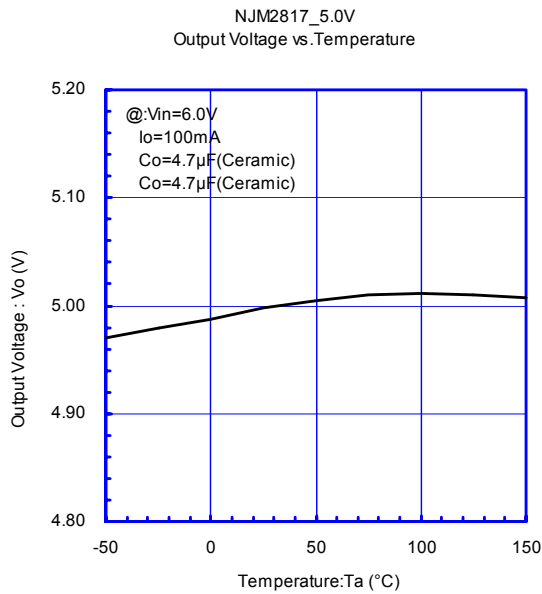
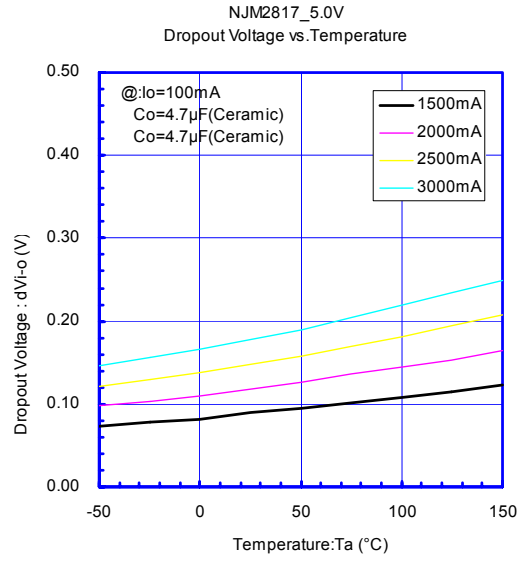
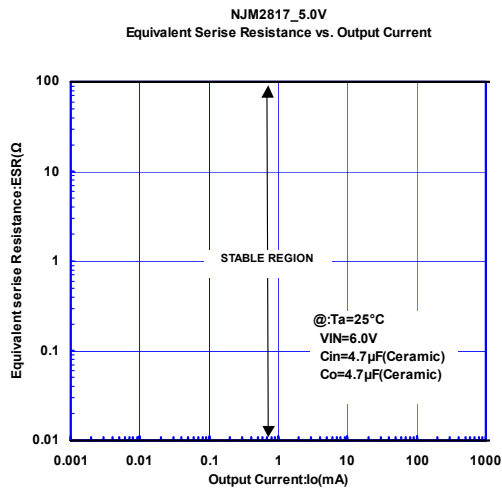
This product is designed to work with any capacitor including a low ESR capacitor for the C_O ; however, refer "Equivalent Series Resistance vs. Output Current" and choose suitable capacitor.

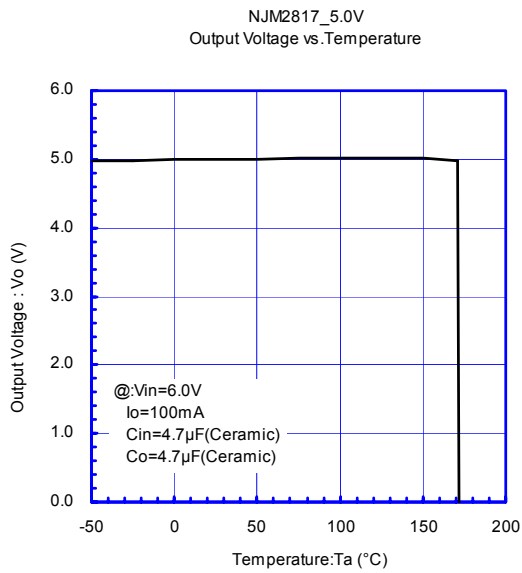
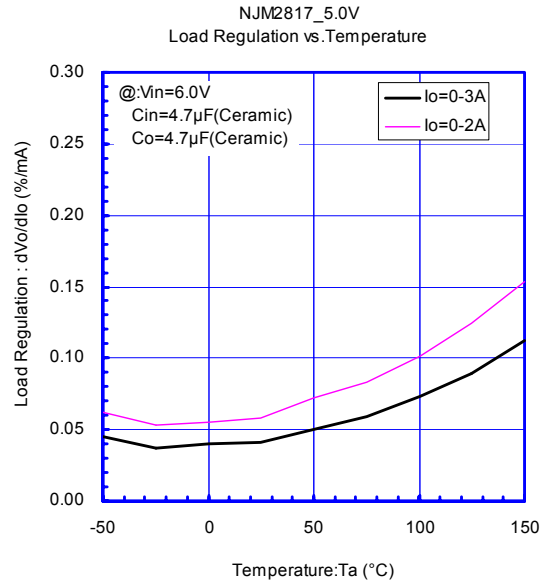
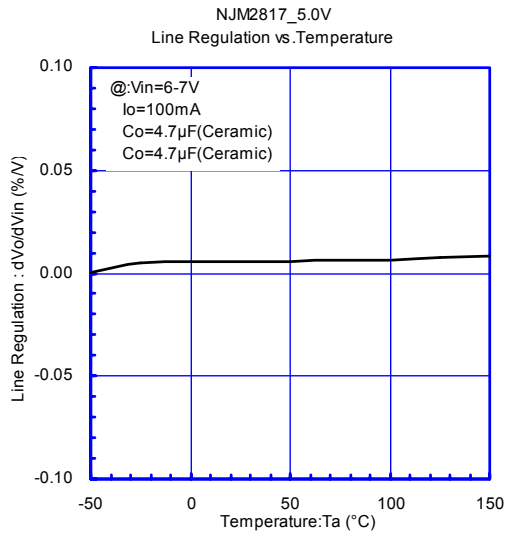
- * When distance from an IC to load is long, an IC may cause malfunction by wiring capacity and an L ingredient. Please use it after having evaluated it enough.

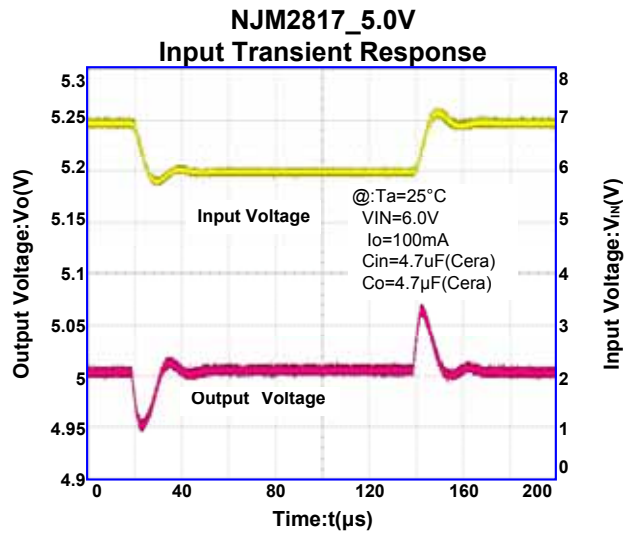
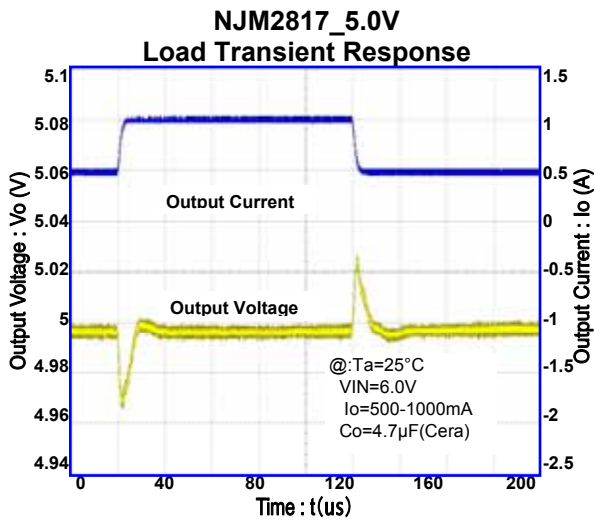
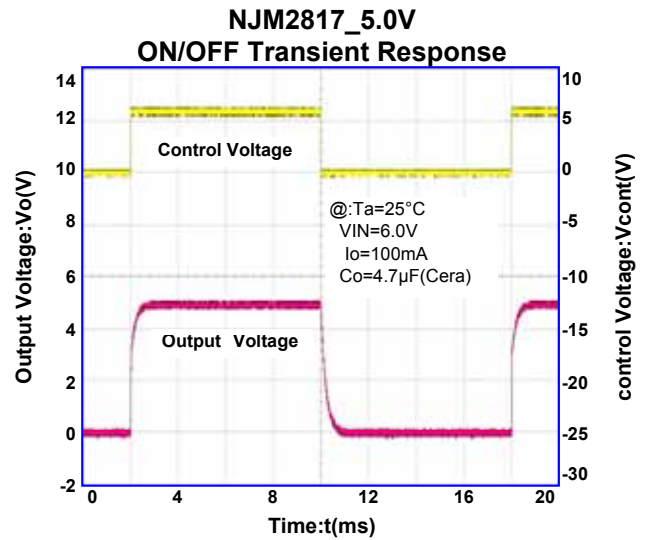
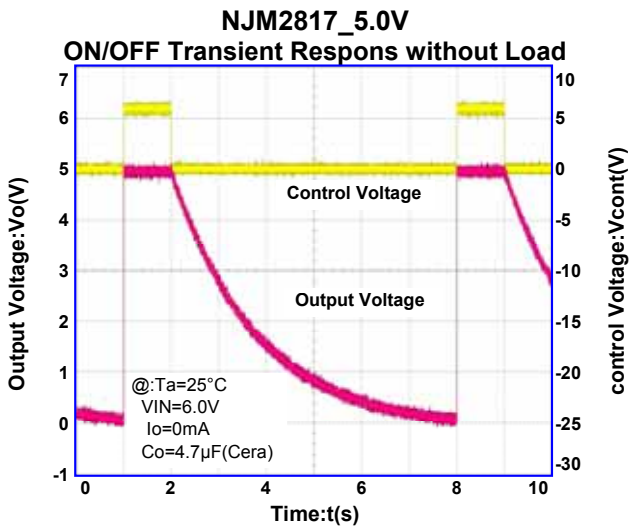
TYPICAL CHARACTERISTICS











[CAUTION]

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