LOW DROPOUT VOLTAGE REGULATOR

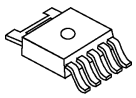
■ GENERAL DESCRIPTION

The NJM2856 is a 3-terminal low dropout voltage regulator. Advanced Bipolar technology achieves low noise, high ripple rejection.

It delivers up to 5V/1A output power with the maximum input voltage of 10V.

The NJM2856 is suitable for various applications such as portable / consumer devices.

■ PACKAGE OUTLINE

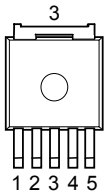


NJM2856DL3

■ 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.)=1A
- High Precision Output Vo±1.0%
- Low Dropout Voltage 0.20V typ. (Io=600mA)
- ON/OFF Control
- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Bipolar Technology
- Package Outline TO-252-5

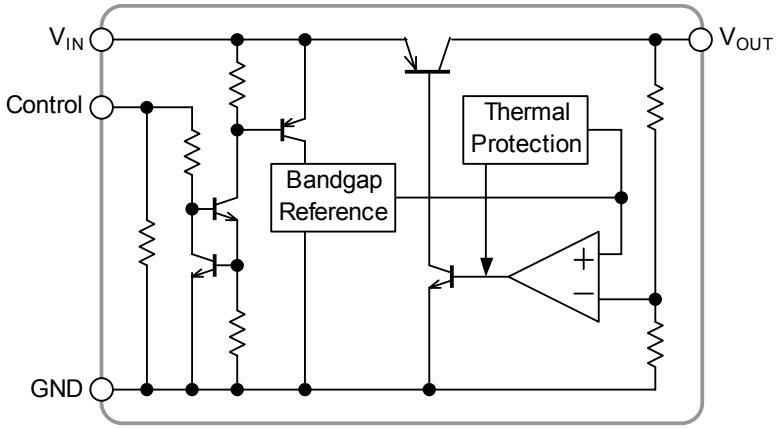
■ PIN CONFIGURATION



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

NJM2856DL3

■ EQUIVALENT CIRCUIT



■ OUTPUT VOLTAGE RANK LIST

Device Name	V_{OUT}
NJM2856DL3-15	1.5V
NJM2856DL3-18	1.8V
NJM2856DL3-23	2.3V
NJM2856DL3-25	2.5V
NJM2856DL3-03	3.0V
NJM2856DL3-33	3.3V
NJM2856DL3-05	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}	+10	V
Control Voltae	V_{CONT}	+10	V
Power Dissipation	P_D	1190(*1)	mW
Operating Temperature	Topr	-40 ~ +85	°C
Storage Temperature	Tstg	-40 ~ +150	°C

(*1): Mounted on glass epoxy board based on EIA/JEDEC. (114.3x76.2x1.6mm: 2Layers, copper area 100mm^2)

■ OPERATING VOLTAGE

V_{IN}=+2.5V ~ +8V (In case of Vo<2.3V version)

■ ELECTRICAL CHARACTERISTICS

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

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	Vo	Io=30mA	-1.0%	-	+1.0%	V
Input Voltage	V_{IN}		-	-	8	V
Quiescent Current	I_Q	Io=0mA	-	400	600	µA
Output Current	Io	Vo-0.3V	1000	1300	-	mA
Line Regulation	$\Delta Vo/\Delta V_{IN}$	V_{IN}=Vo+1V~Vo+6V(Vo≤2V), V_{IN}=Vo+1V~8V(Vo>2V), Io=30mA	-	-	0.10	%/V
Load Regulation	$\Delta Vo/\Delta Io$	Io=0 ~ 1A	-	-	0.004	%/mA
Dropout Voltage(*2)	ΔV_{I-O}	Io=600mA	-	0.20	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(*3)	-	45	-	µVrms
Control Current	I_{CONT}	V_{CONT}=1.6V, Io=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
Input Voltage	V_{IN}		-	-	8	V

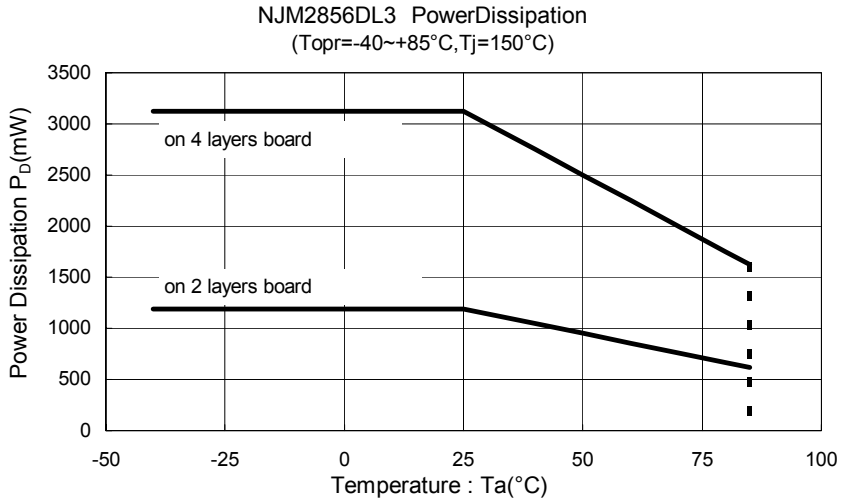
(*2): The output voltage excludes under 2.1V.

(*3): Vo>2.0V : V_{IN}=Vo+1V, Vo≤2.0V : V_{IN}=3.0V

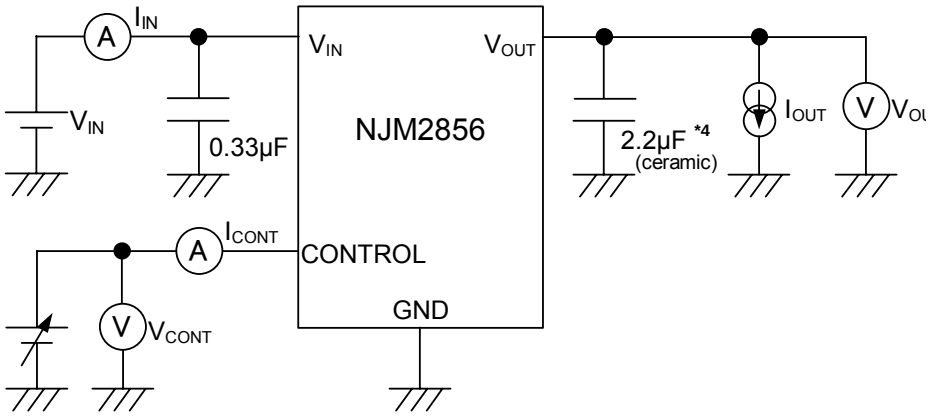
The above specification is a common specification for all output voltages.

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

■ POWER DISSIPATION vs. AMBIENT TEMPERATURE



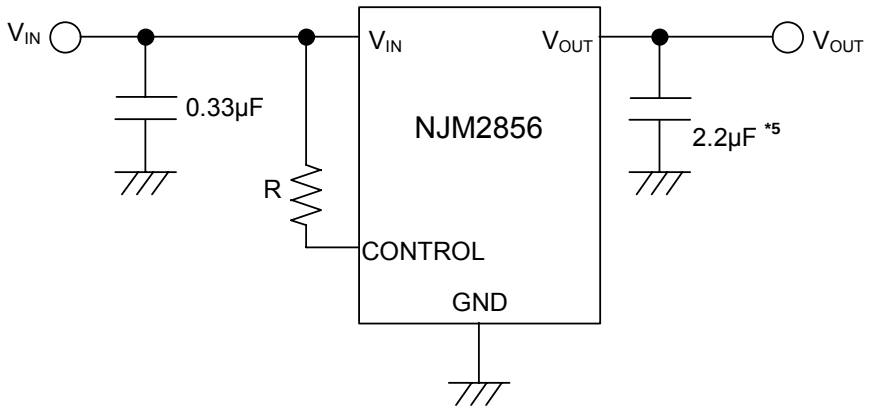
■ TEST CIRCUIT



*4 1.7V<Vo≤2.6V version: Co=4.7µF(ceramic)
Vo≤1.7V version: Co=10µF(ceramic)

■ TYPICAL APPLICATION

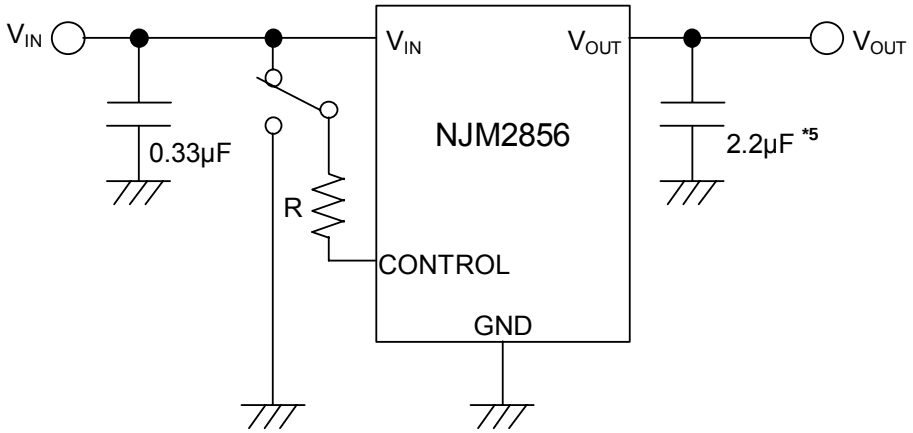
① In the case where ON/OFF Control is not required:



*5 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:



*5 1.7V<Vo≤2.6V version: Co=4.7µF
Vo≤1.7V version: 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.

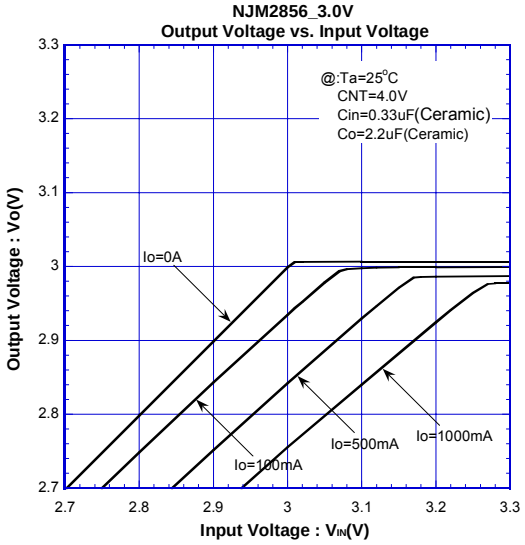
∗Input Capacitance C_{IN}

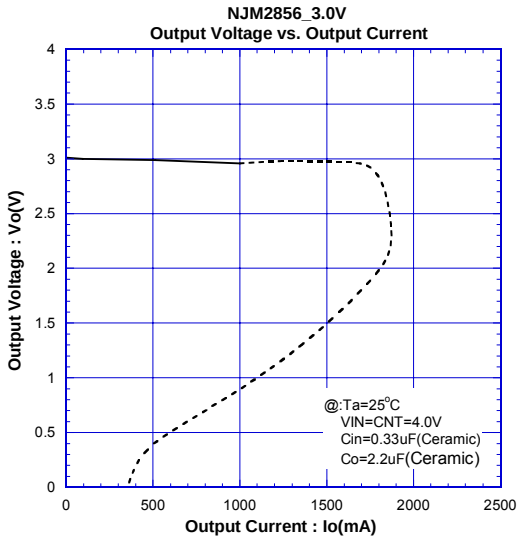
Input Capacitance C_{IN} is required to prevent oscillation and reduce power supply ripple for applications with high power supply impedance or a long power supply line.
Use the C_{IN} value of 0.33μF greater to avoid the problem.
C_{IN} should connect between GND and V_{IN} as short as possible.

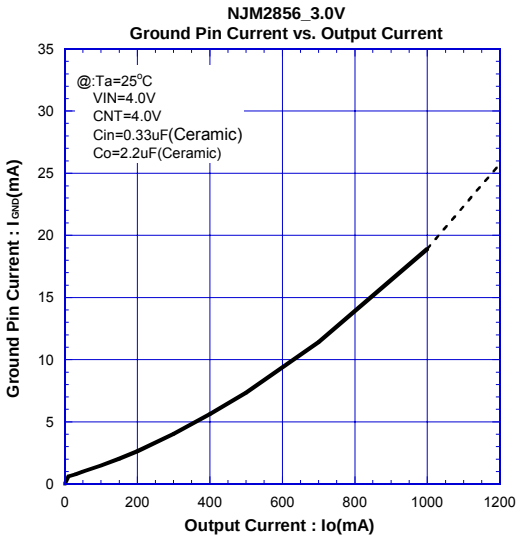
∗Output Capacitance Co

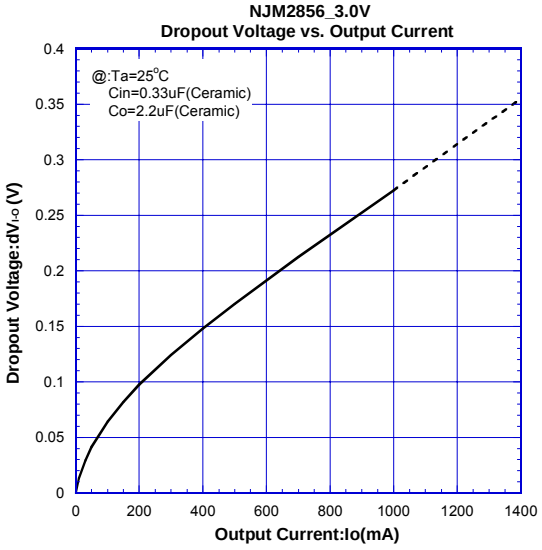
Output capacitor (Co) is required for a phase compensation of the internal error amplifier. The capacitance and the equivalent series resistance (ESR) influence stability of the regulator.
If use a smaller Co, it may cause excess output noise or oscillation of the regulator due to lack of the phase compensation. Therefore, use Co with the recommended capacitance or greater value and connect between Vo terminal and GND terminal with minimal wiring.
The recommended capacitance depends on the output voltage. Low voltage regulator requires greater value of the Co. Thus, check the recommended capacitance for each output voltage.
Use of a greater Co 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 Co; however, refer "Equivalent Series Resistance vs. Output Current" and choose suitable capacitor.

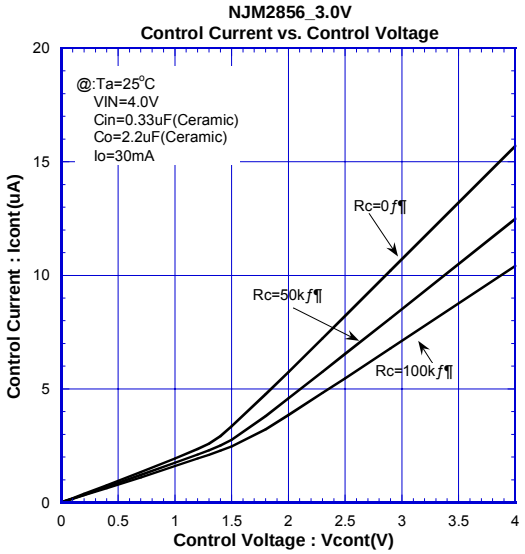
■ TYPICAL CHARACTERISTICS

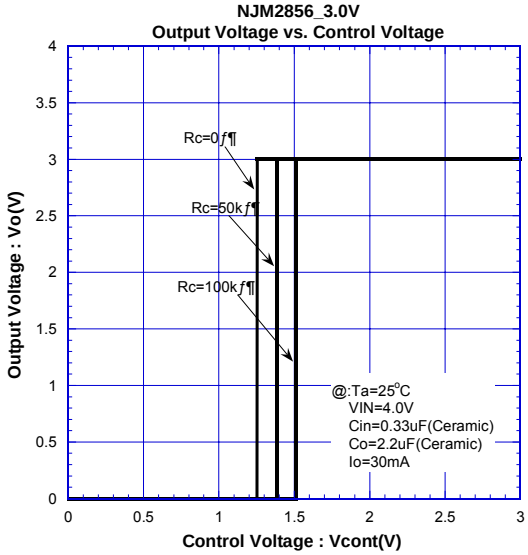






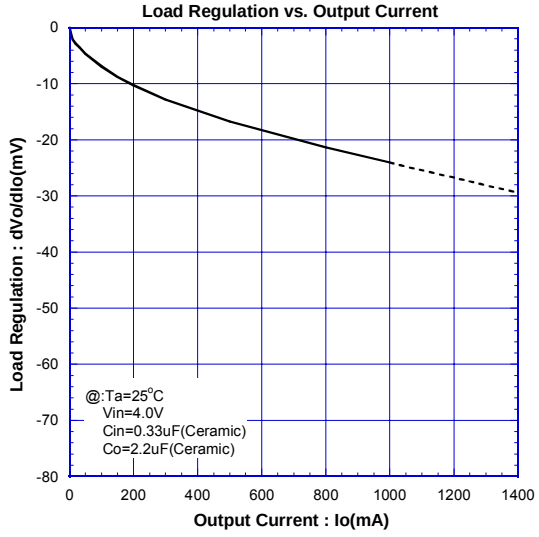




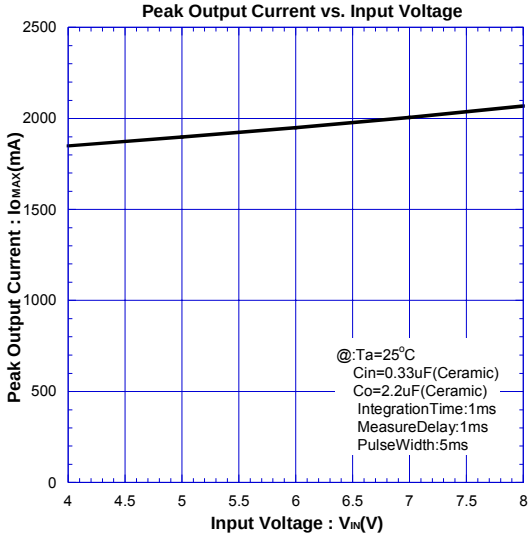


■ TYPICAL CHARACTERISTICS

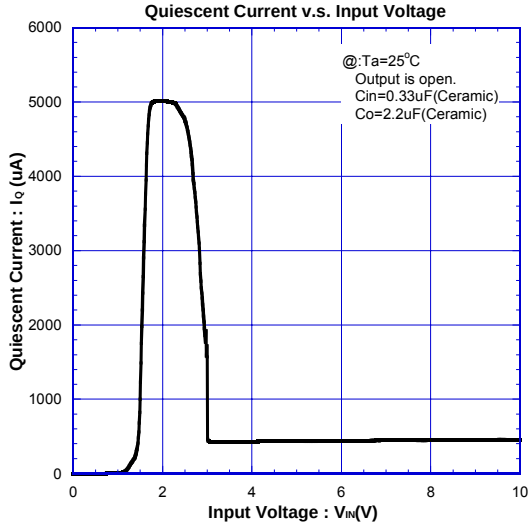
NJM2856_3.0V
Load Regulation vs. Output Current



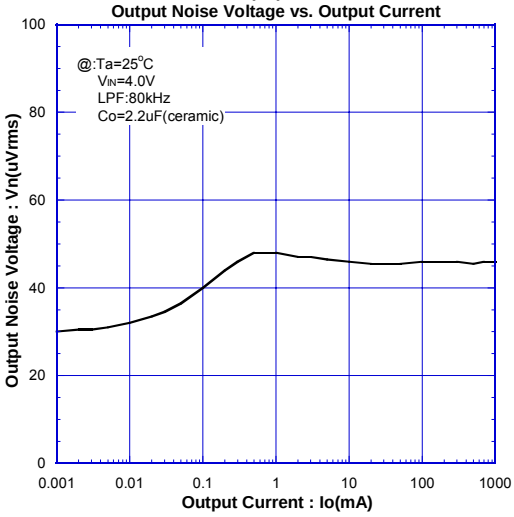
NJM2856_3.0V
Peak Output Current vs. Input Voltage



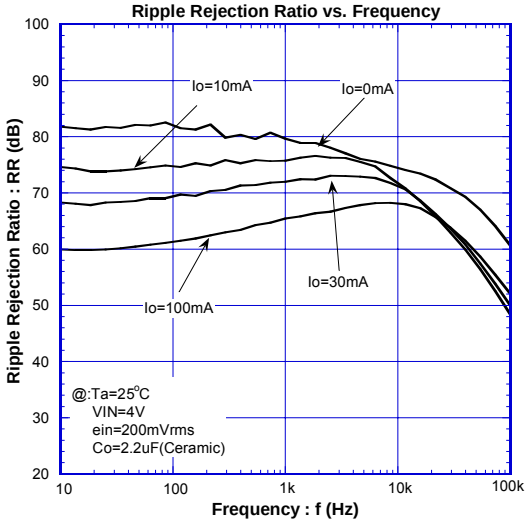
NJM2856_3.0V
Quiescent Current v.s. Input Voltage



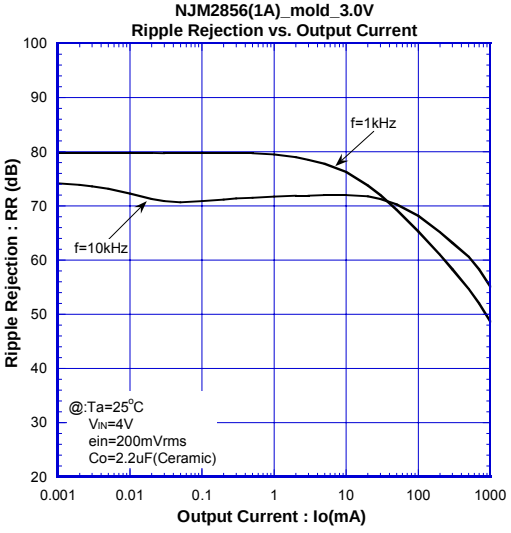
NJM2856(1A)_mold_3.0V
Output Noise Voltage vs. Output Current



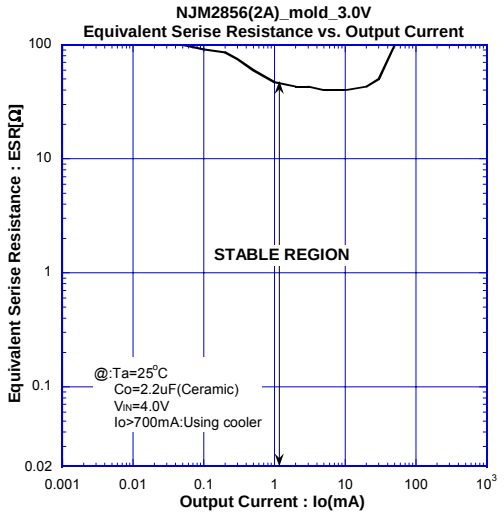
NJM2856(1A)_mold_3.0V
Ripple Rejection Ratio vs. Frequency

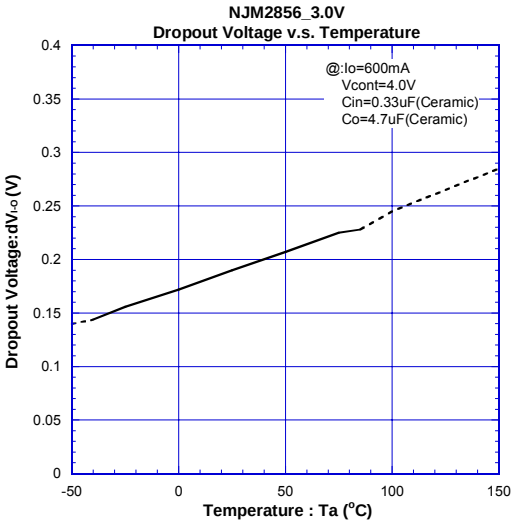


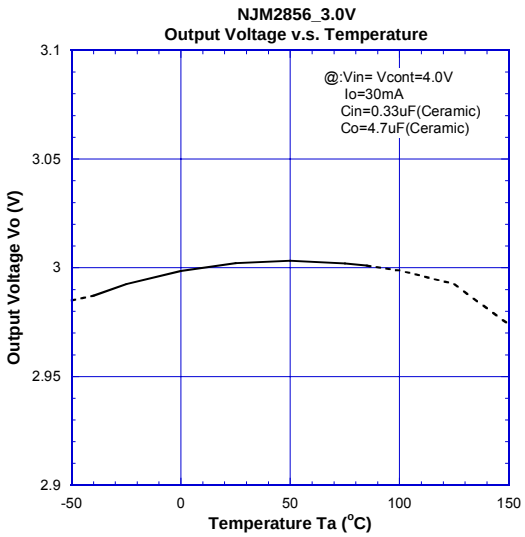
NJM2856(1A)_mold_3.0V
Ripple Rejection vs. Output Current

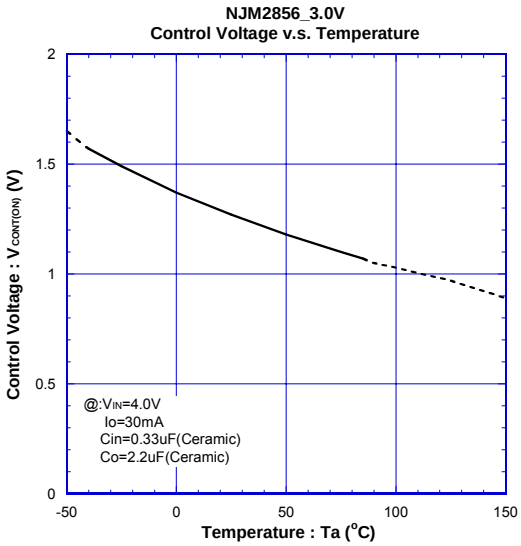


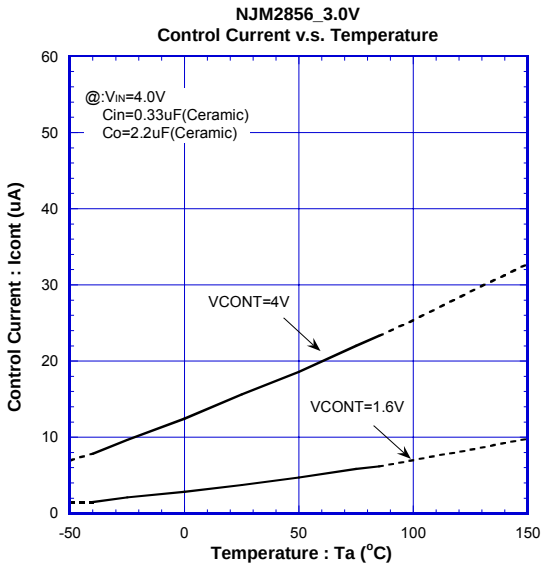
■ TYPICAL CHARACTERISTICS

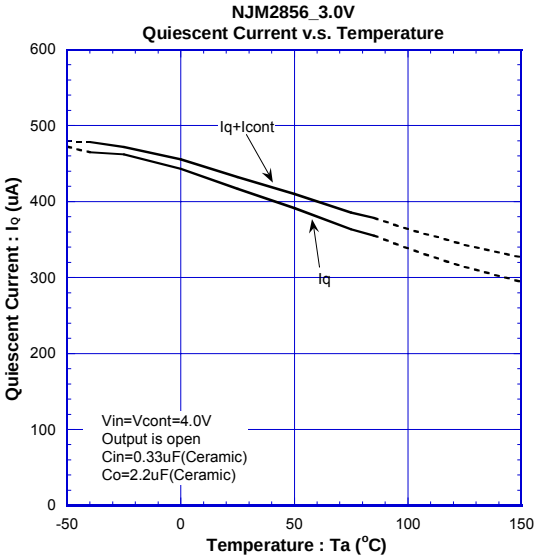






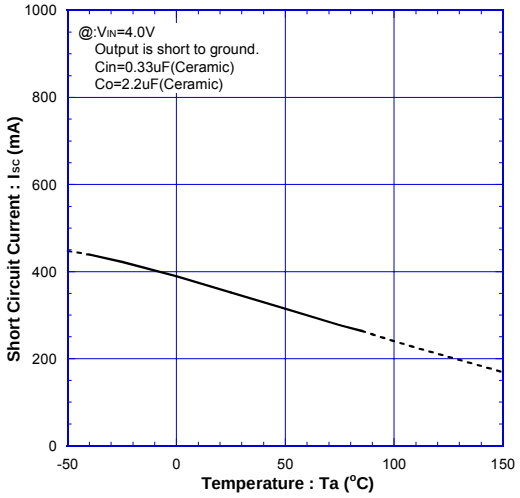




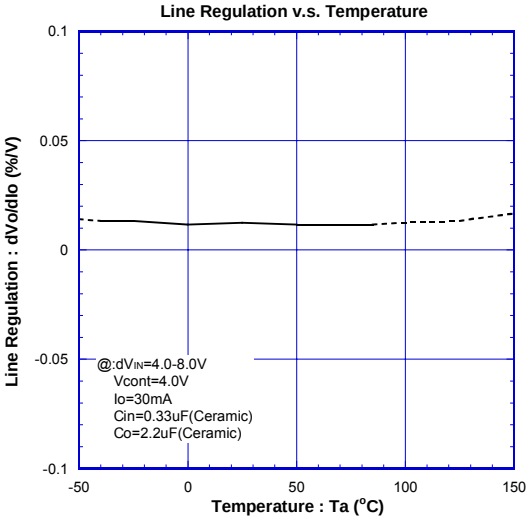


■ TYPICAL CHARACTERISTICS

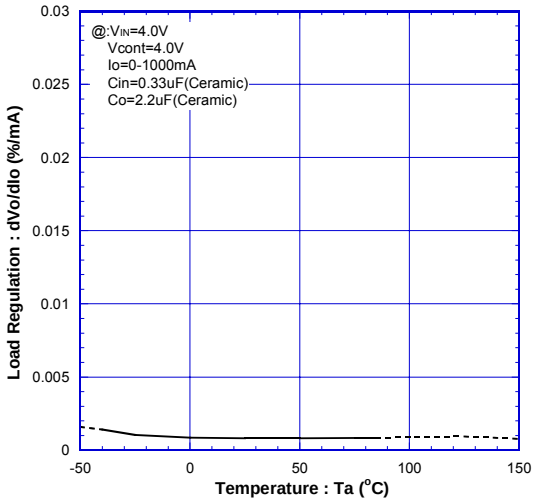
NJM2856_3.0V
Short Circuit Current v.s. Temperature



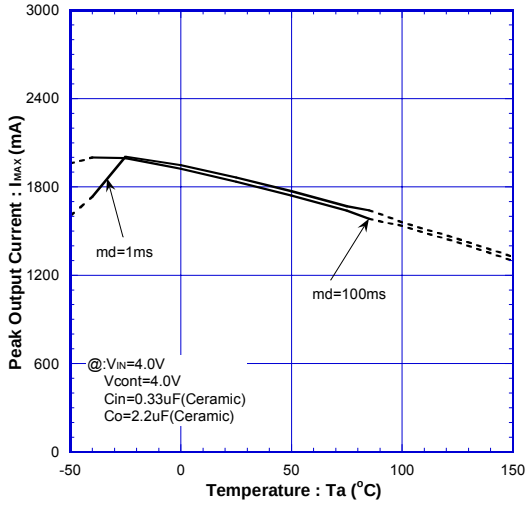
NJM2856_3.0V
Line Regulation v.s. Temperature



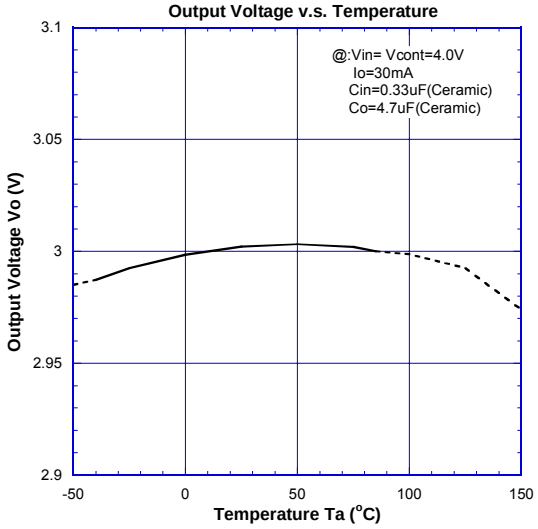
NJM2856_3.0V
Load Regulation v.s. Temperature



NJM2856_3.0V
Peak Output Current v.s. Temperature



NJM2856_3.0V
Output Voltage v.s. Temperature



■ TYPICAL CHARACTERISTICS