LOW DROPOUT VOLTAGE REGULATOR

■ GENERAL DESCRIPTION

The NJM2856 is a low dropout voltage regulator with ON/OFF control.

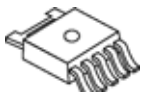
Advanced Bipolar technology achieves low noise, high ripple rejection.

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

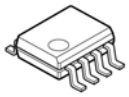
The package option is high power package as TO252-5 and HSOP8.

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

■ PACKAGE OUTLINE



NJM2856DL3

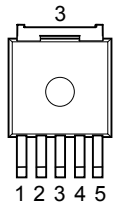


NJM2856GM1

■ FEATURES

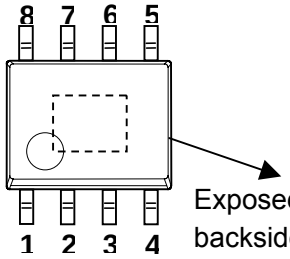
- High Ripple Rejection 75dB typ. (f=1kHz,Vo=3V Version)
- Output Noise Voltage Vno=45μVrms typ.
- Output capacitor with 2.2μF ceramic capacitor (Vo≥2.7V)
- Output Current Io(max.)=1A
- High Precision Output Vo±1.0%
- Low Dropout Voltage 0.20V typ. (Io=600mA)
- ON/OFF Control
- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Bipolar Technology
- Package Outline TO-252-5 HSOP8

■ PIN CONFIGURATION



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

NJM2856DL3

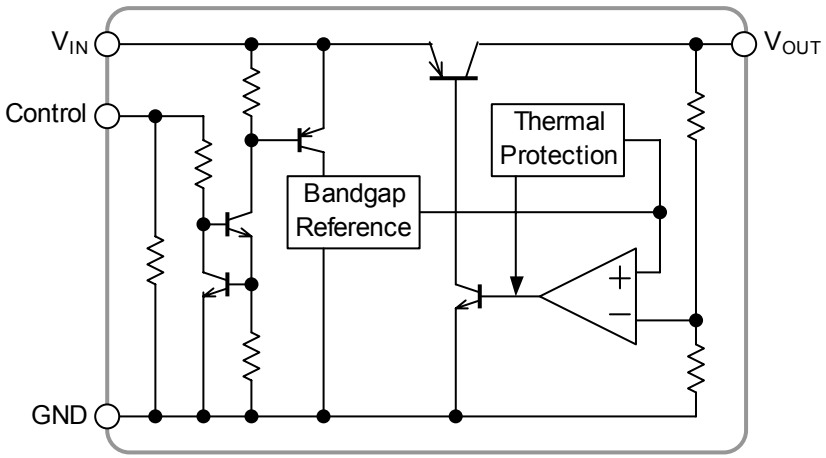


Exposed Pad on backside connected to GND

NJM2856GM1

PIN CONFIGURATION
1. V_{OUT}
2. N.C.
3. GND
4. N.C.
5. CONTROL
6. N.C.
7. N.C.
8. V_{IN}

■ EQUIVALENT CIRCUIT



■ OUTPUT VOLTAGE RANK LIST

TO252-5 Package

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

HSOP8 Package

Device Name	V_{out}
NJM2856GM1-15	1.5V
NJM2856GM1-33	3.3V
NJM2856GM1-05	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	TO252-5	2-Layer(*1)	1190		mW
			4-Layer (*2)	3125		
		HSOP8	2-Layer (*1)	Unused Exposed PAD	630	
				Use Exposed PAD	700	
			4-Layer (*2)	Unused Exposed PAD	870	
				Use Exposed PAD	1700	
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 100mm^2)
(*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 a thermal via hall to a board based on JEDEC standard JESD51-5)

■ OPERATING VOLTAGE

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

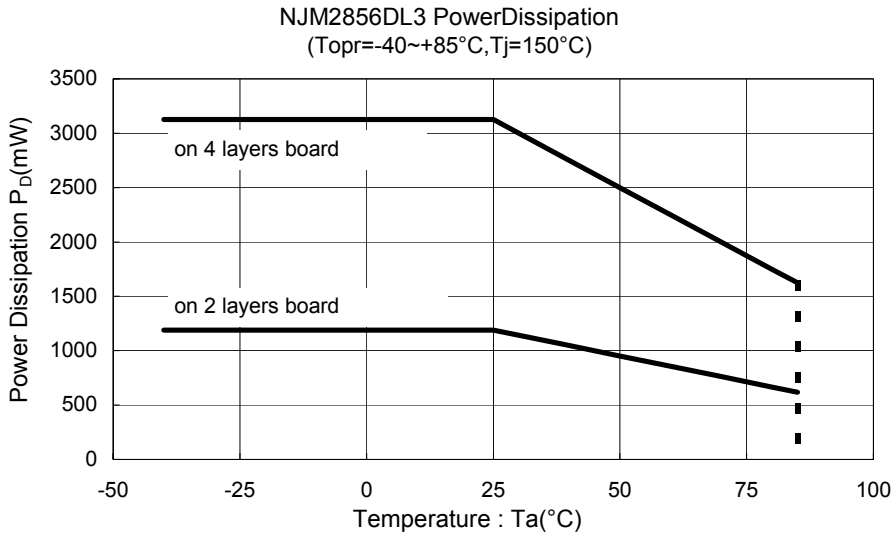
■ ELECTRICAL CHARACTERISTICS

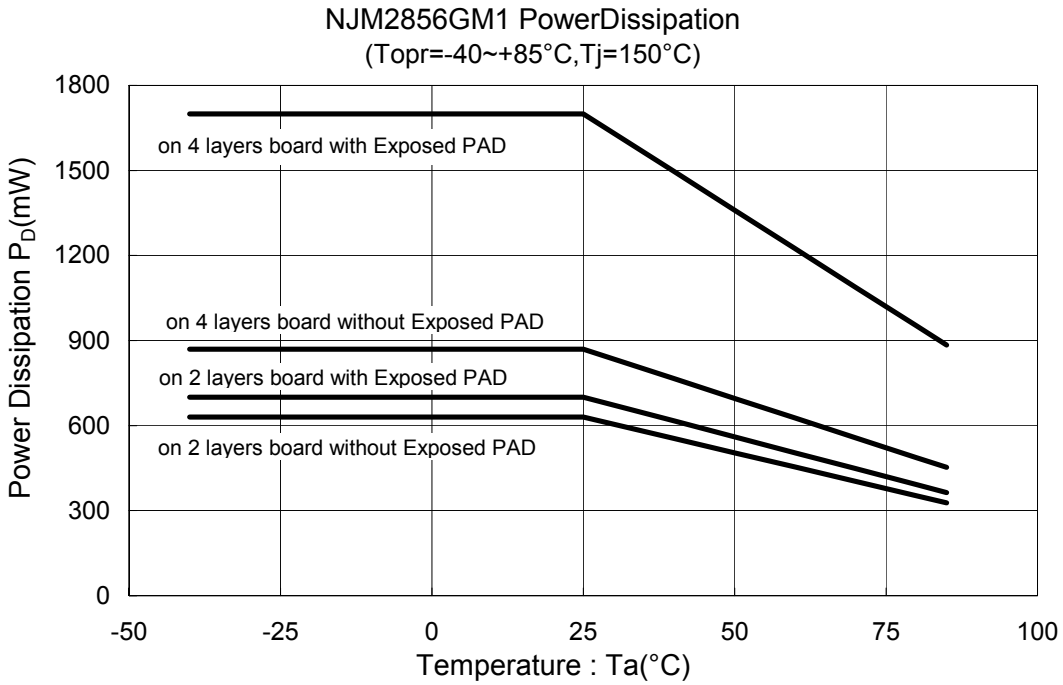
(V_{IN}=V_O+1V, C_{IN}=0.33μF, C_O=2.2μF(1.7V<V_O≤2.6V:4.7μF, V_O≤1.7V:10μF), Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Voltage	V_{IN}		-	-	8	V
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
Output Current	I_O	V_O-0.3V	1000	1300	-	mA
Line Regulation	$\Delta V_O/\Delta V_{IN}$	V_{IN}= V_O+1V~V_O+6V(V_O≤2V), V_{IN}= V_O+1V~8V(V_O>2V), I_O=30mA	-	-	0.10	%/V
Load Regulation	$\Delta V_O/\Delta I_O$	I_O=0~1A	-	-	0.004	%/mA
Dropout Voltage (*3)	ΔV_{I-O}	I_O=600mA	-	0.20	0.28	V
Ripple Rejection	RR	ein=200mVrms,f=1kHz, I_O=10mA V_O=3.0V Version	-	75	-	dB
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta Ta$	Ta=0~85°C, I_O=10mA	-	±50	-	ppm/°C
Output Noise Voltage	V_{NO}	f=10Hz~80kHz, I_O=10mA, V_O=3.0V Version (*4)	-	45	-	μVrms
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

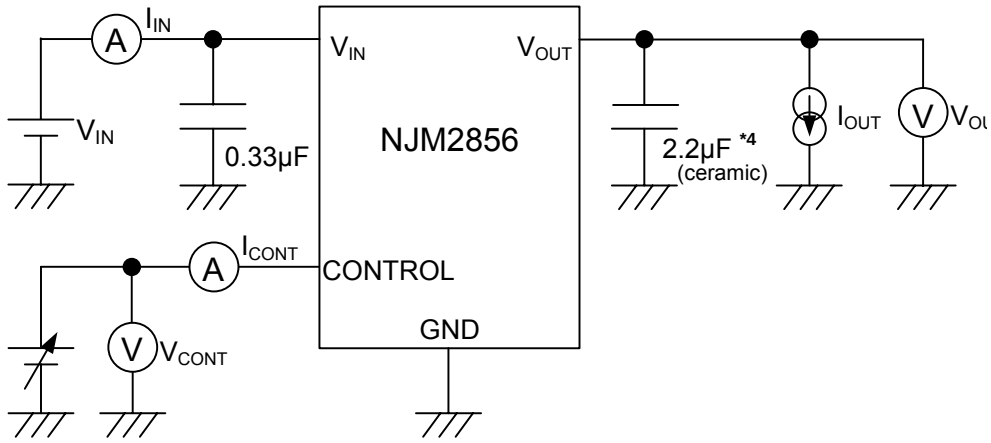
(*3): The output voltage excludes under 2.1V.
(*4): V_O>2.0V: V_{IN}=V_O+1V, V_O≤2.0V: V_{IN}=3.0V
The above specification is a common specification for all output voltages.
Therefore, it may be different from the individual specification for a specific output voltage.

■ POWER DISSIPATION vs. AMBIENT TEMPERATURE





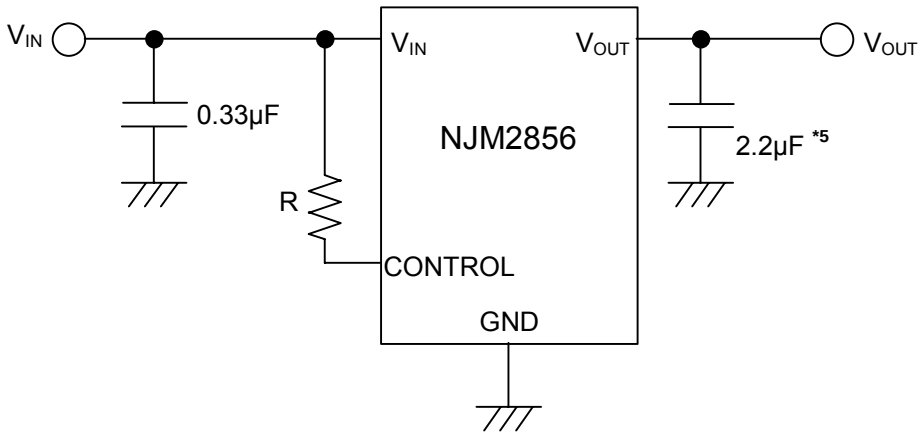
■ TEST CIRCUIT



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

■ TYPICAL APPLICATION

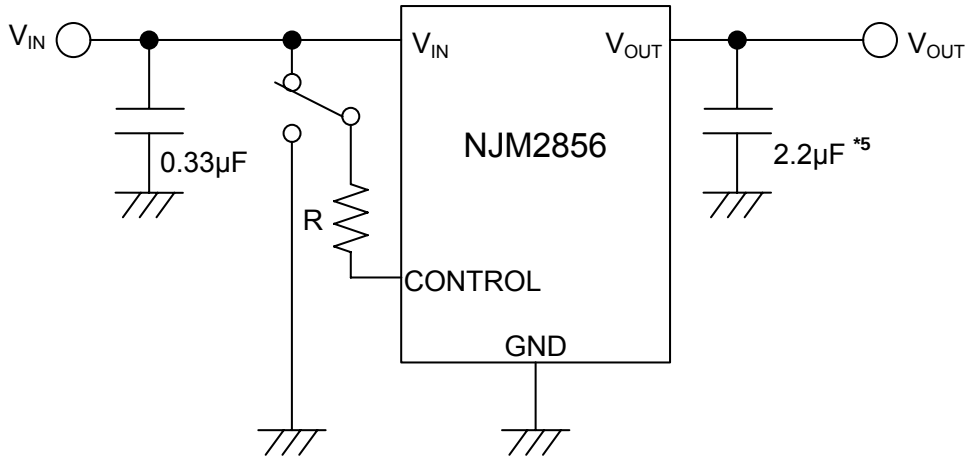
① In the case where ON/OFF Control is not required:



*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".

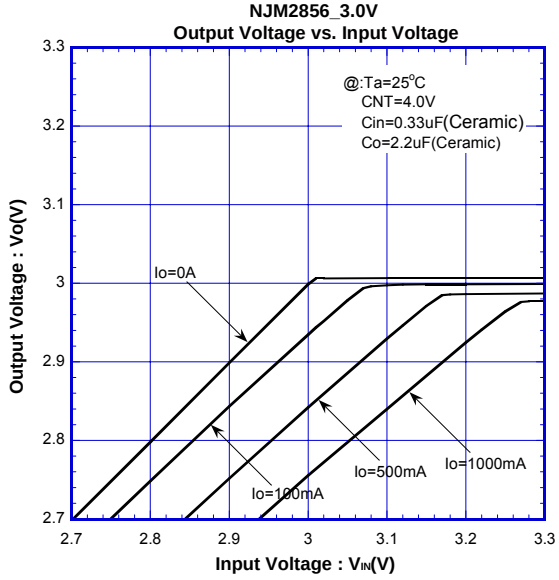
* Input Capacitance C_{IN}

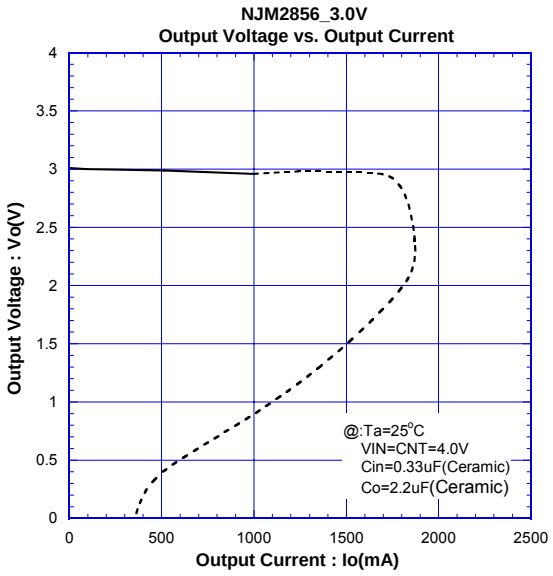
Input Capacitance C_{IN} is required to prevent oscillation and reduce power supply ripple for applications with high power supply impedance or a long power supply line.
Use the C_{IN} value of 0.33µF greater to avoid the problem.
C_{IN} should connect between GND and V_{IN} as short as possible.

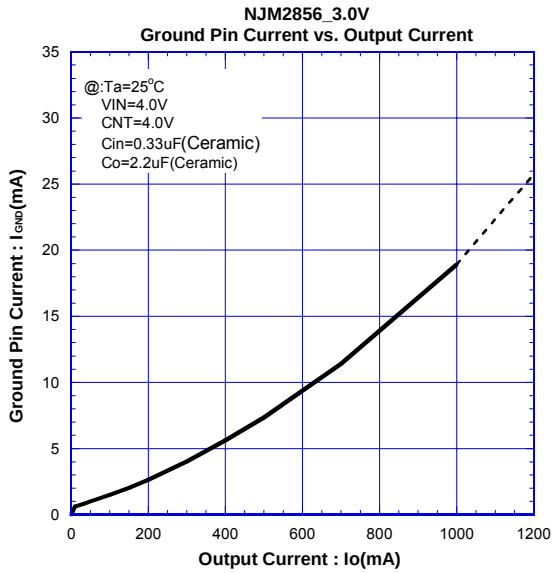
* Output Capacitance Co

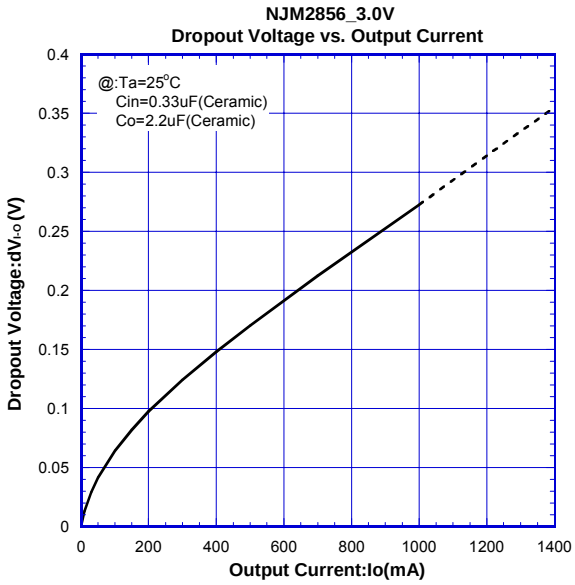
Output capacitor (Co) is required for a phase compensation of the internal error amplifier. The capacitance and the equivalent series resistance (ESR) influence stability of the regulator.
If use a smaller Co, it may cause excess output noise or oscillation of the regulator due to lack of the phase compensation. 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.

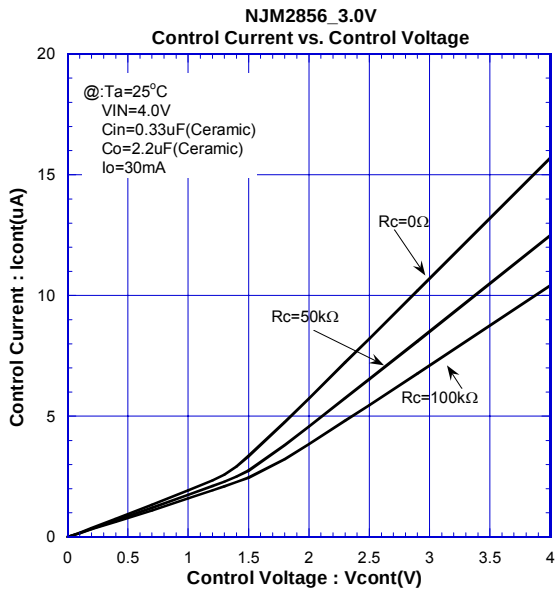
■ TYPICAL CHARACTERISTICS

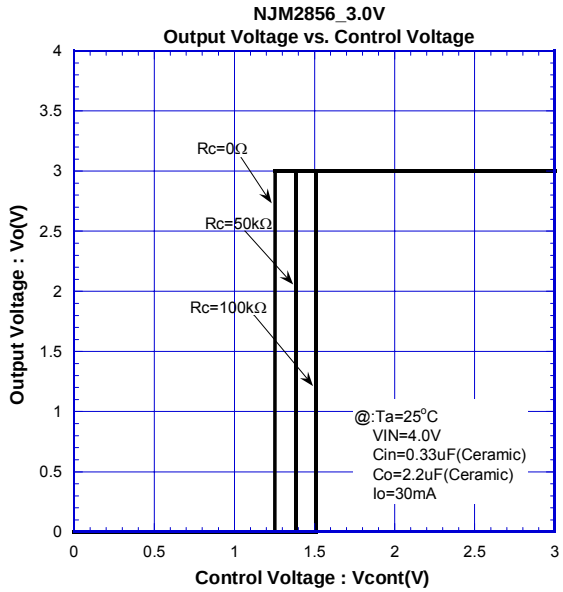












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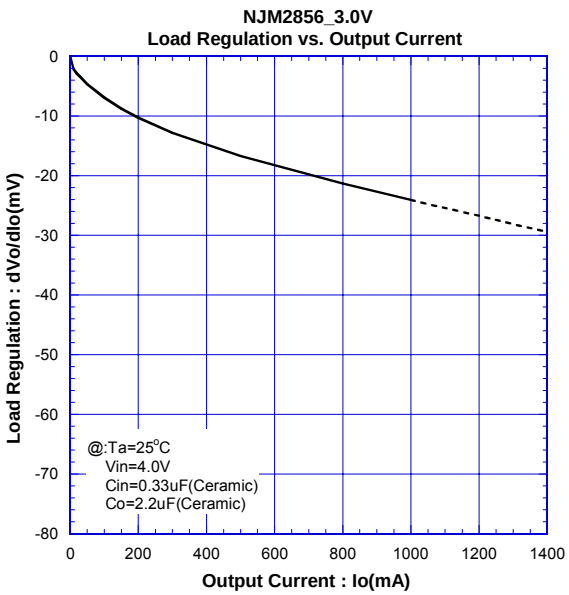
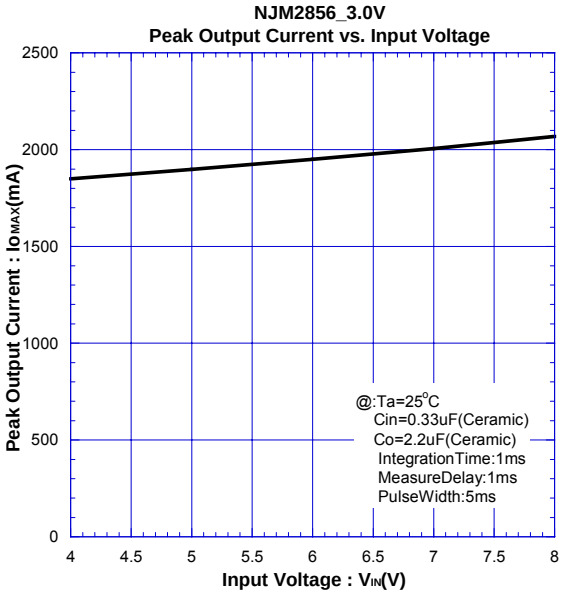
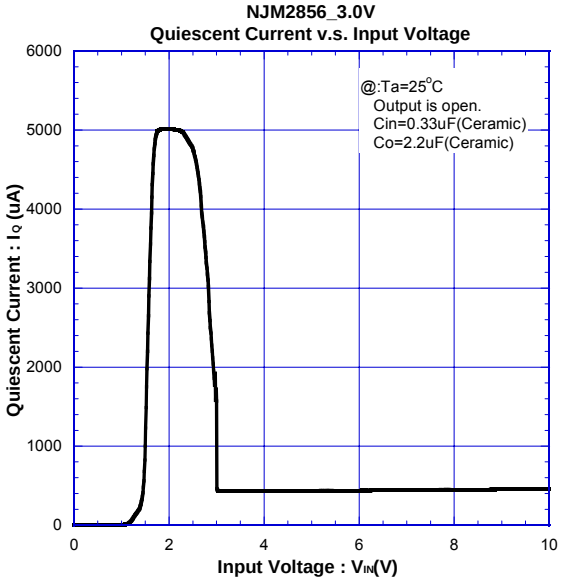
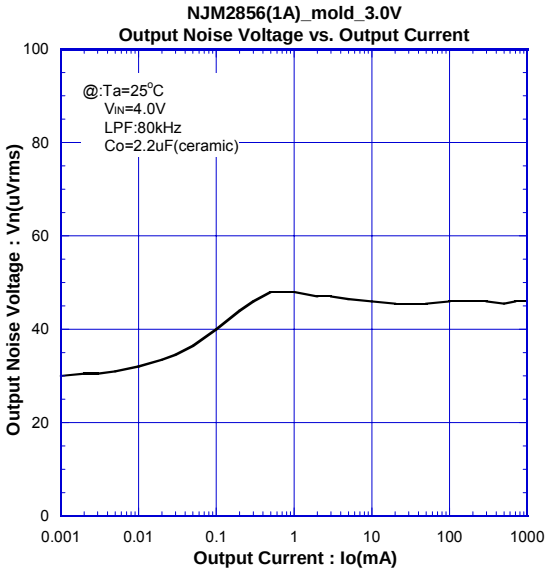
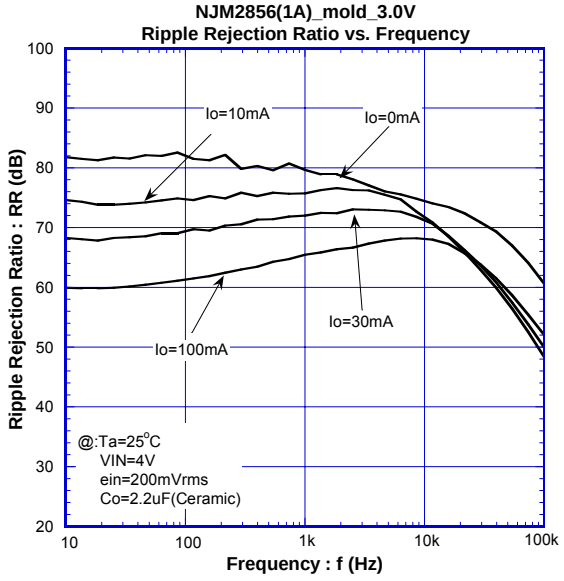
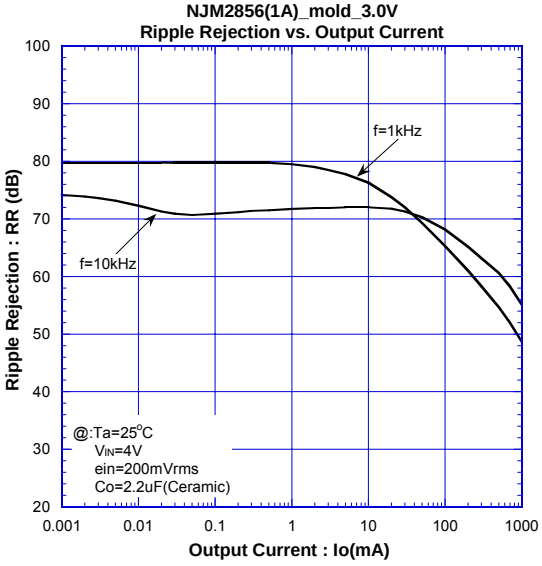




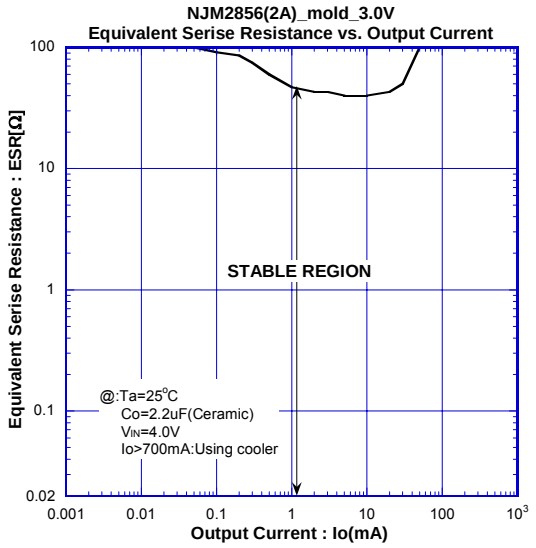


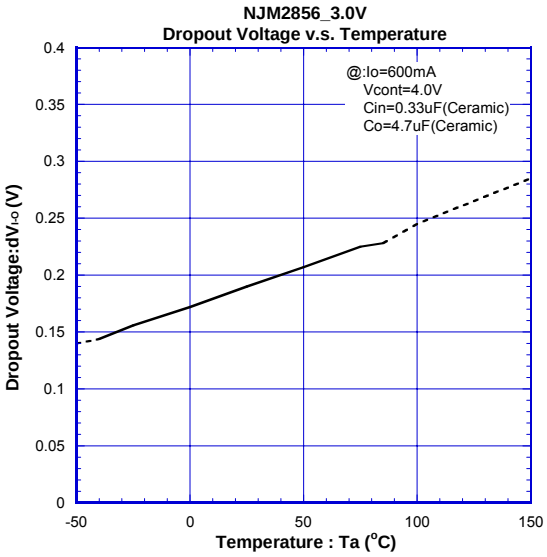


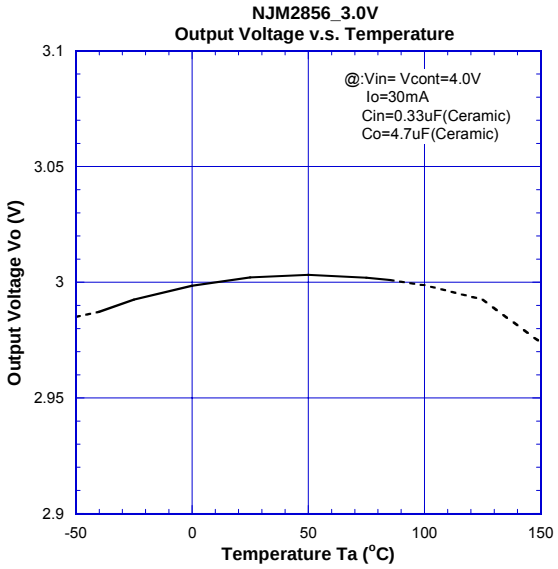


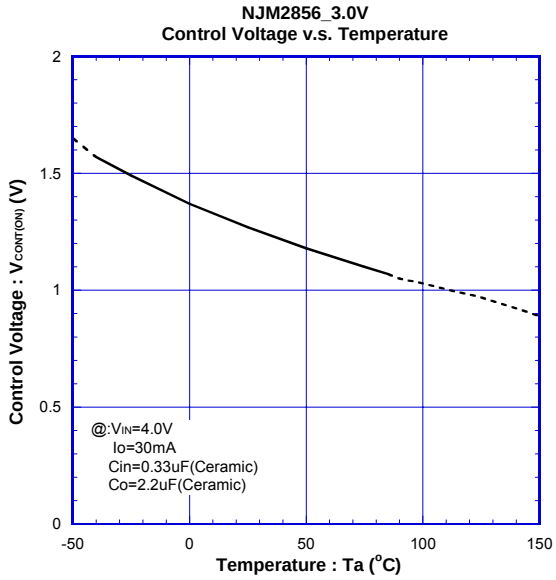


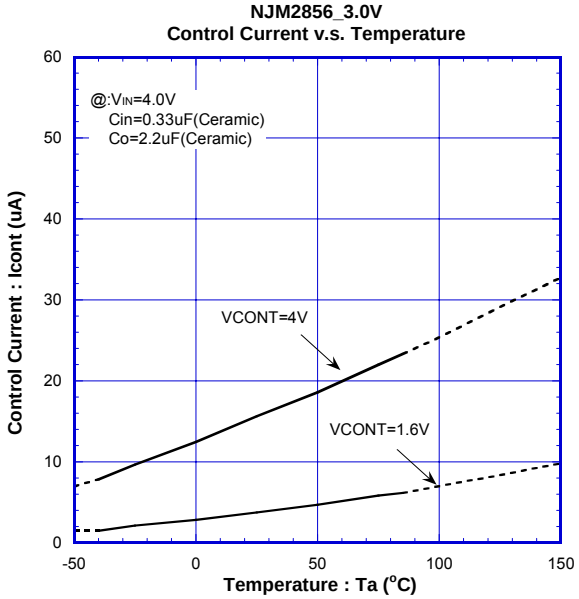
■ TYPICAL CHARACTERISTICS

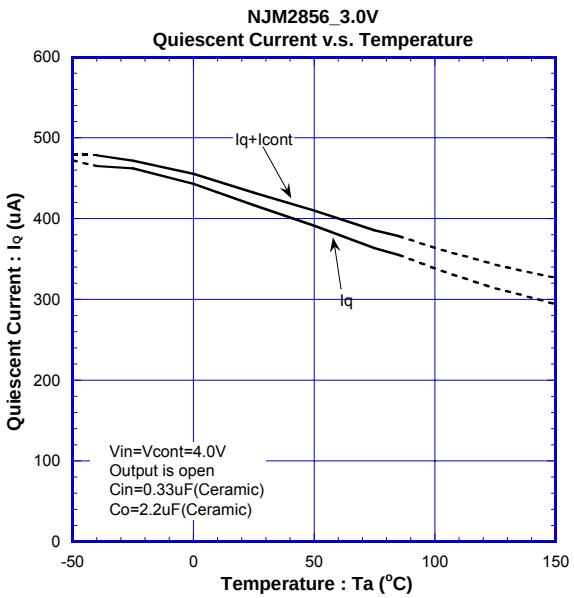






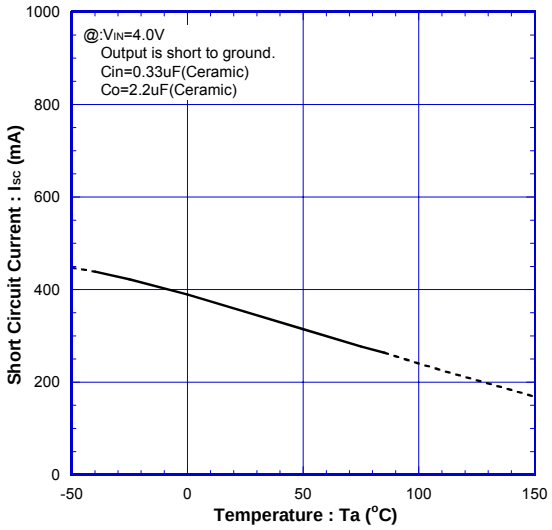




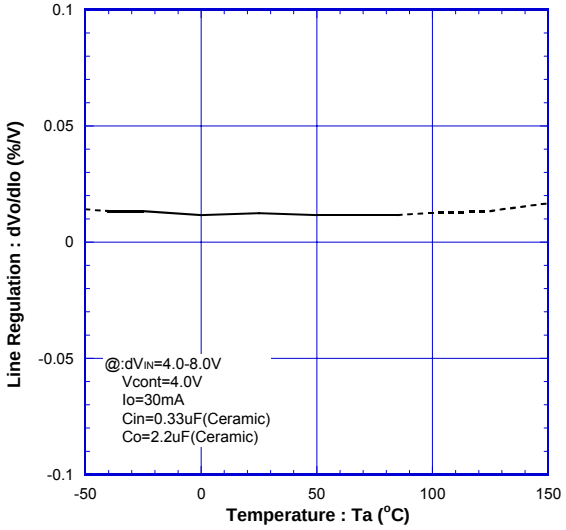


■ TYPICAL CHARACTERISTICS

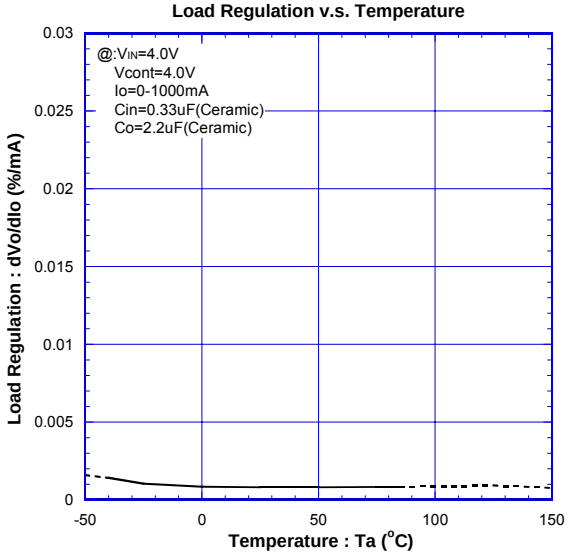
NJM2856_3.0V
Short Circuit Current v.s. Temperature



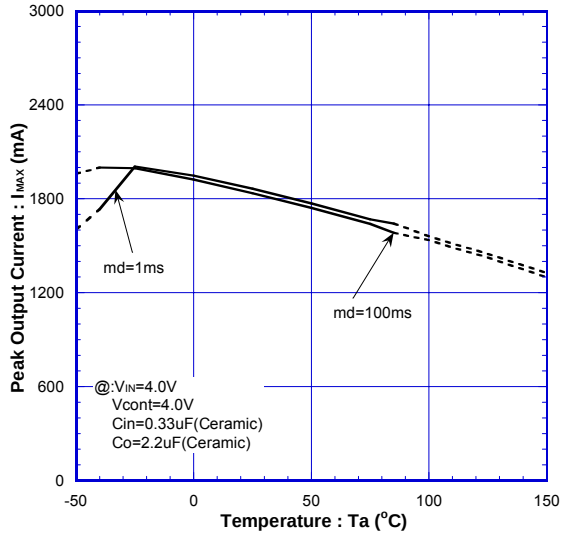
NJM2856_3.0V
Line Regulation v.s. Temperature



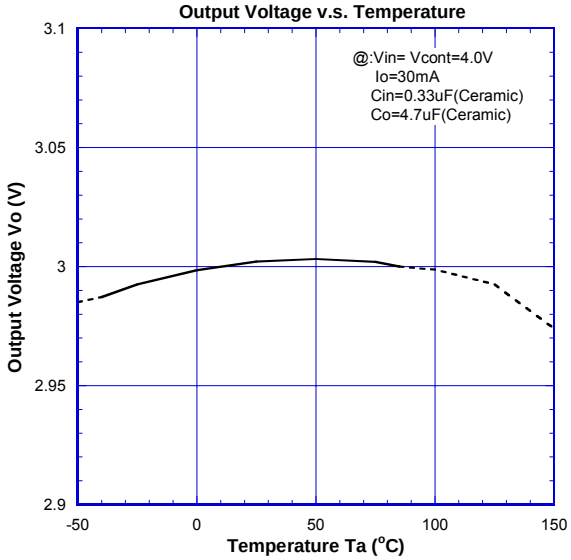
NJM2856_3.0V
Load Regulation v.s. Temperature



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



NJM2856_3.0V
Output Voltage v.s. Temperature



■ TYPICAL CHARACTERISTICS