LOW DROPOUT VOLTAGE REGULATOR

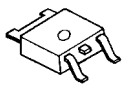
■ GENERAL DESCRIPTION

The NJM2835 is a 500mA output low dropout voltage regulator.

Advanced Bipolar technology achieves low noise, high ripple rejection and high supply voltage.

2.1V to 15.5V output voltage range, 2.2μF small decoupling capacitor, built-in noise bypass capacitor make the NJM2835 suitable for various applications.

■ PACKAGE OUTLINE

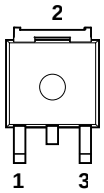


NJM2835DL1

■ FEATURES

- Output voltage options available 2.1 ~ 15.5V
- High Ripple Rejection 75dB typ. (f=1kHz,Vo=3V Version)
- Output Noise Voltage Vno=45μVrms typ.
- Output capacitor with 2.2μF ceramic capacitor (Vo≥5.1V)
- Output Current Io(max.)=500mA
- High Precision Output Vo±1.0%
- Low Dropout Voltage 0.18V typ. (Io=300mA)
- Internal Thermal Overload Protection
- Internal Over Current Protection
- Bipolar Technology
- Package Outline TO-252-3

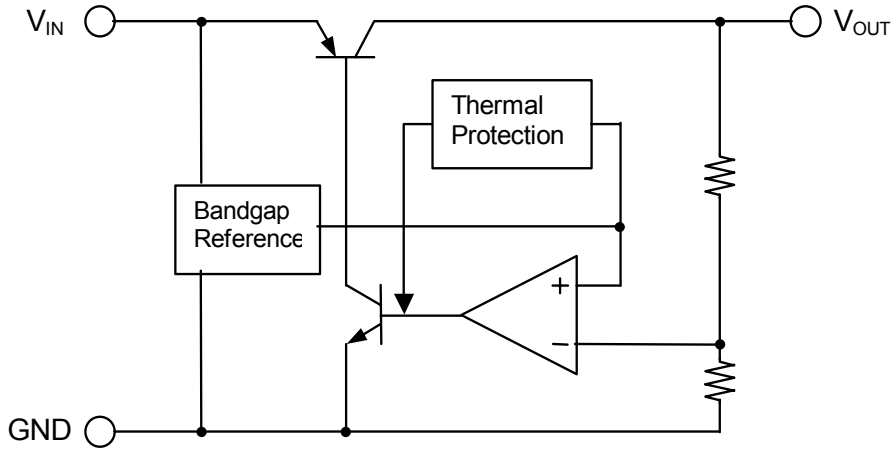
■ PIN CONFIGURATION



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

NJM2835DL1

■ EQUIVALENT CIRCUIT



■ OUTPUT VOLTAGE RANK LIST

The WHITE column shows applicable Voltage Rank(s)

Device Name	Vout	Device Name	Vout	Device Name	Vout
NJM2835DL1-21	2.1V	NJM2835DL1-36	3.6V	NJM2835DL1-08	8.0V
NJM2835DL1-22	2.2V	NJM2835DL1-37	3.7V	NJM2835DL1-85	8.5V
NJM2835DL1-23	2.3V	NJM2835DL1-38	3.8V	NJM2835DL1-09	9.0V
NJM2835DL1-24	2.4V	NJM2835DL1-39	3.9V	NJM2835DL1-10	10.0V
NJM2835DL1-25	2.5V	NJM2835DL1-04	4.0V	NJM2835DL1-12	12.0V
NJM2835DL1-26	2.6V	NJM2835DL1-41	4.1V	NJM2835DL1-15	15.0V
NJM2835DL1-27	2.7V	NJM2835DL1-42	4.2V		
NJM2835DL1-28	2.8V	NJM2835DL1-43	4.3V		
NJM2835DL1-29	2.9V	NJM2835DL1-44	4.4V		
NJM2835DL1-03	3.0V	NJM2835DL1-45	4.5V		
NJM2835DL1-31	3.1V	NJM2835DL1-46	4.6V		
NJM2835DL1-32	3.2V	NJM2835DL1-47	4.7V		
NJM2835DL1-33	3.3V	NJM2835DL1-48	4.8V		
NJM2835DL1-34	3.4V	NJM2835DL1-49	4.9V		
NJM2835DL1-35	3.5V	NJM2835DL1-05	5.0V		

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	+20	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 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)

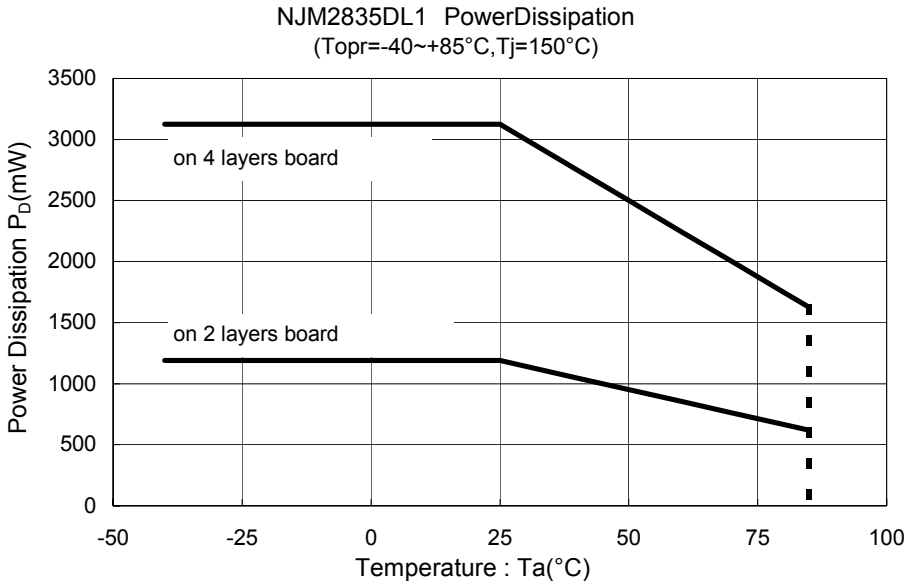
■ ELECTRICAL CHARACTERISTICS

($V_{IN=}$ Vo+1V, C_{IN}=0.33μF, Co=2.2μF (2.9V<Vo≤5V:Co=4.7μF,Vo≤2.9V:Co=10μF),Ta=25°C)

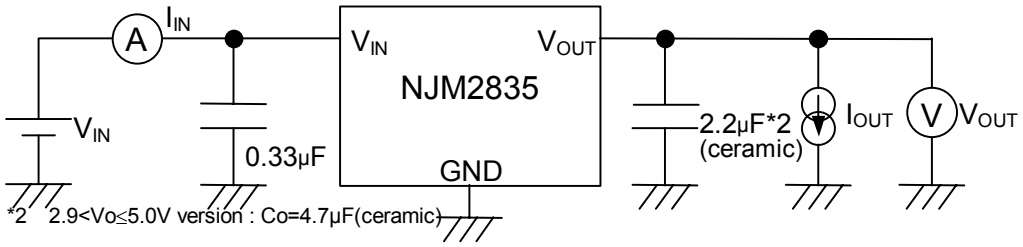
PARAMETER	SYMBOL	TEST CONDITION		MIN	TYP	MAX	UNIT
Output Voltage	Vo	Io=30mA		-1.0%	-	+1.0%	V
Quiescent Current	I_Q	Io=0mA	Vo≤5V Version	-	200	300	μA
			5V<Vo≤10V Version	-	215	315	μA
			10V<Vo≤15V Version	-	230	330	μA
Output Current	Io	Vo-0.3V		500	650	-	mA
Line Regulation	$\Delta Vo/\Delta V_{IN}$	V_{IN}=Vo+1V ~ Vo+6V(Vo≤12V), V_{IN}=Vo+1V ~ 18V(Vo>12V), Io=30mA		-	-	0.10	%/V
Load Regulation	$\Delta Vo/\Delta Io$	Io=0 ~ 500mA		-	-	0.007	%/mA
Dropout Voltage(*1)	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
Input Voltage	V_{IN}			-	-	18	V

(*1): 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



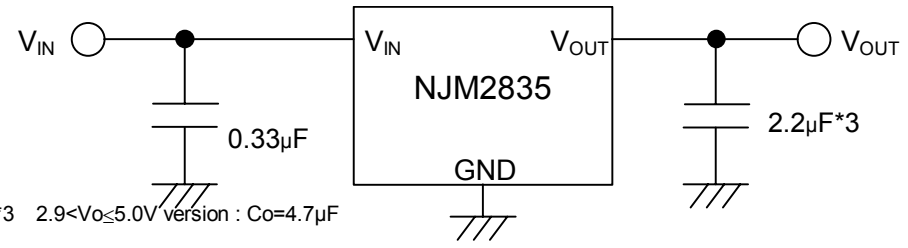
■ TEST CIRCUIT



*2 2.9<Vo≤5.0V version : Co=4.7μF(ceramic)

Vo≤2.9V version : Co=10μF(ceramic)

■ TYPICAL APPLICATION



*3 2.9<Vo≤5.0V version : Co=4.7μF

Vo≤2.9V version : Co=10μF

∗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 C_O

Output capacitor (C_O) will be required for a phase compensation of the internal error amplifier. The capacitance and the equivalent series resistance (ESR) influence to stable operation of the regulator.

This product is designed to work with a low ESR capacitor (C_O). However use of recommended capacitance or larger value is effective 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 larger value and connect between Vo terminal and GND terminal with shortest path. The recommended capacitance depends on the output voltage rank. Low voltage regulator requires larger value C_O. Thus, check the recommended capacitance for each output voltage rank.

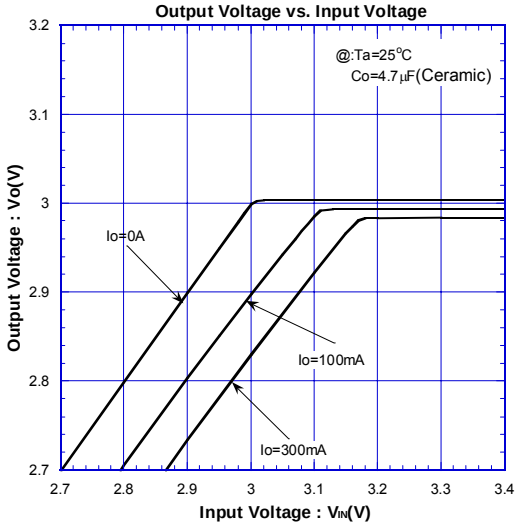
In addition, You should consider varied characteristics of capacitor (a frequency characteristic, a temperature characteristic, a DC bias characteristic and so on) and unevenness peculiar to a capacitor supplier enough .We recommend that withstand voltage margin against output voltage and superior in a temperature characteristic, when selecting Output capacitor.

Uses of a larger C_O reduces output noise and ripple output, and also improves output transient response against rapid load change.

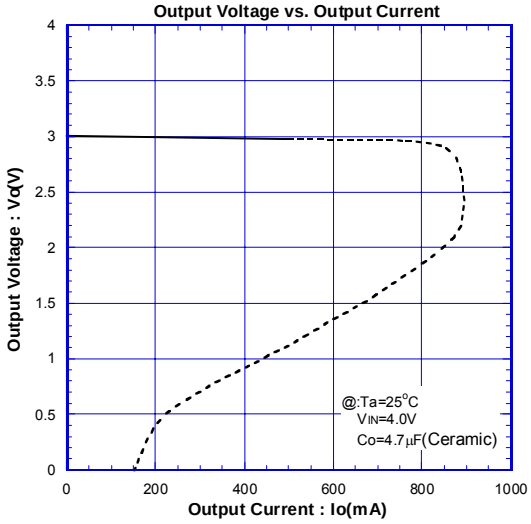
■ TYPICAL CHARACTERISTICS

●DC CHARACTERISTICS (3V Version)

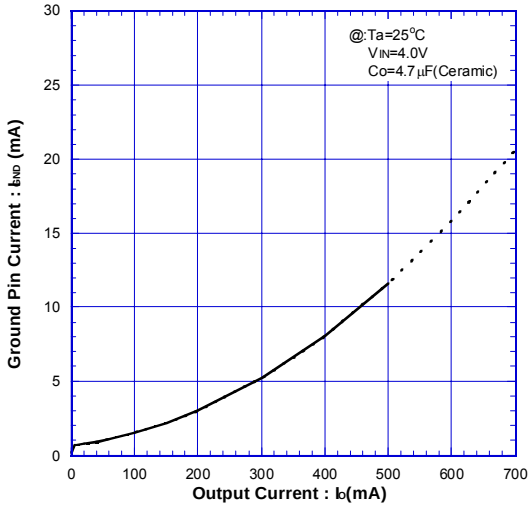
NJM2835_3.0V
Output Voltage vs. Input Voltage



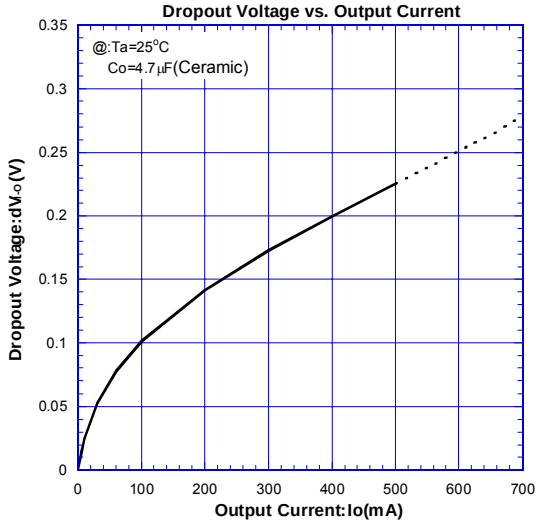
NJM2835_3.0V
Output Voltage vs. Output Current



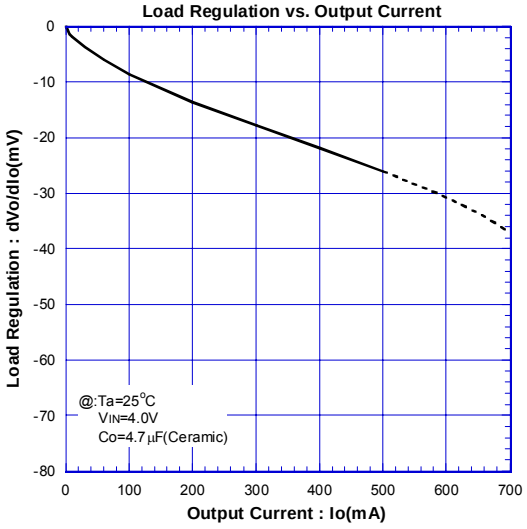
NJM2835_3.0V
Ground Pin Current v.s. Output Current



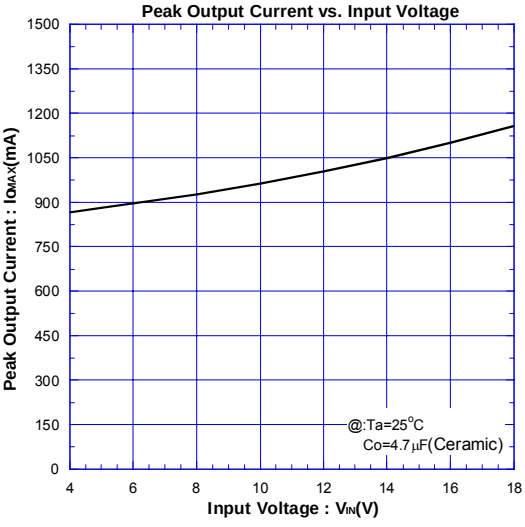
NJM2835_3.0V
Dropout Voltage vs. Output Current



NJM2835_3.0V
Load Regulation vs. Output Current

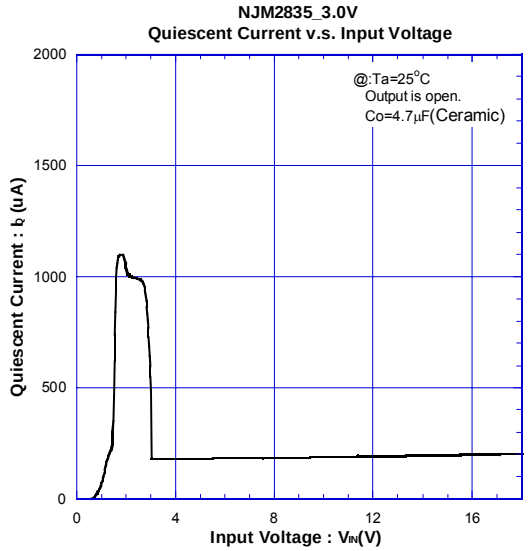


NJM2835_3.0V
Peak Output Current vs. Input Voltage

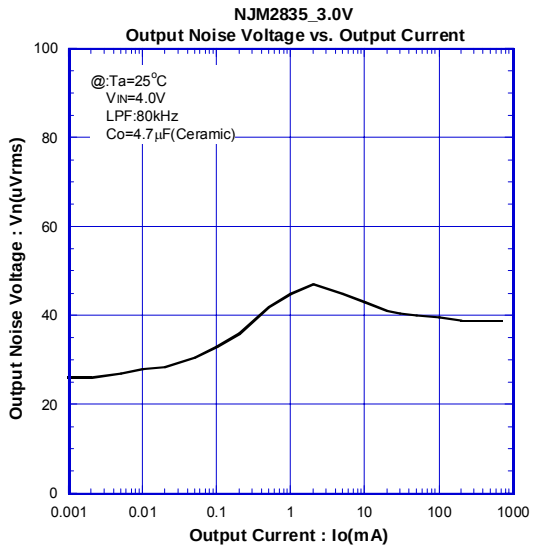


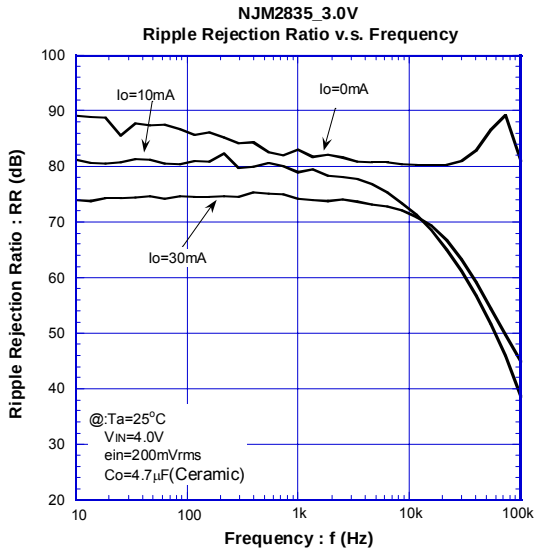
■ TYPICAL CHARACTERISTICS

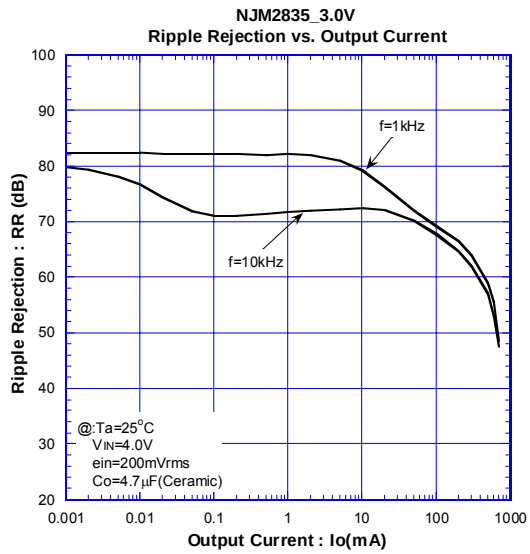
●DC CHARACTERISTICS (3V Version)

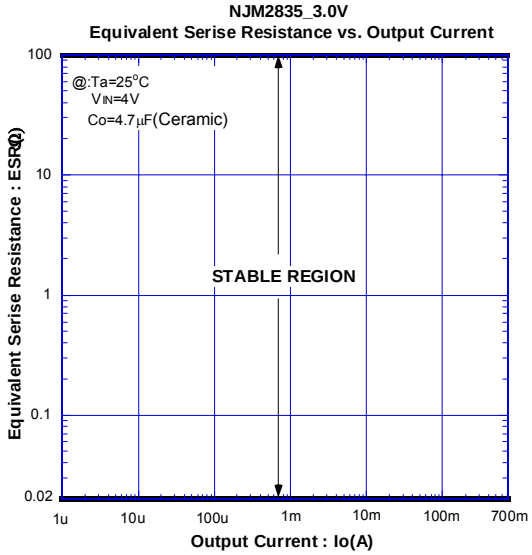


●AC CHARACTERISTICS (3V Version)





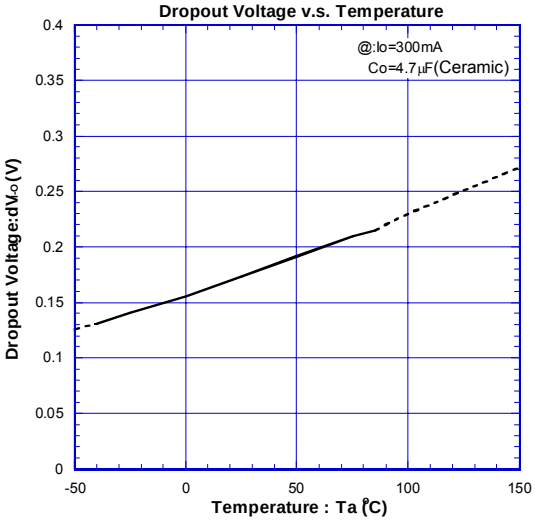




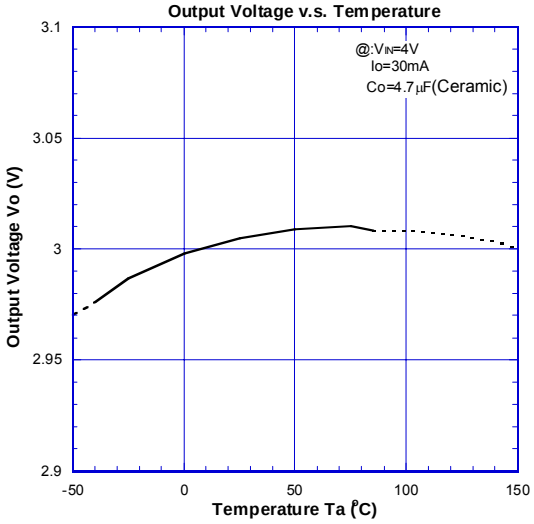
■ TYPICAL CHARACTERISTICS

●TEMPERATURE CHARACTERISTICS (3V Version)

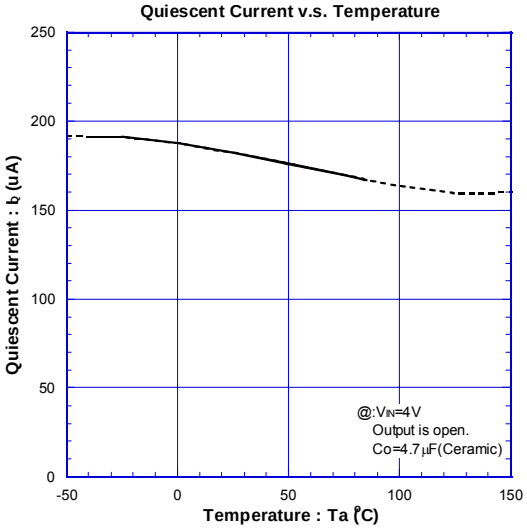
NJM2835_3.0V
Dropout Voltage v.s. Temperature



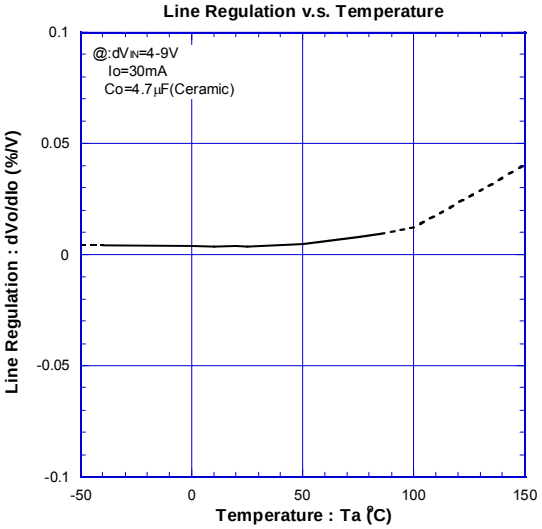
NJM2835_3.0V
Output Voltage v.s. Temperature



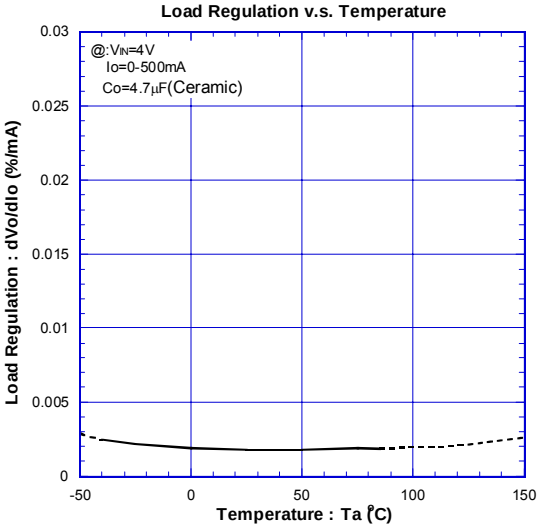
NJM2835_3.0V
Quiescent Current v.s. Temperature



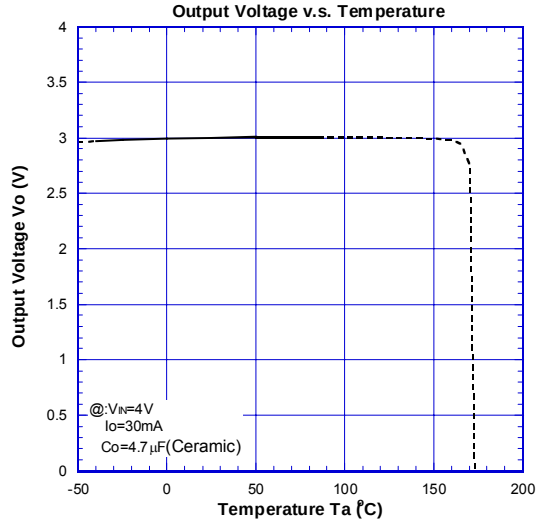
NJM2835_3.0V
Line Regulation v.s. Temperature



NJM2835_3.0V
Load Regulation v.s. Temperature

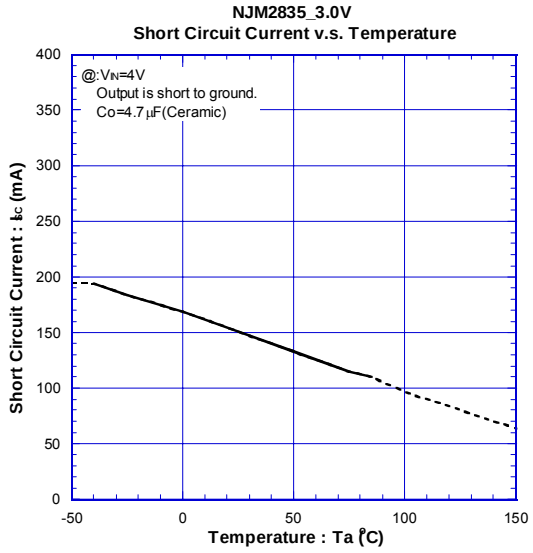


NJM2835_3.0V
Output Voltage v.s. Temperature



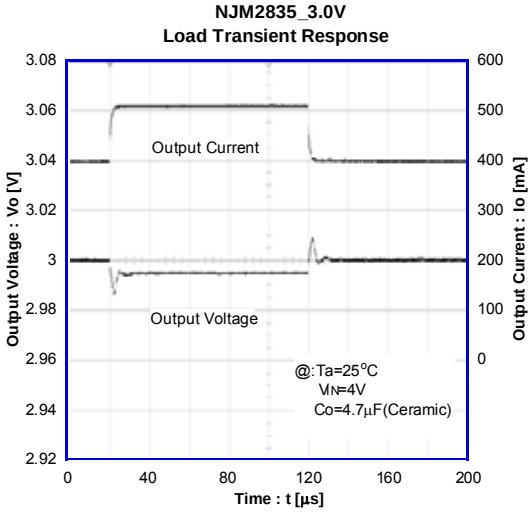
■ TYPICAL CHARACTERISTICS

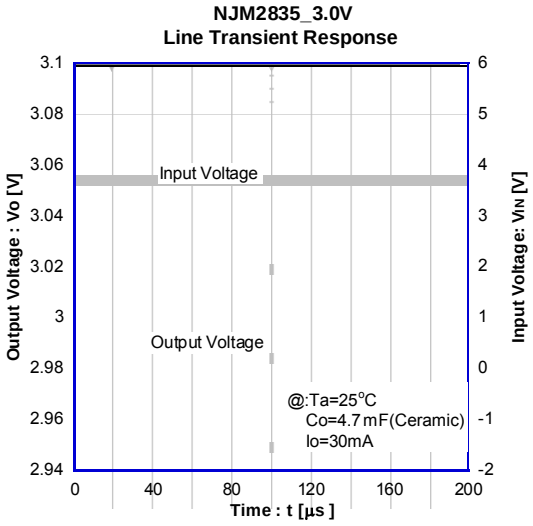
●TEMPERATURE CHARACTERISTICS (3V Version)



■ TYPICAL CHARACTERISTICS

●TRANSIENT RESPONSE (3V Version)

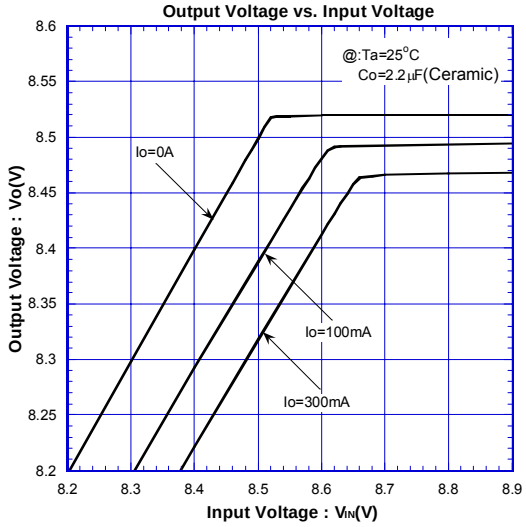




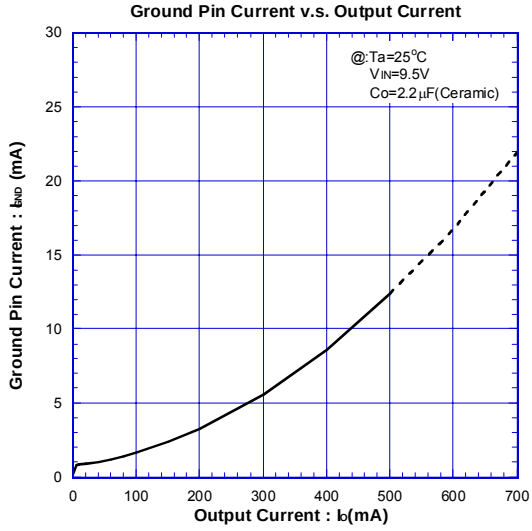
■ TYPICAL CHARACTERISTICS

●DC CHARACTERISTICS (8.5V Version)

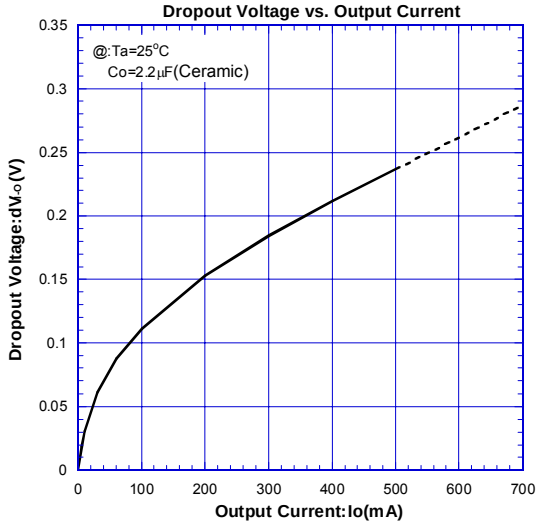
NJM2835_8.5V
Output Voltage vs. Input Voltage



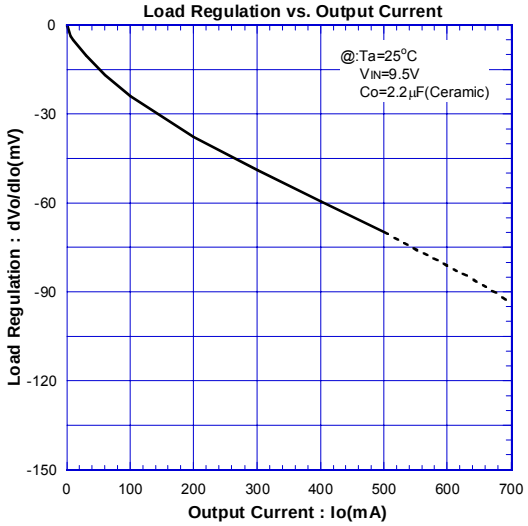
NJM2835_8.5V
Ground Pin Current v.s. Output Current



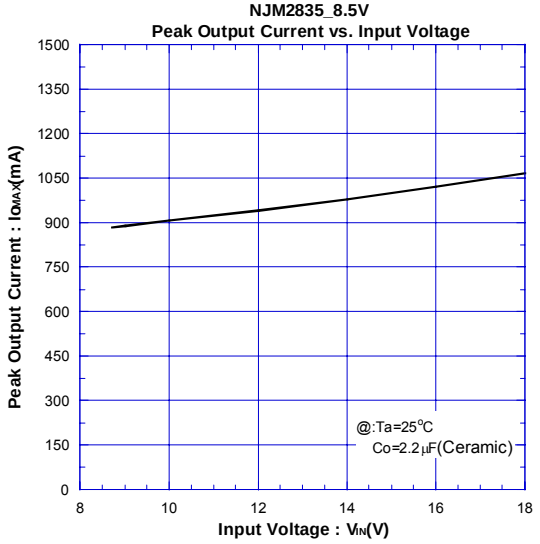
NJM2835_8.5V
Dropout Voltage vs. Output Current



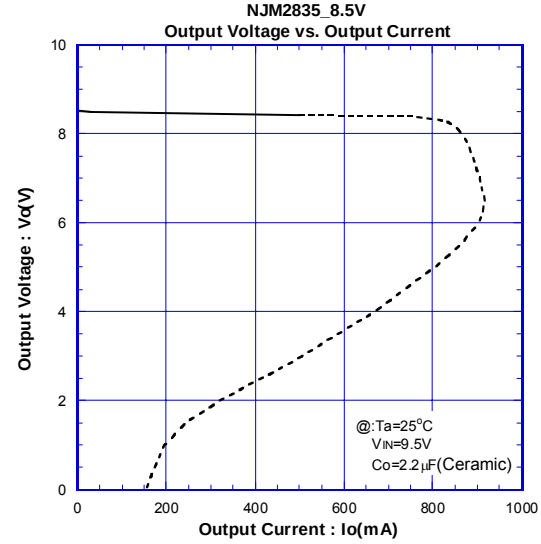
NJM2830_8.5V
Load Regulation vs. Output Current



NJM2835_8.5V
Peak Output Current vs. Input Voltage

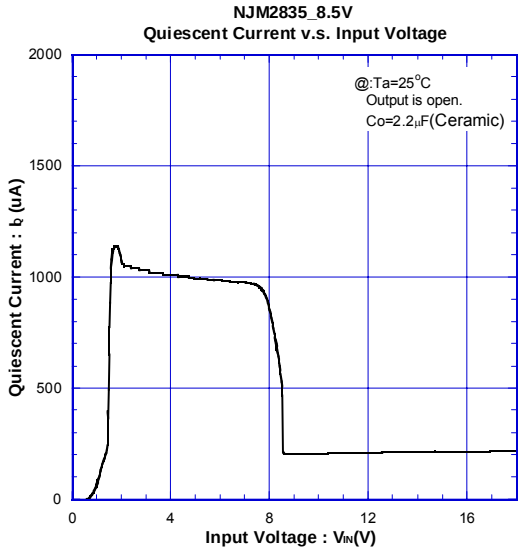


NJM2835_8.5V
Output Voltage vs. Output Current

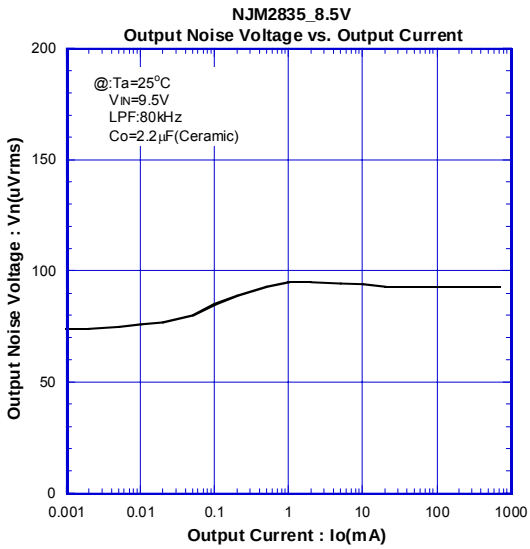


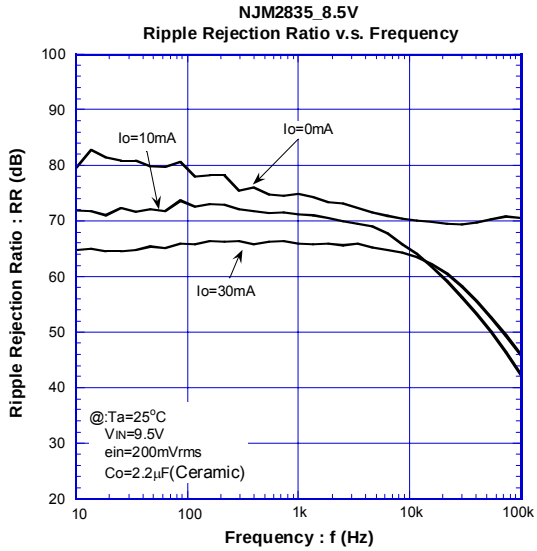
■ TYPICAL CHARACTERISTICS

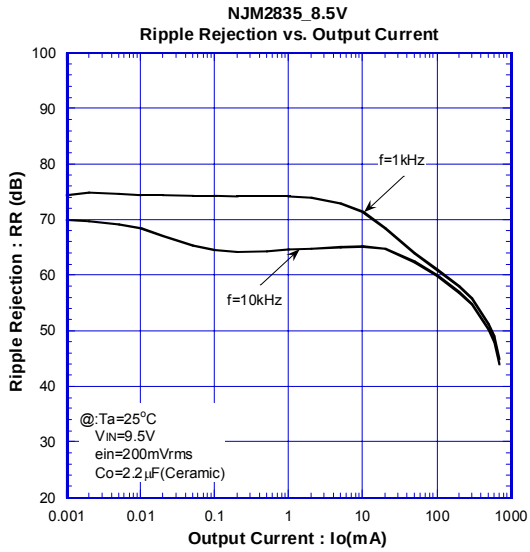
●DC CHARACTERISTICS (8.5V Version)

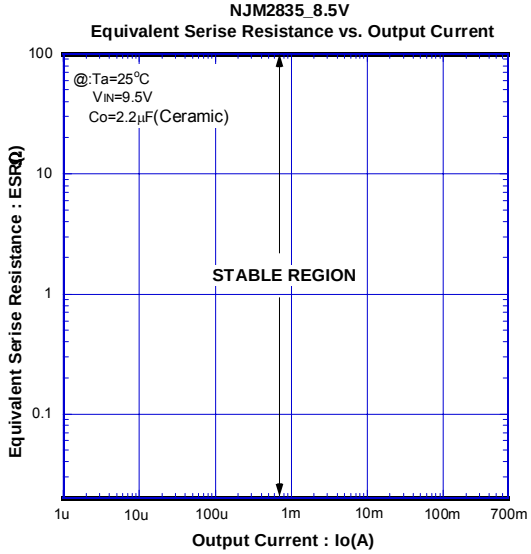


●AC CHARACTERISTICS (8.5V Version)





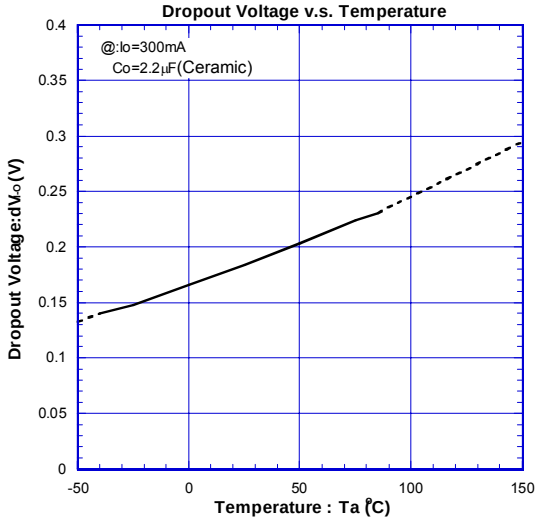




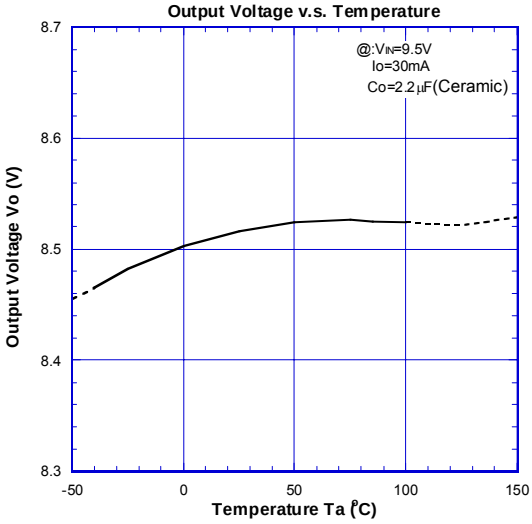
■ TYPICAL CHARACTERISTICS

●TEMPERATURE CHARACTERISTICS (8.5V Version)

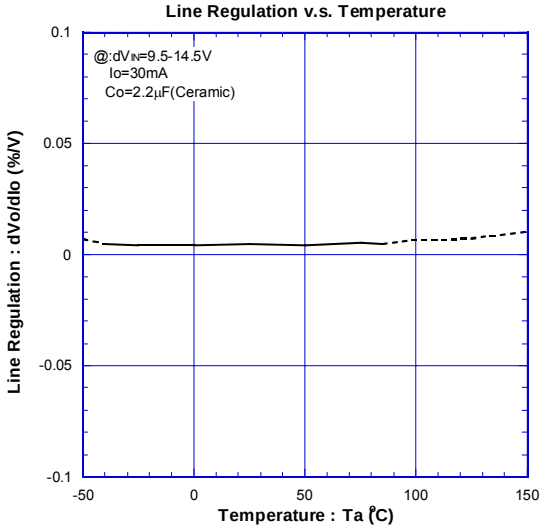
NJM2835_8.5V
Dropout Voltage v.s. Temperature



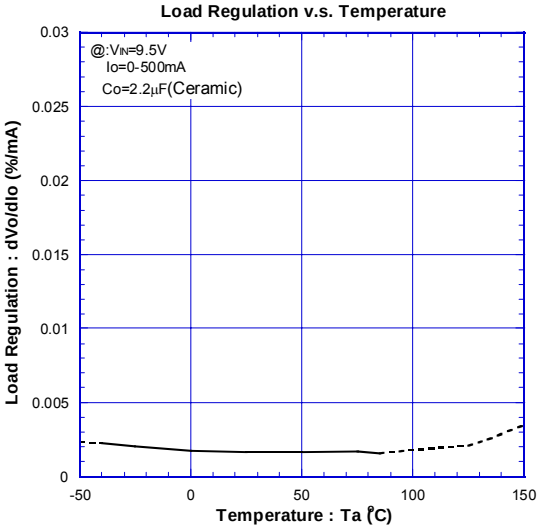
NJM2835_8.5V
Output Voltage v.s. Temperature



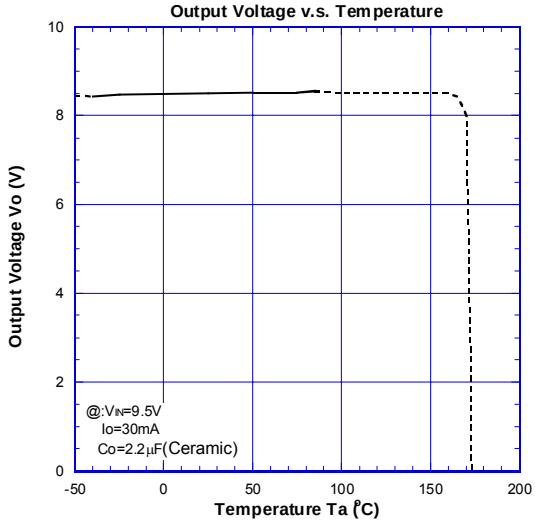
NJM2835_8.5V
Line Regulation v.s. Temperature



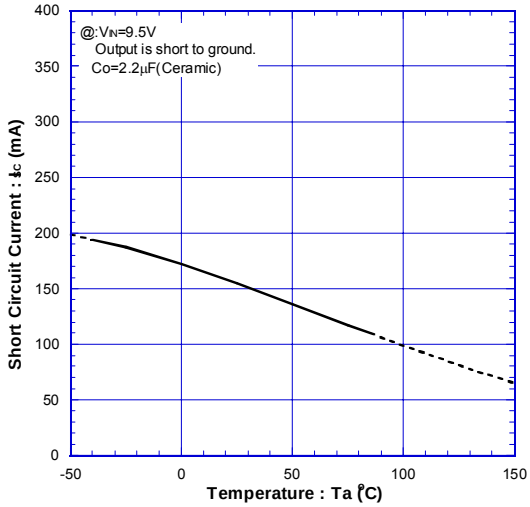
NJM2835_8.5V
Load Regulation v.s. Temperature



NJM2835_8.5V
Output Voltage v.s. Temperature

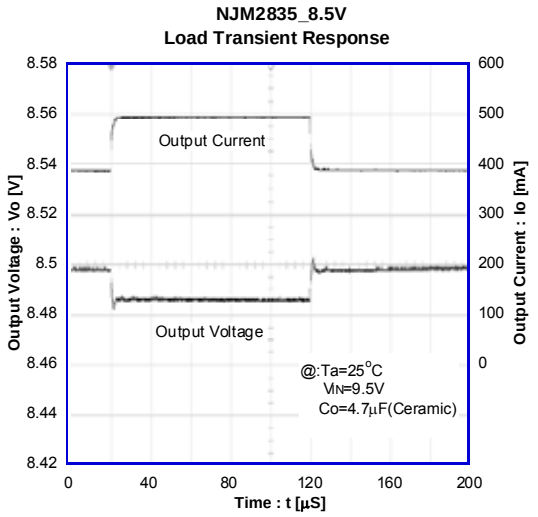


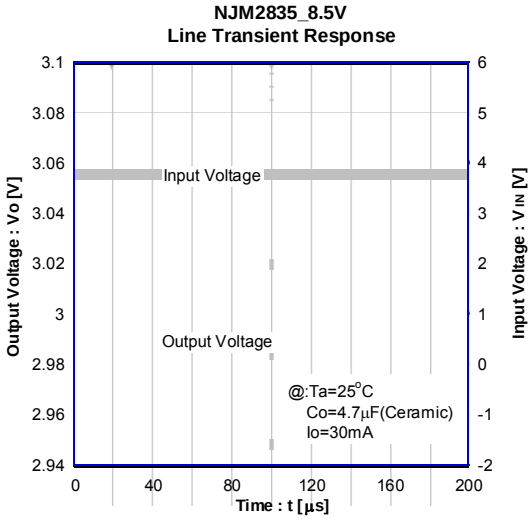
NJM2830_8.5V
Short Circuit Current v.s. Temperature



■ TYPICAL CHARACTERISTICS

●TRANSIENT RESPONSE (8.5V Version)

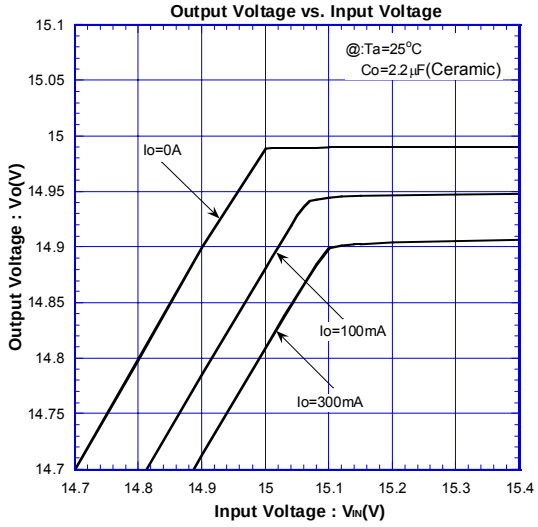




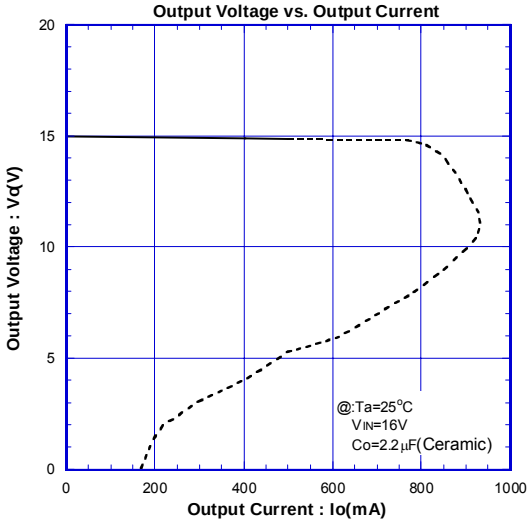
■ TYPICAL CHARACTERISTICS

●DC CHARACTERISTICS (15V Version)

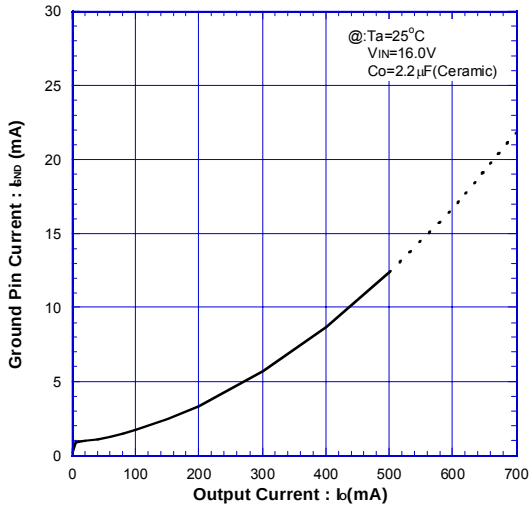
NJM2835_15V
Output Voltage vs. Input Voltage



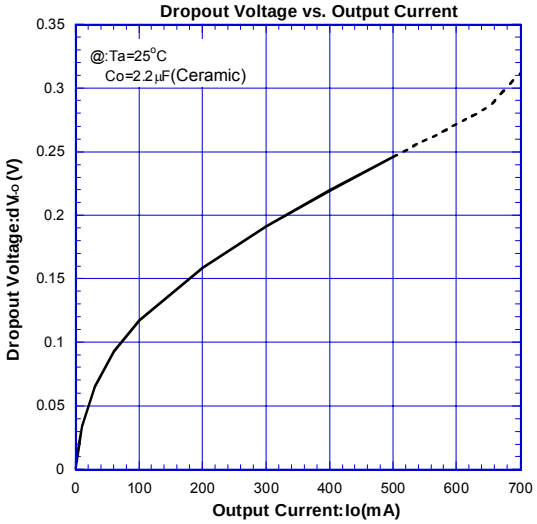
NJM2835_15V
Output Voltage vs. Output Current



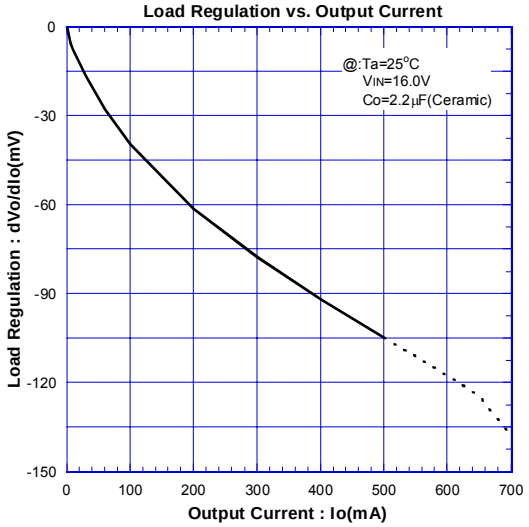
NJM2835_15V
Ground Pin Current v.s. Output Current



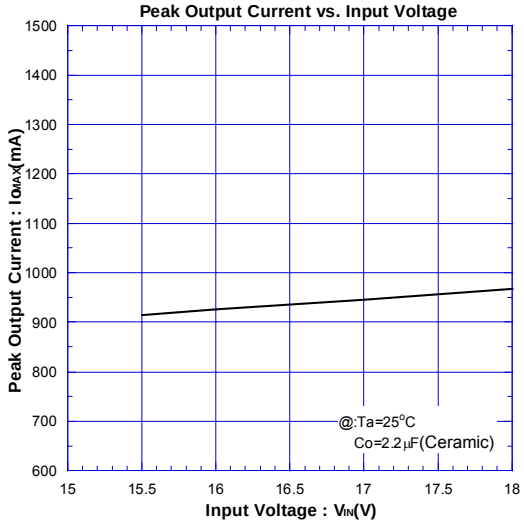
NJM2835_15V
Dropout Voltage vs. Output Current



NJM2835_15V
Load Regulation vs. Output Current

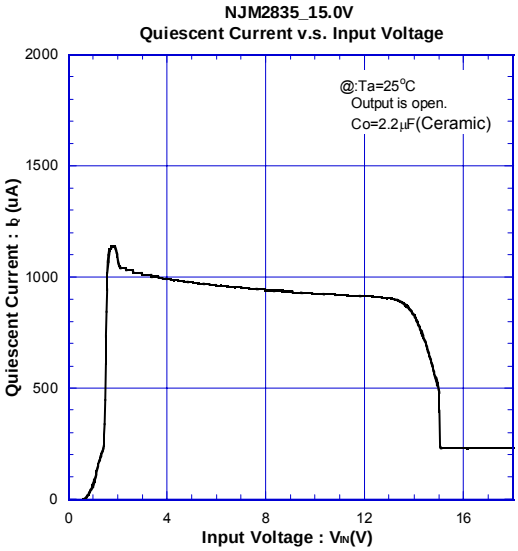


NJM2835_15V
Peak Output Current vs. Input Voltage

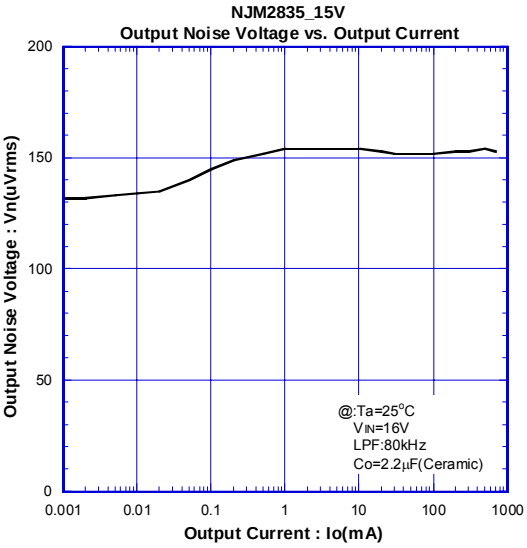


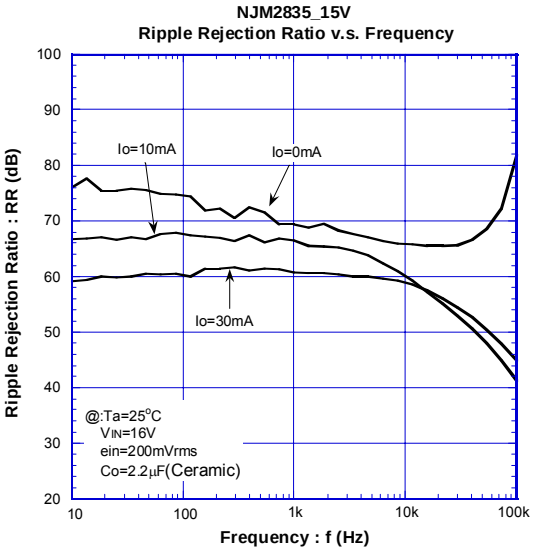
■ TYPICAL CHARACTERISTICS

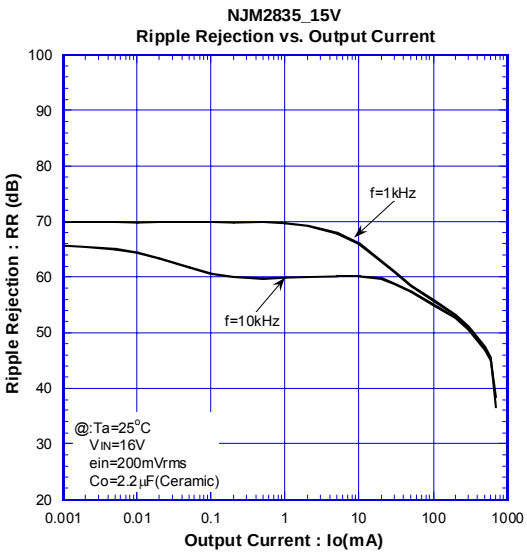
●DC CHARACTERISTICS (15V Version)

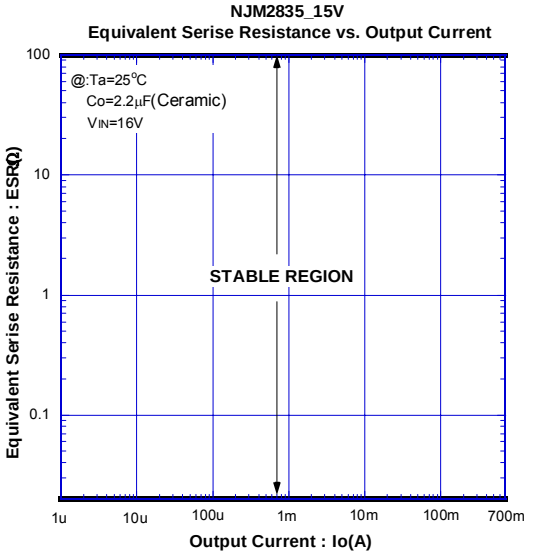


●AC CHARACTERISTICS (15V Version)





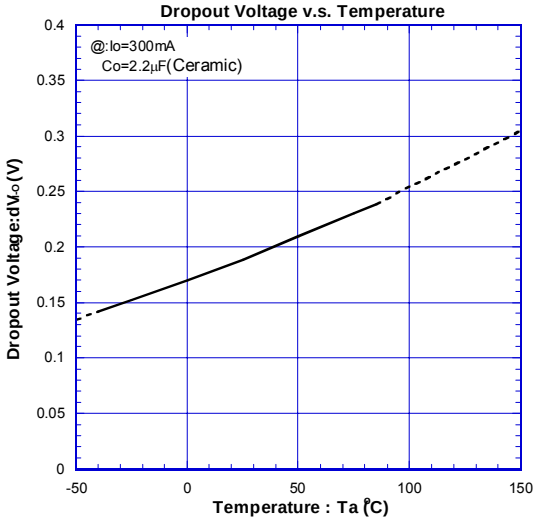




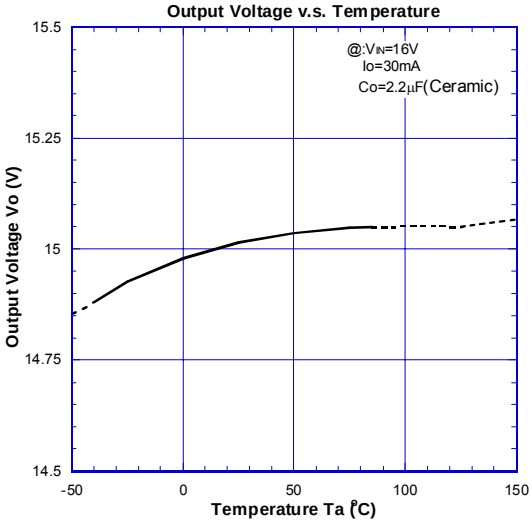
■ TYPICAL CHARACTERISTICS

●TEMPERATURE CHARACTERISTICS (15V Version)

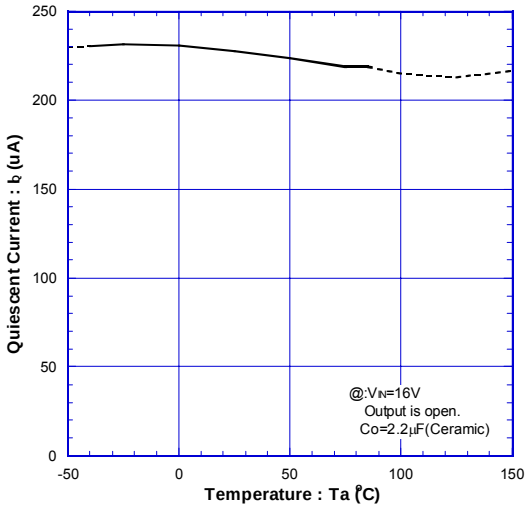
NJM2835_15V
Dropout Voltage v.s. Temperature



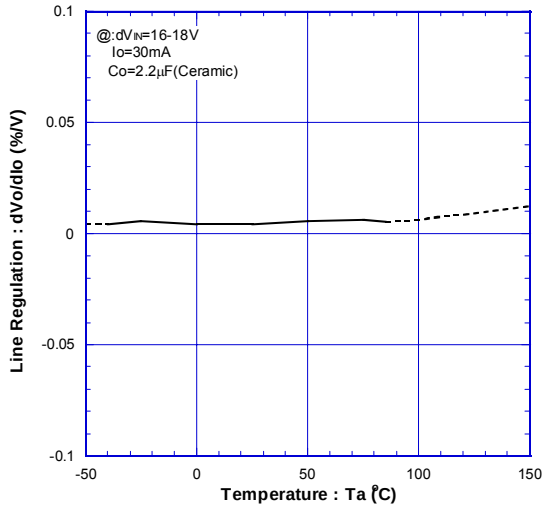
NJM2835_15V
Output Voltage v.s. Temperature



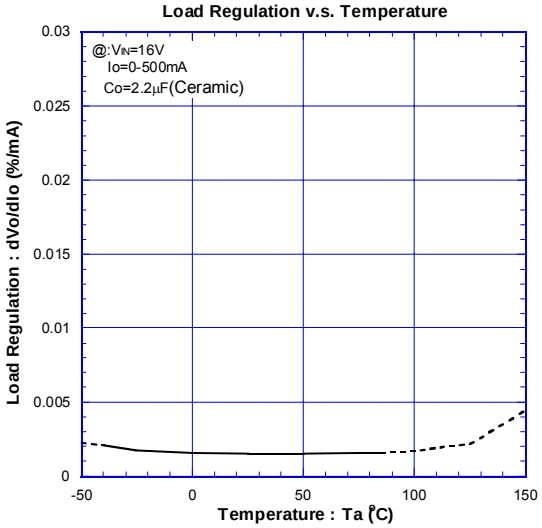
NJM2835_15V
Quiescent Current v.s. Temperature



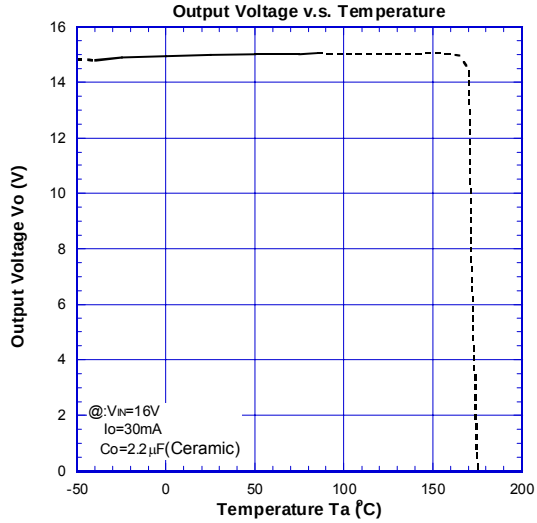
NJM2835_15V
Line Regulation v.s. Temperature



NJM2835_15V
Load Regulation v.s. Temperature

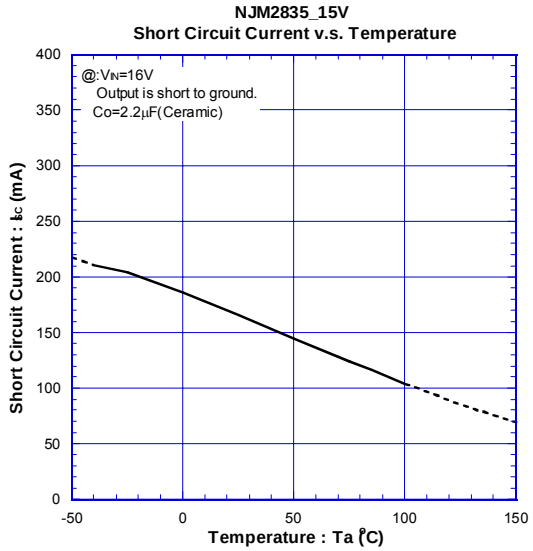


NJM2835_15V
Output Voltage v.s. Temperature



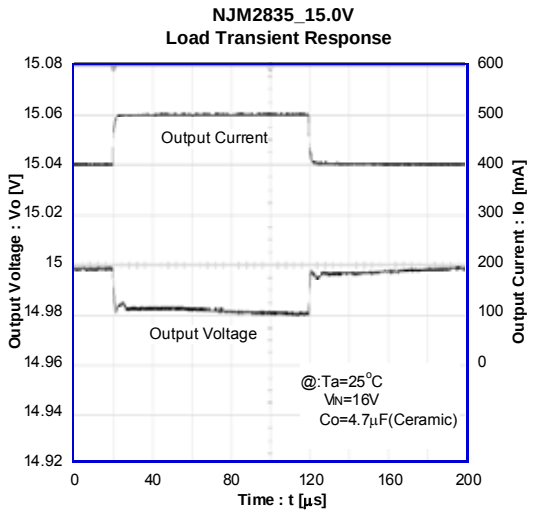
■ TYPICAL CHARACTERISTICS

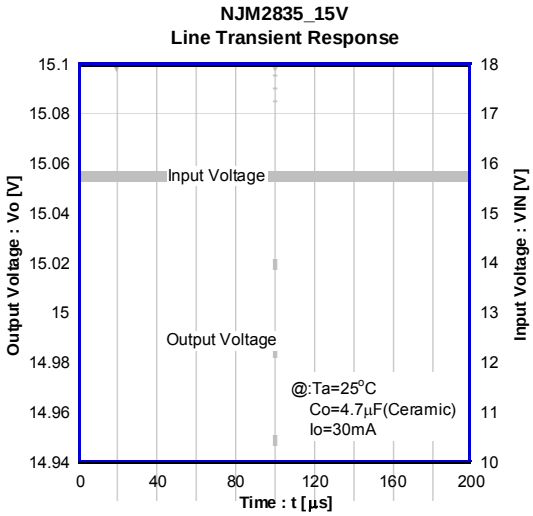
●TEMPERATURE CHARACTERISTICS (15V Version)



■ TYPICAL CHARACTERISTICS

●TRANSIENT RESPONSE (15V Version)





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The specifications on this databook are only
given for information , without any guarantee
as regards either mistakes or omissions. The
application circuits in this databook are
described only to show representative