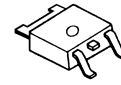


LOW DROPOUT VOLTAGE REGULATOR

■ 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, 2.2 μ F small decoupling capacitor, built-in noise bypass capacitor make the NJM2835 suitable for various applications.

■ PACKAGE OUTLINE

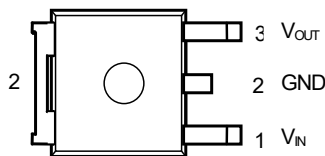


NJM2835DL1

■ FEATURES

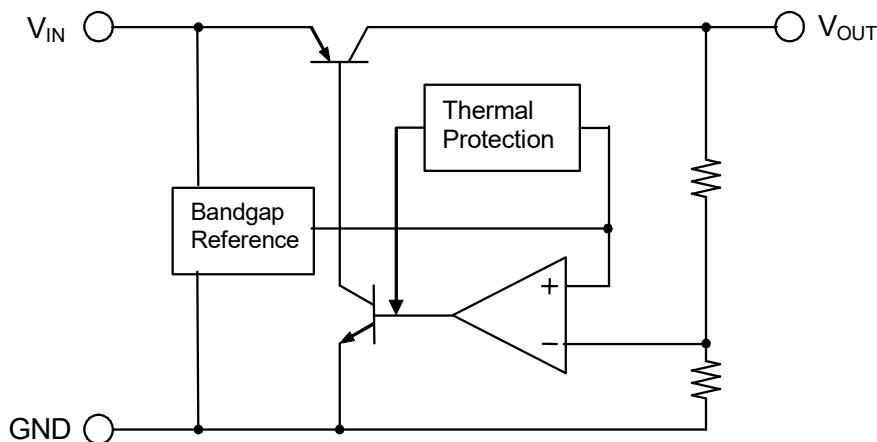
- Output voltage options available 2.1 ~ 15.5V
- High Ripple Rejection 75dB typ. (f=1kHz, Vo=3V Version)
- Output Noise Voltage Vno=45 μ Vrms typ.
- Output capacitor with 2.2 μ F ceramic capacitor (Vo \geq 5.1V)
- Output Current Io(max.)=500mA
- High Precision Output Vo \pm 1.0%
- Low Dropout Voltage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

■ PIN CONFIGURATION



NJM2835DL1

■ BLOCK DIAGRAM



■ 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	T_{opr}	-40 ~ +85	°C
Storage Temperature	T_{stg}	-40 ~ +150	°C

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

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

(For 4Layers: Applying 74.2 × 74.2mm inner Cu area and a thermal via hole to a board based on JEDEC standard JESD51-5)

■ ELECTRICAL CHARACTERISTICS

$V_{IN} = V_o + 1V$, $C_{IN} = 0.33\mu F$, $C_o = 2.2\mu F$ ($2.9V < V_o \leq 5V$: $C_o = 4.7\mu F$, $V_o \leq 2.9V$: $C_o = 10\mu F$), $T_a = 25^\circ C$

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT	
Output Voltage	V_o	$I_o = 30mA$	-1.0%	-	+1.0%	V	
Quiescent Current	I_Q	$I_o = 0mA$	$V_o \leq 5V$ Version	-	200	300	μA
			$5V < V_o \leq 10V$ Version	-	215	315	μA
			$10V < V_o \leq 15V$ Version	-	230	330	μA
Output Current	I_o	$V_o - 0.3V$	500	650	-	mA	
Line Regulation	$\Delta V_o / \Delta V_{IN}$	$V_{IN} = V_o + 1V \sim V_o + 6V (V_o \leq 12V)$, $V_{IN} = V_o + 1V \sim 18V (V_o > 12V)$, $I_o = 30mA$	-	-	0.10	%/V	
Load Regulation	$\Delta V_o / \Delta I_o$	$I_o = 0 \sim 500mA$	-	-	0.007	%/mA	
Dropout Voltage(*3)	ΔV_{LO}	$I_o = 300mA$	-	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/°C	
Output Noise Voltage	V_{NO}	$f = 10Hz \sim 80kHz$, $I_o = 10mA$, $V_o = 3V$ Version	-	45	-	μV_{rms}	
Input Voltage	V_{IN}		-	-	18	V	

(*3): 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.

■ THERMAL CHARACTERISTICS

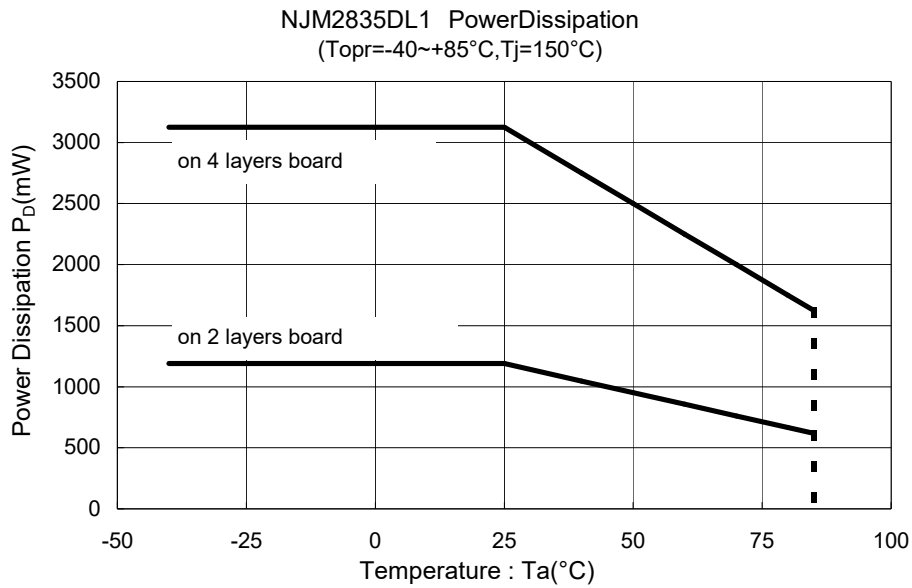
PARAMETER	SYMBOL	VALUE	UNIT
Junction-to-Ambient thermal resistance	θ_{ja}	105 (*4)	$^{\circ}\text{C/W}$
		40 (*5)	
Junction-to-Top of package characterization parameter	ψ_{jt}	17 (*4)	$^{\circ}\text{C/W}$
		12 (*5)	

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

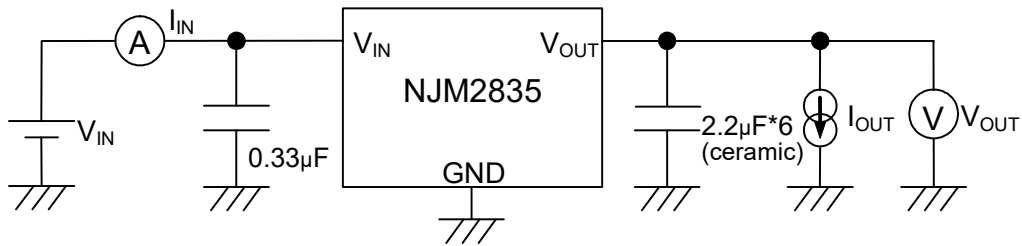
(*5): Mounted on glass epoxy board. (76.2 × 114.3 × 1.6mm:based on EIA/JDEC standard, 4Layers)

(For 4Layers: Applying 74.2 × 74.2mm inner Cu area and a thermal via hole to a board based on JEDEC standard JESD51-5)

■ POWER DISSIPATION vs. AMBIENT TEMPERATURE



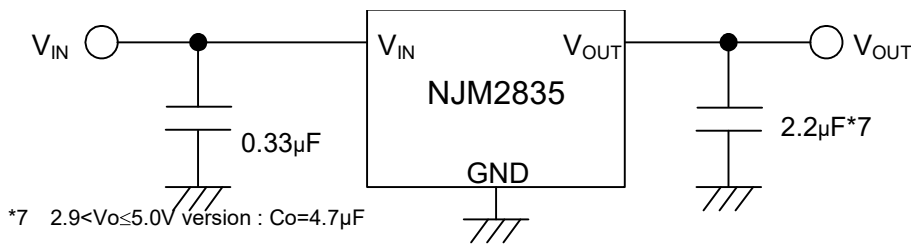
■ TEST CIRCUIT



*6 2.9<V_o≤5.0V version : C_o=4.7µF(ceramic)

V_o≤2.9V version : C_o=10µF(ceramic)

■ TYPICAL APPLICATION



*7 2.9<V_o≤5.0V version : C_o=4.7µF

V_o≤2.9V version : C_o=10µF

*Input Capacitor C_{IN}

Input Capacitor C_{IN} is required to prevent oscillation and reduce power supply ripple for applications when high power supply impedance or a long power supply line.

Therefore, use the recommended C_{IN} value (refer to conditions of ELECTRIC CHARACTERISTIC) or larger and should connect between GND and V_{IN} as shortest path as possible to avoid the problem.

*Output Capacitor C_O

The 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.

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

On the other hand, use of a larger C_O reduces an output noise and a ripple output, and also improves an output transient response when load rapidly changes.

Therefore, use the recommended C_O value (refer to conditions of ELECTRIC CHARACTERISTIC) or larger and should connect between GND and V_{OUT} as shortest path as possible for stable operation.

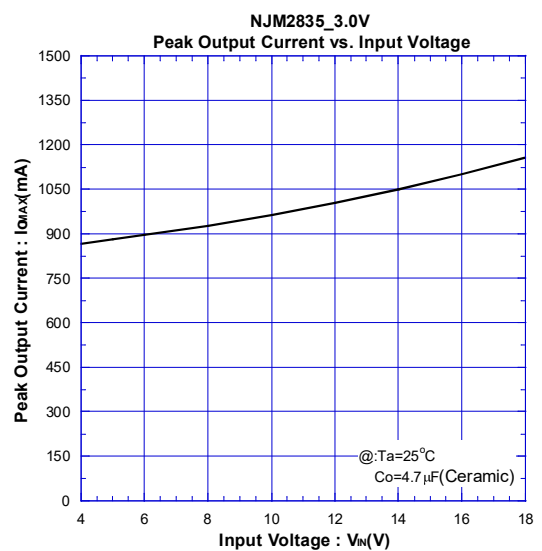
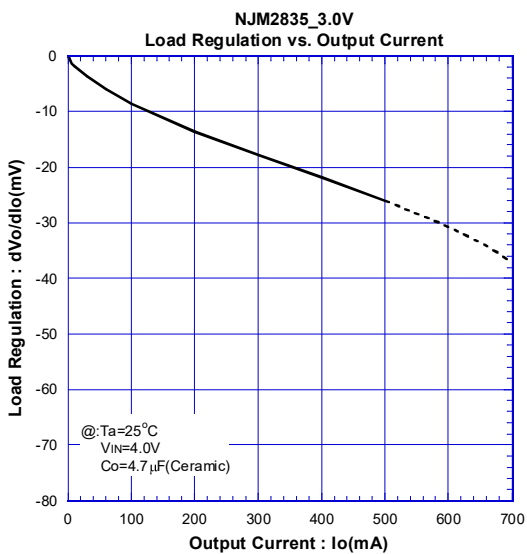
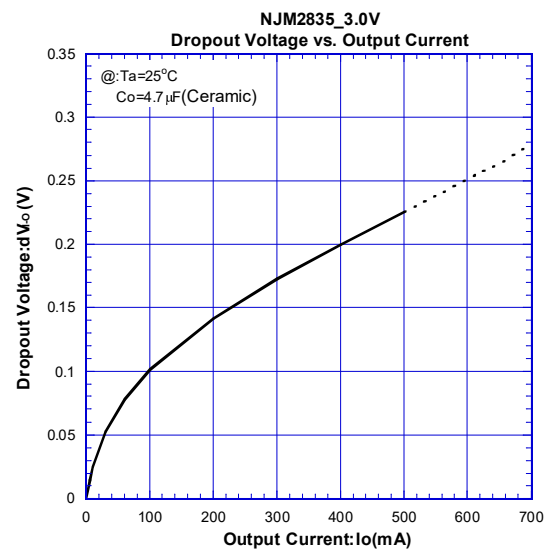
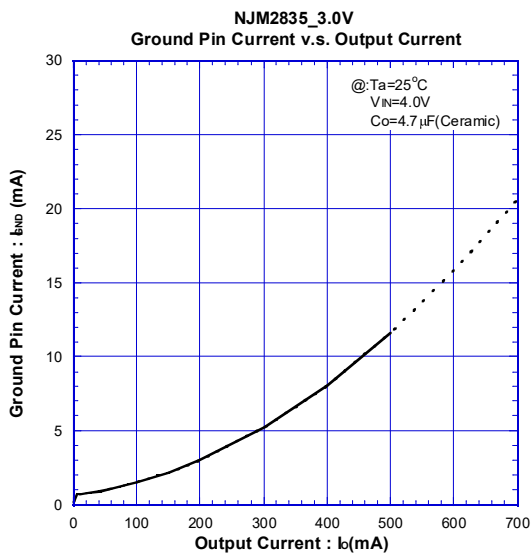
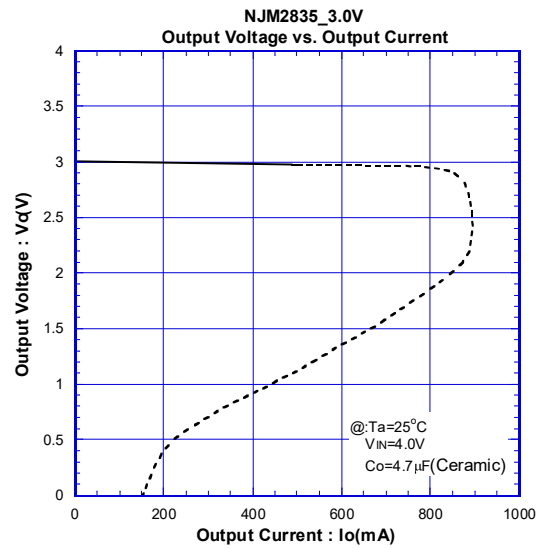
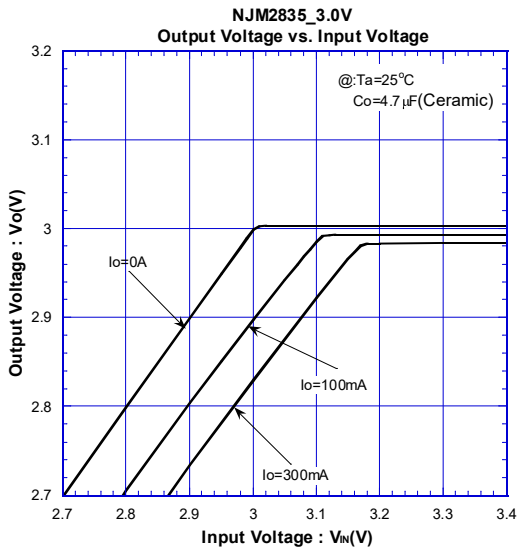
The recommended capacitance depends on the output voltage rank. Especially, a low voltage regulator requires larger C_O value.

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.

When selecting C_O, recommend that have withstand voltage margin against an output voltage and superior temperature characteristic.

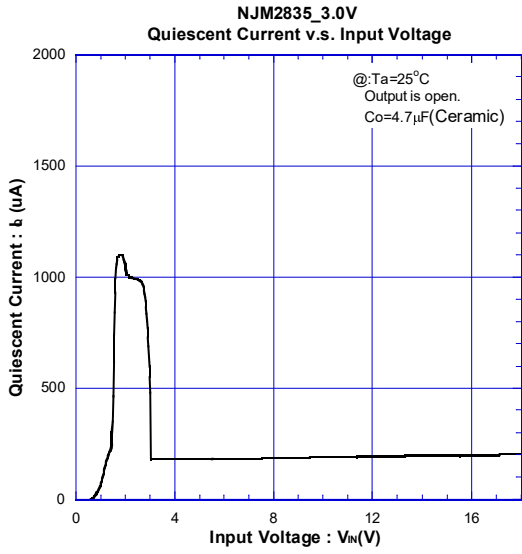
TYPICAL CHARACTERISTICS

DC CHARACTERISTICS (3V Version)

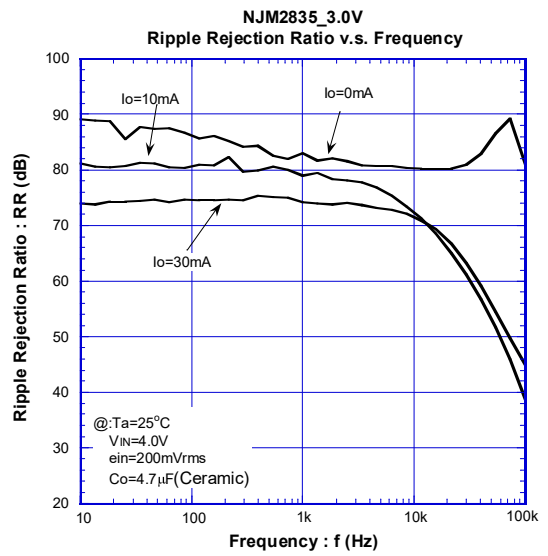
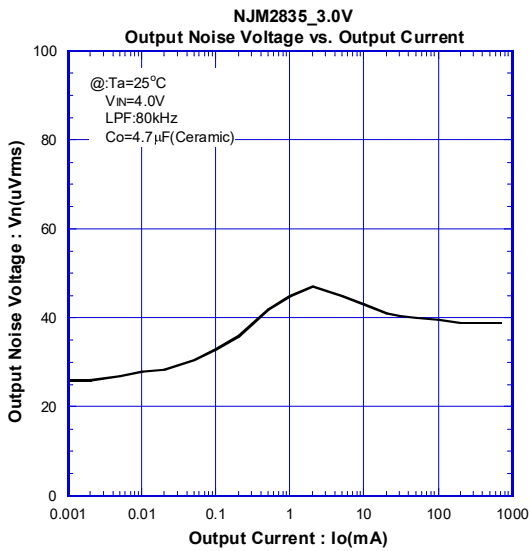


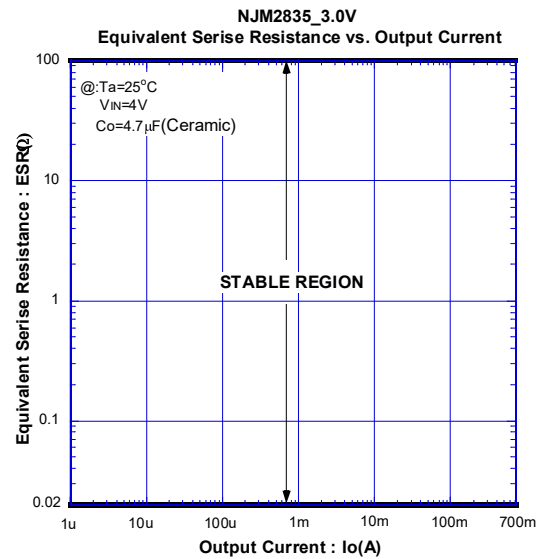
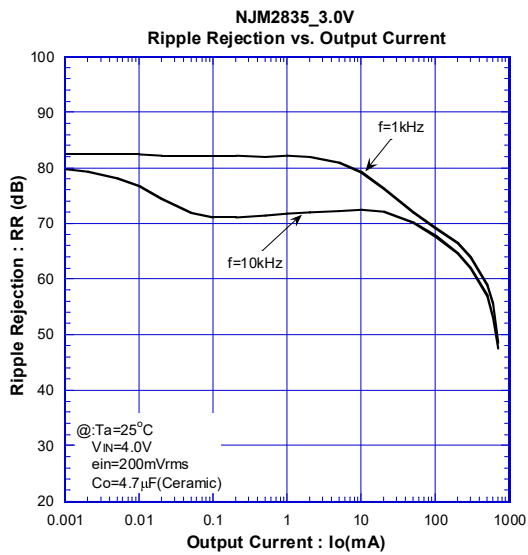
■ TYPICAL CHARACTERISTICS

● DC CHARACTERISTICS (3V Version)



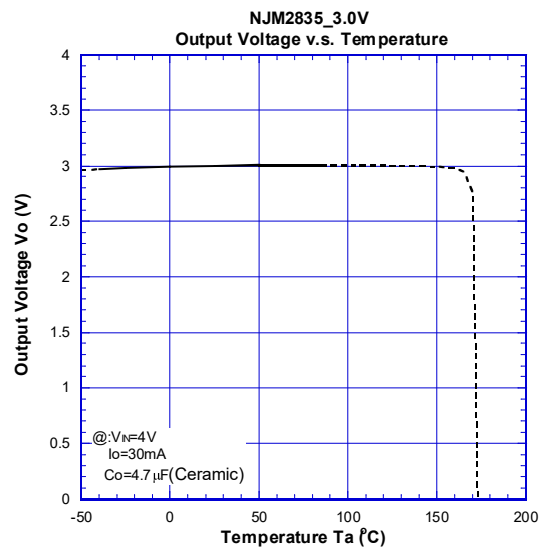
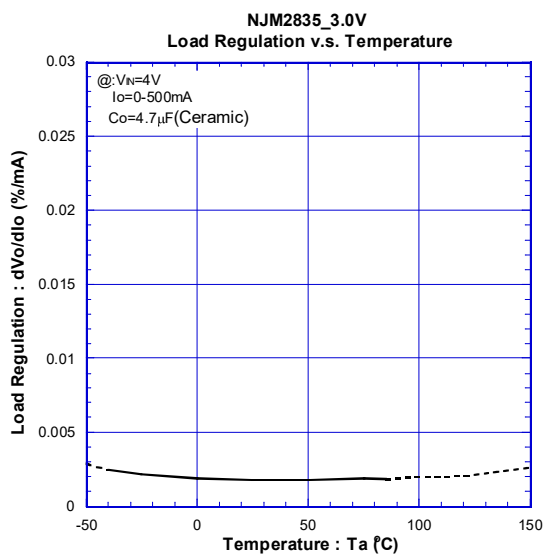
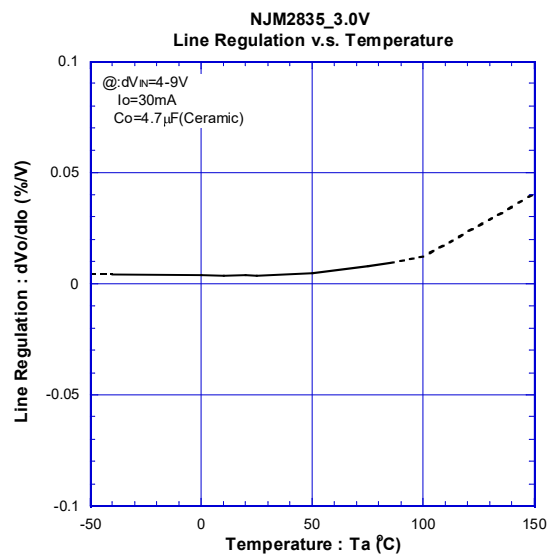
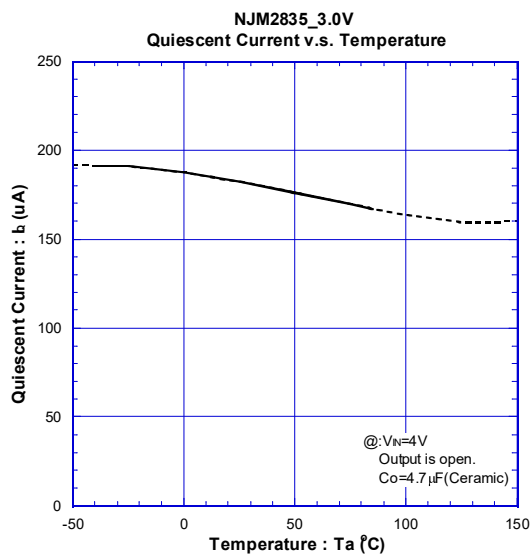
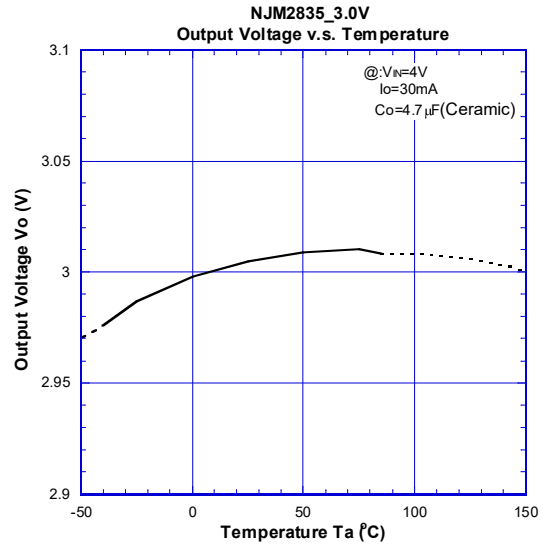
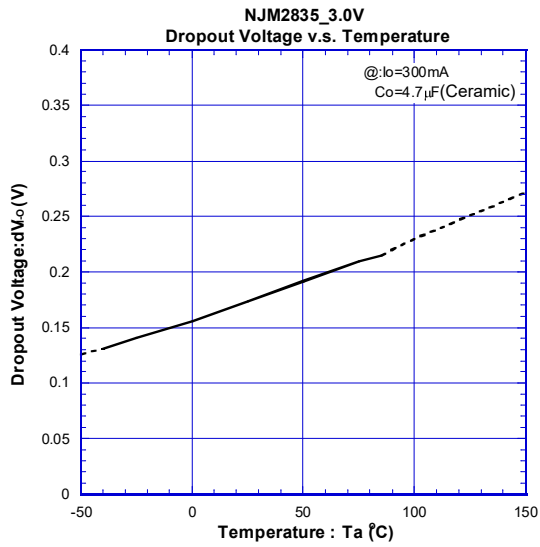
● AC CHARACTERISTICS (3V Version)





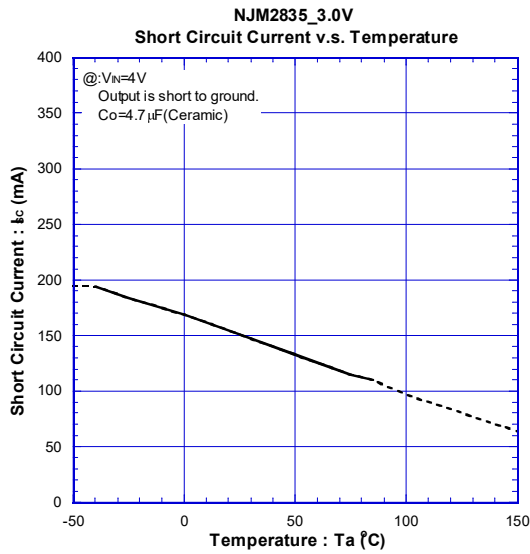
TYPICAL CHARACTERISTICS

● TEMPERATURE CHARACTERISTICS (3V Version)



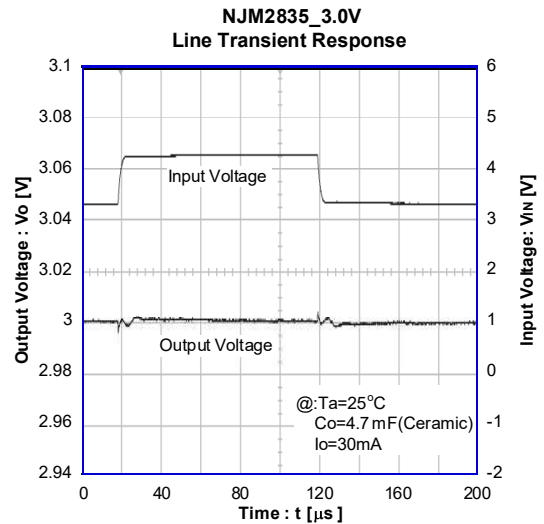
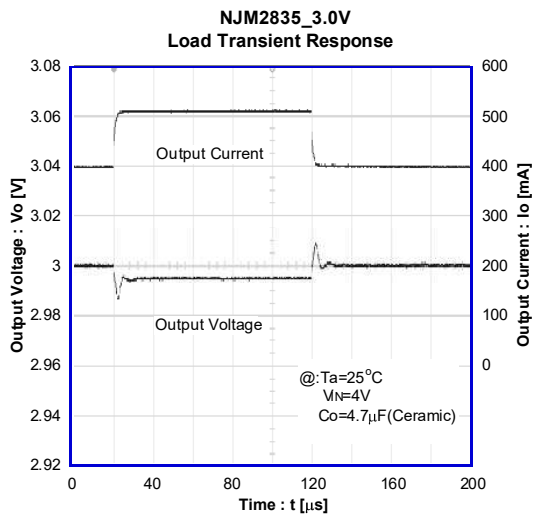
TYPICAL CHARACTERISTICS

TEMPERATURE CHARACTERISTICS (3V Version)



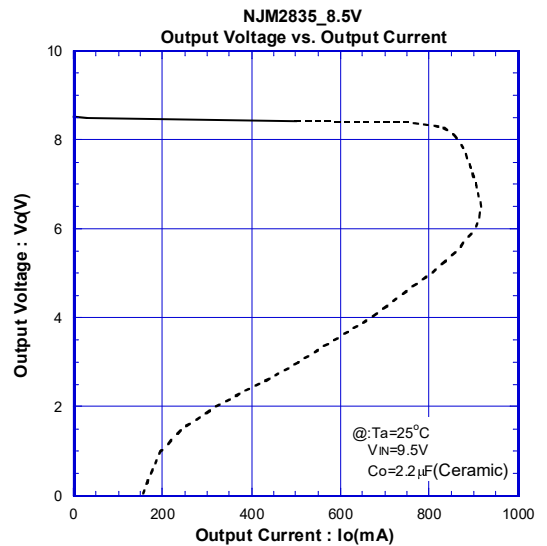
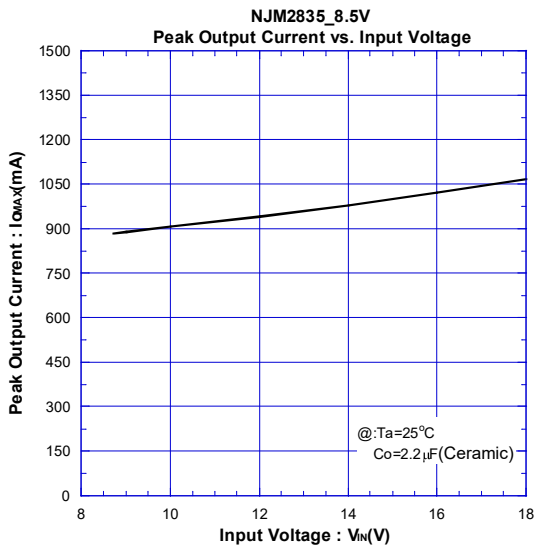
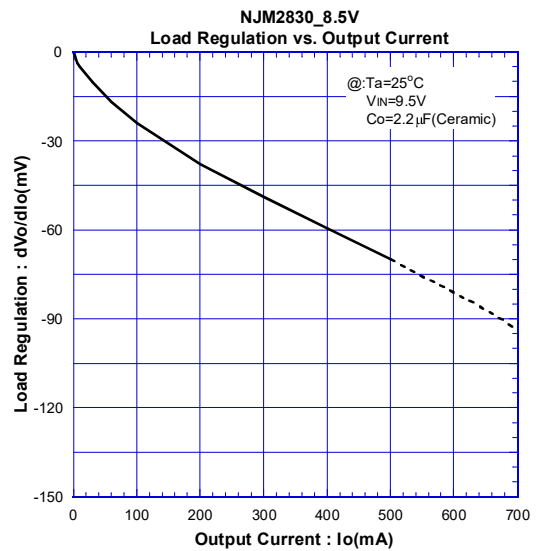
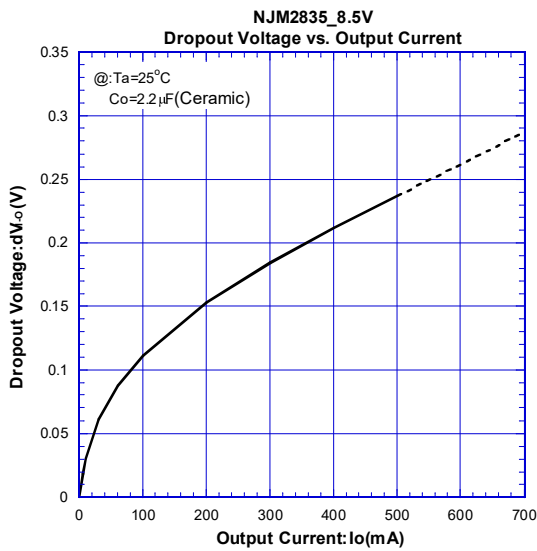
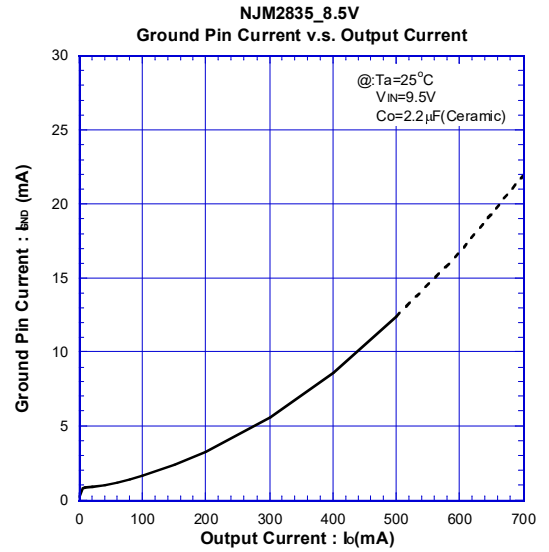
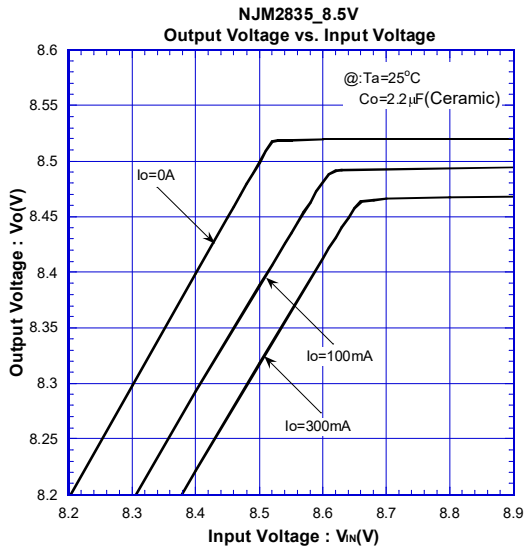
TYPICAL CHARACTERISTICS

TRANSIENT RESPONSE (3V Version)



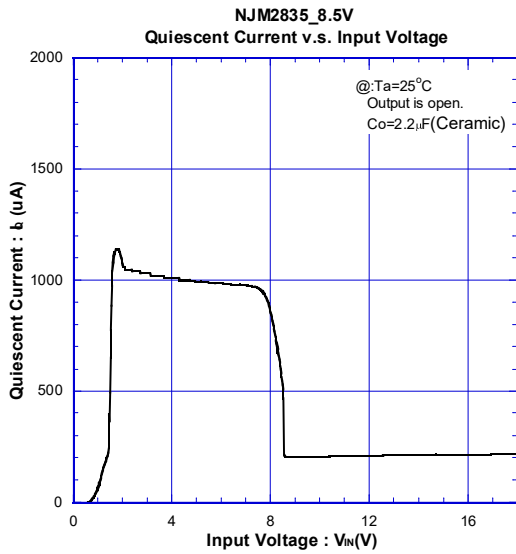
TYPICAL CHARACTERISTICS

DC CHARACTERISTICS (8.5V Version)

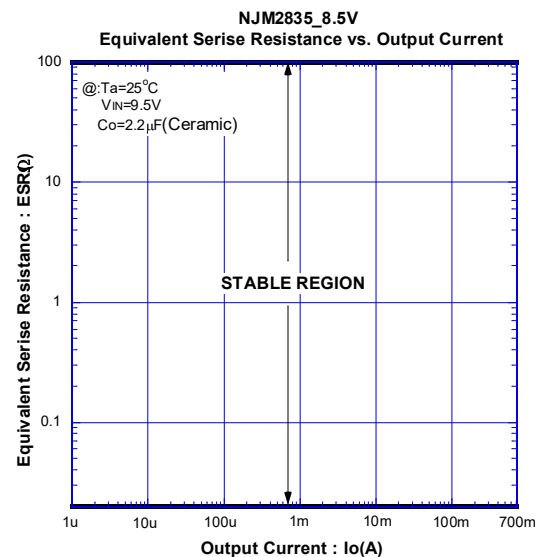
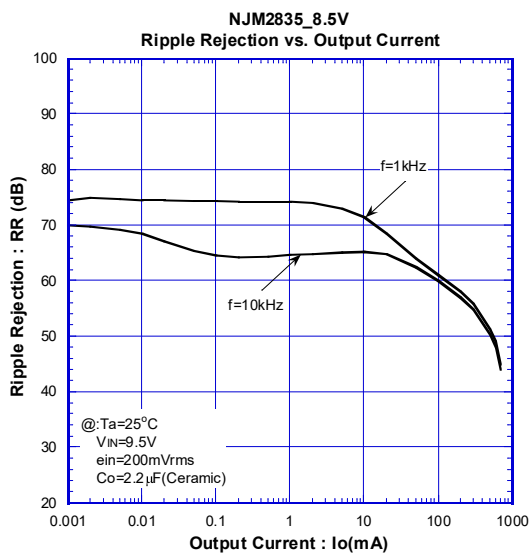
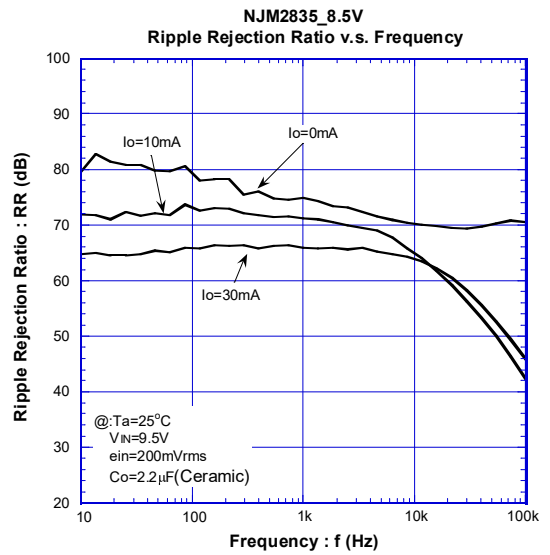
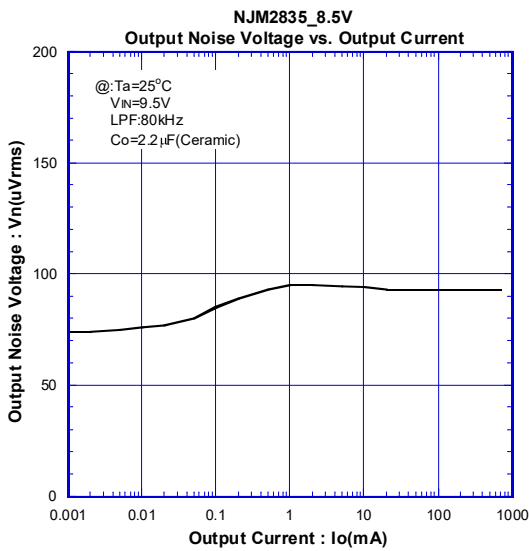


■ TYPICAL CHARACTERISTICS

● DC CHARACTERISTICS (8.5V Version)

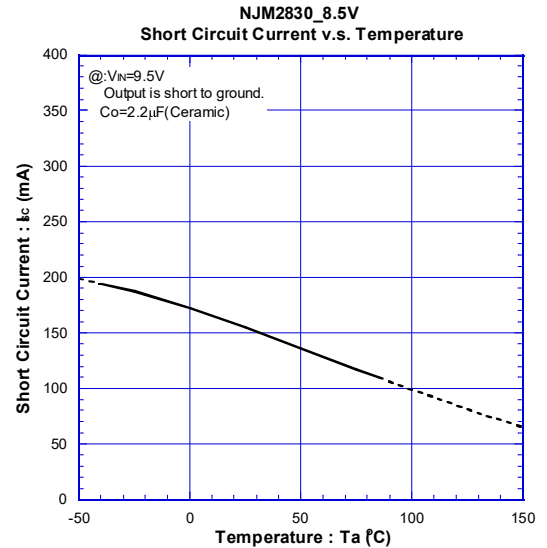
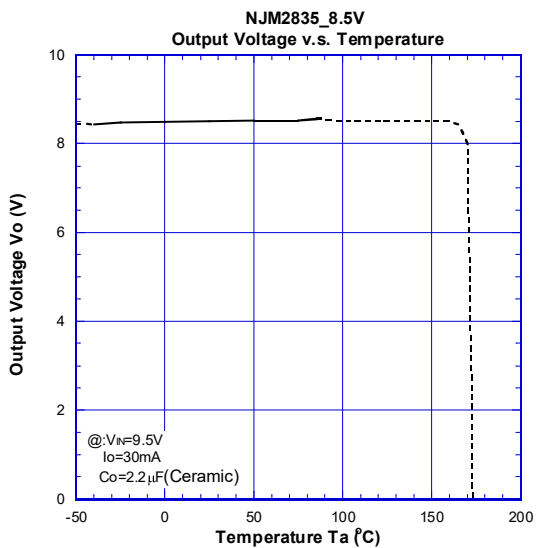
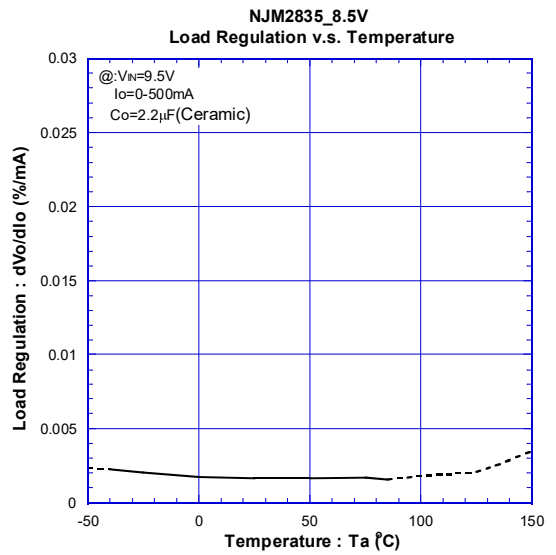
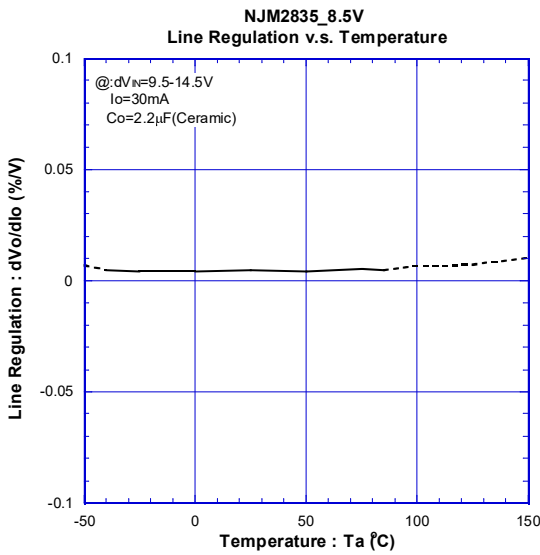
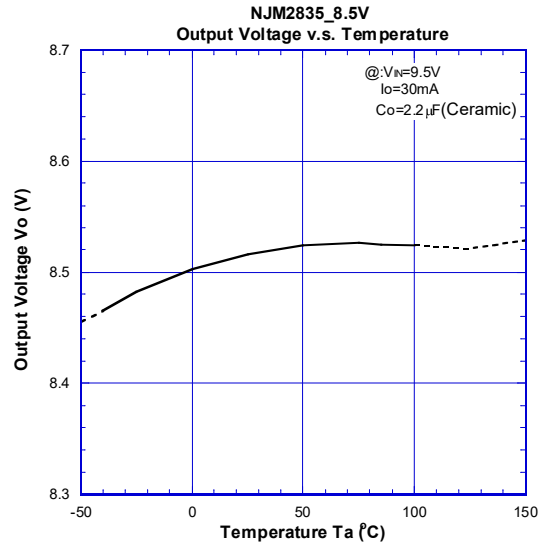
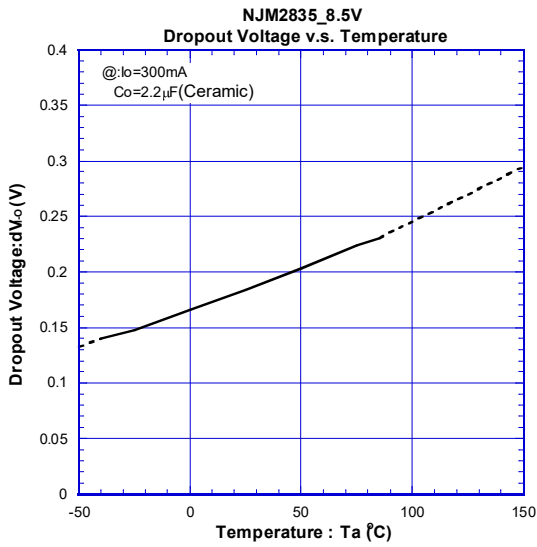


● AC CHARACTERISTICS (8.5V Version)



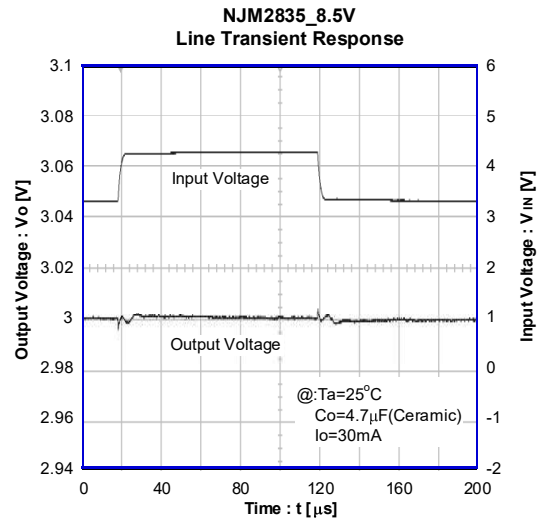
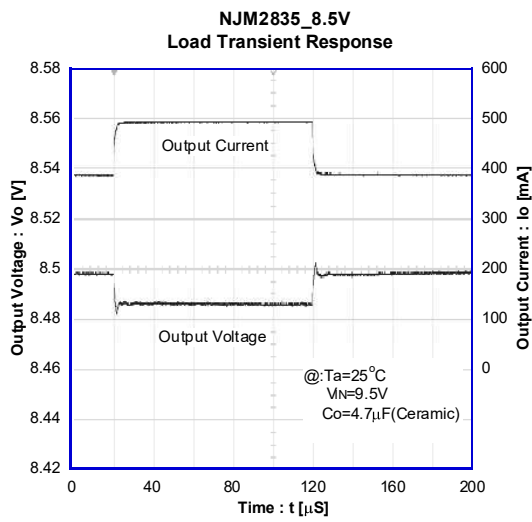
■ TYPICAL CHARACTERISTICS

● TEMPERATURE CHARACTERISTICS (8.5V Version)



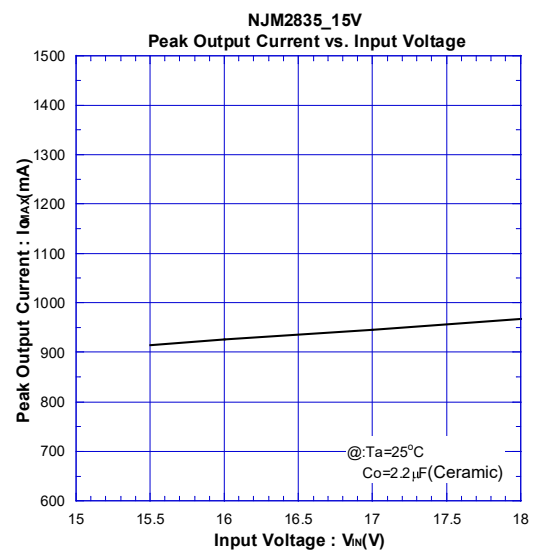
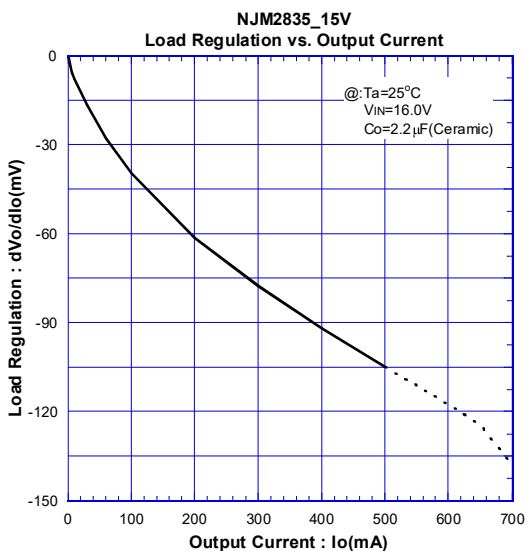
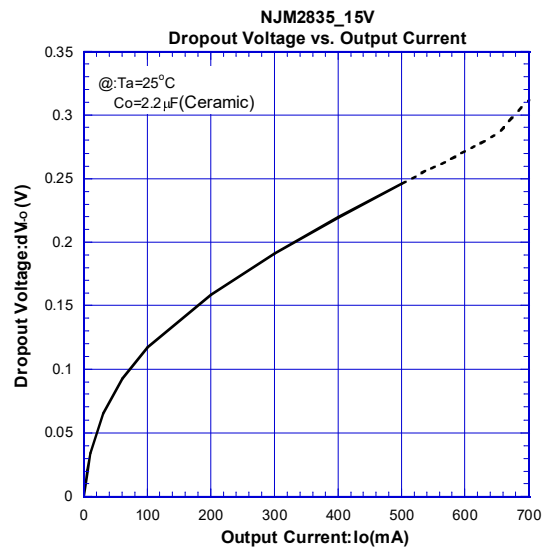
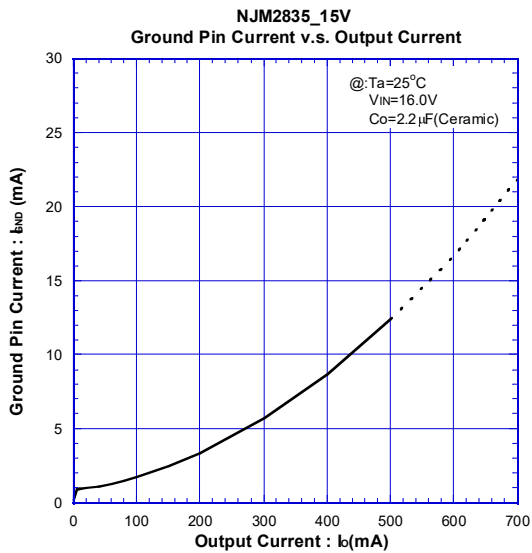
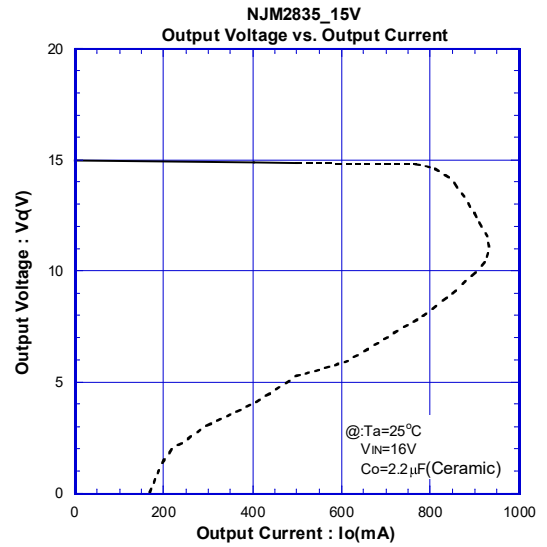
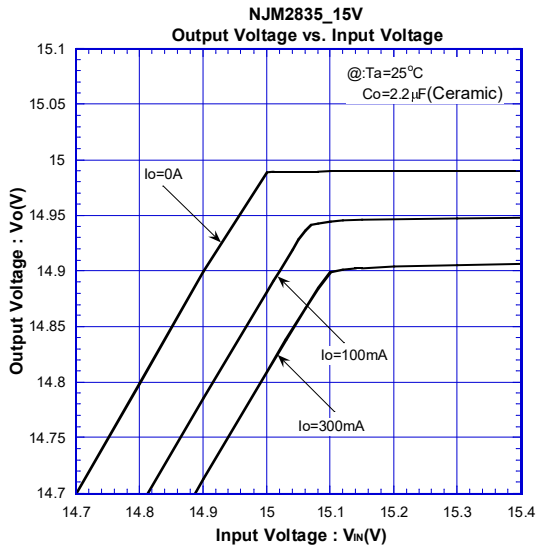
■ TYPICAL CHARACTERISTICS

● TRANSIENT RESPONSE (8.5V Version)



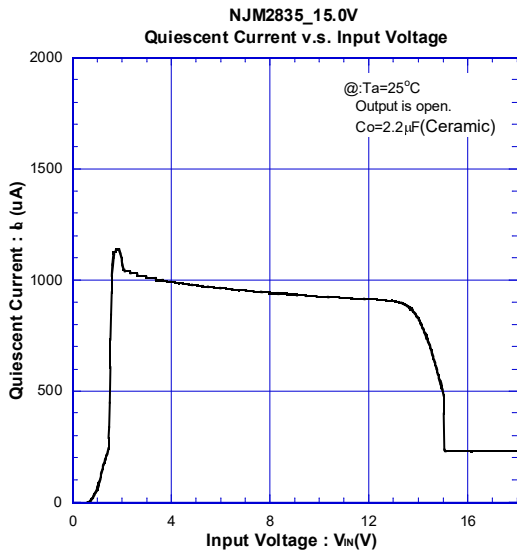
TYPICAL CHARACTERISTICS

DC CHARACTERISTICS (15V Version)

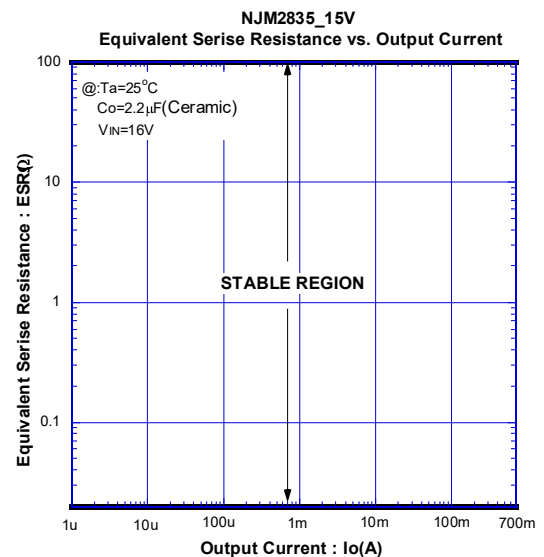
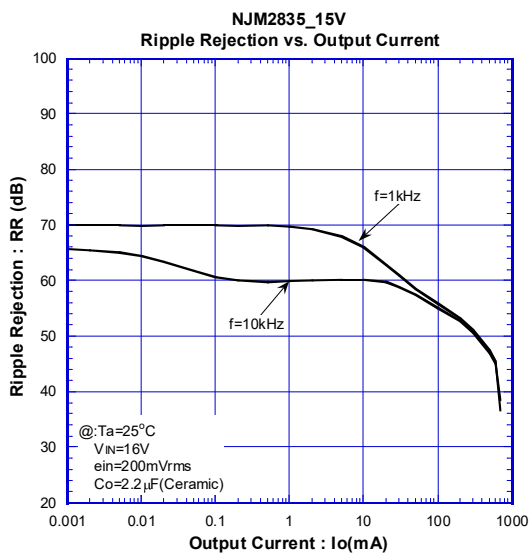
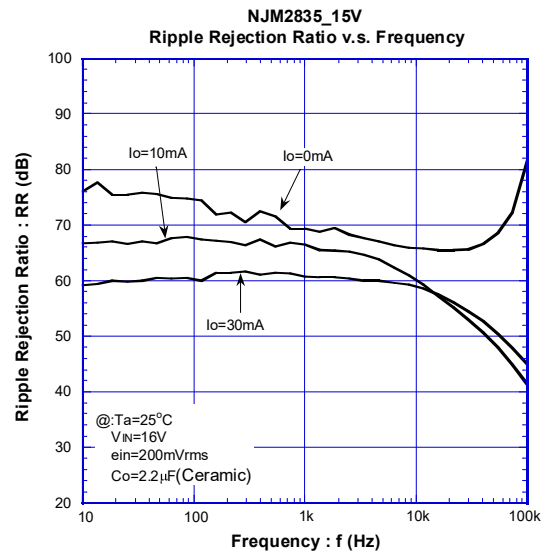
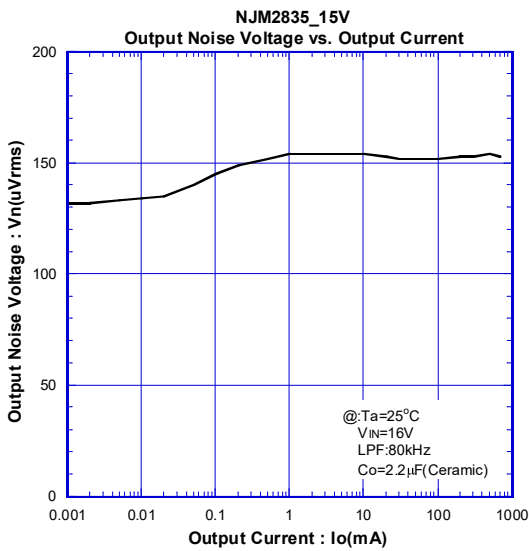


TYPICAL CHARACTERISTICS

DC CHARACTERISTICS (15V Version)

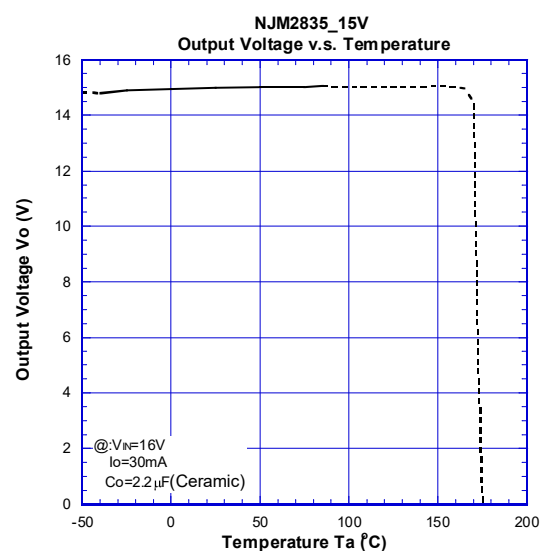
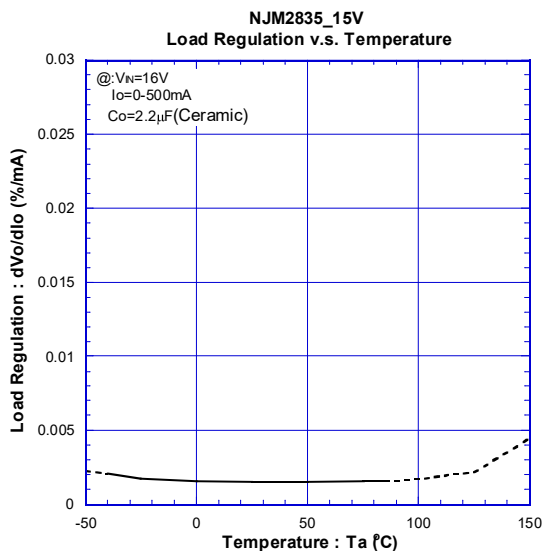
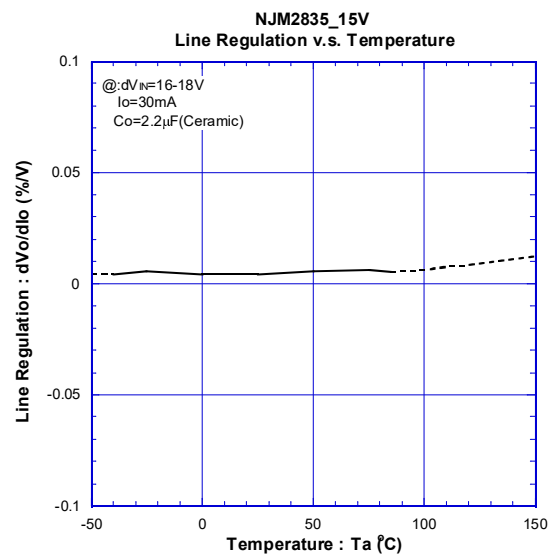
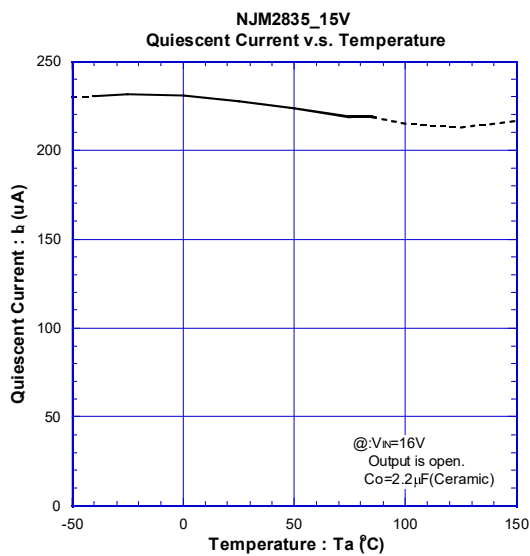
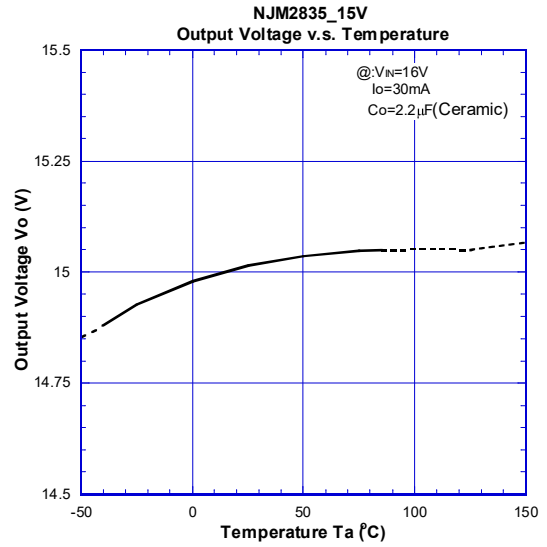
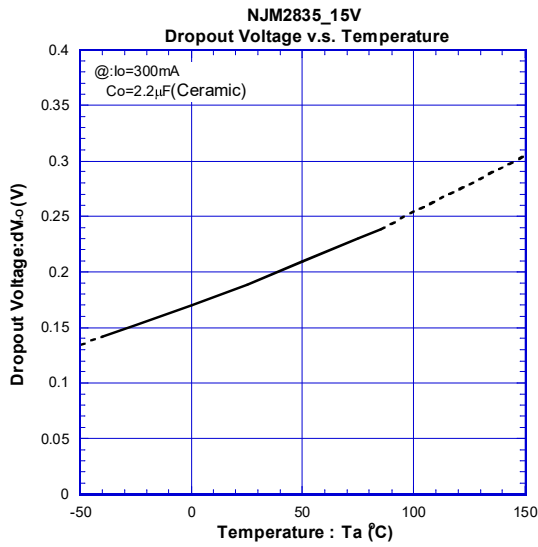


AC CHARACTERISTICS (15V Version)



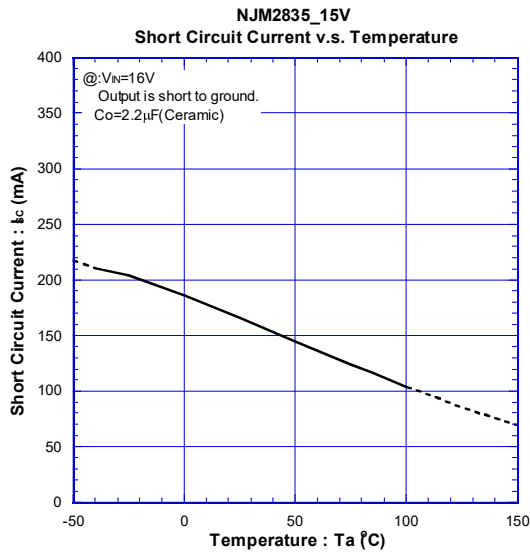
TYPICAL CHARACTERISTICS

TEMPERATURE CHARACTERISTICS (15V Version)



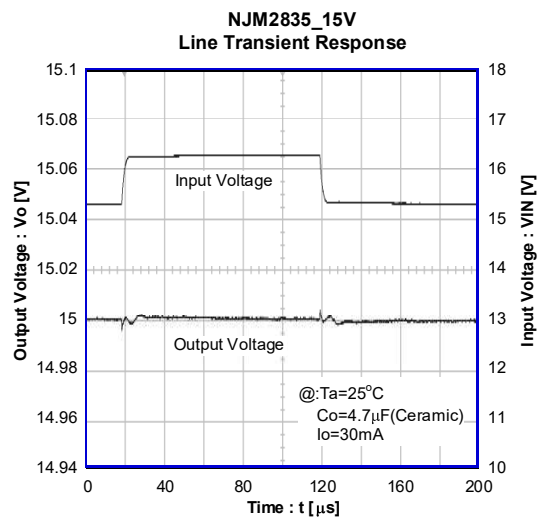
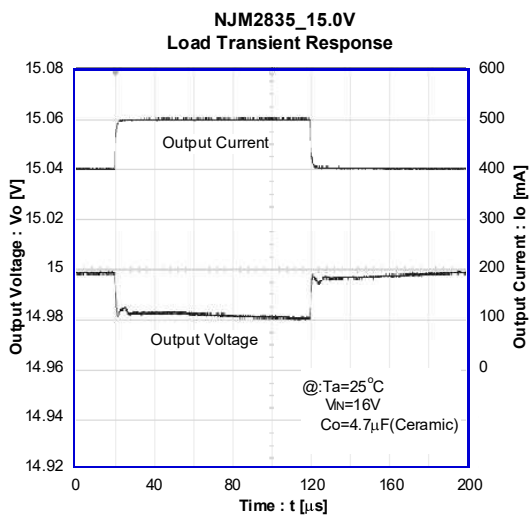
TYPICAL CHARACTERISTICS

TEMPERATURE CHARACTERISTICS (15V Version)



TYPICAL CHARACTERISTICS

TRANSIENT RESPONSE (15V Version)



[CAUTION]
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