

LOW DROPOUT VOLTAGE REGULATOR

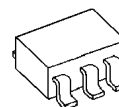
■ GENERAL DESCRIPTION

NJM2881/82 is a low dropout voltage regulator with ON/OFF control.

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

It is mounted on SOT-23-5 as small package and 1.0 μ F ceramic capacitor is available. Therefore it is suitable for cellular phone, camcorder, IC decoder, camera, and other portable items.

■ PACKAGE OUTLINE

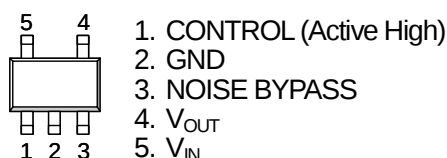


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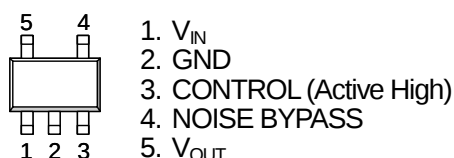
■ FEATURES

- High Ripple Rejection 75dB typ. (f=1kHz, $V_o=3V$ version)
- Low Output Noise Voltage $V_{no}=30\mu V_{rms}$ ($C_p=0.01\mu F$)
- Output capacitor with 1.0 μF ceramic capacitor ($V_o\geq 2.7V$)
- Output Current $I_o(max.)=300mA$
- High Precision Output $V_o\pm 1.0\%$
- Low Dropout Voltage 0.10V typ. ($I_o=100mA$)
- ON/OFF Control (Active High)
- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Bipolar Technology
- Package Outline SOT-23-5

■ PIN CONFIGURATION

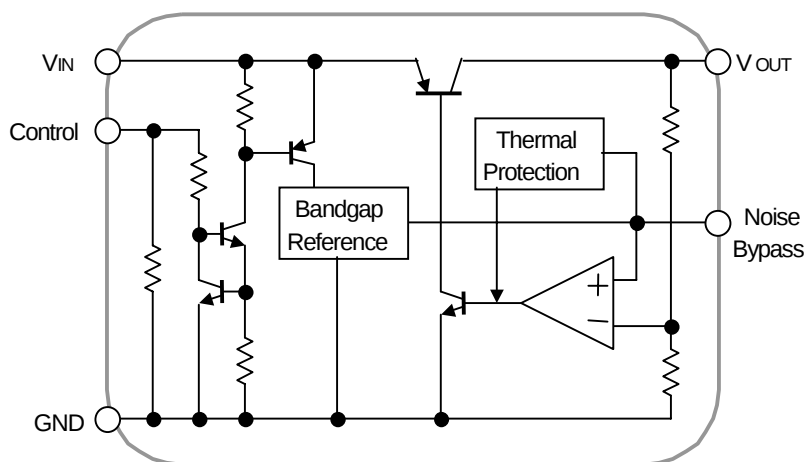


NJM2881F



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■ EQUIVALENT CIRCUIT



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■ OUTPUT VOLTAGE RANK LIST(* : Under development)

Device Name	V _{OUT}	Device Name	V _{OUT}
NJM288*F15	1.5V	NJM288*F31	3.1V
NJM288*F17	1.7V	NJM288*F33	3.3V
NJM288*F18	1.8V	NJM288*F345	3.45V
NJM288*F21	2.1V	NJM288*F35	3.5V
NJM288*F25	2.5V	NJM288*F38	3.8V
NJM288*F28	2.8V	NJM288*F04	4.0V
*NJM288*F285	2.85V	NJM288*F43	4.3V
NJM288*F29	2.9V	*NJM288*F47	4.7V
NJM288*F03	3.0V	NJM288*F05	5.0V

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V _{IN}	+14	V
Control Voltage	V _{CONT}	+14(*1)	V
Power Dissipation	P _D	SOT-23-5	350(*2)
			200(*3)
Operating Temperature	T _{opr}	-40 ~ +85	°C
Storage Temperature	T _{stg}	-40 ~ +125	°C

(*1): When input voltage is less than +14V, the absolute maximum control voltage is equal to the input voltage.

(*2): Mounted on glass epoxy board based on EIA/JEDEC. (114.3x76.2x1.6mm: 2Layers)

(*3): Device itself.

■ Operating voltage

V_{IN}=+2.3 ~ +6V (In case of V_O<2.1V)

■ ELECTRICAL CHARACTERISTICS

(V_O>2.0V version: V_{IN}=V_O+1V, C_{IN}=0.1μF, C_O=1.0μF: V_O≥2.7V (C_O=2.2μF: V_O≤2.6V), C_p=0.01μF, Ta=25°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, except I _{cont}	-	120	180	μA
Quiescent Current at Control OFF	I _{Q(OFF)}	V _{CONT} =0V	-	-	100	nA
Output Current	I _O	V _O =0.3V	300	400	-	mA
Line Regulation	ΔV _O /ΔV _{IN}	V _{IN} =V _O +1V ~ V _O +6V, I _O =30mA	-	-	0.10	%/V
Load Regulation	ΔV _O /ΔI _O	I _O =0 ~ 300mA	-	-	0.03	%/mA
Dropout Voltage	ΔV _{I-O}	I _O =100mA	-	0.10	0.18	V
Ripple Rejection	RR	e _{in} =200mVrms, f=1kHz, I _O =10mA, V _O =3V version	-	75	-	dB
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔTa	Ta=0 ~ 85°C, I _O =10mA	-	± 50	-	ppm/°C
Output Noise Voltage	V _{NO}	f=10Hz ~ 80kHz, I _O =10mA, V _O =3V version	-	30	-	μVrms
Control Voltage for ON-state	V _{CONT(ON)}		1.6	-	-	V
Control Voltage for OFF-state	V _{CONT(OFF)}		-	-	0.6	V

■ ELECTRICAL CHARACTERISTICS

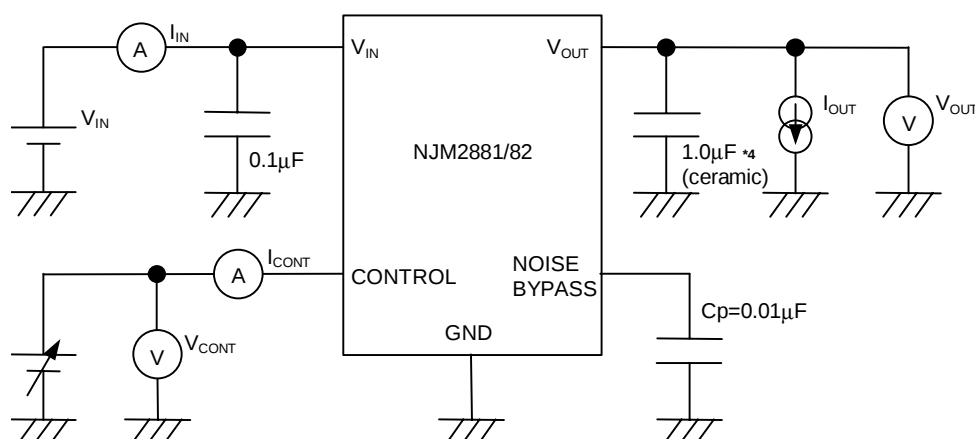
($V_O \leq 2.0V$ version: $V_{IN} = V_O + 1V$, $C_{IN} = 0.1\mu F$, $C_O = 2.2\mu F$; $V_O \geq 1.9V$ ($C_O = 4.7\mu F$: $V_O \leq 1.8V$), $C_P = 0.01\mu F$, $T_a = 25^\circ C$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	$I_O = 30mA$	-1.0%	-	+1.0%	V
Quiescent Current	I_Q	$I_O = 0mA$, except I_{CONT}	-	120	180	μA
Quiescent Current at Control OFF	$I_{Q(OFF)}$	$V_{CONT} = 0V$	-	-	100	nA
Output Current	I_O	$V_O = 0.3V$	300	400	-	mA
Line Regulation	$\Delta V_O / \Delta V_{IN}$	$V_{IN} = V_O + 1V \sim V_O + 6V$, $I_O = 30mA$	-	-	0.10	%/V
Load Regulation	$\Delta V_O / \Delta I_O$	$I_O = 0 \sim 300mA$	-	-	0.03	%/mA
Ripple Rejection	RR	$e_{in} = 200mV_{rms}$, $f = 1kHz$, $I_O = 10mA$, $V_O = 1.8V$ version	-	80	-	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/ $^\circ C$
Output Noise Voltage	V_{NO}	$f = 10Hz \sim 80kHz$, $I_O = 10mA$, $V_O = 1.8V$ version	-	20	-	μV_{rms}
Control Voltage for ON-state	$V_{CONT(ON)}$		1.6	-	-	V
Control Voltage for OFF-state	$V_{CONT(OFF)}$		-	-	0.6	V

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.

■ TEST CIRCUIT

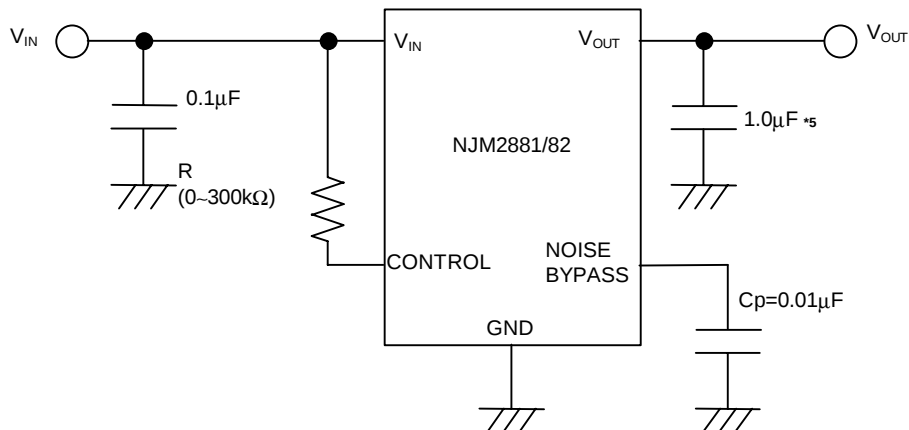


*4 $1.9V \leq V_O \leq 2.6V$ version: $C_O = 2.2\mu F$ (ceramic)
 $V_O \leq 1.8V$ version: $C_O = 4.7\mu F$ (ceramic)

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■ TYPICAL APPLICATION

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

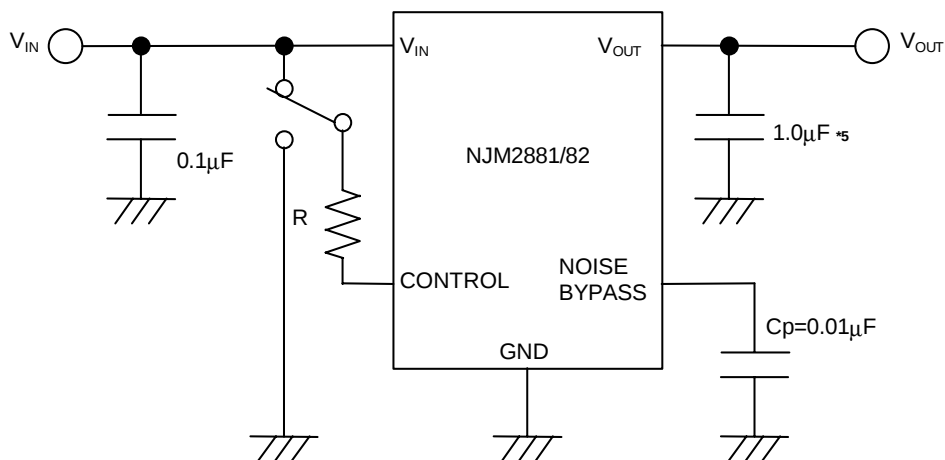


*5 $1.9V \leq V_o \leq 2.6V$ version: $C_o=2.2\mu F$
 $V_o \leq 1.8V$ version: $C_o=4.7\mu F$

Connect control terminal to V_{IN} terminal

The quiescent current can be reduced by using a resistance "R". Instead, it increases the minimum operating voltage. For further information, please refer to Figure "Output Voltage vs. Control Voltage".

② In use of ON/OFF CONTROL:



*5 $1.9V \leq V_o \leq 2.6V$ version: $C_o=2.2\mu F$
 $V_o \leq 1.8V$ version: $C_o=4.7\mu F$

State of control terminal:

- "H" → output is enabled.
- "L" or "open" → output is disabled.

*Noise bypass Capacitance C_p

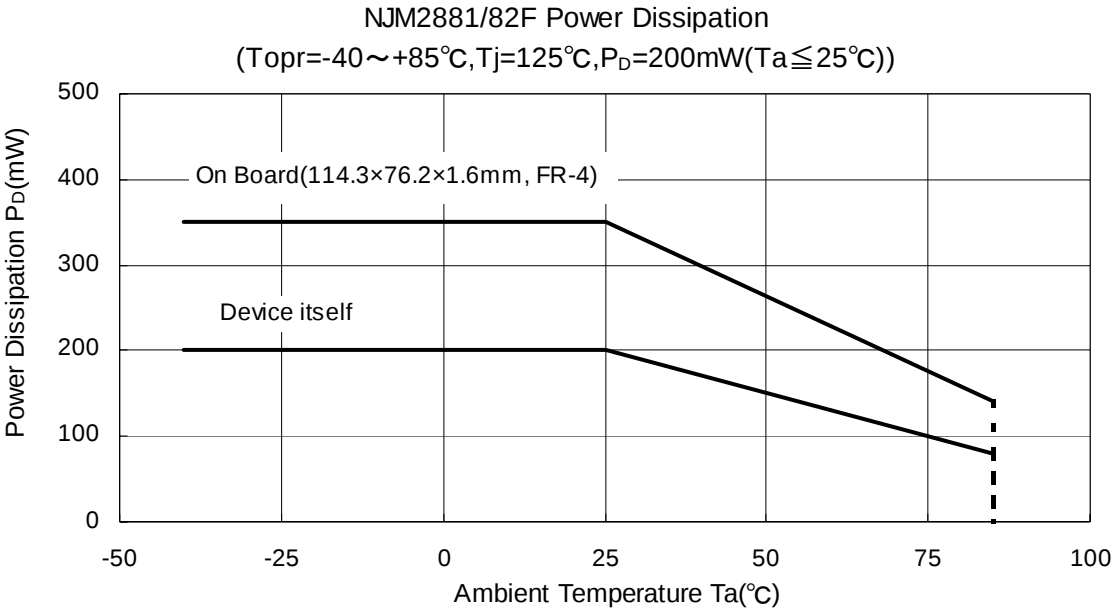
Noise bypass capacitance C_p reduces noise generated by band-gap reference circuit.

Noise level and ripple rejection will be improved when larger C_p is used.

Use of smaller C_p value may cause oscillation.

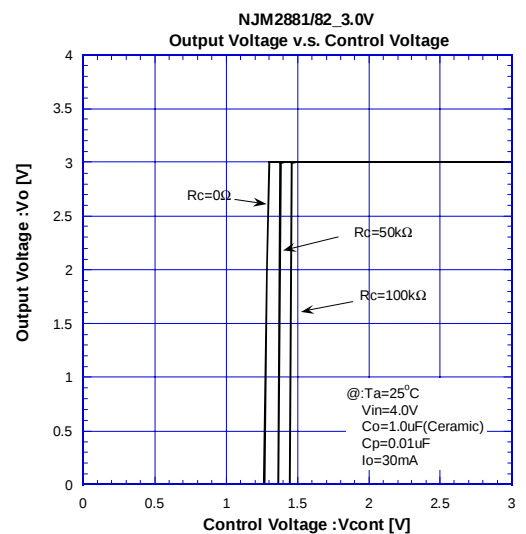
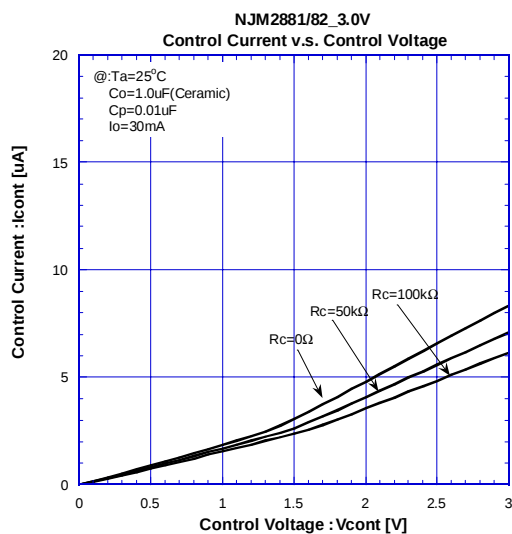
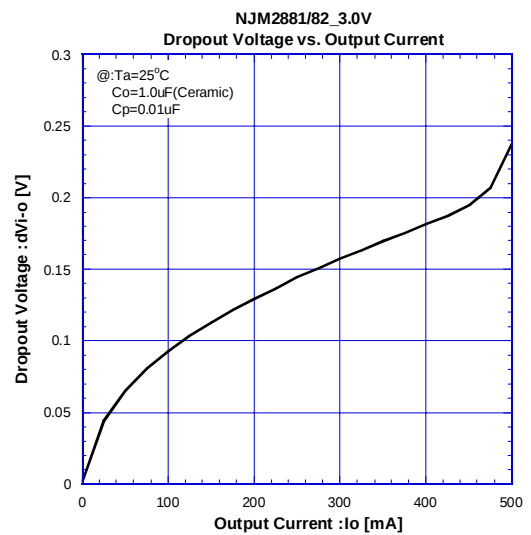
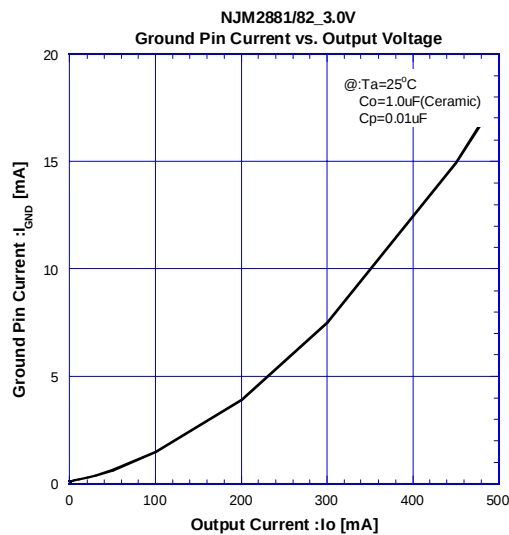
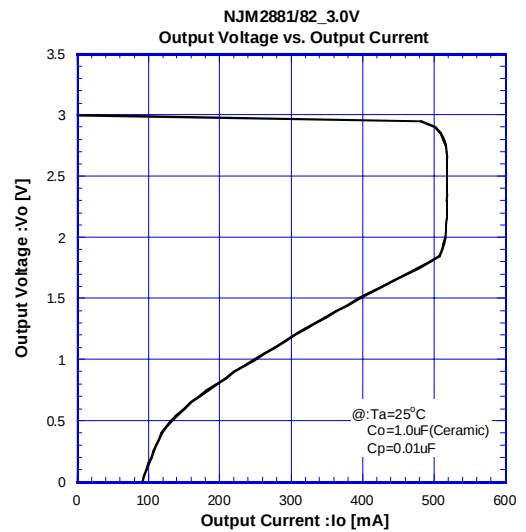
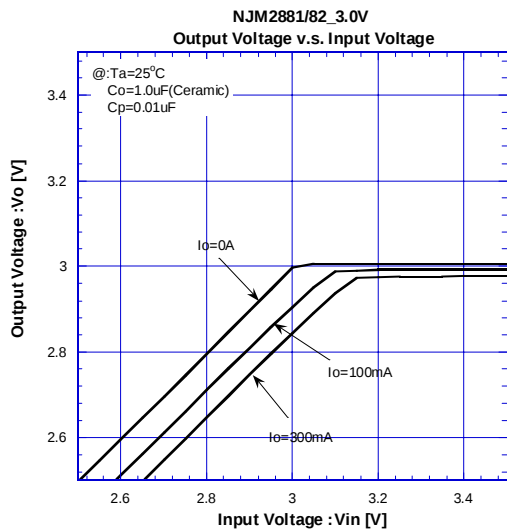
Use the C_p value of $0.01\mu F$ greater to avoid the problem.

POWER DISSIPATION vs. AMBIENT TEMPERATURE

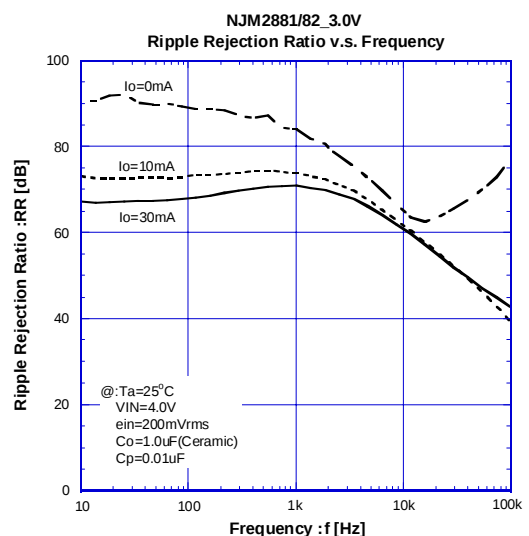
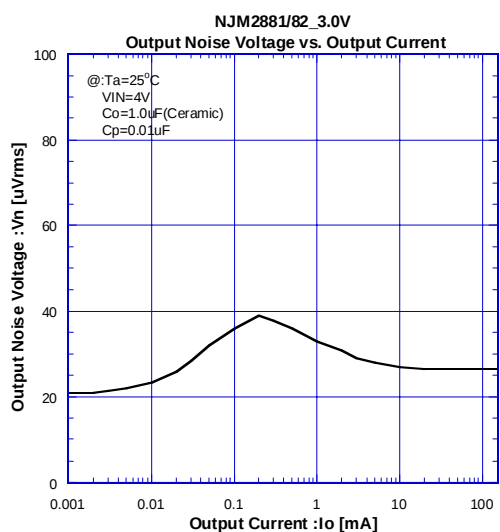
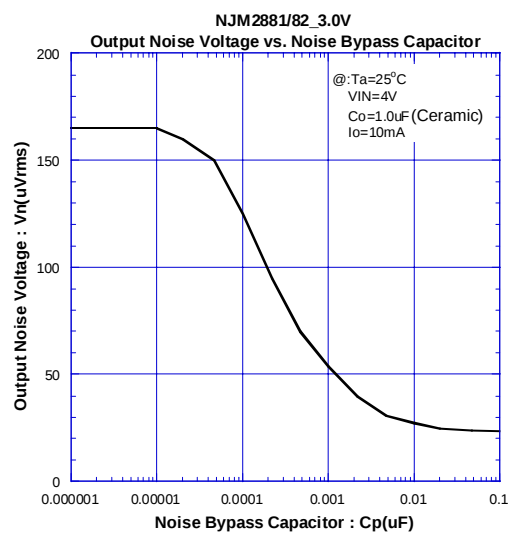
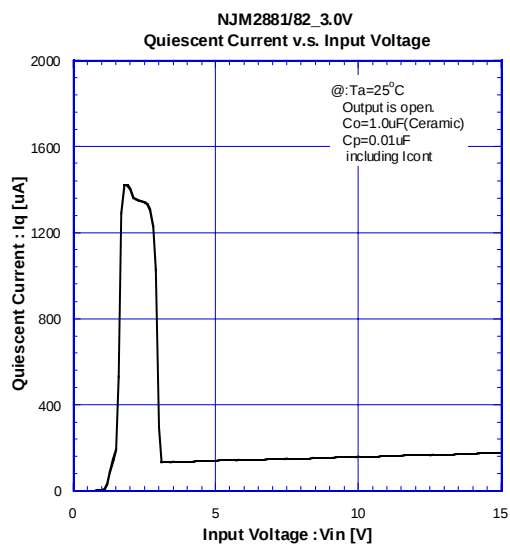
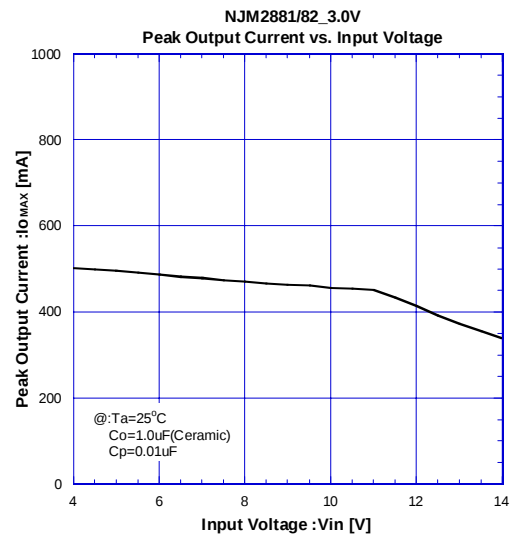
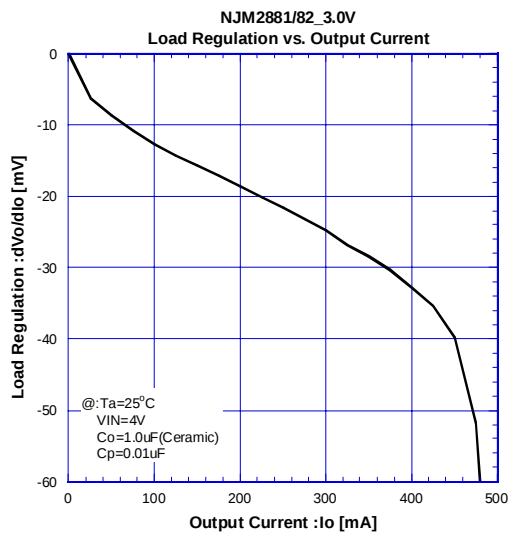


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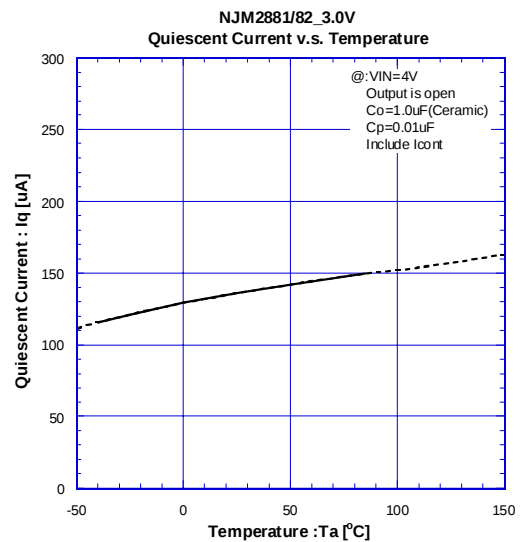
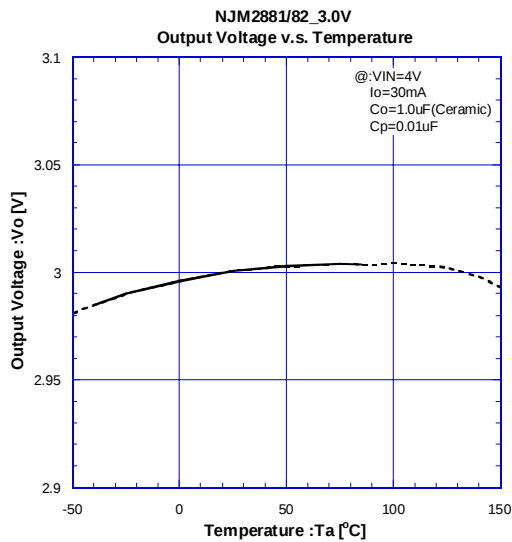
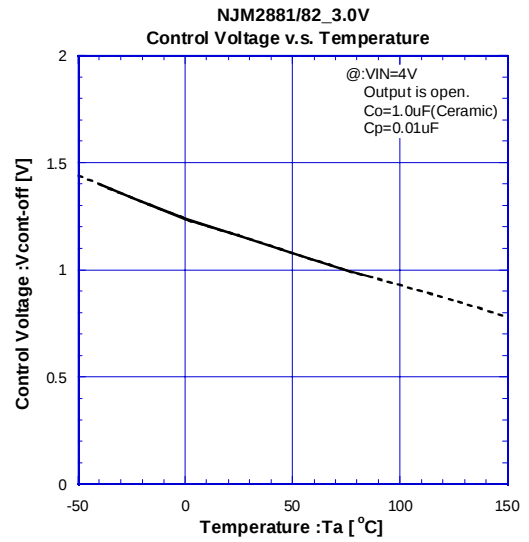
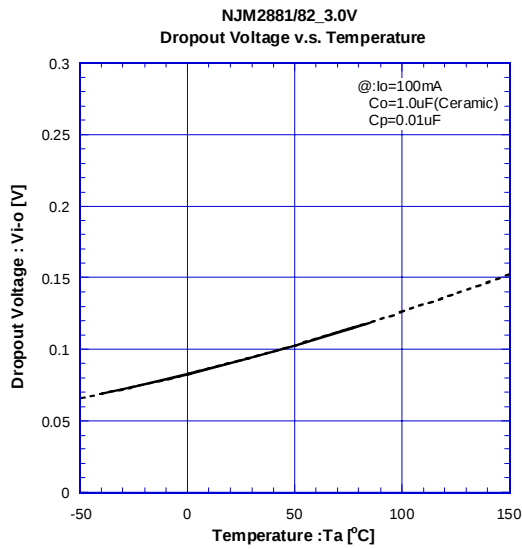
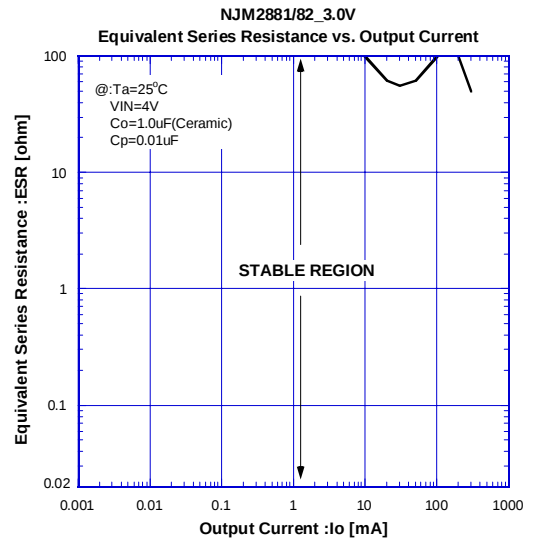
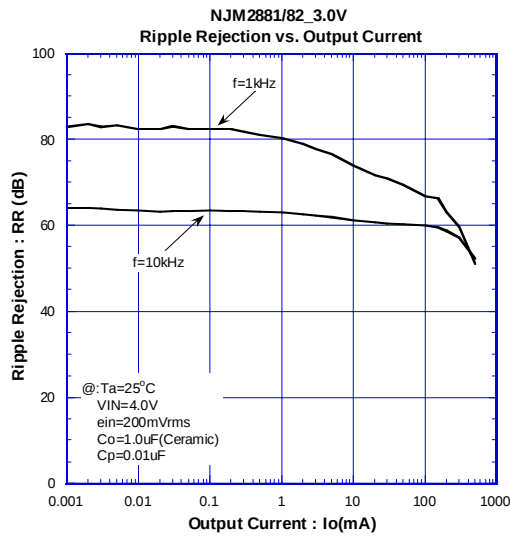
■ ELECTRICAL CHARACTERISTICS



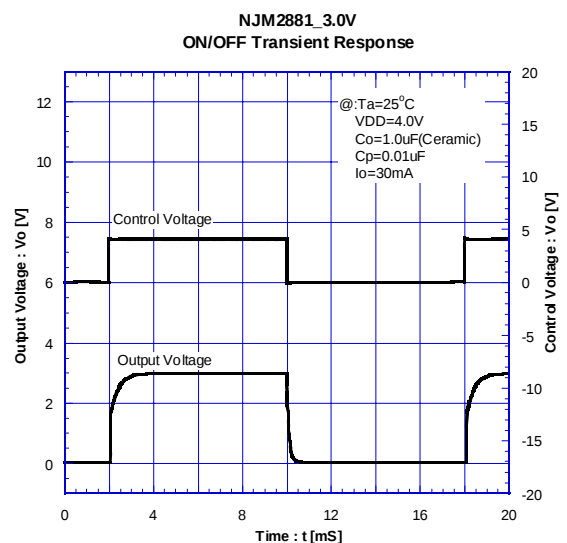
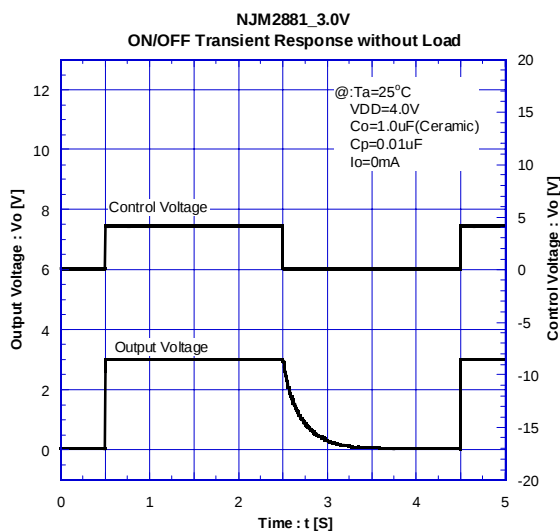
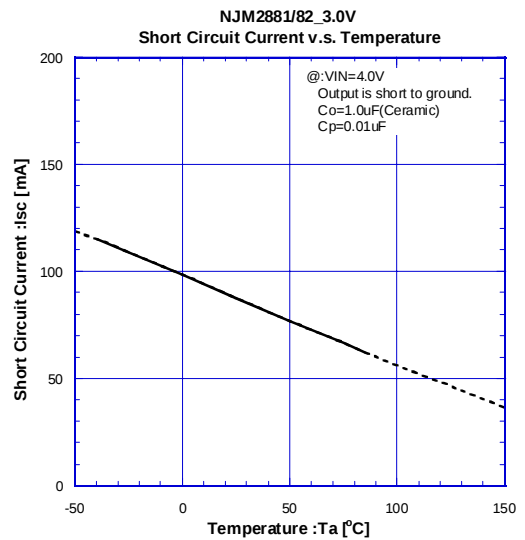
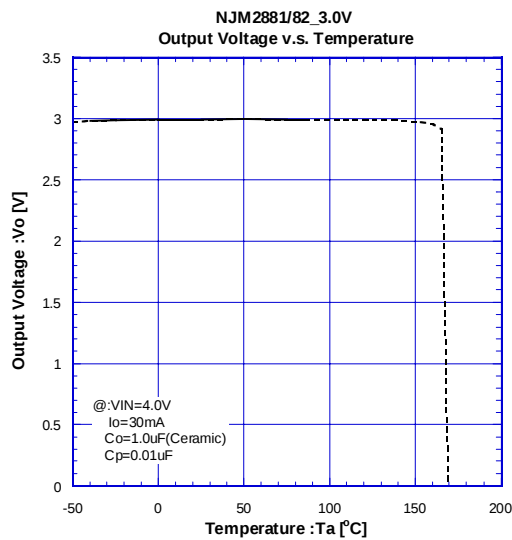
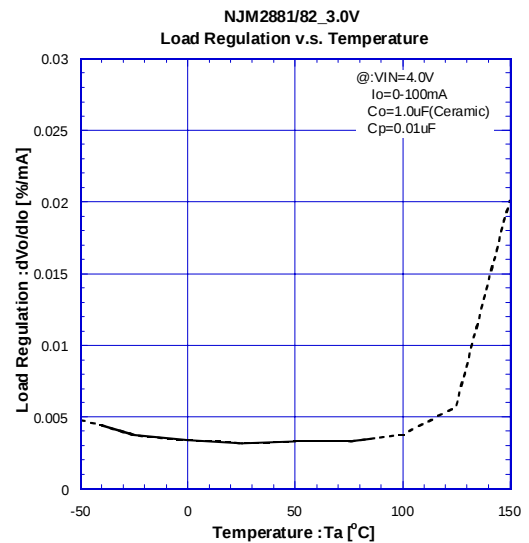
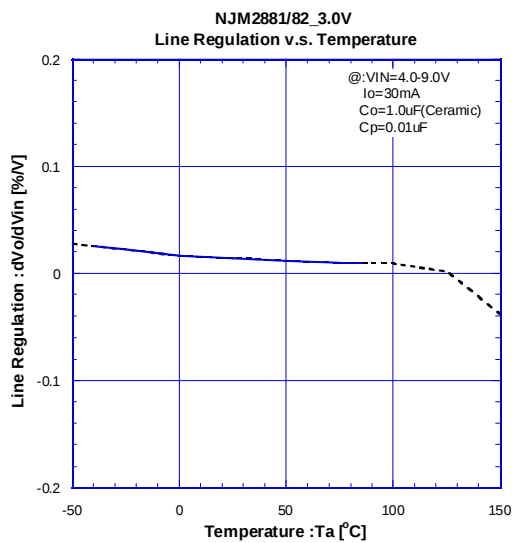
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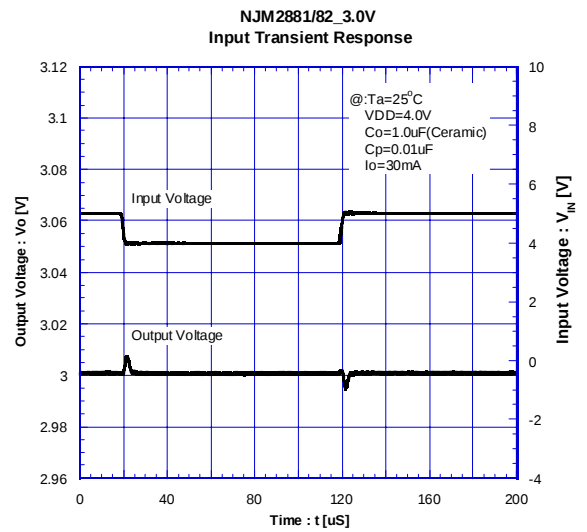
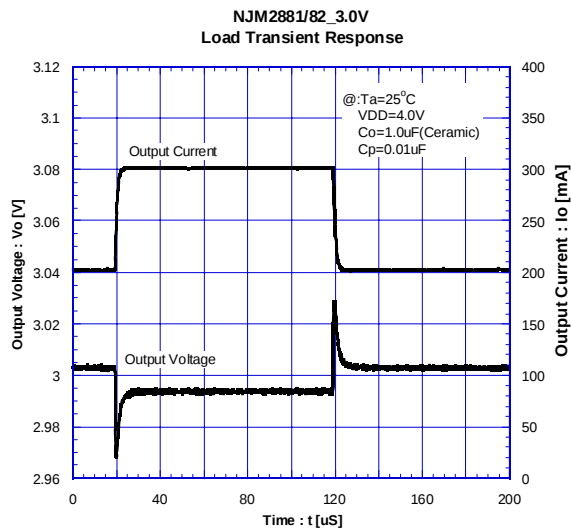


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