

LOW DROPOUT VOLTAGE REGULATOR

■ GENERAL DESCRIPTION

NJM2874/75/76 is a low dropout voltage regulator designed for cellular phone application.

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

■ PACKAGE OUTLINE



NJM2874F/75F/76F

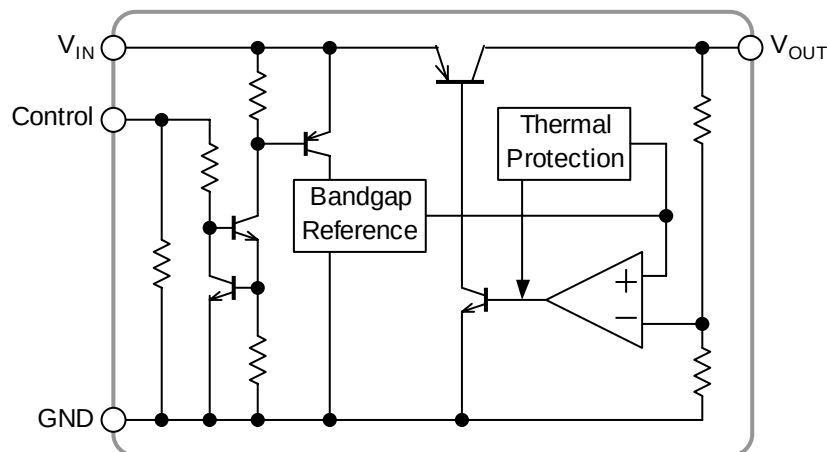
■ FEATURES

- High Ripple Rejection 75dB typ. (f=1kHz $V_o=3V$ Version)
- Output Noise Voltage $V_{no}=45\mu V_{rms}$ typ.
- Output capacitor with 1.0 μF ceramic capacitor ($V_o \geq 2.7V$)
- Output Current $I_o(max.)=150mA$
- High Precision Output $V_o \pm 1\%$
- Low Dropout Voltage 0.10V typ. ($I_o=60mA$)
- ON/OFF Control (Active High)
- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Bipolar Technology
- Package Outline SOT-23-5

■ PIN CONFIGURATION

PIN FUNCTION			
5	4	1. V_{IN}	1. V_{OUT}
		2. GND	2. GND
		3. NC	3. V_{IN}
		4. V_{OUT}	4. CONTROL
1	2	5. V_{IN}	5. NC
		NJM2874F	NJM2875F
			NJM2876F

■ EQUIVALENT CIRCUIT



■ OUTPUT VOLTAGE RANK LIST

Device Name	V _{OUT}
NJM287×F21	2.1V
NJM287×F28	2.8V
NJM287×F03	3.0V
NJM287×F33	3.3V
NJM287×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)	mW
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. (114.3x76.2x1.6mm: 2Layer, FR-4)

(*3):Device itself

■ ELECTRICAL CHARACTERISTICS

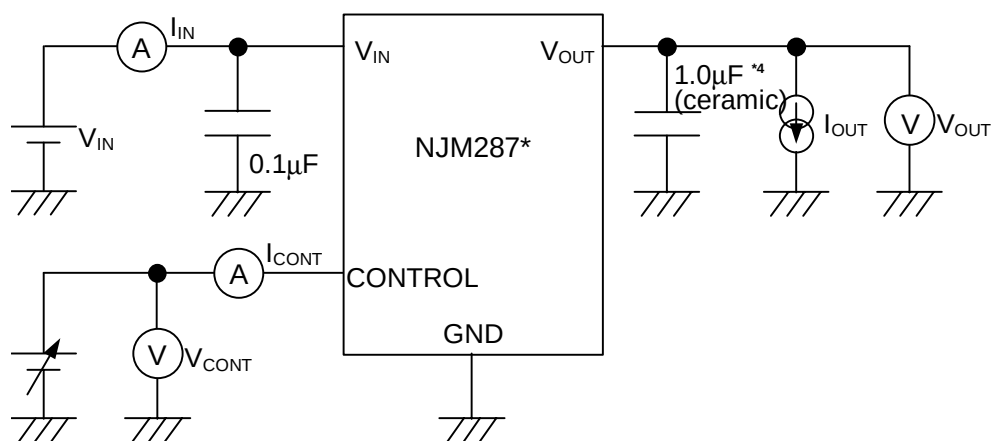
(V_{IN}=V_O+1V, C_{IN}=0.1μF, C_O=1.0μF: V_O≥2.7V (C_O=2.2μF: V_O≤2.6V), Ta=25°C)

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, expect 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	150	200	—	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 ~ 100mA	—	—	0.03	%/mA
Dropout Voltage	ΔV _{L-O}	I _O =60mA	—	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	—	45	—	μVrms
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.

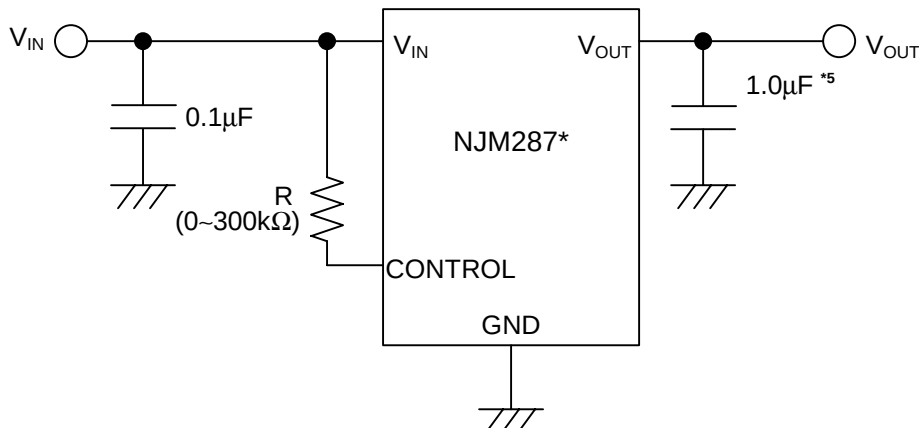
■ TEST CIRCUIT



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

■ TYPICAL APPLICATION

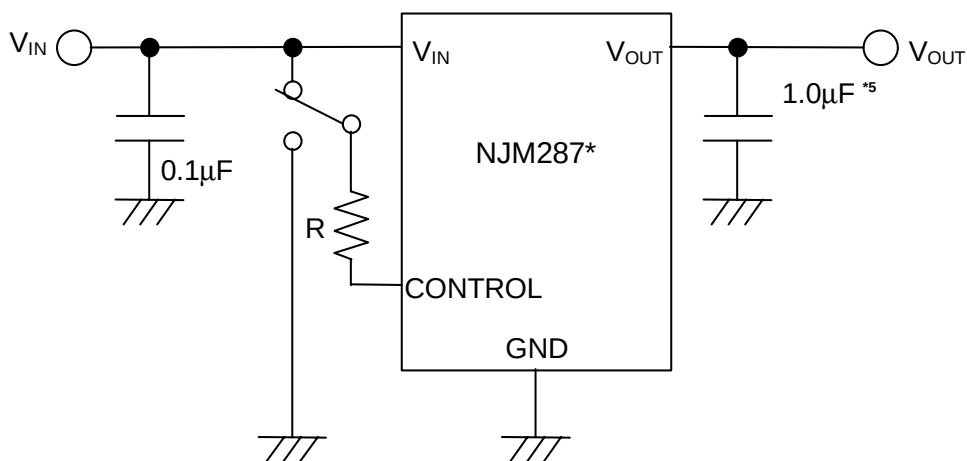
① In case that ON/OFF Control is not required:



*5 $V_O \leq 2.6V$ version: $C_O = 2.2\mu F$

Connect control terminal to V_{IN} terminal

② In use of ON/OFF CONTROL:



*5 $V_O \leq 2.6V$ version: $C_O = 2.2\mu F$

State of control terminal:

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

*Noise bypass Capacitance C_p

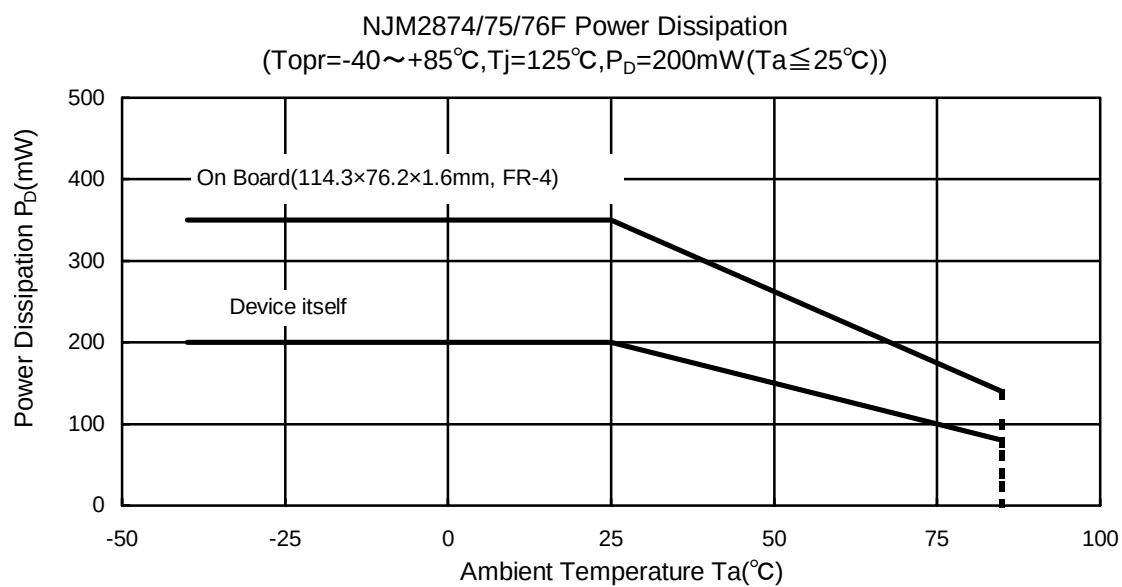
Noise bypass capacitance C_p reduces noise generated by band-gap reference circuit. Noise level and ripple rejection will be improved when larger C_p is used. Use of smaller C_p value may cause oscillation. Use the C_p value of $0.01\mu F$ greater to avoid the problem.

*In the case of using a resistance "R" between V_{IN} and control.

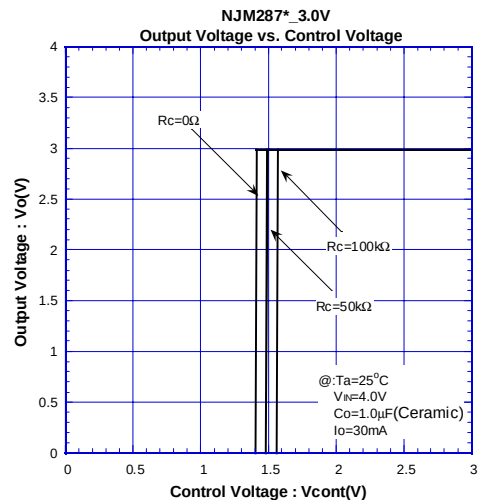
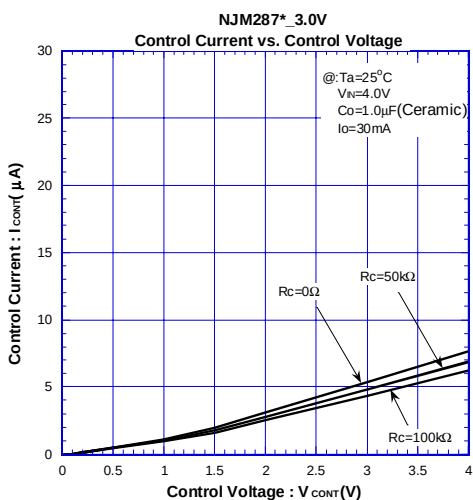
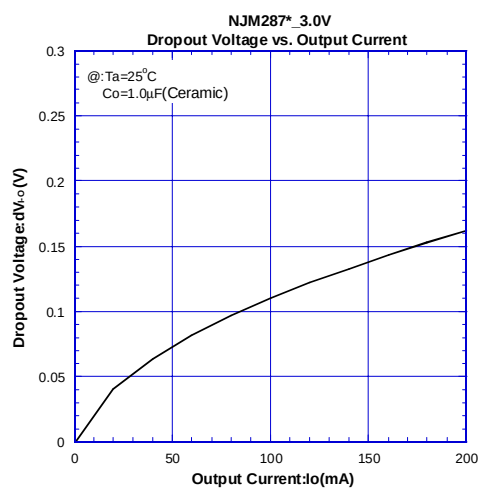
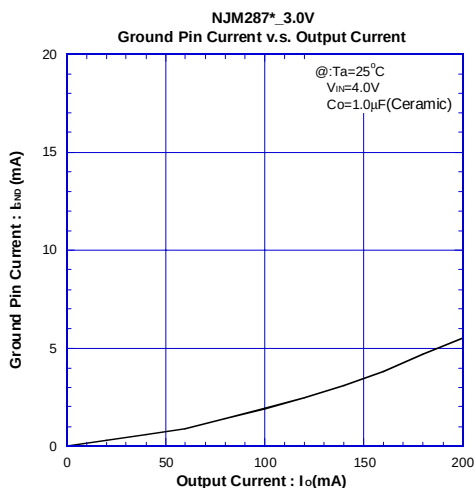
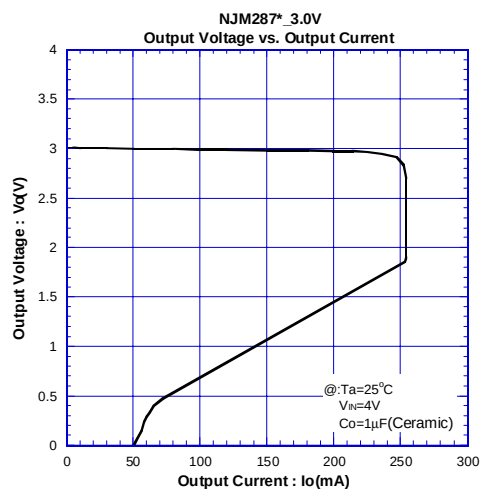
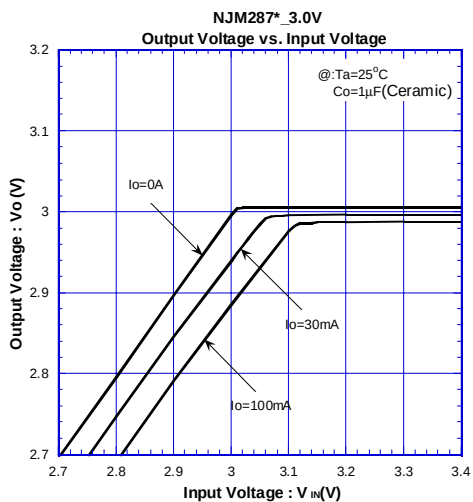
The current flow into the control terminal while the IC is ON state (I_{CONT}) can be reduced when a pull up resistance "R" is inserted between V_{IN} and the control terminal.

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.

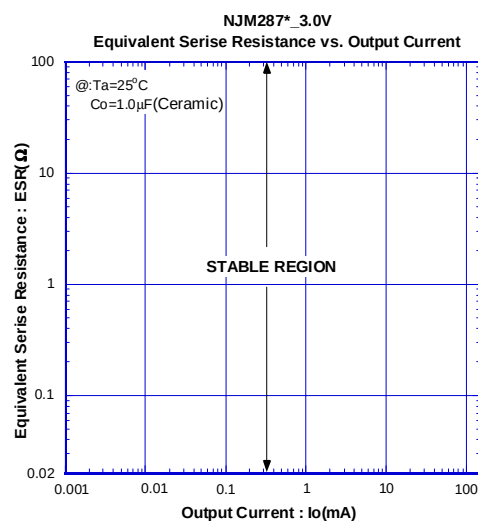
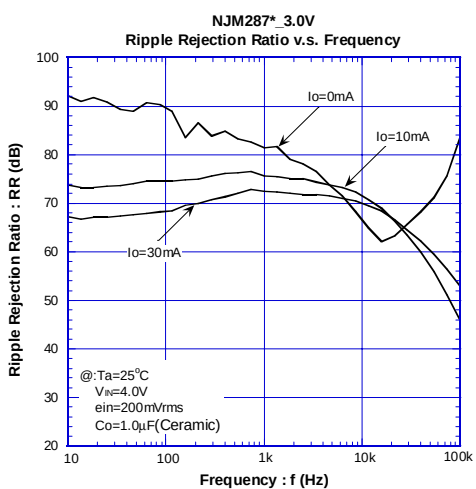
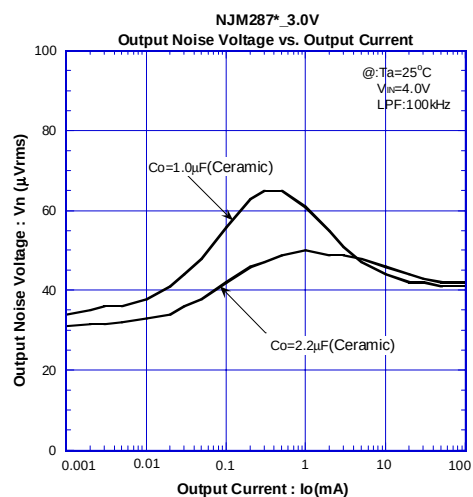
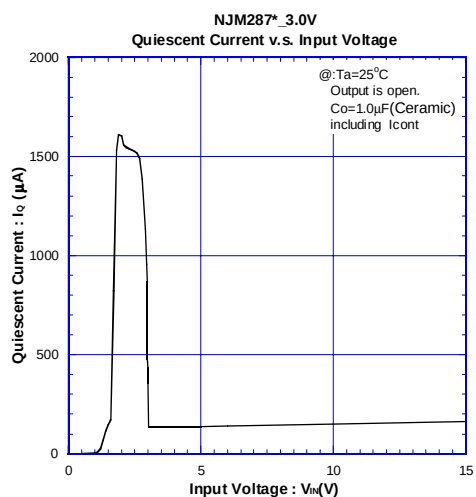
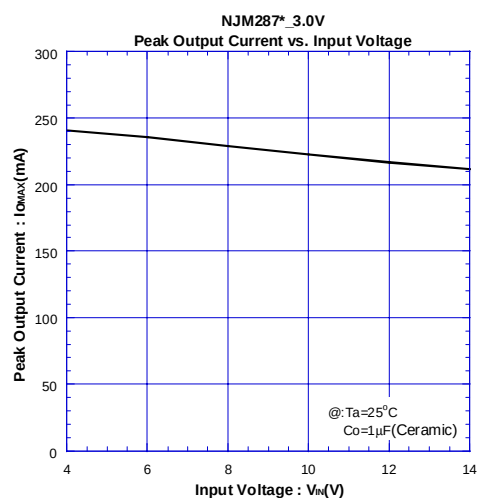
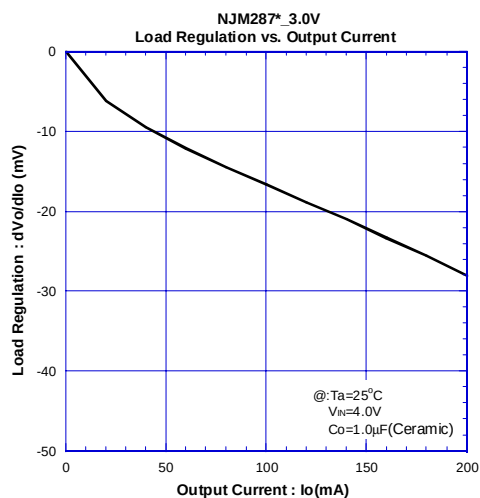
■ POWER DISSIPATION vs. AMBIENT TEMPERATURE



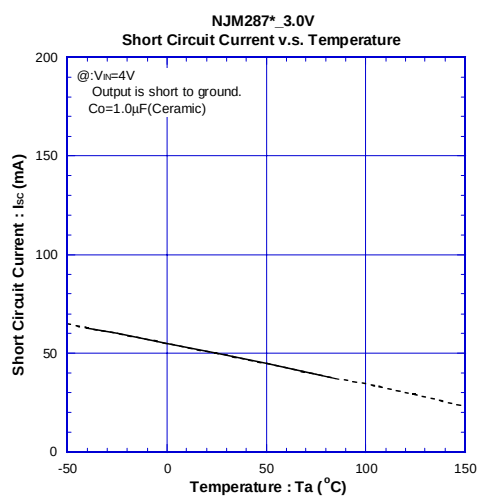
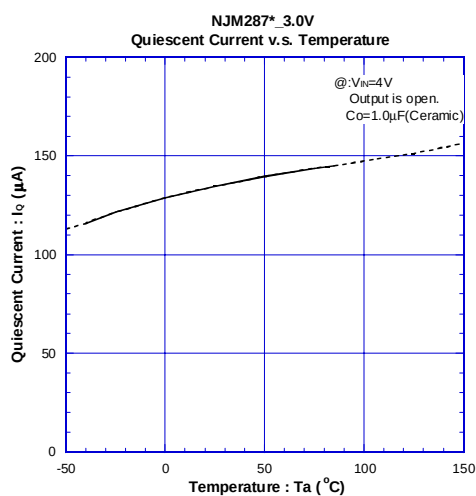
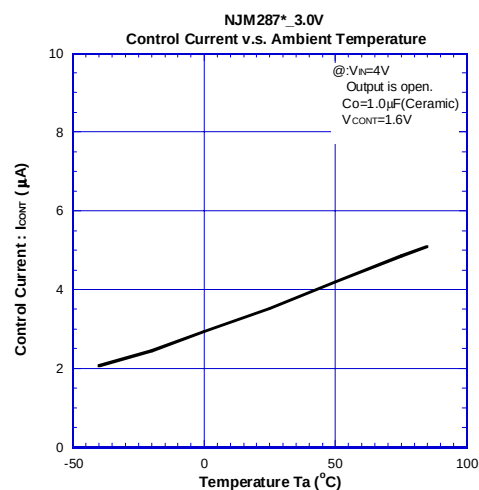
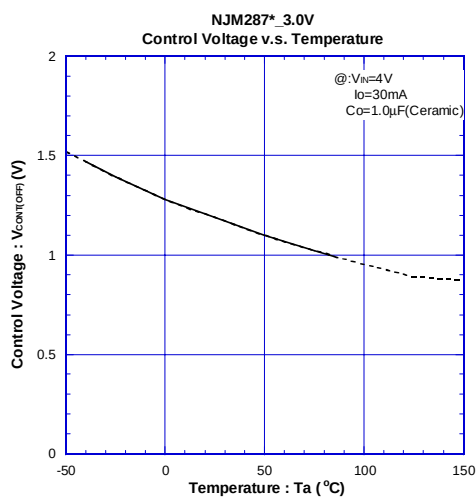
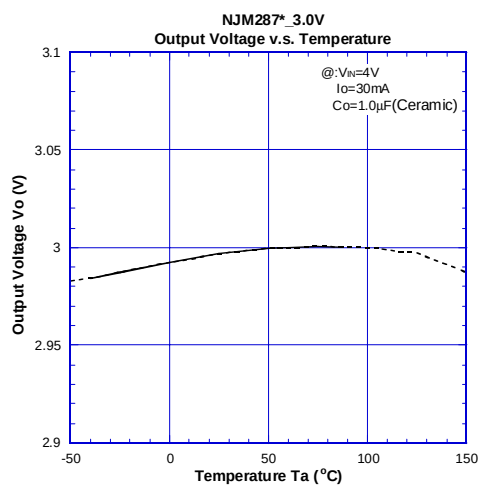
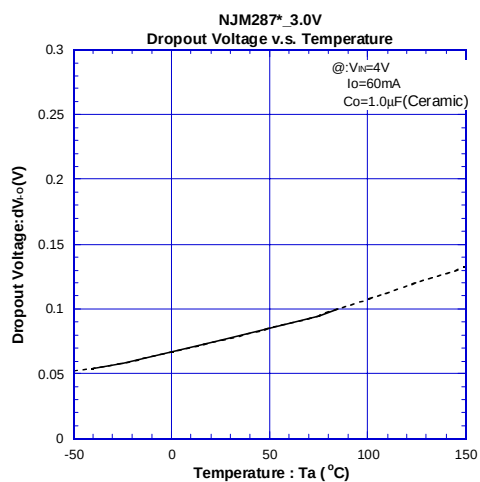
■ ELECTRICAL CHARACTERISTICS



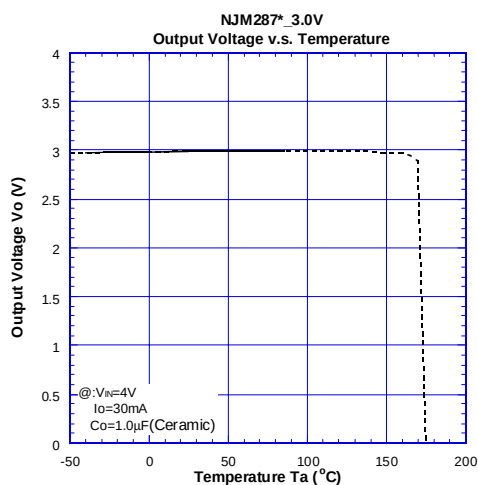
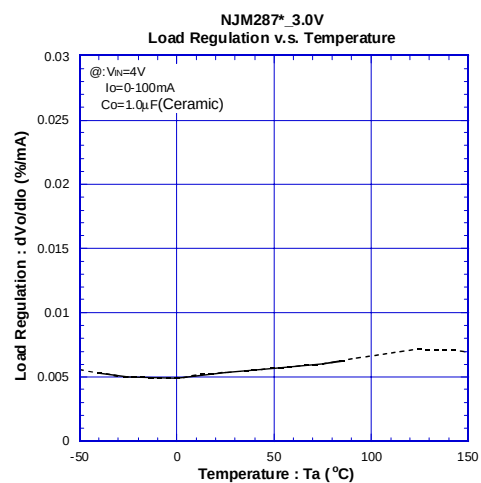
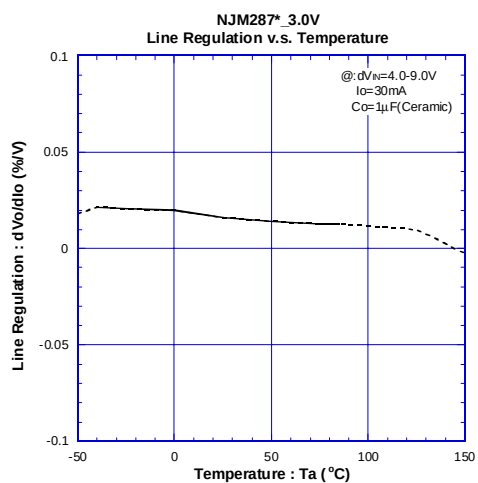
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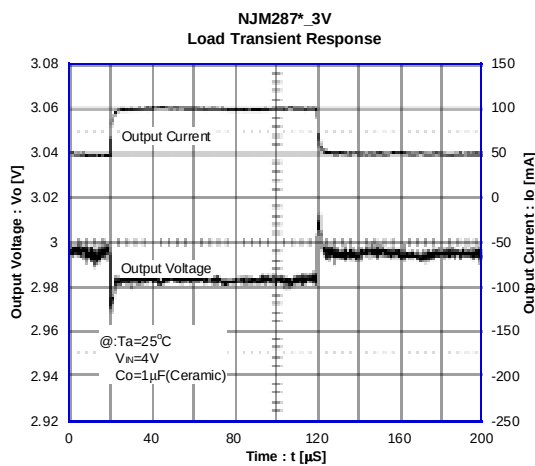
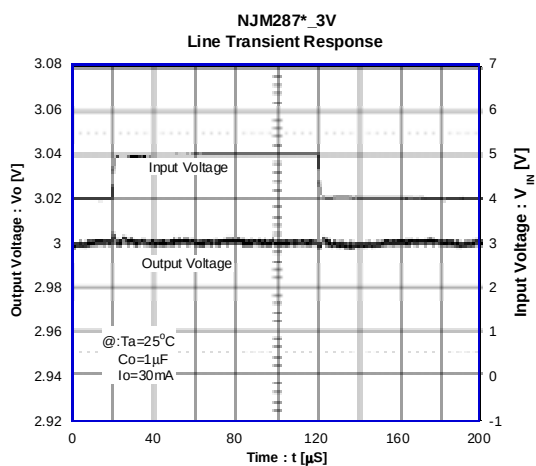
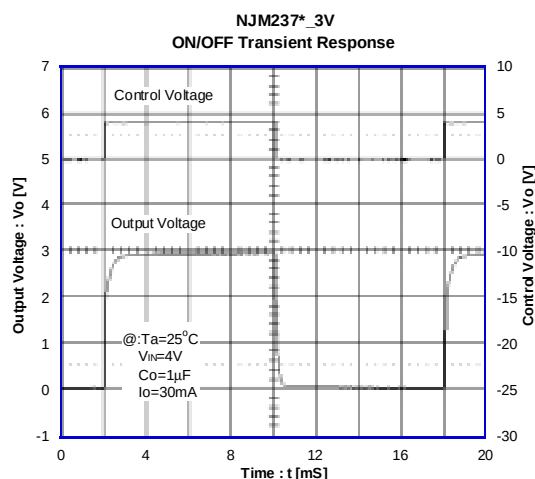
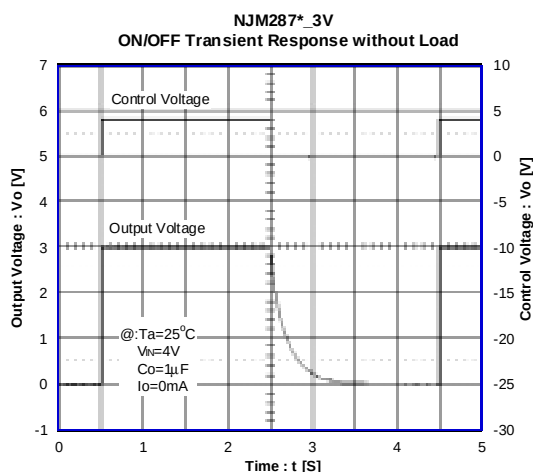
■ ELECTRICAL CHARACTERISTICS



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