

Low Dropout Voltage Regulator with Reset

■ GENERAL DISCRIPTION

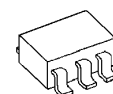
The NJU7270 is a low drop out voltage regulator with input-monitor reset function.

Advanced CMOS technology achieves ultra low current consumption and high accuracy.

It delivers up to 5V/100mA output power with the maximum input voltage of 9V.

The NJU7270 is suitable for MPU applications.

■ PACKAGE OUTLINE

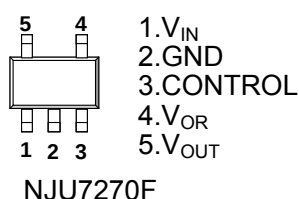


NJU7270F

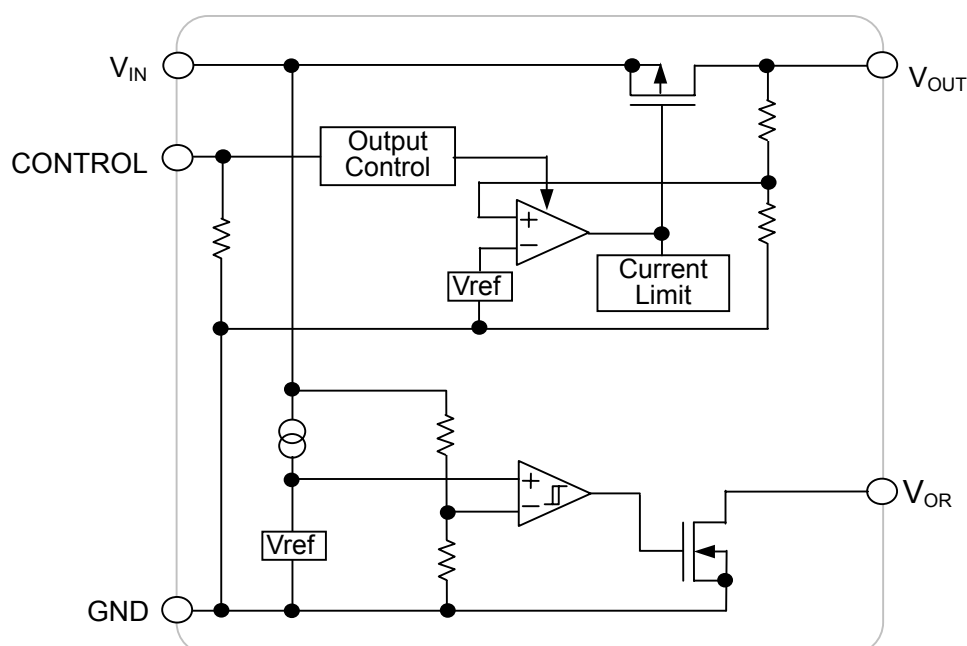
■ FEATURES

- Ultra Low Quiescent Current $I_q = 3.0\mu A$ typ. ($I_o = 0mA$)
- Output Voltage Accuracy $V_o = \pm 1.0\%$
- Reset Voltage Accuracy $V_{RT} = \pm 1.0\%$
- Input Voltage Monitor type
- Output Current $I_o(max.) = 100mA$
- Output capacitor with 0.1 μF ceramic capacitor
- Nch Open Drain Output
- Internal Short Circuit Current Limit
- CMOS Technology
- Package Outline SOT-23-5

■ PIN CONFIGURATION



■ EQUIVALENT CIRCUIT



■ OUTPUT VOLTAGE/ DETECTION VOLTAGE

Device Name	Output Voltage	Detection Voltage
NJU7270F1520A	1.5V	2.0V
NJU7270F3145A	3.1V	4.5V
NJU7270F3342A	3.3V	4.2V
NJU7270F0555A	5.0V	5.5V

Output voltage options available : 1.5 ~ 5.0V (0.1V step)

Detection voltage options available : 2.0 ~ 6.0V (0.1V step)

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	+11	V
Control Voltage	V_{CONT}	+11(*1)	V
V_{OR} Pin Output Voltage	V_{OR}	$V_{SS} - 0.3 \sim +11$	V
V_{OR} Pin Output Current	I_{OR}	50	mA
Power Dissipation	P_D	200(*2) 350(*3)	mW
Operating Temperature	T_{opr}	-40 ~ +85	°C
Storage Temperature	T_{stg}	-40 ~ +125	°C

(*1): Device itself

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

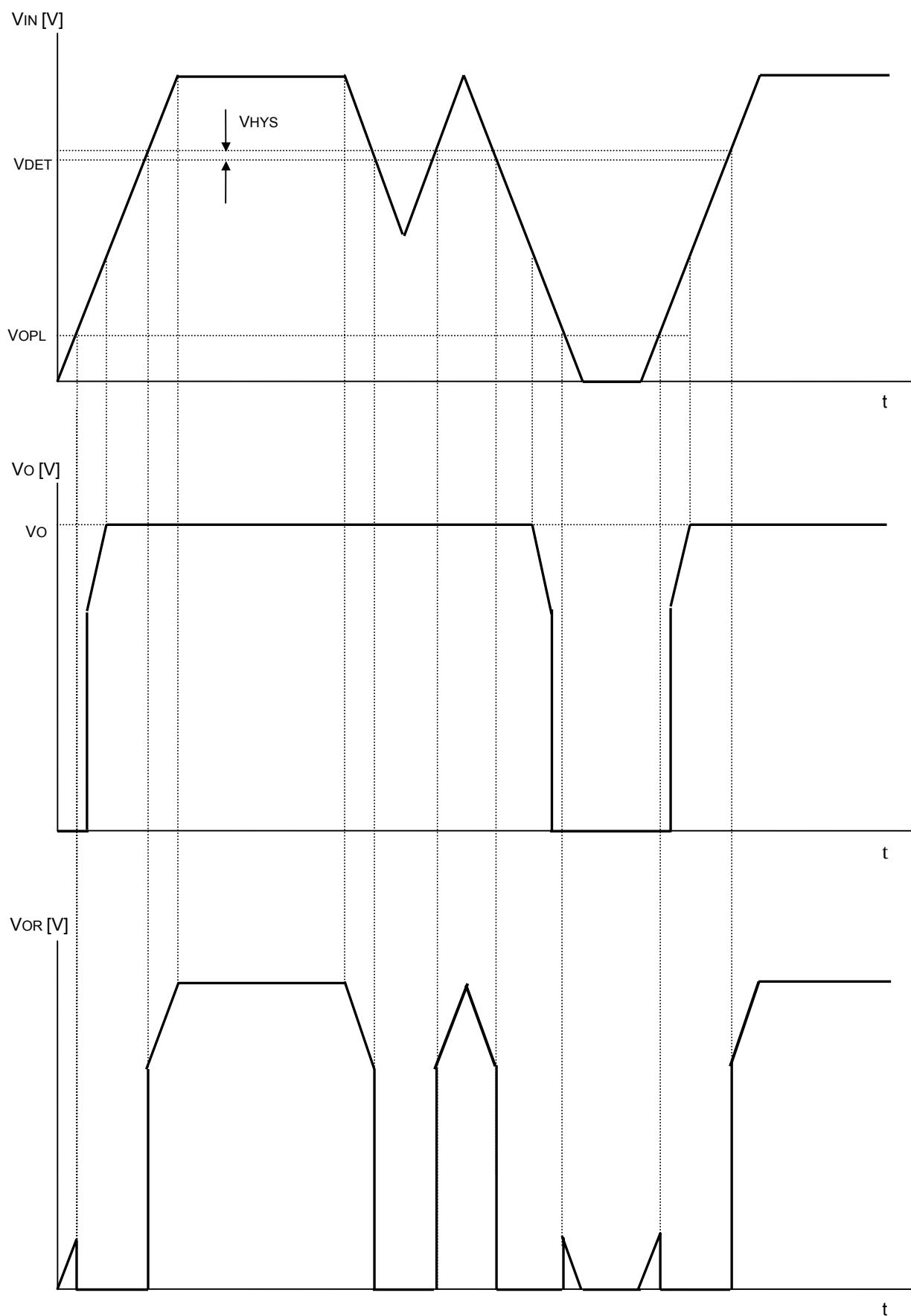
■ ELECTRICAL CHARACTERISTICS ($V_{IN}=V_O+1$, $C_{IN}=0.1\mu F$, $C_O=0.1\mu F$, $T_a=25^\circ C$)

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
General Characteristics							
Quiescent Current	I _Q	V _{IN} =V _O +2 , V _{CONT} =V _{IN} , I _O =0mA		-	3.0	7.8	μA
Quiescent Current at Control OFF	I _{Q(OFF)}	V _{IN} =V _O +2 , V _{CONT} =0V , I _O =0mA		-	0.8	1.8	μA
Regulator Block							
Output Voltage	V _O	I _O =30mA		-1.0%	-	+1.0%	V
Output Current	I _O	V _O - 0.3V		100	-	-	mA
Line Regulation	ΔV _O /ΔV _{IN}	V _{IN} =V _O +1V ~ V _O +6V(3.0 > V _O) V _{IN} =V _O +1V ~ 9.0V(3.0 ≤ V _O) I _O =30mA		-	-	0.30	%/V
Load Regulation	ΔV _O /ΔI _O	I _O =0 ~ 100mA		-	-	0.15	%/mA
Output Voltage Temperature Coefficient	ΔV _O /ΔT _a	T _a =0 ~ 85°C, I _O =10mA		-	±100	-	ppm/°C
Control Voltage for ON-State	V _{CONT(ON)}			1.6	-	V _{IN}	V
Control Voltage for OFF-State	V _{CONT(OFF)}			0	-	0.3	V
Pull-down Resistance	R _{CONT}			2.0	5	10	MΩ
Short Circuit Limit	I _{LIM}	V _O =0V		-	25	-	mA
Input Voltage	V _{IN}			-	-	9	V
Dropout Voltage	ΔV _{I-O}	I _O =40mA	1.5V ≤ V _O ≤ 2.0V	-	0.19	0.60	V
		I _O =60mA	2.1V ≤ V _O ≤ 2.4V	-	0.19	0.29	V
			2.5V ≤ V _O ≤ 2.7V	-	0.18	0.27	V
			2.8V ≤ V _O ≤ 3.3V	-	0.17	0.26	V
			3.4V ≤ V _O ≤ 5.0V	-	0.16	0.24	V
			5.1V ≤ V _O ≤ 6.0V	-	0.15	0.22	V

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Reset Block							
Detection Voltage	V _{DET}			-1.0%	-	+1.0%	V
Hysteresis Voltage	V _{HYS}			V _{DET} ×0.03	V _{DET} ×0.05	V _{DET} ×0.08	V
V _{OR} Pin Output Current	I _{OR}	Nch, V _{DS} =0.5V V _{CONT} =0V	V _{IN} =1.2V	0.75	2.0	-	mA
			V _{IN} =2.4V (V _{DET} ≥ 2.7V Version)	4.5	7.0	-	mA
Output Leak Current	I _{LEAK}	V _{IN} =V _{OR} =V _{CONT} =9V		-	-	0.1	μA
Detection Voltage Temperature Coefficient	ΔV _{DET} /ΔTa	Ta=0 ~ 85°C		-	±100	-	ppm/°C
Operating Voltage(*4)	V _{OPL}	R _L =100kΩ		-	-	0.8	V

(*3): The value condition that V_{OR} become 10% or less of V_{IN} .

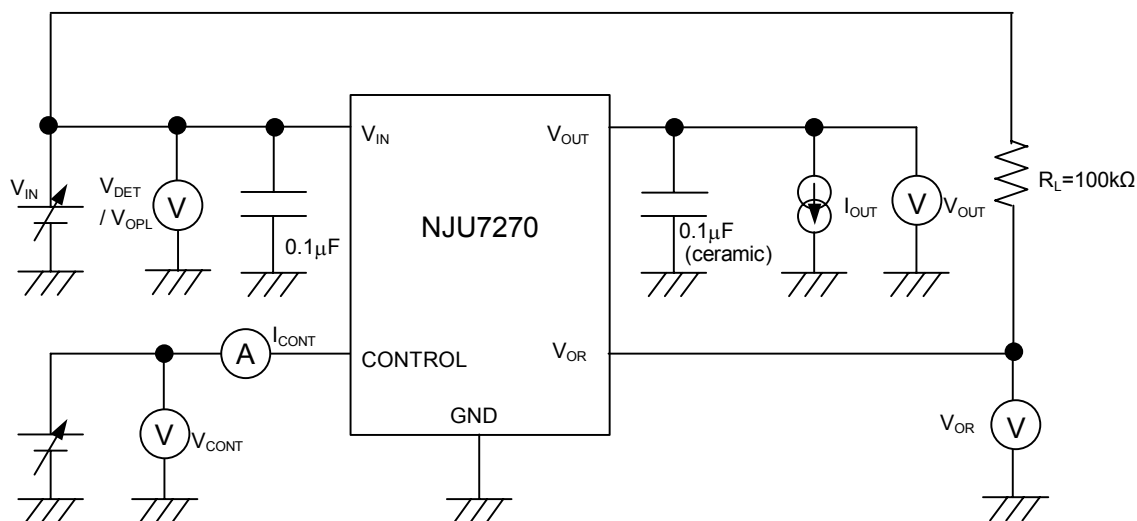
■ TIMING CHART



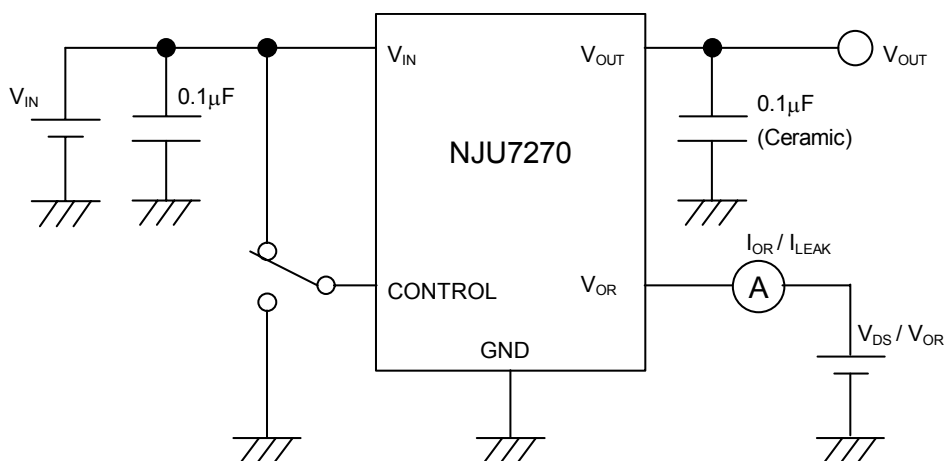
* V_{OR} is the case where a pull-up is carried out to V_{IN} through resistance.

■ TEST CIRCUIT

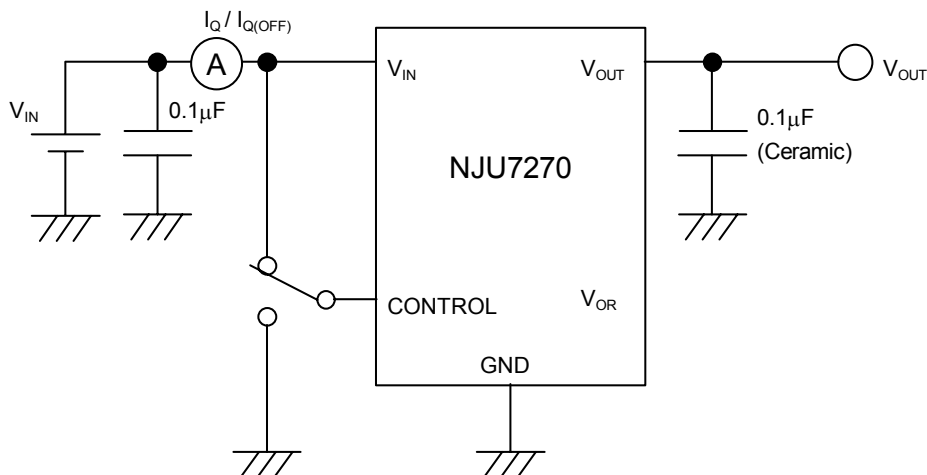
① COMMON TEST CIRCUIT



② OUTPUT CURRENT/OUTPUT LEAK CURRENT TEST CIRCUIT

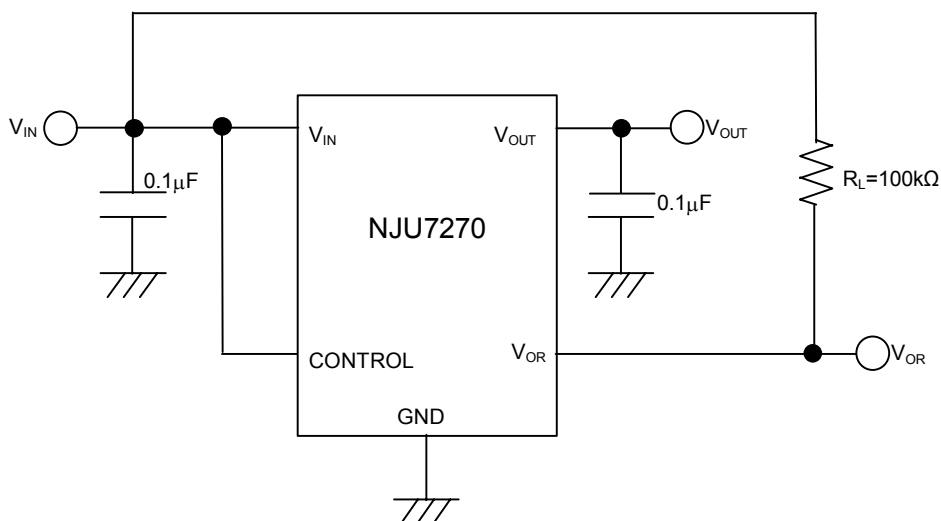


③ QUIESCENT CURRENT TEST CIRCUIT



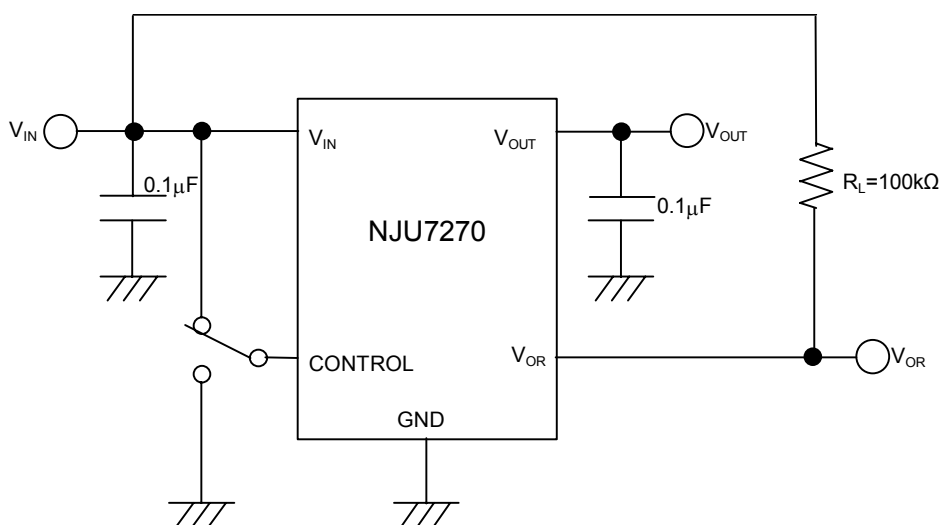
■ TYPICAL APPLICATION

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



Connect control terminal to V_{IN} terminal.

② In use of ON/OFF Control:



State of control terminal:

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

*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 0.1 μF 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) is required for a phase compensation of the internal error amplifier. The capacitance and the equivalent series resistance (ESR) influence stability of the regulator.

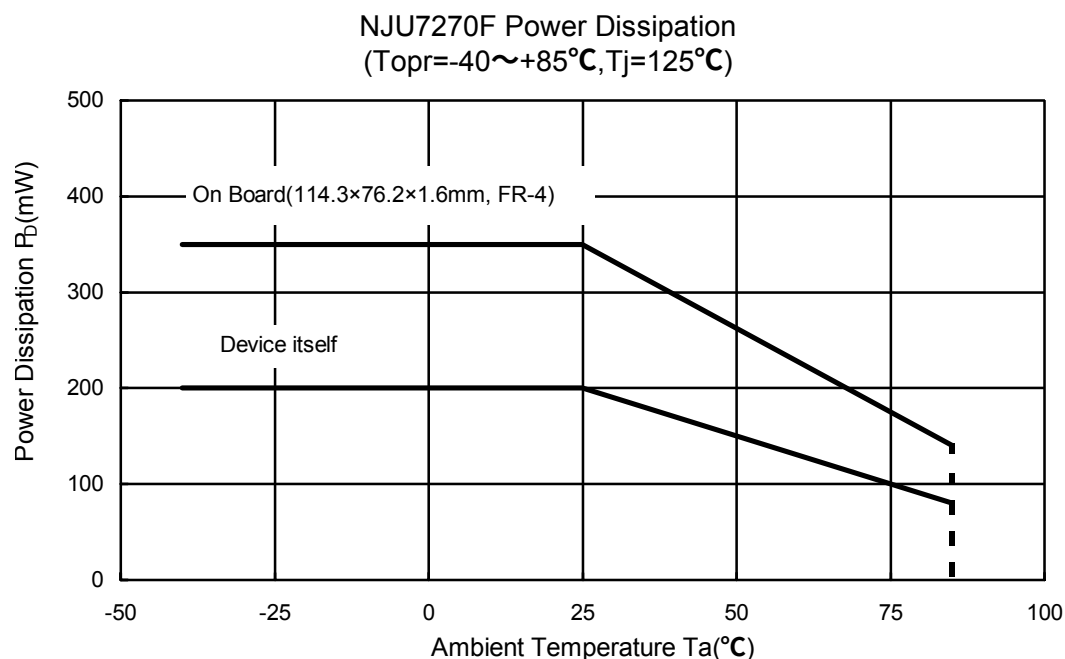
If use a smaller C_O , it may cause excess output noise or oscillation of the regulator due to lack of the phase compensation. Therefore, use C_O with the recommended capacitance or greater value and connect between V_O terminal and GND terminal with minimal wiring.

The recommended capacitance depends on the output voltage. Low voltage regulator requires greater value of the C_O . Thus, check the recommended capacitance for each output voltage.

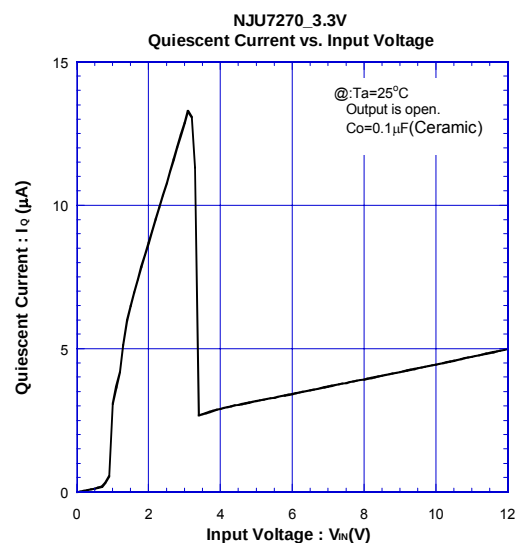
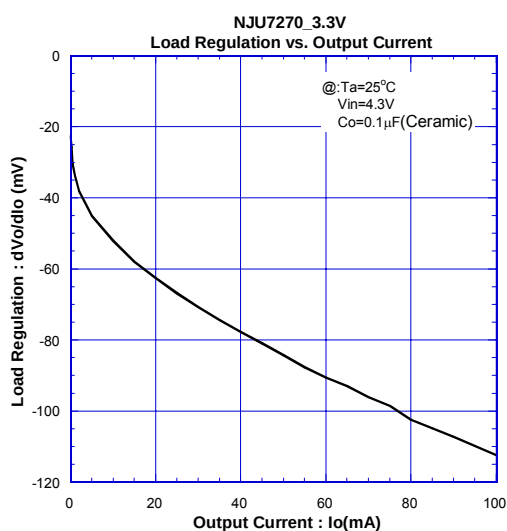
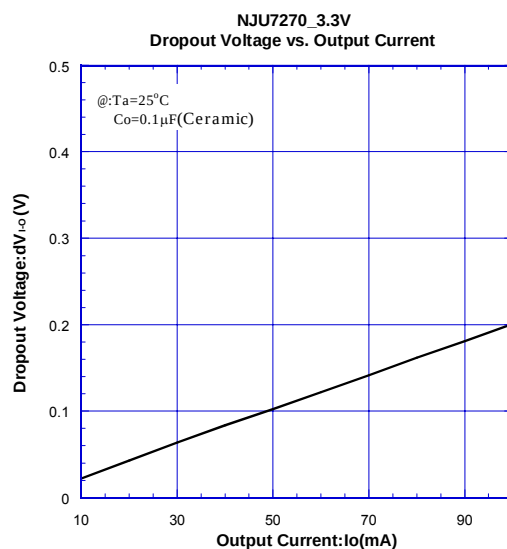
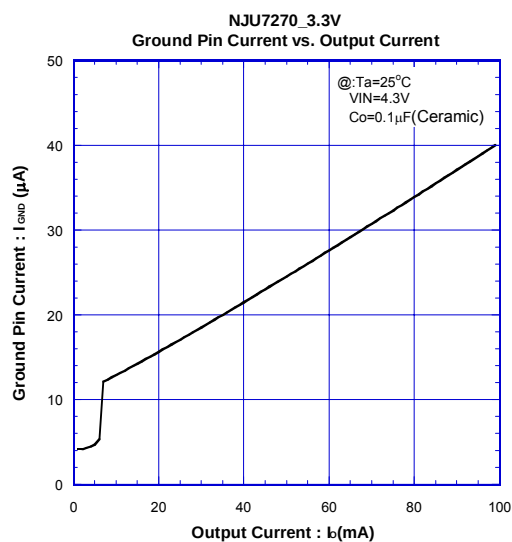
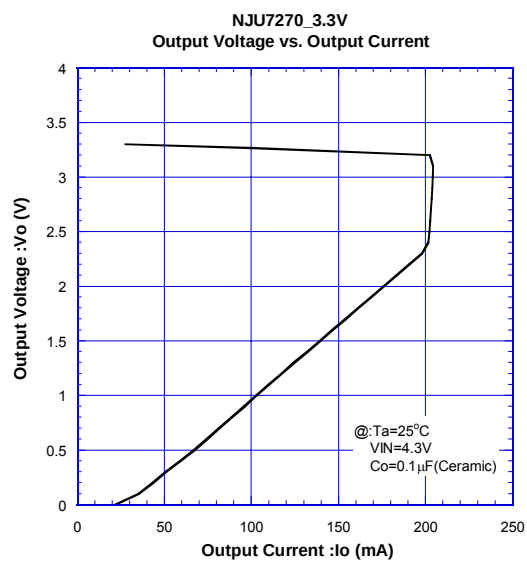
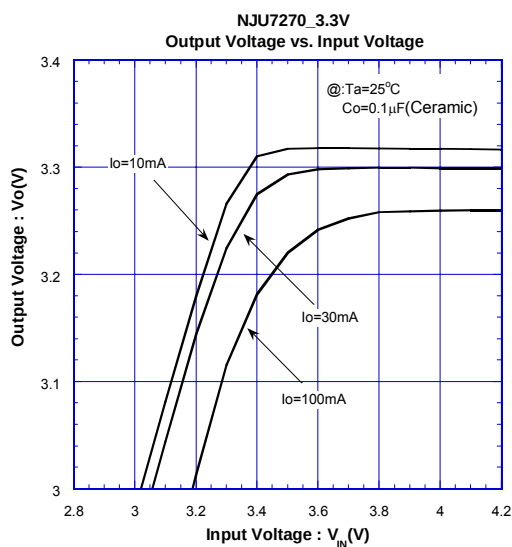
Use of a greater C_O reduces output noise and ripple output, and also improves transient response of the output voltage against rapid load change.

This product is designed to work with any capacitor including a low ESR capacitor for the C_O ; however, refer "Equivalent Series Resistance vs. Output Current" and choose suitable capacitor.

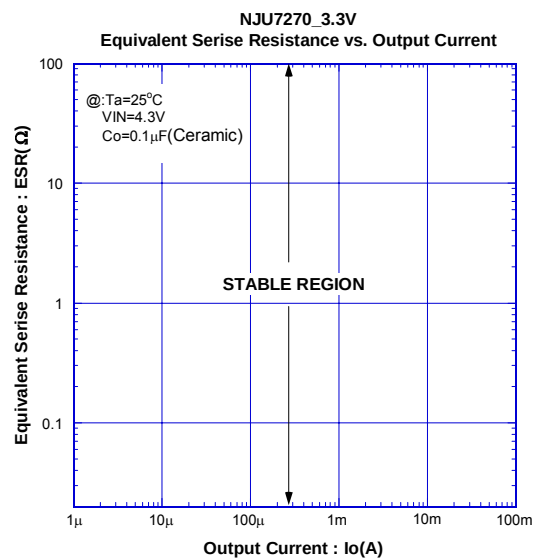
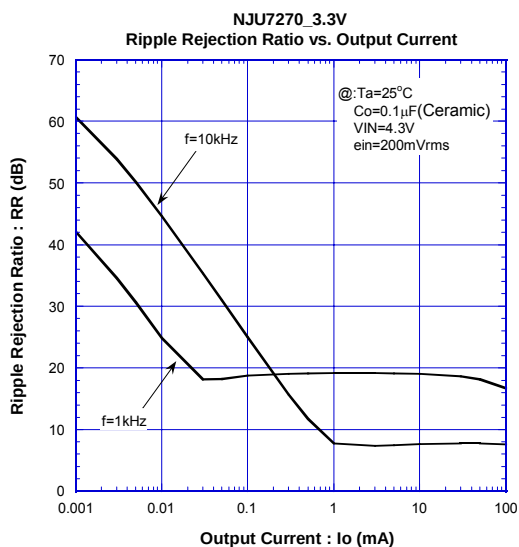
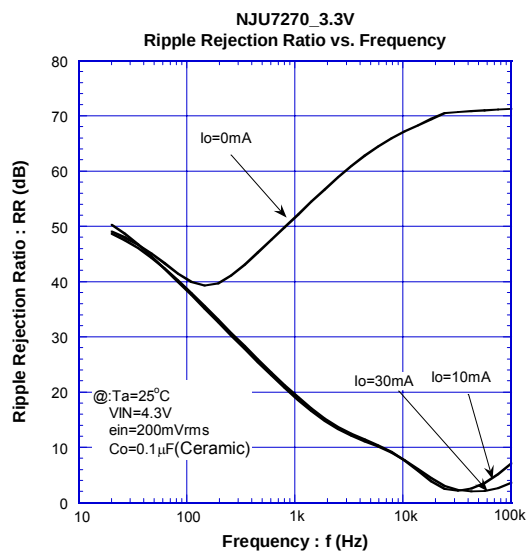
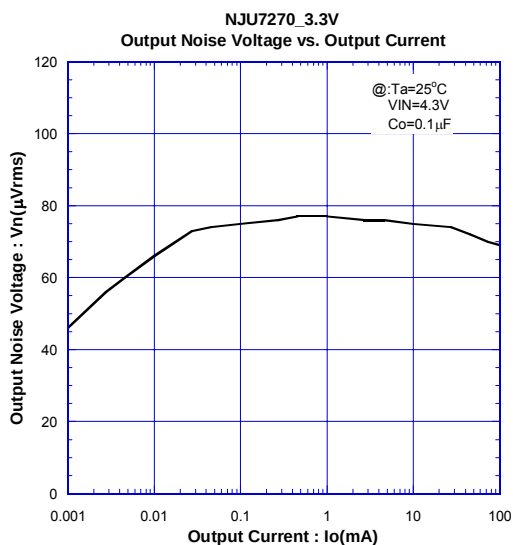
■ POWER DISSIPATION vs. AMBIENT TEMPERATURE



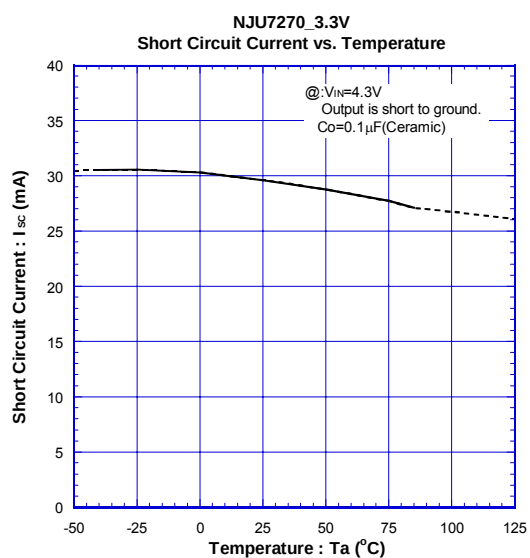
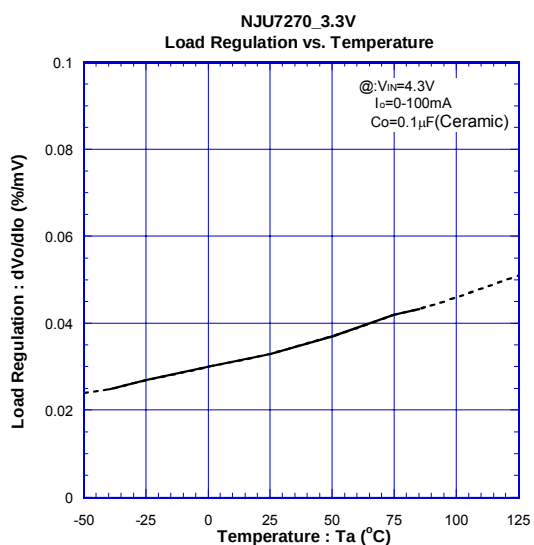
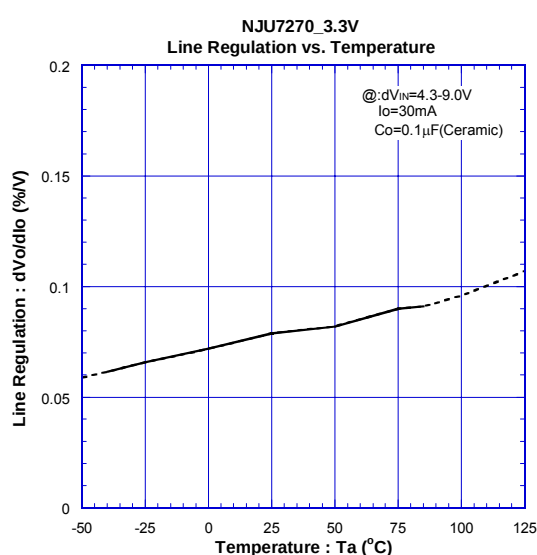
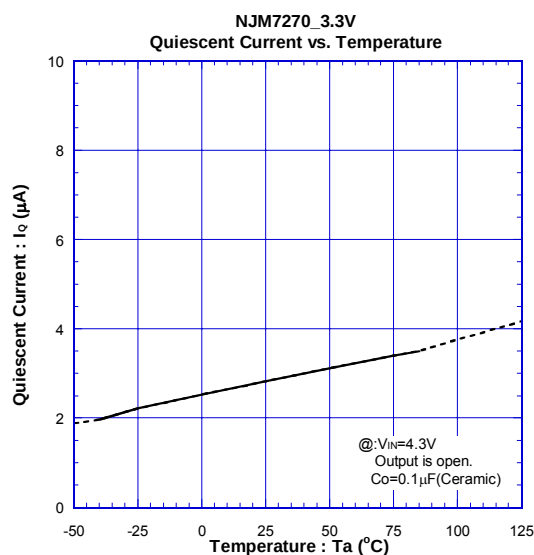
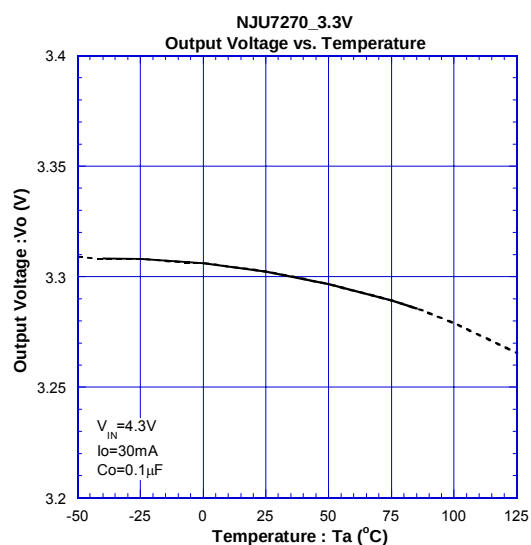
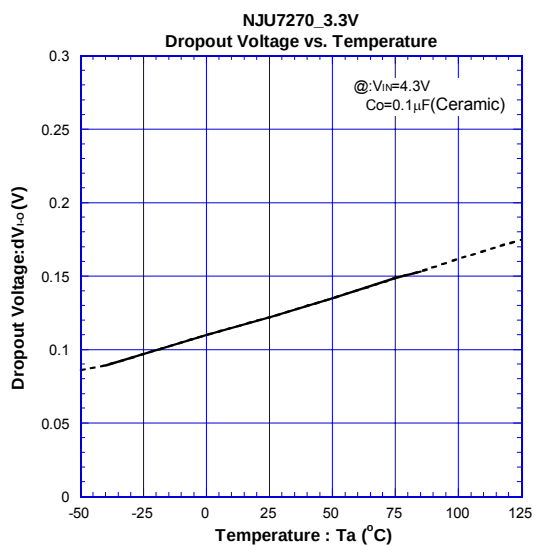
■ TYPICAL CHARACTERISTICS (LDO BLOCK)



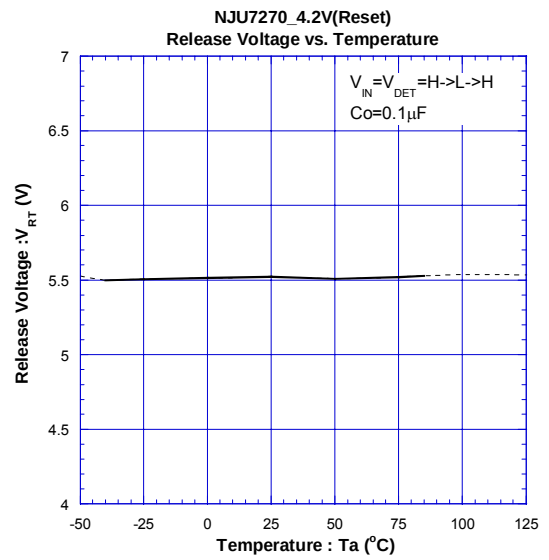
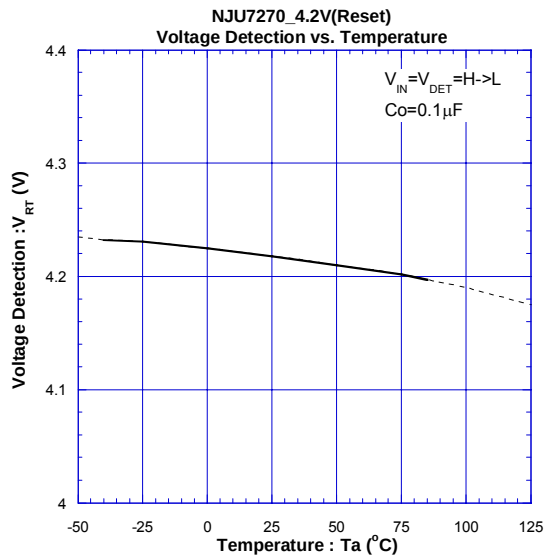
■ TYPICAL CHARACTERISTICS (LDO BLOCK)



■ TYPICAL CHARACTERISTICS (LDO BLOCK)



■ TYPICAL CHARACTERISTICS (RESET BLOCK)



[CAUTION]

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