

LOW DROPOUT VOLTAGE REGULATOR WITH ON/OFF CONTROL

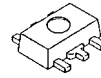
■ GENERAL DESCRIPTION

The NJM2370 is a low dropout voltage regulator with ON/OFF control.

It features dropout voltage of 0.1V at $I_o=30\text{mA}$, low output noise and high ripple rejection by connecting an external capacitor to noise bypass terminal.

It's suitable for portable items such as cellular phones, video camera and others.

■ PACKAGE OUTLINE



NJM2370U/U1



NJM2370R

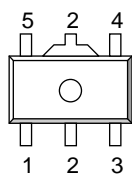


NJM2370RB1

■ FEATURES

- Output Current (150mA min. ($V_o-0.3\text{V}$))
- Low Dropout Voltage (0.1V typ. ($I_o=30\text{mA}$))
- External Capacitor for Noise Bypass
- ON/OFF Control Function
- Over Current Limit
- Thermal Shutdown
- Bipolar Technology
- Package Outline SOT-89(5pin), VSP8, TVSP-8

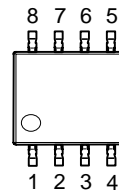
■ PIN CONFIGURATION



NJM2370U/U1

PIN FUNCTION

1. CONTROL
2. GND
3. NOISE BYPASS
4. V_{OUT}
5. V_{IN}

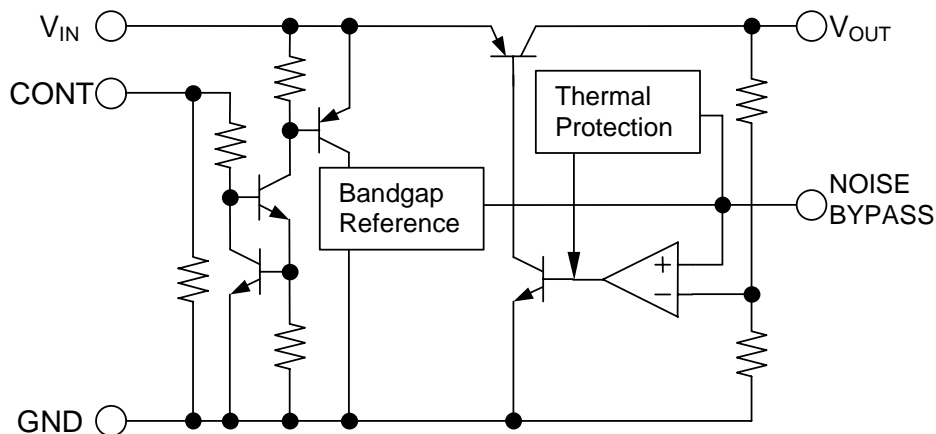


NJM2370R/RB1

PIN FUNCTION

1. CONTROL
2. GND
3. NC
4. NOISE BYPASS
5. V_{OUT}
6. NC
7. NC
8. V_{IN}

■ EQUIVALENT CIRCUIT



■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	20	V
Control Voltage	V_{CONT}	20(*1)	V
Power Dissipation	P_D	SOT-89	350
		VSP8,TVSP8	320
Operating Temperature Range	Topr	-40 ~ +85	°C
Storage Temperature Range	Tstg	-40 ~ +125	°C

(*1)When input voltage is less than +20V, the absolute maximum control voltage is equal to the input voltage.

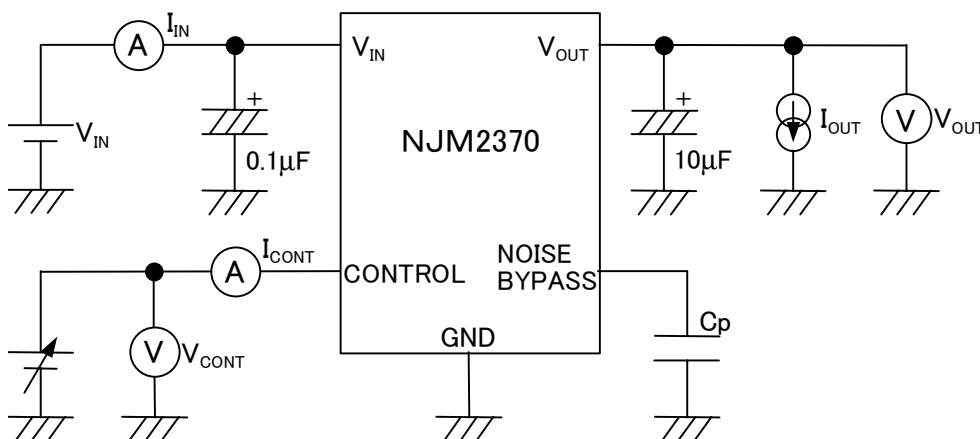
■ ELECTRICAL CHARACTERISTICS (Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_o	$V_{IN}=V_o+1V, I_o=30mA$	-3%	-	+3%	V
Quiescent Current 1	I_{Q1}	$I_o=0mA, \text{expect } I_{CONT}$	-	180	-	μA
Quiescent Current 2	I_{Q2}	CONTROL-GND short	-	-	100	nA
Output Current	I_o	$(V_o-0.3V)$	150	180	-	mA
Line Regulation	$\Delta V_o/\Delta V_{IN}$	$V_{IN}=(V_o+1V) \sim (V_o+6V)$ $V_o=2V \text{ to } 14V$	-	-	0.12	%/V
		$V_{IN}=(V_o+1V) \sim (V_o+5V)$ $V_o=15V$	-	-	0.12	%/V
Load Regulation	$\Delta V_o/\Delta I_o$	$I_o=0 \sim 60mA$	-	-	0.03	%/mA
Dropout Voltage	ΔV_{I-O}	$I_o=30mA$	-	0.1	0.3	V
Ripple Rejection	RR	$f=400Hz, e_{in}=100mVp-p$ $V_{IN}=V_o+1.5V, I_o=10mA$	-	60	-	dB
Average Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T_a$	$T_a=-20 \sim 75^\circ C, I_o=10mA$ $V_{IN}=V_o+1.5V$	-	0.2	-	mV/°C
Output Noise Voltage	V_{NO}	$10Hz < f < 80kHz, I_o=10mA, V_o=3V$	-	30	-	μV_{rms}

The above specification is a common specification for all output voltages.

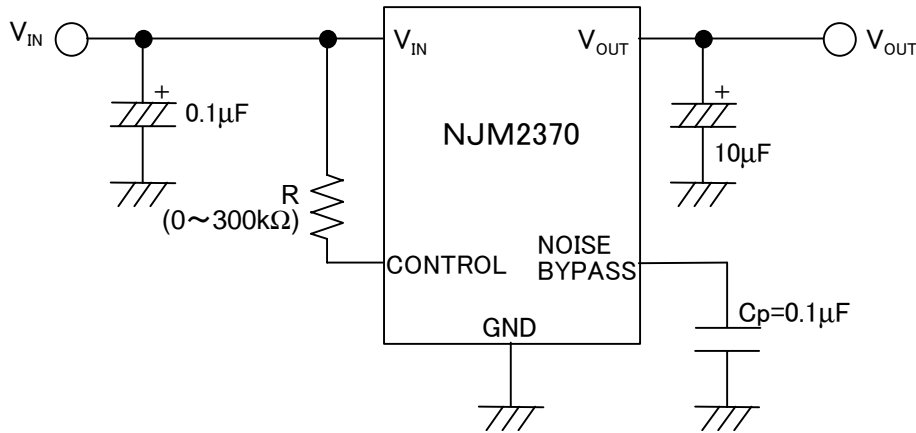
Therefore, it may be different from the individual specification for a specific output voltage.

■ TEST CIRCUIT



■ TYPICAL APPLICATION

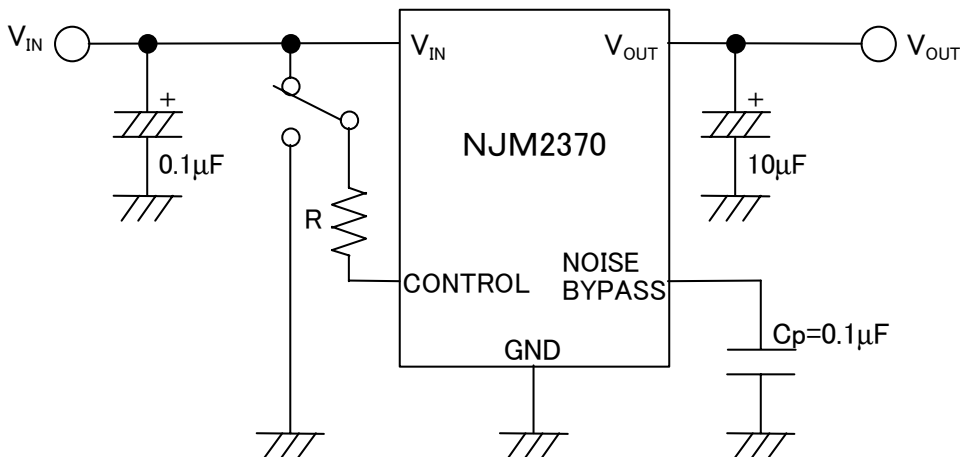
① In Nonuse of ON/OFF Control



Connect control terminal(1Pin) to V_{IN} terminal(5Pin)

When a resistance “R” is connected, the quiescent current decreases, but minimum operating voltage increases. Please refer to a figure of Output Voltage vs. Control Voltage.

② In Use of ON/OFF CONTROL



When the control terminal is “H”, it is ON.

When the control terminal is “L” or “open”, it is OFF.

★Noise bypass Capacitance Cp

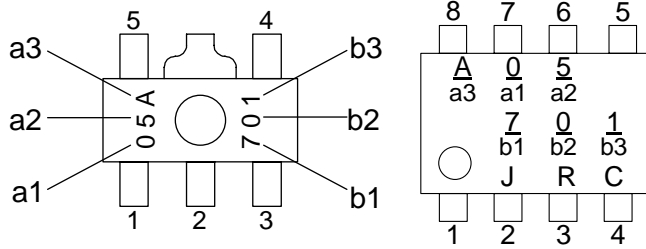
Noise bypass capacitance CP reduces noise generated by band-gap reference circuit.

Noise level and ripple rejection will be improved when larger CP is used. Please refer to the typical characteristics to determine the value.

Use of smaller CP value may induce oscillation.

Please make sure to use CP value of greater than 0.1uF to avoid the problem.

■ PACKAGE MARKING



a1,a2 Output voltage rank
(Please refer to output voltage rank list)

a3 Plant code.(NJM2370 is "A")

b1 Last digit of the calendar year

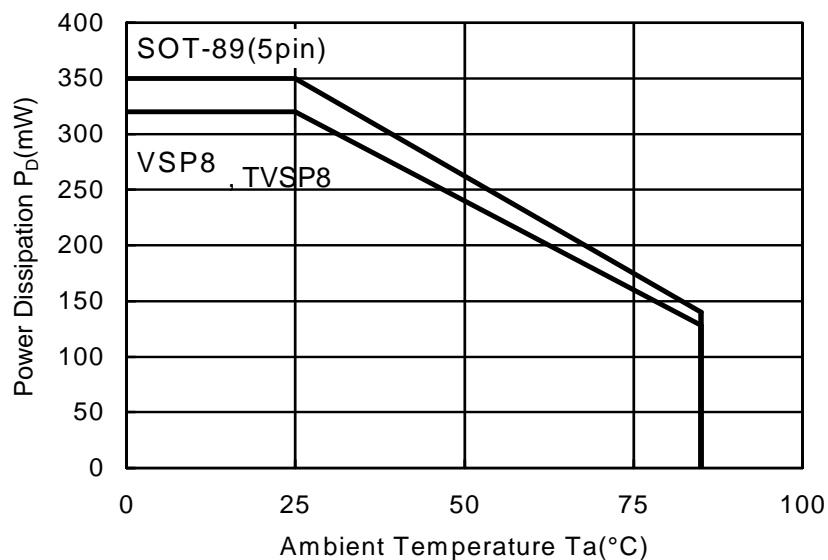
b2,b3 Lot Number

■ OUTPUT VOLTAGE RANK LIST

Output Voltage	Part Number	Marking	
		a1	a2
2.0V	NJM2370X02	0	2
2.1V	NJM2370X21	2	1
2.2V	NJM2370X22	2	2
2.3V	NJM2370X23	2	3
2.4V	NJM2370X24	2	4
2.5V	NJM2370X25	2	5
2.6V	NJM2370X26	2	6
2.7V	NJM2370X27	2	7
2.8V	NJM2370X28	2	8
2.9V	NJM2370X29	2	9
3.0V	NJM2370X03	0	3
3.1V	NJM2370X31	3	1
3.2V	NJM2370X32	3	2
3.3V	NJM2370X33	3	3
3.5V	NJM2370X35	3	5

Output Voltage	Part Number	Marking	
		a1	a2
3.6V	NJM2370X36	3	6
3.7V	NJM2370X37	3	7
3.8V	NJM2370X38	3	8
3.9V	NJM2370X39	3	9
4.0V	NJM2370X04	0	4
4.7V	NJM2370X47	4	7
5.0V	NJM2370X05	0	5
6.0V	NJM2370X06	0	6
8.0V	NJM2370X08	0	8
8.5V	NJM2370X85	8	5
9.0V	NJM2370X09	0	9
10.0V	NJM2370X10	1	0
12.0V	NJM2370X12	1	2
13.0V	NJM2370X13	1	3
15.0V	NJM2370X15	1	5

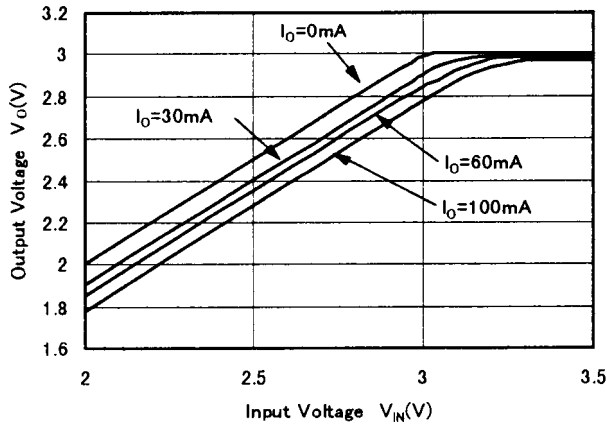
■ POWER DISSIPATION VS. AMBIENT TEMPERATURE



■ TYPICAL CHARACTERISTICS

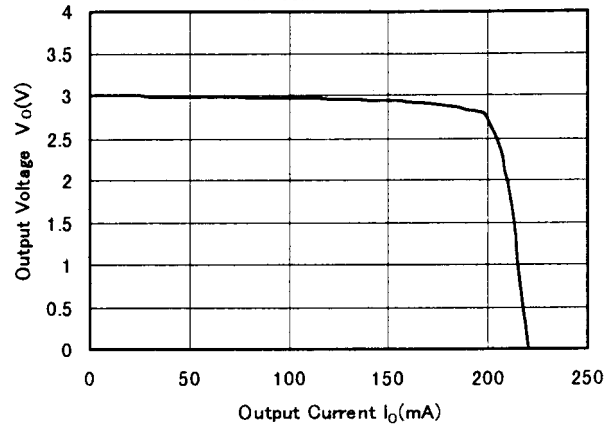
NJM2370U03 / R03 Dropout Voltage

($V_{IN}=V_{CONT}$, $T_a=25^\circ\text{C}$)



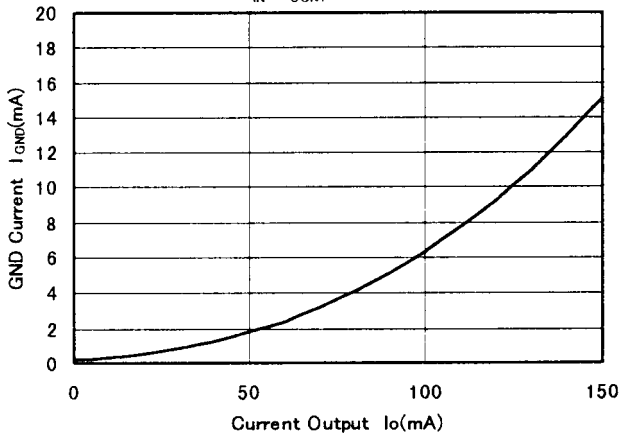
NJM2370U03 / R03 Load Regulation

($V_{IN}=V_{CONT}=4\text{V}$, $T_a=25^\circ\text{C}$)



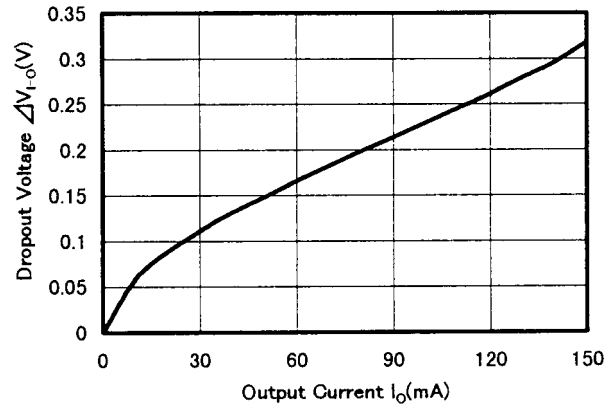
NJM2370U03/R03 GND Current vs. Output Current

($V_{IN}=V_{CONT}=4\text{V}$, $T_a=25^\circ\text{C}$)



NJM2370U03/R03 Dropout Voltage vs. Output Current

($T_a=25^\circ\text{C}$)

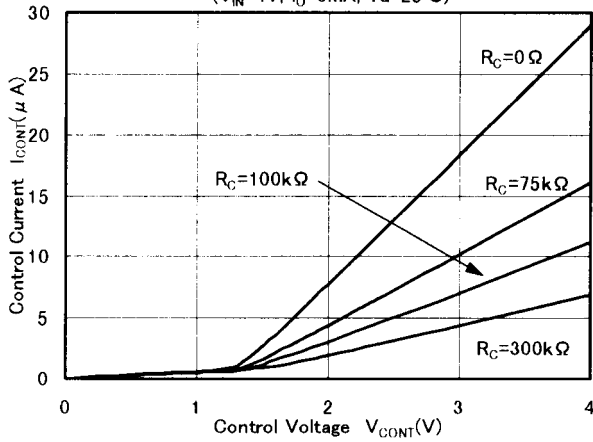


NJM2370

■ TYPICAL CHARACTERISTICS

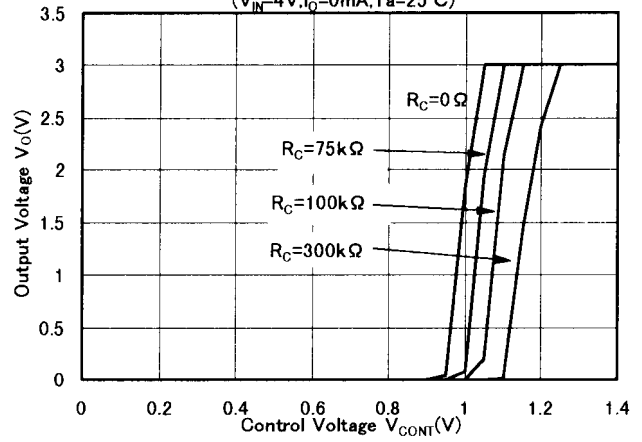
NJM2370U03 / R03 Control Current vs. Control Voltage

($V_{IN}=4V, I_O=0mA, T_a=25^\circ C$)



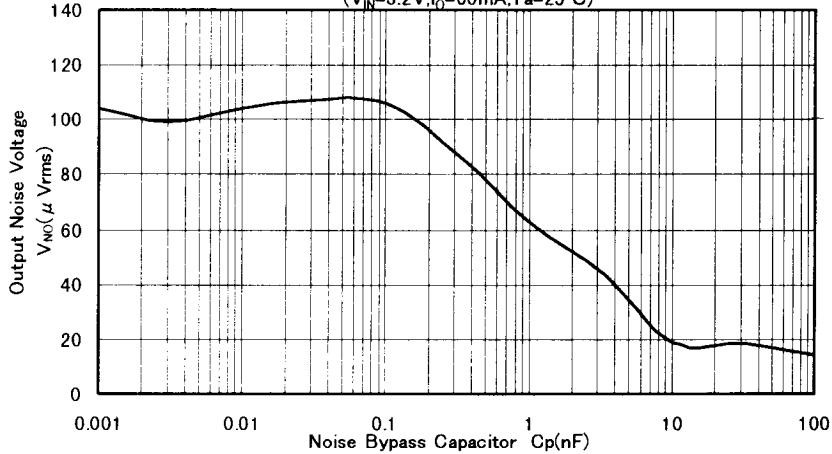
NJM2370U03 / R03 Output Voltage vs. Control Voltage

($V_{IN}=4V, I_O=0mA, T_a=25^\circ C$)



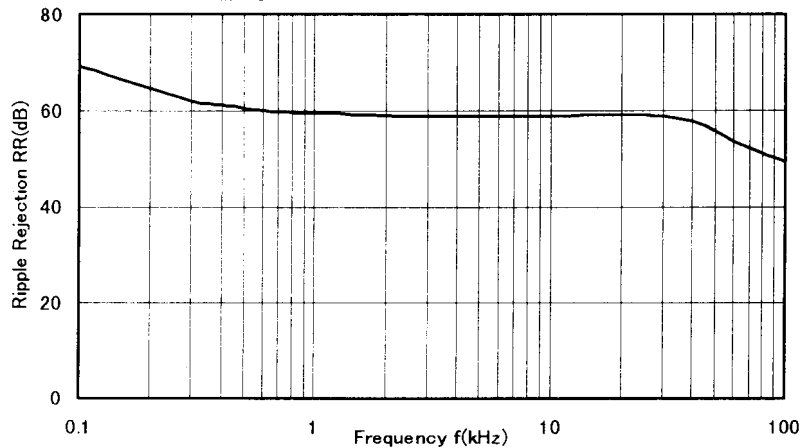
NJM2370U03/R03 Output Noise Voltage vs. Noise Bypass Capacitor

($V_{IN}=3.2V, I_O=60mA, T_a=25^\circ C$)



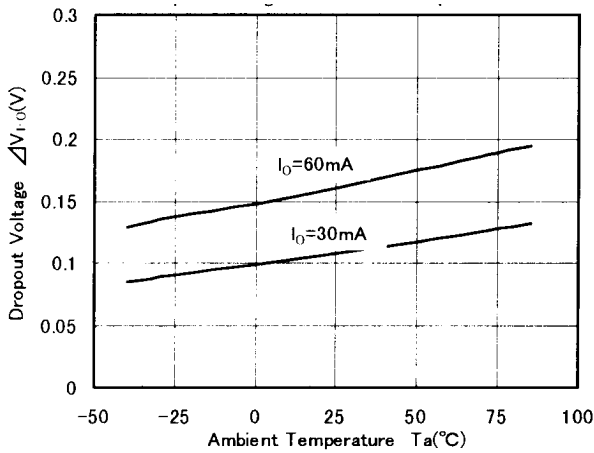
NJM2370U03/R03 Ripple Rejection vs. Frequency

($V_{IN}=V_O+1.5V, e_{in}=100mV_{rms}, I_O=10mA, T_a=25^\circ C$)

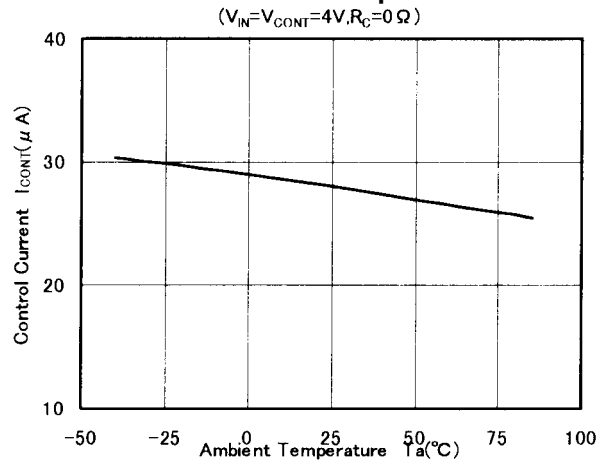


■ TYPICAL CHARACTERISTICS

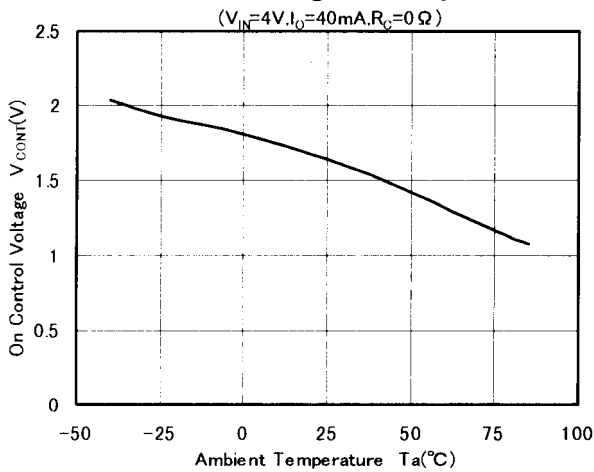
Dropout Voltage vs. Ambient Temperature



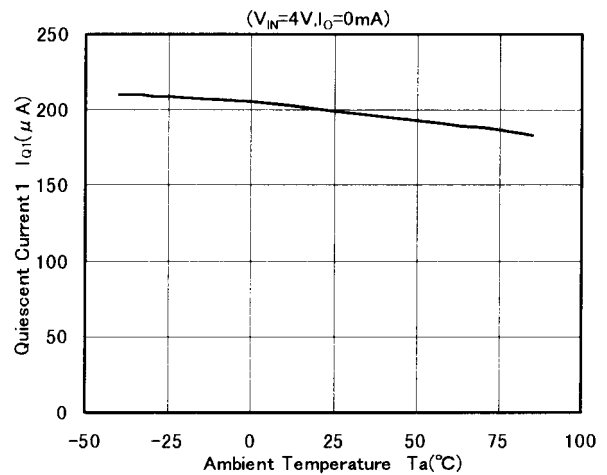
NJM2370U03 / R03 Control Current vs. Ambient Temperature



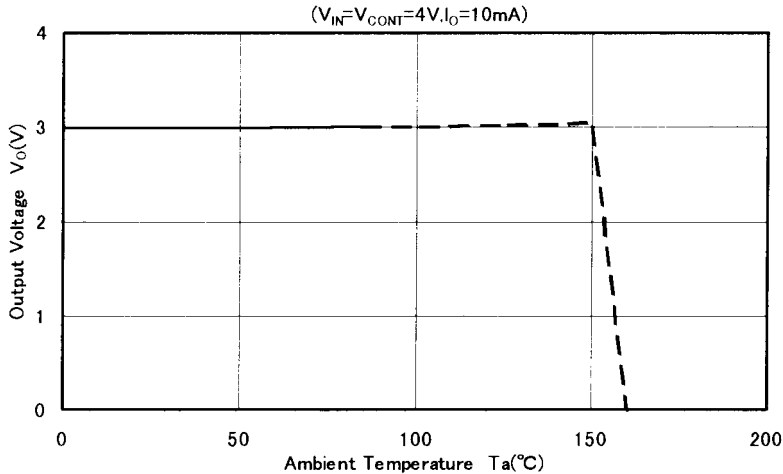
On Control Voltage vs. Temperature



NJM2370U03 / R03 Quiescent Current 1 vs. Ambient Temperature



Thermal Shutdown



[CAUTION]

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