

LOW DROPOUT VOLTAGE REGULATOR WITH ON/OFF CONTROL

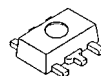
■ GENERAL DESCRIPTION

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

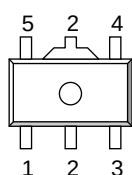


NJM2370RB1

■ 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

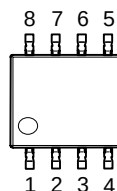
■ PIN CONFIGURATION



NJM2370U/U1

PIN FUNCTION

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

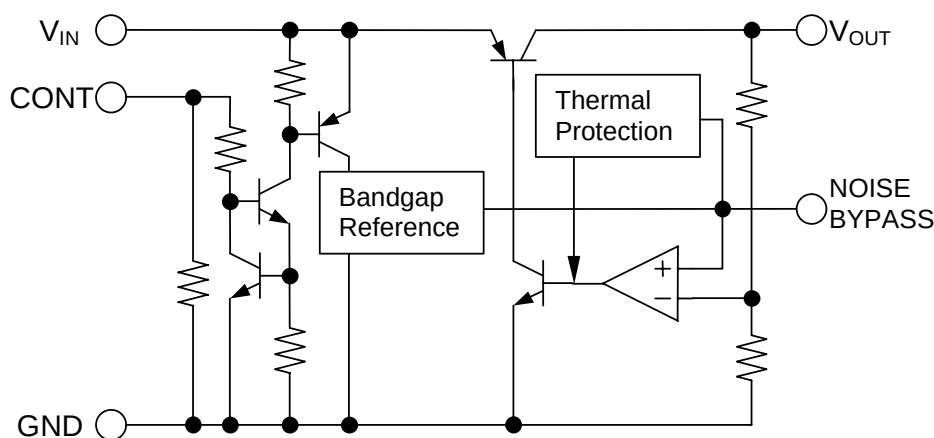


NJM2370R/RB1

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

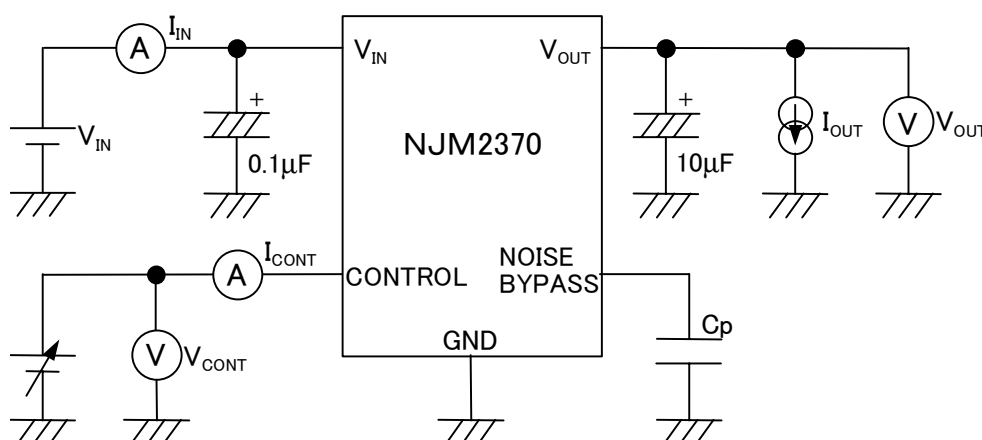
(Ta=25°C)

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}	$I_O=0mA$, 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	$\Delta V_O/\Delta V_{IN}$	$V_{IN}=(V_O+1V) \sim (V_O+6V)$ $V_O=2V$ 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.

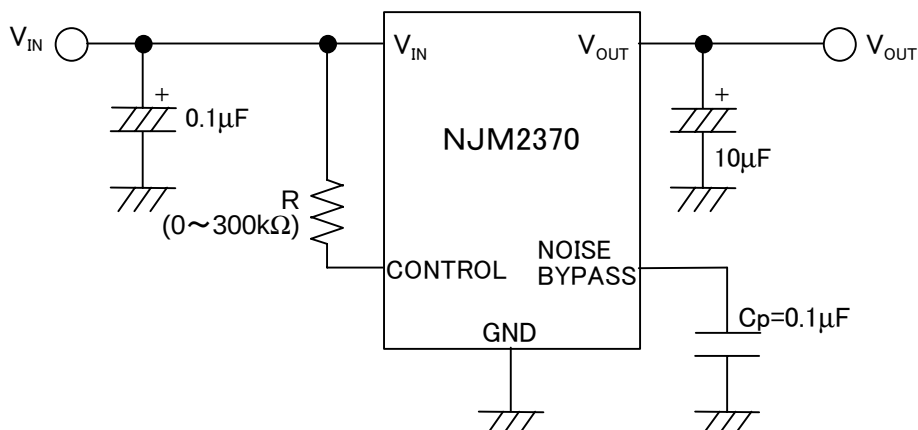
Therefore, it may be different from the individual specification for a specific output voltage.

■ TEST CIRCUIT



■ TYPICAL APPLICATION

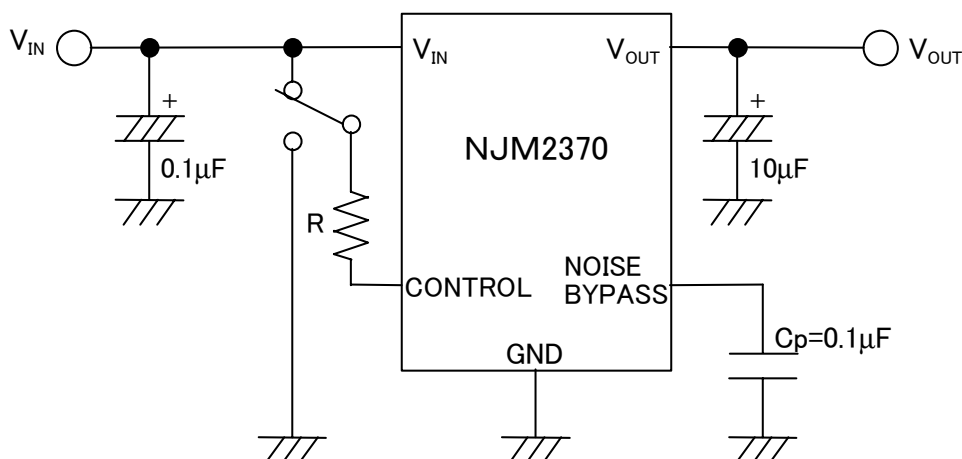
① In Nonuse of ON/OFF Control



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 C_p

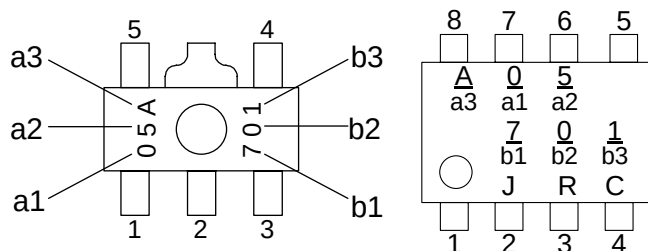
Noise bypass capacitance C_p reduces noise generated by band-gap reference circuit.

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

Use of smaller C_p value may induce oscillation.

Please make sure to use C_p value of greater than 0.1μF 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

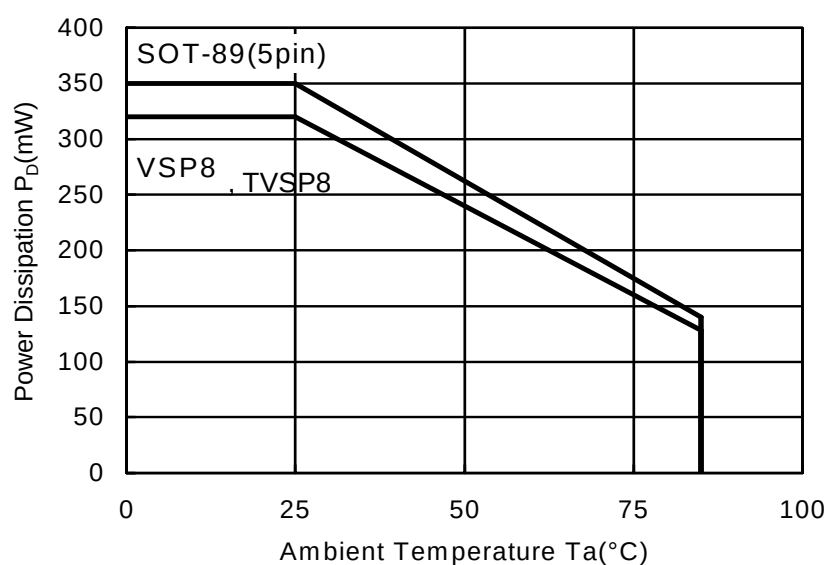
b2,b3 Lot Number

■ 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

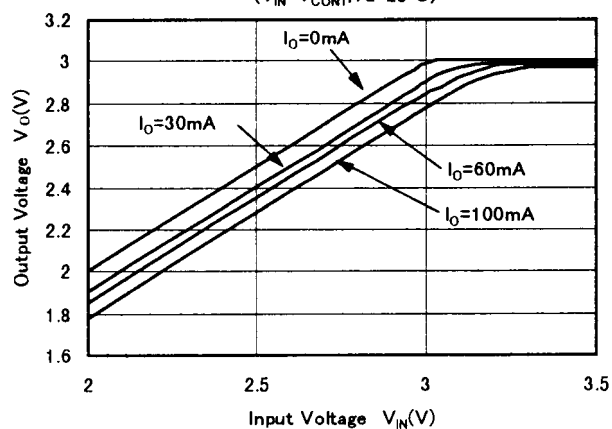
■ POWER DISSIPATION VS. AMBIENT TEMPERATURE



■ TYPICAL CHARACTERISTICS

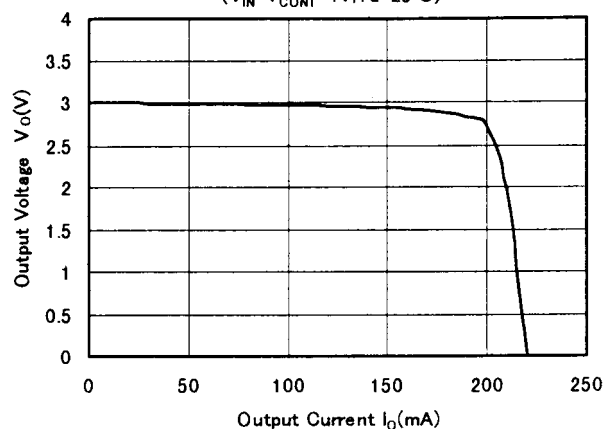
NJM2370U03 / R03 Dropout Voltage

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



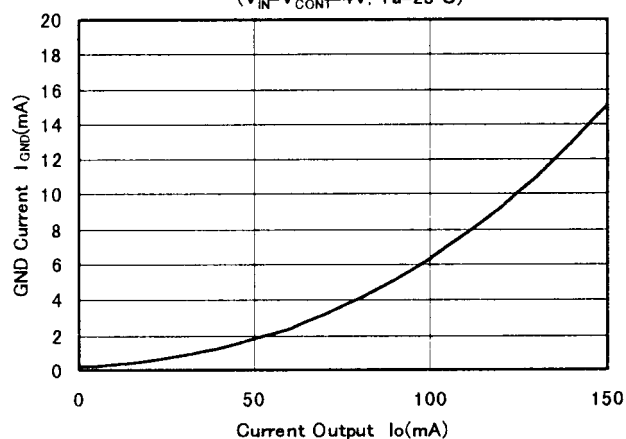
NJM2370U03 / R03 Load Regulation

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



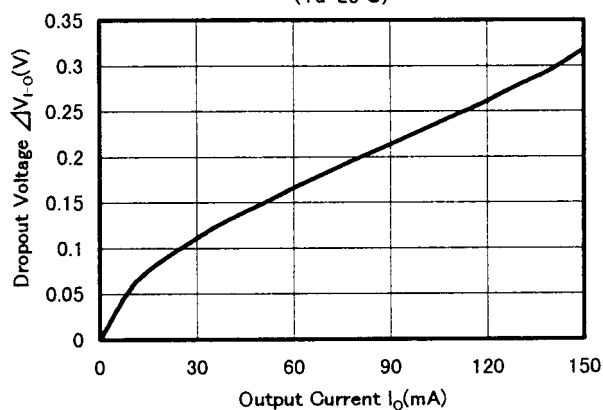
NJM2370U03/R03 GND Current vs. Output Current

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



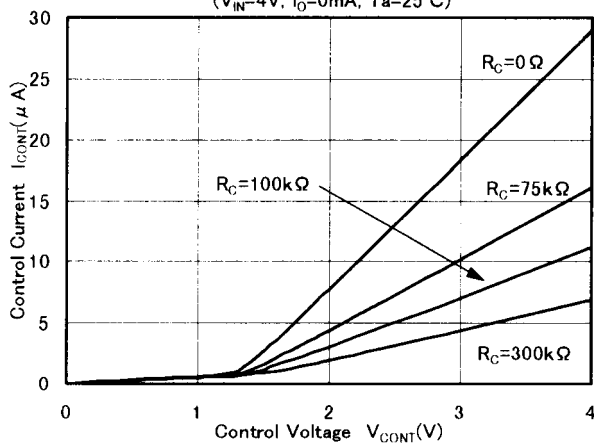
NJM2370U03/R03 Dropout Voltage vs. Output Current

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

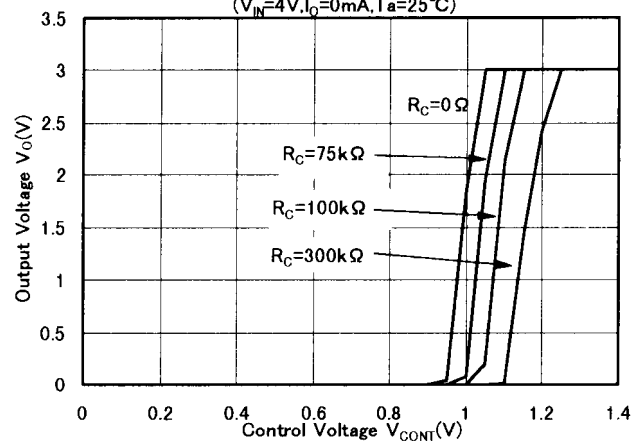


■ TYPICAL CHARACTERISTICS

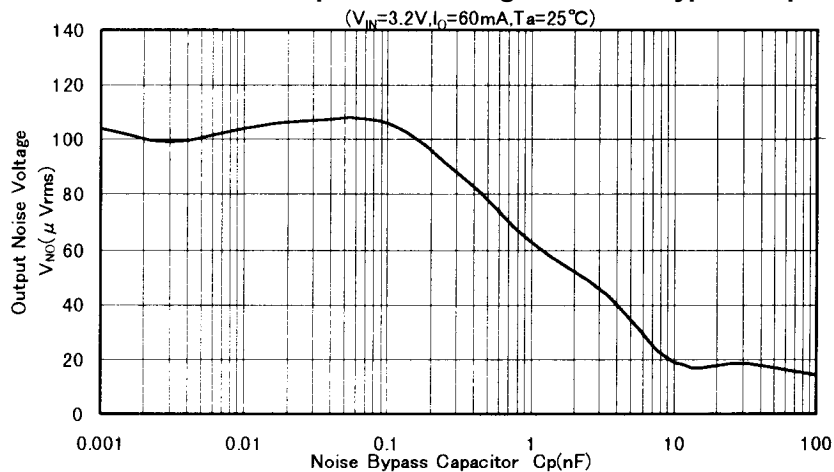
NJM2370U03 / R03 Control Current vs. Control Voltage
($V_{IN}=4V, I_O=0mA, T_a=25^\circ C$)



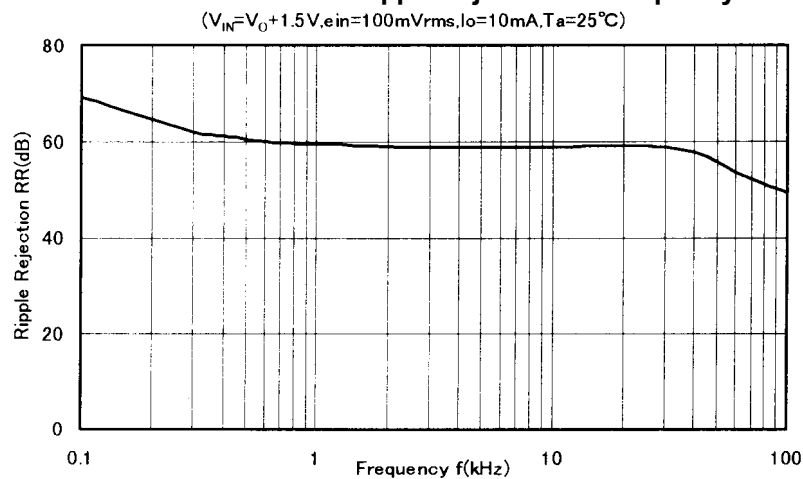
NJM2370U03 / R03 Output Voltage vs. Control Voltage
($V_{IN}=4V, I_O=0mA, T_a=25^\circ C$)



NJM2370U03/R03 Output Noise Voltage vs. Noise Bypass Capacitor

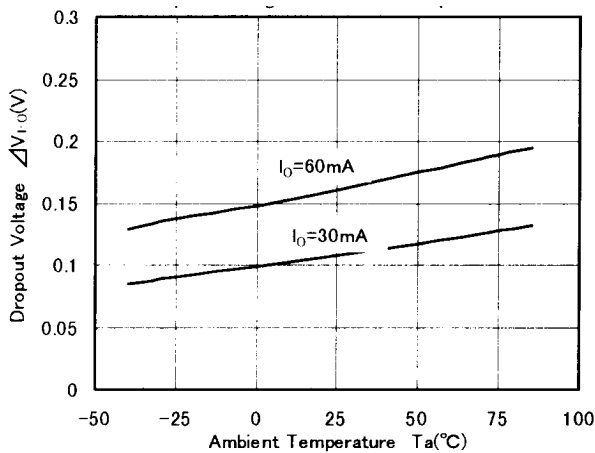


NJM2370U03/R03 Ripple Rejection vs. Frequency



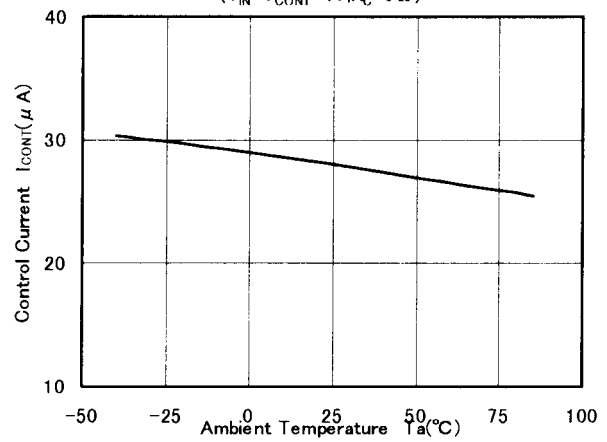
■ TYPICAL CHARACTERISTICS

Dropout Voltage vs. Ambient Temperature



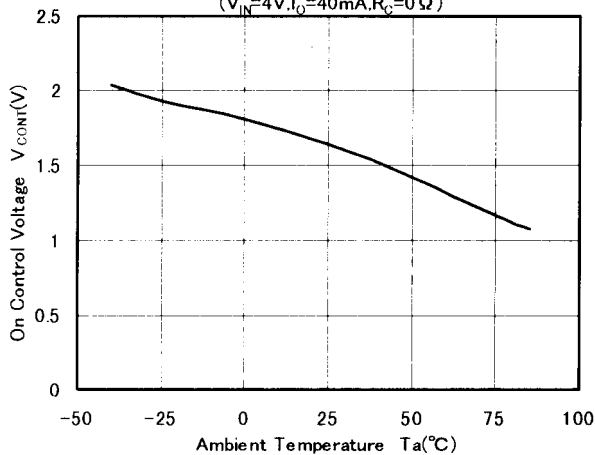
NJM2370U03 / R03 Control Current vs. Ambient Temperature

($V_{IN}=V_{CONT}=4\text{V}, R_C=0\Omega$)



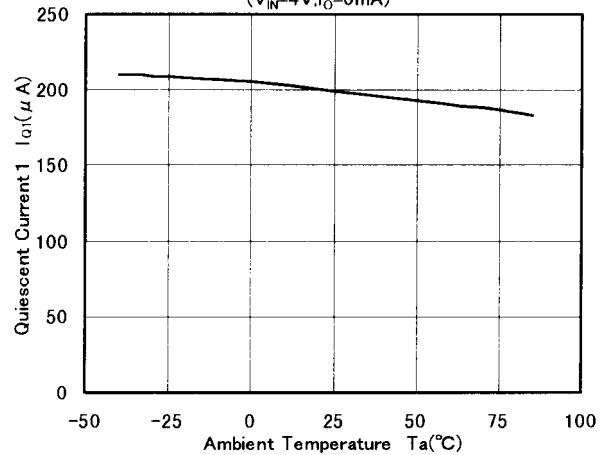
On Control Voltage vs. Temperature

($V_{IN}=4\text{V}, I_0=40\text{mA}, R_C=0\Omega$)



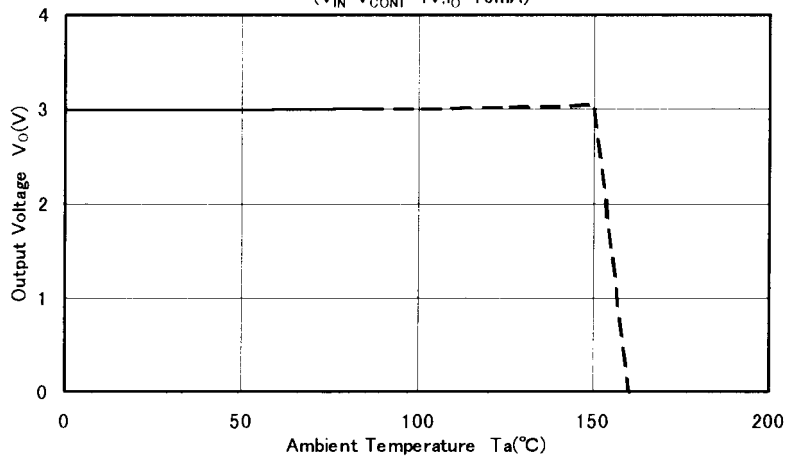
NJM2370U03 / R03 Quiescent Current 1 vs. Ambient Temperature

($V_{IN}=4\text{V}, I_0=0\text{mA}$)



Thermal Shutdown

($V_{IN}=V_{CONT}=4\text{V}, I_0=10\text{mA}$)



[CAUTION]

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