

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

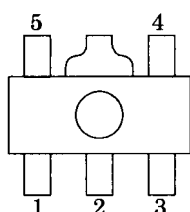


NJM2370R

■ FEATURES

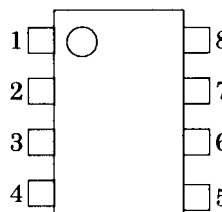
- Output Current (150mA min. ($V_O=0.3\text{V}$))
- Low Dropout Voltage (0.1V typ. ($I_O=30\text{mA}$))
- External Capacitor for Noise Bypass
- ON / OFF Control Function
- Over Current Limit
- Thermal Shutdown
- Bipolar Technology
- Package Outline SOT-89 (5pin), VSP8

■ PIN CONFIGURATION



NJM2370U

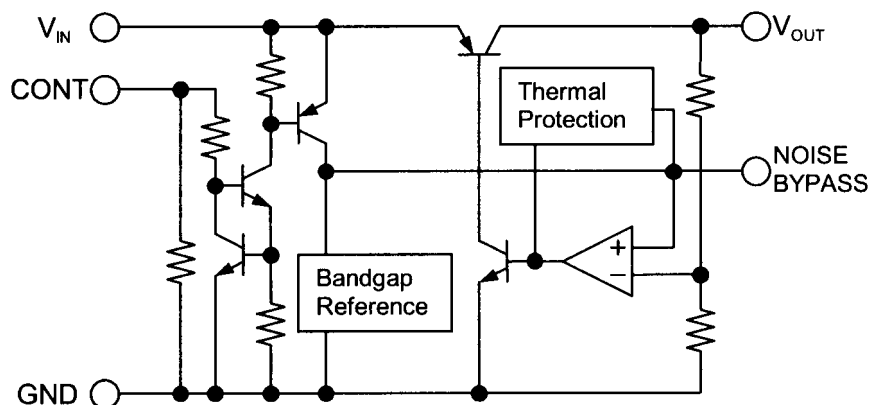
PIN FUNCTION
 1. CONTROL
 2. GND
 3. NOISE BYPASS
 4. V_{OUT}
 5. V_{IN}



NJM2370R

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

■ EQUIVALENT CIRCUIT



NJM2370

■ ABSOLUTE MAXIMUM RATINGS

(T_a=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V _{IN}	20	V
Control Voltage	V _{CONT}	20 (note 1)	V
Power Dissipation	P _D	(SOT-89) 350 (VSP8) 320	mW
Operating Temperature Range	T _{opr}	-40 to +85	°C
Storage Temperature Range	T _{stg}	-40 to +125	°C

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

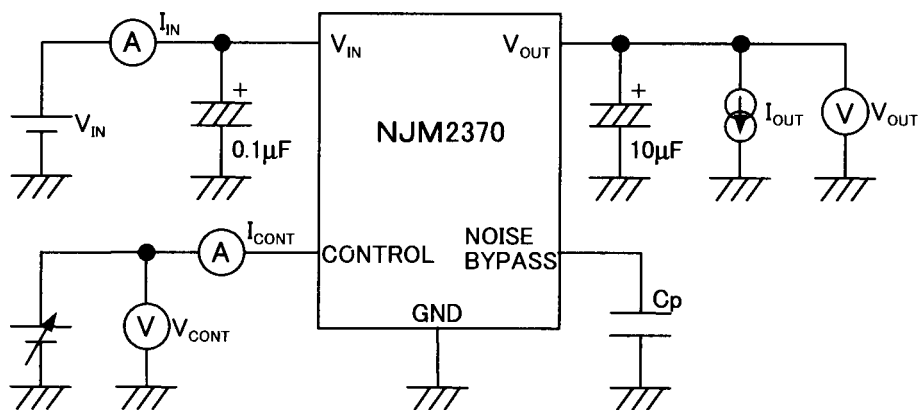
■ ELECTRICAL CHARACTERISTICS

(T_a=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	ΔV _O / ΔV _{IN}	V _{IN} =(V _O +1V) to (V _O +6V) V _O =2V to 14V	-	-	0.12	% / V
		V _{IN} =(V _O +1V) to (V _O +5V) V _O =15V	-	-	0.12	% / V
Load Regulation	ΔV _O / ΔI _O	I _O =0 to 60mA	-	-	0.03	% / mA
Dropout Voltage	ΔV _{I-O}	I _O =30mA	-	0.1	0.3	V
Ripple Rejection	R-R	f=400Hz, e _{in} =100mV _{P-P} V _{IN} =V _O +1.5V, I _O =10mA	-	60	-	dB
Average Temperature Coefficient of Output Voltage	ΔV _O / ΔT _a	T _a =-20 to 75°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	-	μVrms

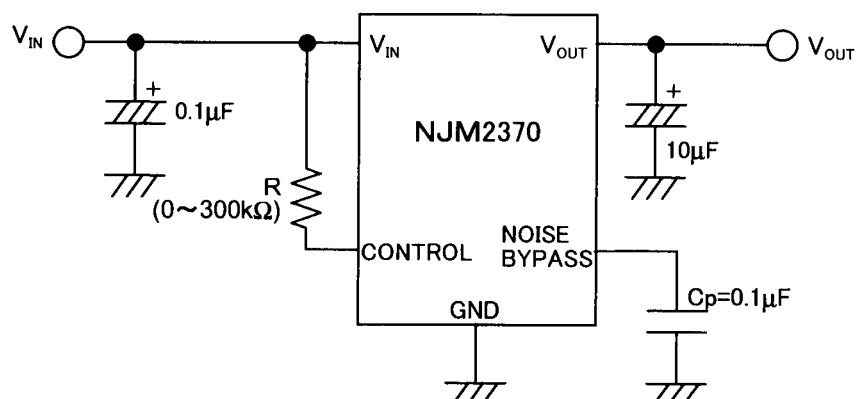
(note 2) Please confirm the specification separately because some parameters depend on output voltage.

■ TEST CIRCUIT



■ TYPICAL APPLICATION

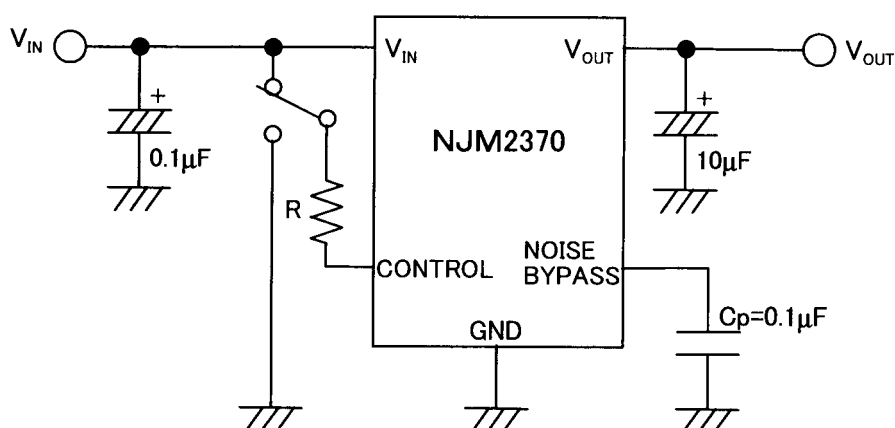
(1) In Nonuse of ON / OFF Control



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.

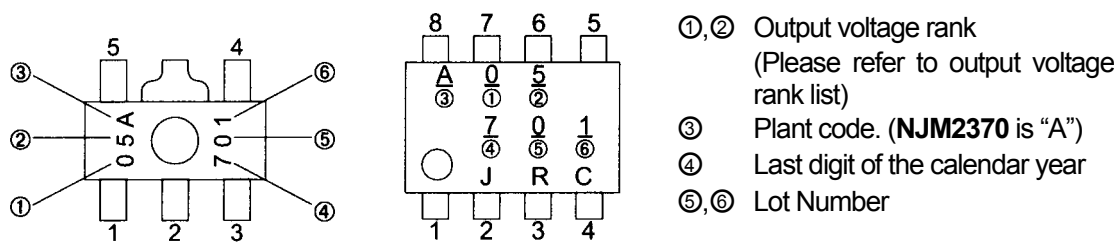
Noise level and ripple rejection will be improved when larger C_p is used. Please refer to the typical characteristics to determine the value.

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.

NJM2370

■ PACKAGE MARKING



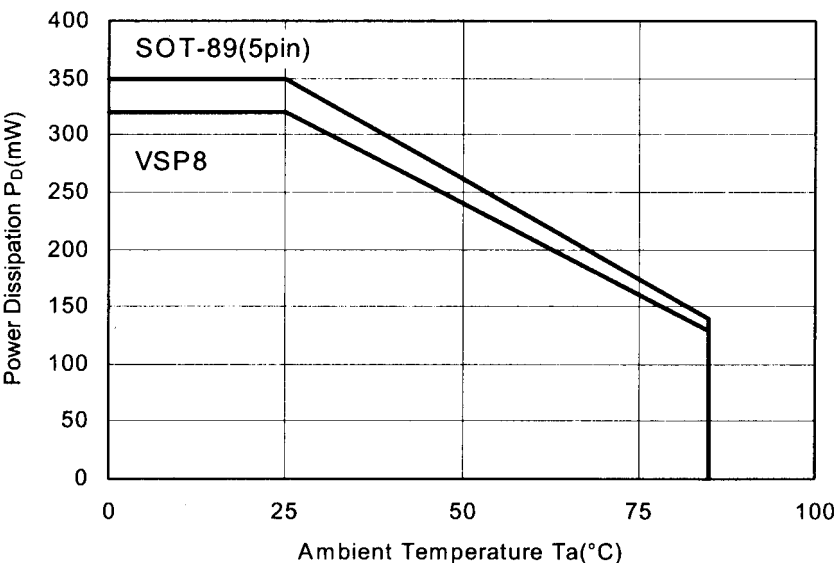
■ OUTPUT VOLTAGE RANK LIST

Output Voltage	Part Number	Marking	
		①	②
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	
		①	②
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
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

(*1) : SOT-89 (5pin) ONLY
(*2) : VSP8 ONLY

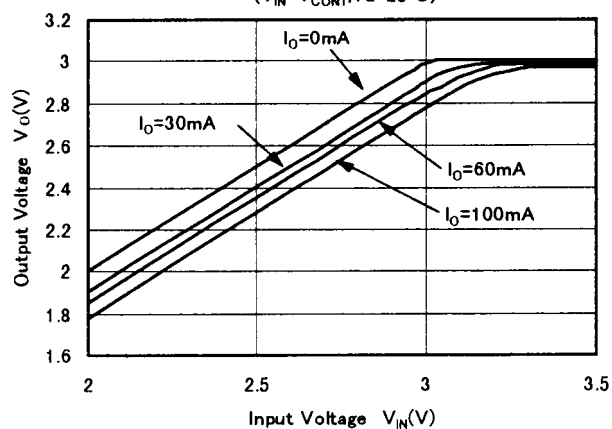
■ POWER DISSIPATION VS. AMBIENT TEMPERATURE



■ TYPICAL CHARACTERISTICS

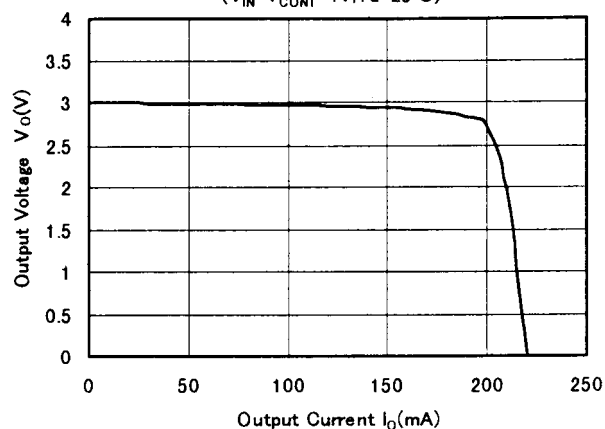
NJM2370U03 / R03 Dropout Voltage

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



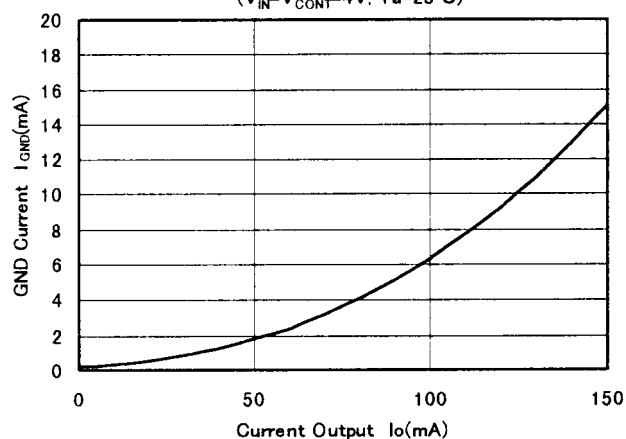
NJM2370U03 / R03 Load Regulation

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



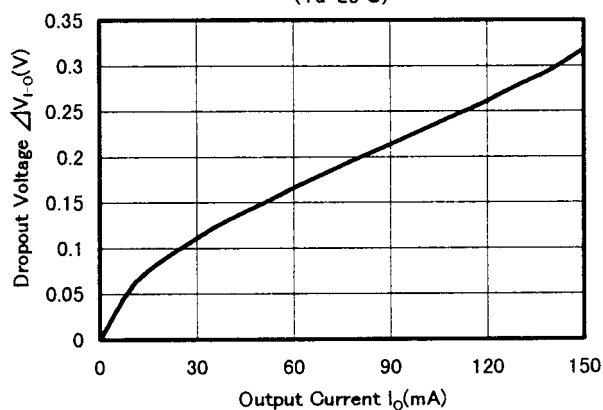
NJM2370U03/R03 GND Current vs. Output Current

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



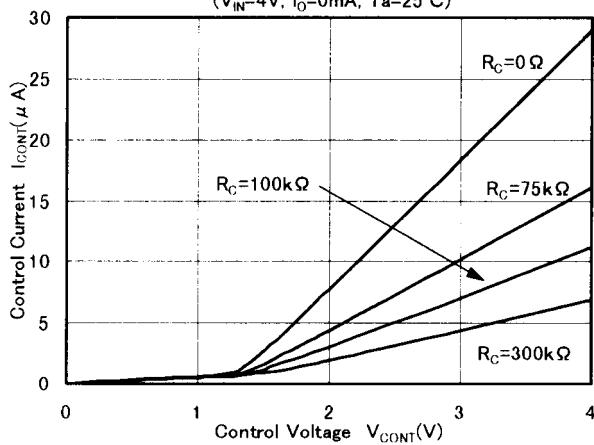
NJM2370U03/R03 Dropout Voltage vs. Output Current

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

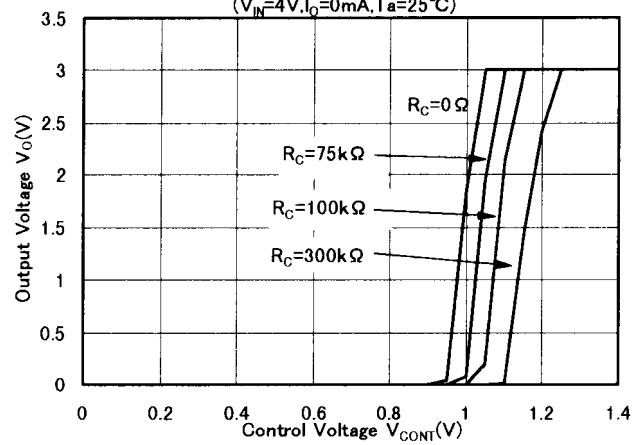


■ TYPICAL CHARACTERISTICS

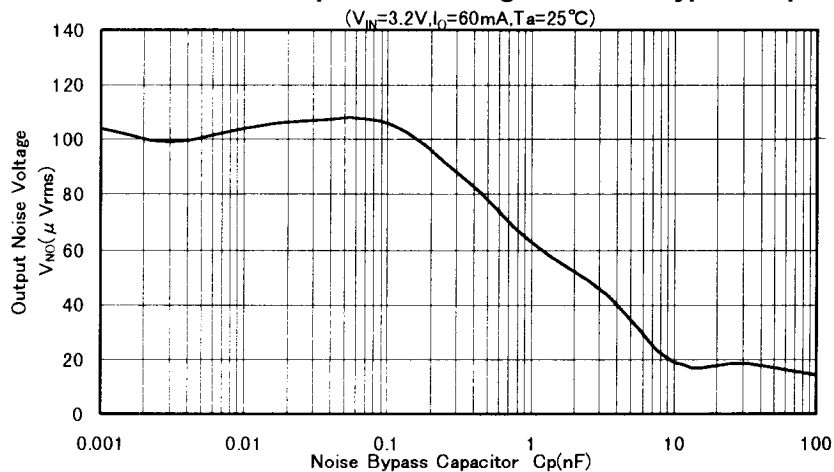
NJM2370U03 / R03 Control Current vs. Control Voltage
($V_{IN}=4V, I_O=0mA, T_a=25^\circ C$)



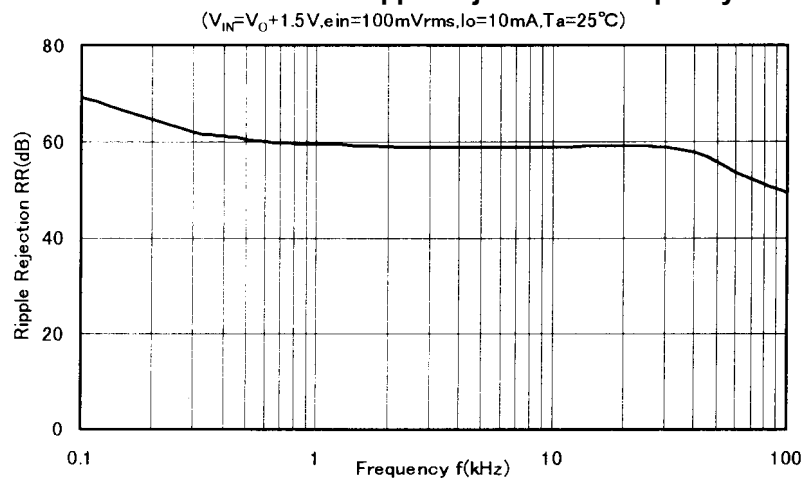
NJM2370U03 / R03 Output Voltage vs. Control Voltage
($V_{IN}=4V, I_O=0mA, T_a=25^\circ C$)



NJM2370U03/R03 Output Noise Voltage vs. Noise Bypass Capacitor

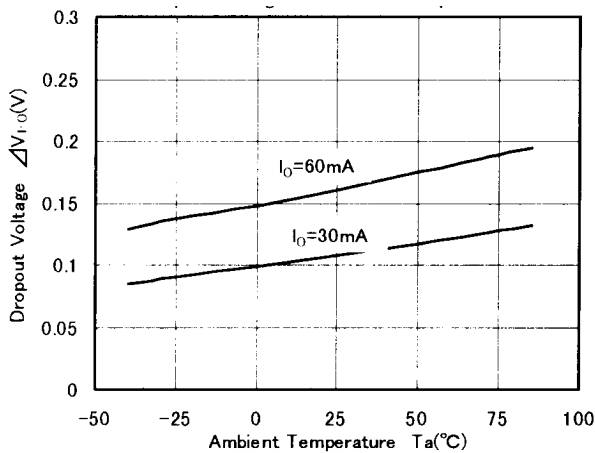


NJM2370U03/R03 Ripple Rejection vs. Frequency



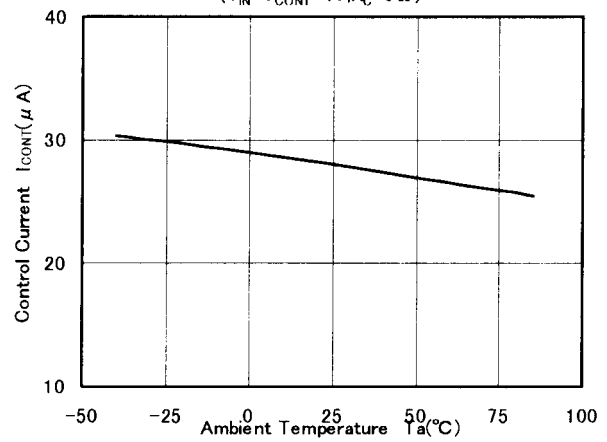
■ TYPICAL CHARACTERISTICS

Dropout Voltage vs. Ambient Temperature



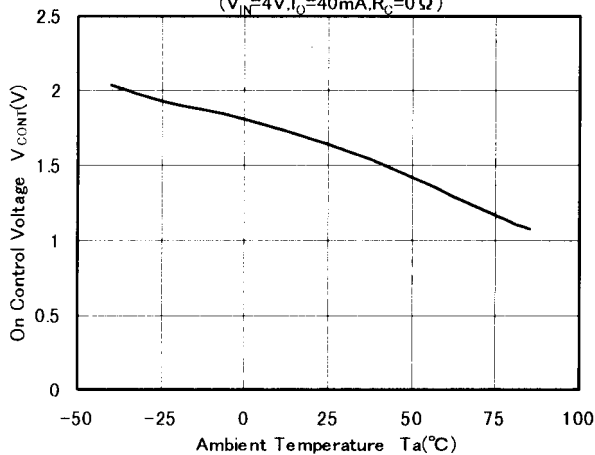
NJM2370U03 / R03 Control Current vs. Ambient Temperature

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



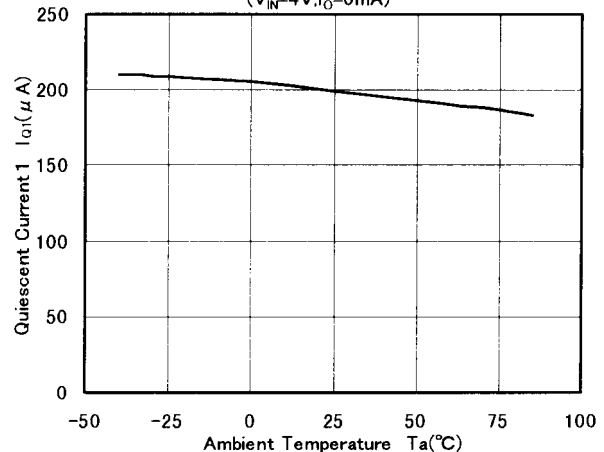
On Control Voltage vs. Temperature

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



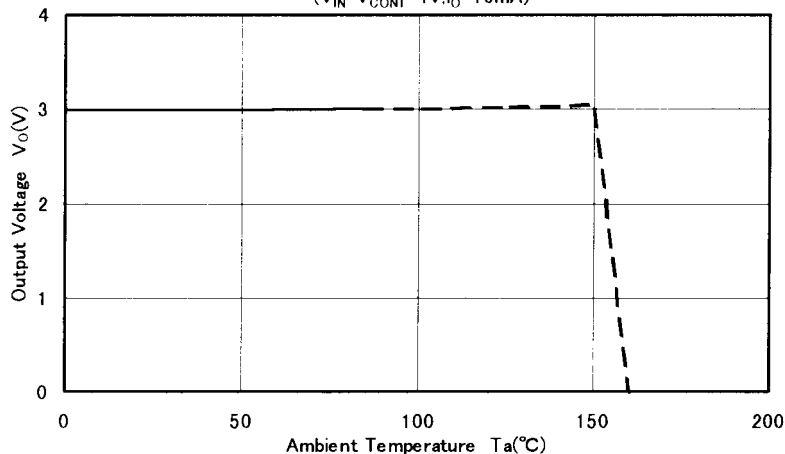
NJM2370U03 / R03 Quiescent Current 1 vs. Ambient Temperature

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



Thermal Shutdown

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



[CAUTION]

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