

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



NJM2370U1

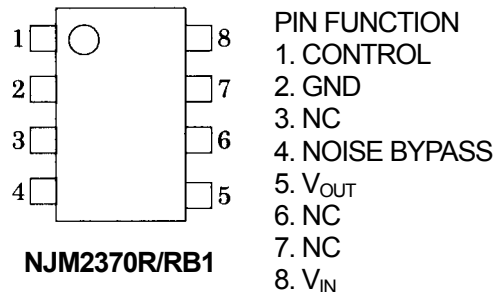
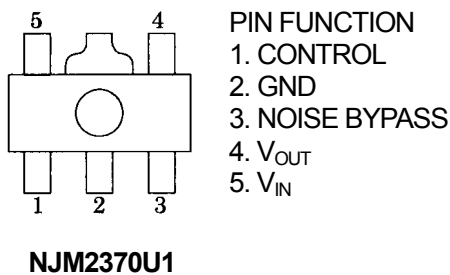


NJM2370R/RB1

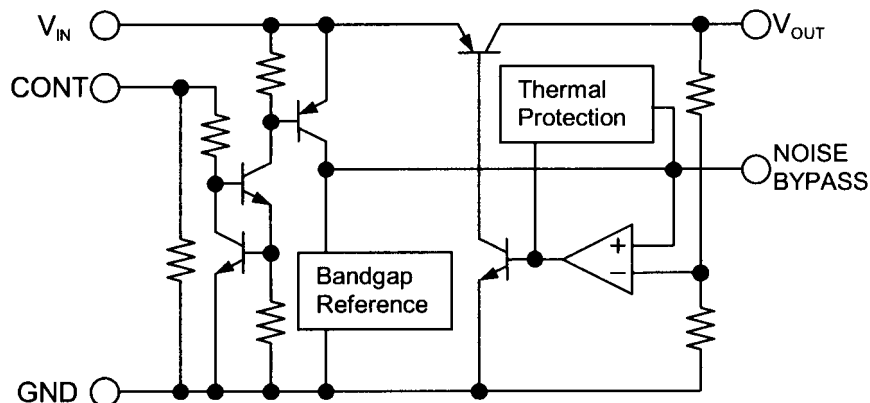
■ FEATURES

- 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-89-5, VSP8, TVSP8

■ PIN CONFIGURATION



■ EQUIVALENT CIRCUIT



NJM2370

■ ABSOLUTE MAXIMUM RATINGS

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

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	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-40 to +125	$^\circ\text{C}$

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

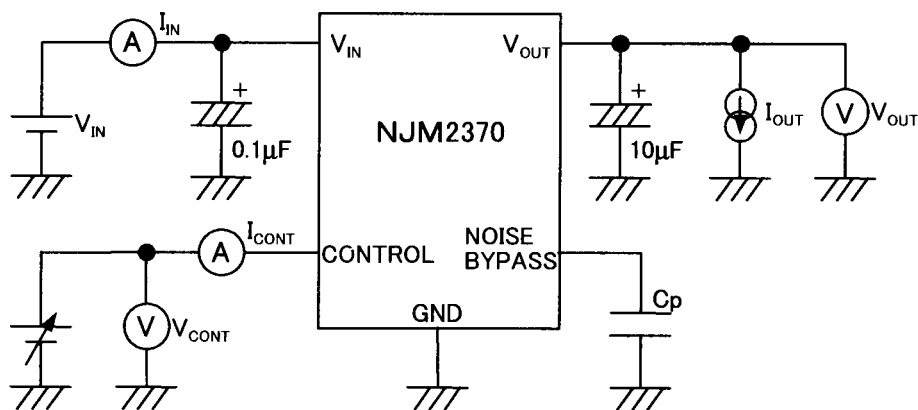
■ ELECTRICAL CHARACTERISTICS

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

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	$V_{IN}=V_O+1V, I_O=30\text{mA}$	-3%	-	+3%	V
Quiescent Current 1	I_{Q1}	$I_O=0\text{mA}$, 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	$\Delta V_O / \Delta V_{IN}$	$V_{IN}=(V_O+1V)$ 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	$\Delta V_O / \Delta I_O$	$I_O=0$ to 60mA	-	-	0.03	% / mA
Dropout Voltage	ΔV_{LO}	$I_O=30\text{mA}$	-	0.1	0.3	V
Ripple Rejection	R-R	$f=400\text{Hz}$, $e_{in}=100\text{mV}_{P-P}$ $V_{IN}=V_O+1.5V, I_O=10\text{mA}$	-	60	-	dB
Average Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T_a$	$T_a=-20$ to 75°C , $I_O=10\text{mA}$ $V_{IN}=V_O+1.5V$	-	0.2	-	$\text{mV} / ^\circ\text{C}$
Output Noise Voltage	V_{NO}	$10\text{Hz} < f < 80\text{kHz}$, $I_O=10\text{mA}$, $V_O=3V$	-	30	-	μV_{rms}

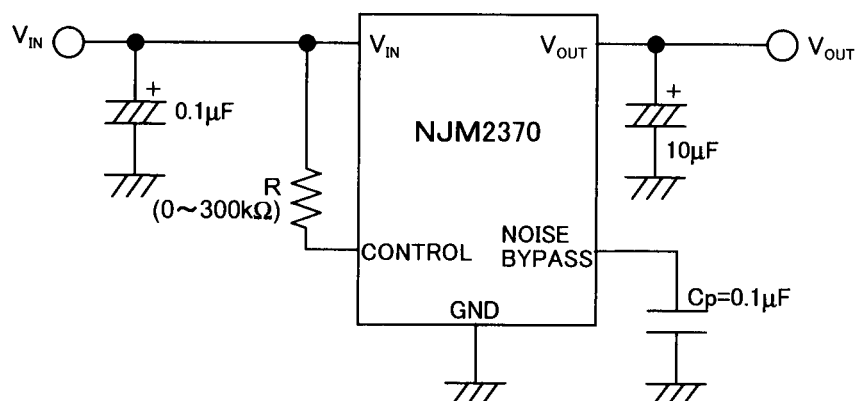
(note 2) Please confirm the specification separately because some parameters depend on output voltage.

■ TEST CIRCUIT



■ TYPICAL APPLICATION

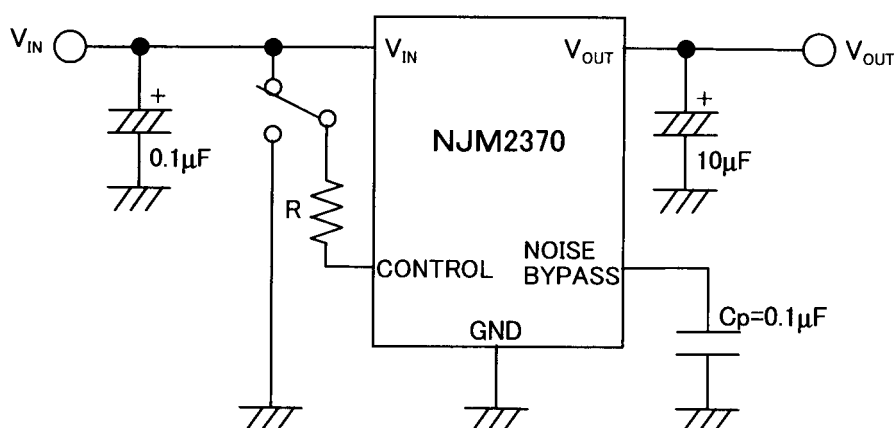
(1) In Nonuse of ON / OFF Control



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.

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■ OUTPUT VOLTAGE RANK LIST

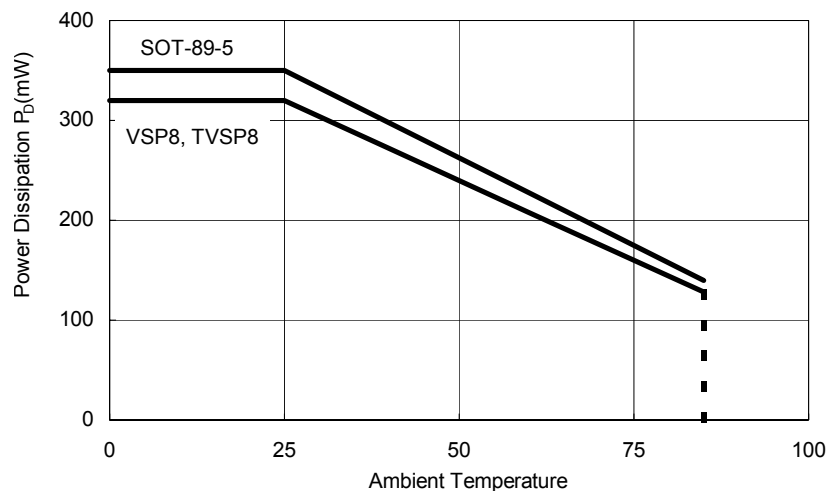
Past Number	Output Voltage		Past Number	Output Voltage		Past Number	Output Voltage	
NJM2370U1/R/RB1-02	2.0V		NJM2370U1/R/RB1-31	3.1V		NJM2370U1/R/RB1-08	8.0V	(*1)
NJM2370U1/R/RB1-21	2.1V	(*1)	NJM2370U1/R/RB1-32	3.2V	(*1)	NJM2370U1/R/RB1-85	8.5V	
NJM2370U1/R/RB1-22	2.2V	(*1)	NJM2370U1/R/RB1-33	3.3V		NJM2370U1/R/RB1-09	9.0V	
NJM2370U1/R/RB1-23	2.3V	(*1)	NJM2370U1/R/RB1-35	3.5V		NJM2370U1/R/RB1-10	10.0V	
NJM2370U1/R/RB1-24	2.4V	(*1)	NJM2370U1/R/RB1-36	3.6V	(*1)	NJM2370U1/R/RB1-12	12.0V	
NJM2370U1/R/RB1-25	2.5V		NJM2370U1/R/RB1-37	3.7V	(*1)	NJM2370U1/R/RB1-13	13.0V	(*2)
NJM2370U1/R/RB1-26	2.6V	(*1)	NJM2370U1/R/RB1-38	3.8V	(*1)	NJM2370U1/R/RB1-D3	13.5V	
NJM2370U1/R/RB1-27	2.7V		NJM2370U1/R/RB1-39	3.9V	(*1)	NJM2370U1/R/RB1-15	15.0V	
NJM2370U1/R/RB1-28	2.8V	(*1)	NJM2370U1/R/RB1-04	4.0V		NJM2370U1/R/RB1-F5	15.5V	
NJM2370U1/R/RB1-29	2.9V	(*1)	NJM2370U1/R/RB1-05	5.0V				
NJM2370U1/R/RB1-03	3.0V		NJM2370U1/R/RB1-06	6.0V				

(*1) : VSP8, TVSP8 ONLY

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

■ POWER DISSIPATION VS. AMBIENT TEMPERATURE

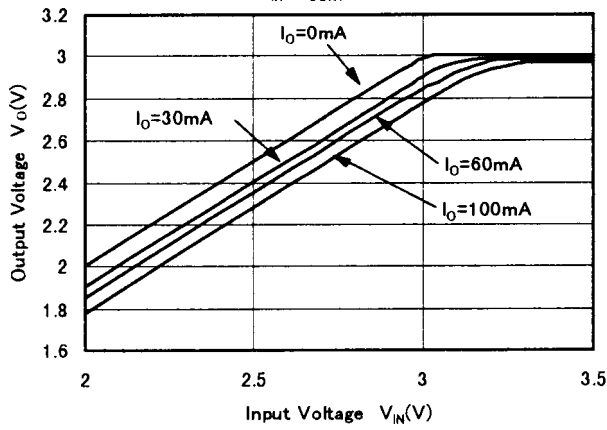
NJM2370F3 Power Dissipation
($T_{opr} = -40 \sim +85$, $T_j = 125$)



■ TYPICAL CHARACTERISTICS

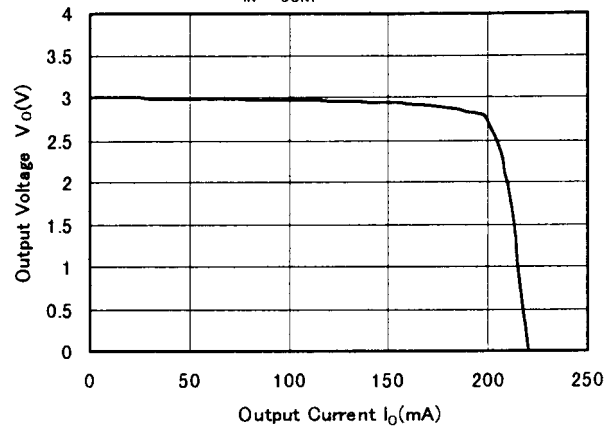
NJM2370 3V Version Dropout Voltage

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



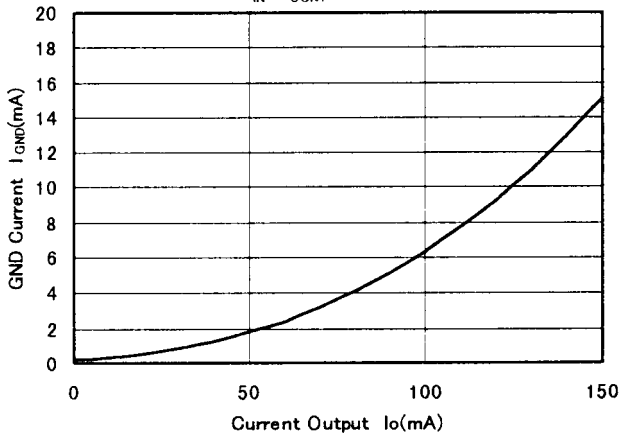
NJM2370 3V Version Load Regulation

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



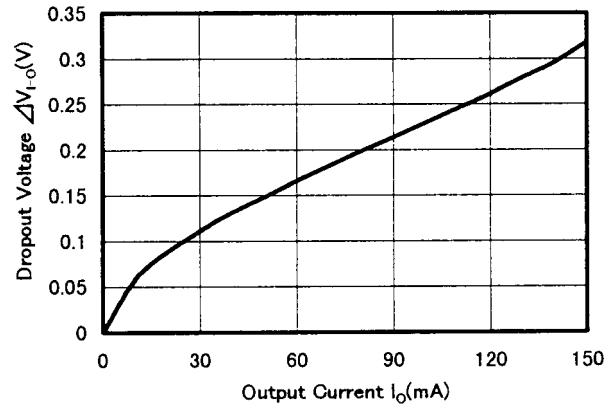
NJM2370 3V Version GND Current vs. Output Current

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



NJM2370 3V Version Dropout Voltage

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

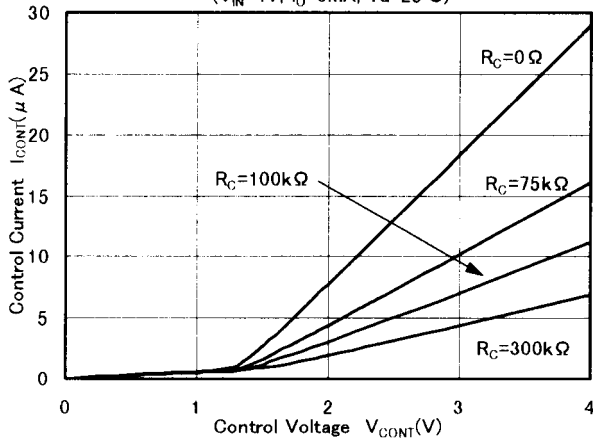


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■ TYPICAL CHARACTERISTICS

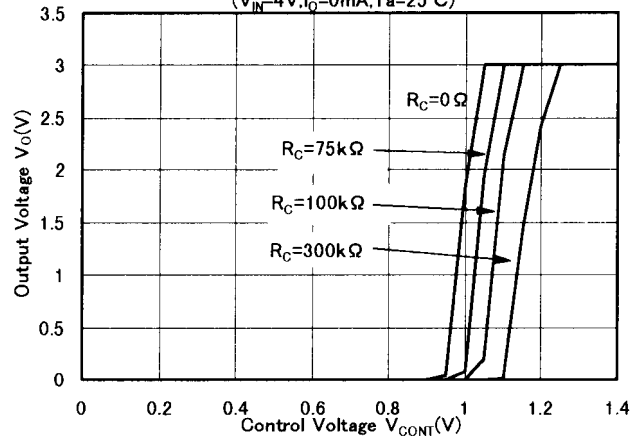
NJM2370 3V Version Control Current vs. Control Voltage

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



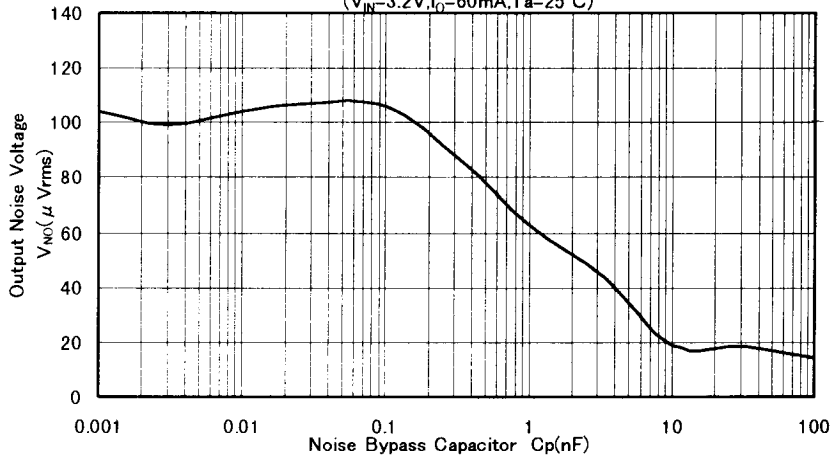
NJM2370 3V Version Output Voltage vs. Control Voltage

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



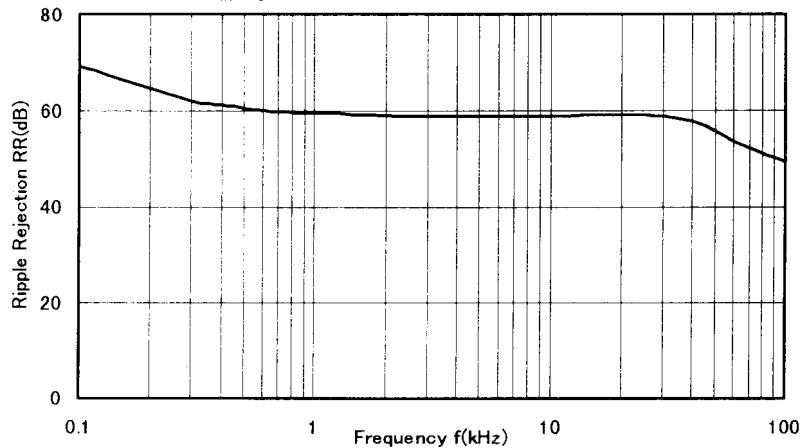
NJM2370 3V Version Output Noise Voltage vs. Noise Bypass Capacitor

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



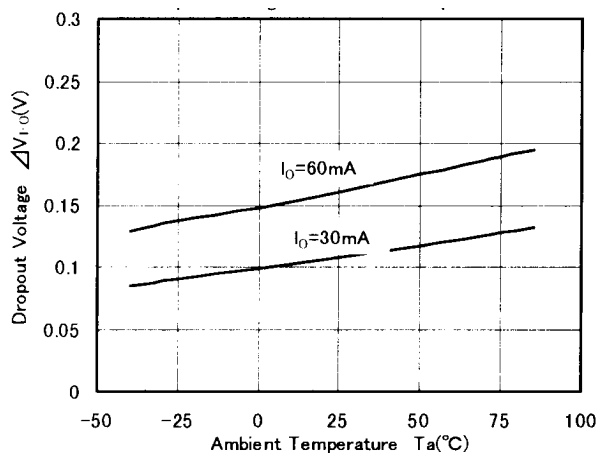
NJM2370 3V Version Ripple Rejection vs. Frequency

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



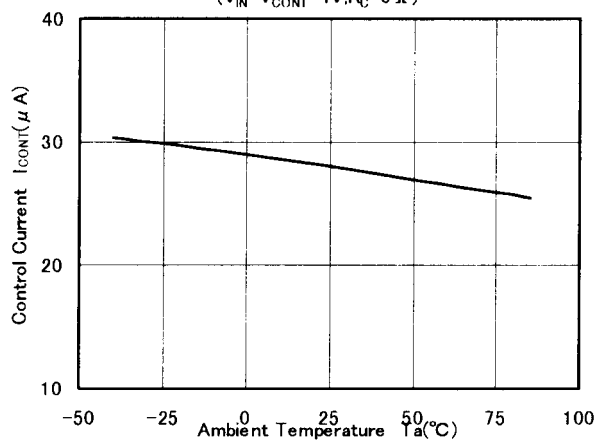
■ TYPICAL CHARACTERISTICS

Dropout Voltage vs. Ambient Temperature



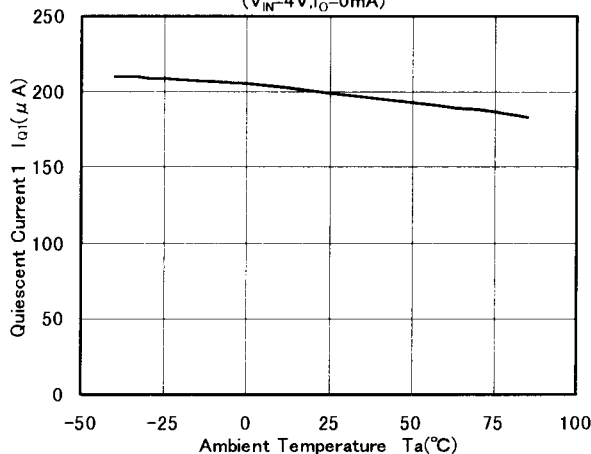
NJM2370 3V Version Control Current vs. Ambient Temperature

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



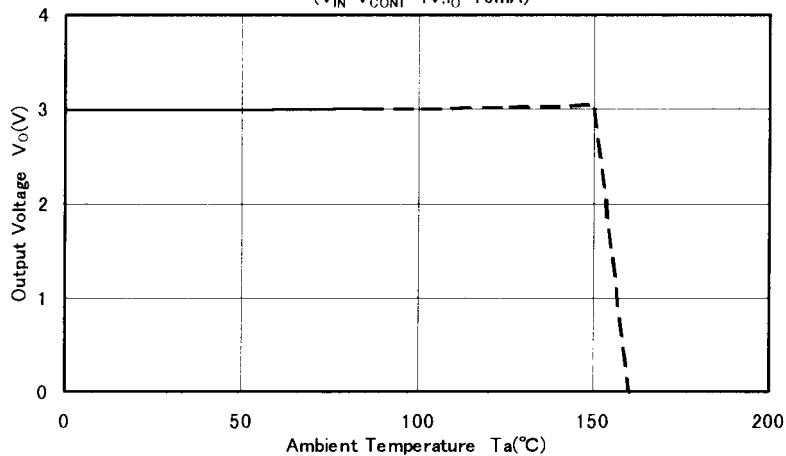
NJM2370 3V Version Quiescent Current 1 vs. Ambient Temperature

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



Thermal Shutdown

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



[CAUTION]

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