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 Io=30mA, low output noise and high ripple rejection by connecting an external capaciter to noise bypass terminal.

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

■ PACKAGE OUTLINE

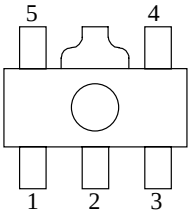
NJM2370U

NJM2370R

■ FEATURES

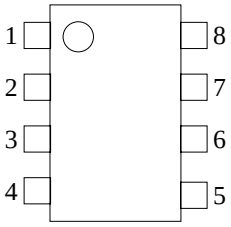
- Output Current (150mA min. (Vo-0.3V))
- Low Dropout Voltage (0.1V typ. (Io=30mA))
- External Capaciter for Noise Bypass
- ON/OFF Control Function
- Over Current Limit
- Thermal Shutdown
- Bipolar Technology
- Package Outline SOT-89(5pin), VSP8

■ PIN CONFIGURATION



NJM2370U

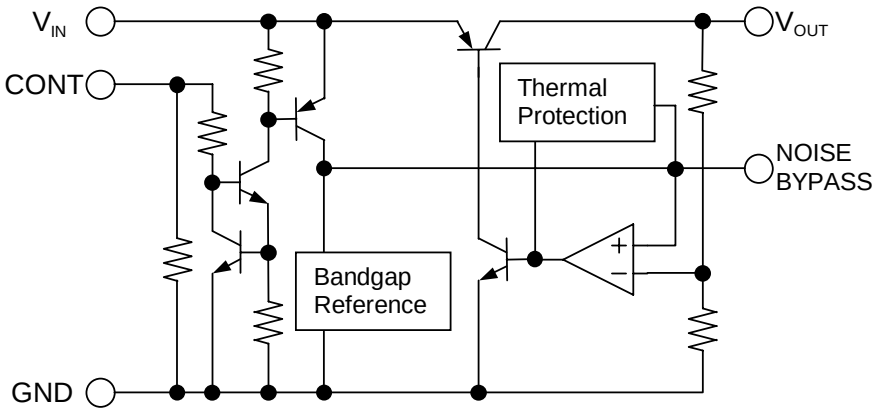
PIN FUNCTION
1. CONTROL
2. GND
3. NOISE BYPASS
4. V_{OUT}
5. V_{IN}



NJM2370R

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

■ EQUIVALENT CIRCUIT



■ ABSOLUTE MAXIMUM RATINGS (Ta=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	Topr	–40 ~ +85	°C
Storage Temperature Range	Tstg	–40 ~ +125	°C

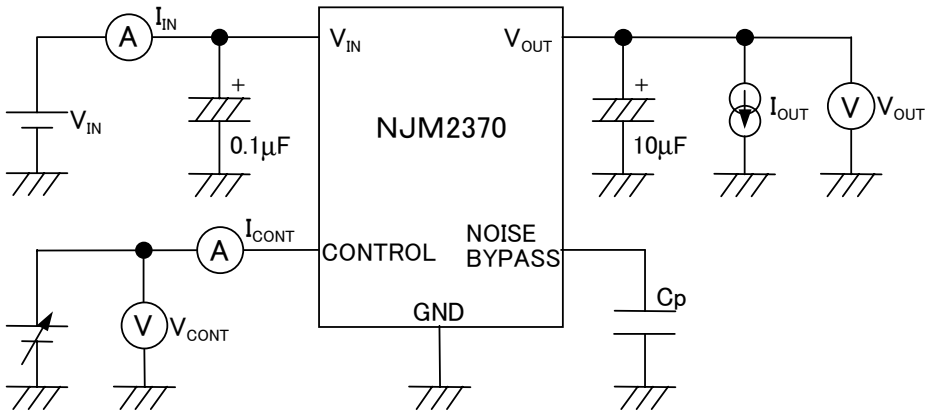
(note 1)When input voltage is less than +20V, the absolute maximum control voltage is equal to the input voltage.

■ ELECTRICAL CHARACTERISTICS (Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	Vo	V_{IN}=Vo+1V, Io=30mA	–3%	–	+3%	V
Quiescent Current 1	I_Q1	Io=0mA,expect I_{CONT}	–	180	–	µA
Quiescent Current 2	I_Q2	CONTROL–GND short	–	–	100	nA
Output Current	Io	(Vo–0.3V)	150	180	–	mA
Line Regulation	$\Delta Vo/\Delta V_{IN}$	V_{IN}=(Vo+1V) ~ (Vo+6V) Vo=2V to 14V	–	–	0.12	%/V
		V_{IN}=(Vo+1V) ~ (Vo+5V) Vo=15V	–	–	0.12	%/V
Load Regulation	$\Delta Vo/\Delta Io$	Io=0 ~ 60mA	–	–	0.03	%/mA
Dropout Voltage	ΔV_{I-O}	Io=30mA	–	0.1	0.3	V
Ripple Rejection	R • R	f=400Hz, ein=100mVp-p V_{IN}=Vo+1.5V, Io=10mA	–	60	–	dB
Average Temperature Coefficient of Output Voltage	$\Delta Vo/\Delta Ta$	Ta=–20 ~ 75°C, Io=10mA V_{IN}=Vo+1.5V	–	0. 2	–	mV/°C
Output Noise Voltage	V_{NO}	10Hz< f < 80kHz, Io=10mA, Vo=3V	–	30	–	µVrms

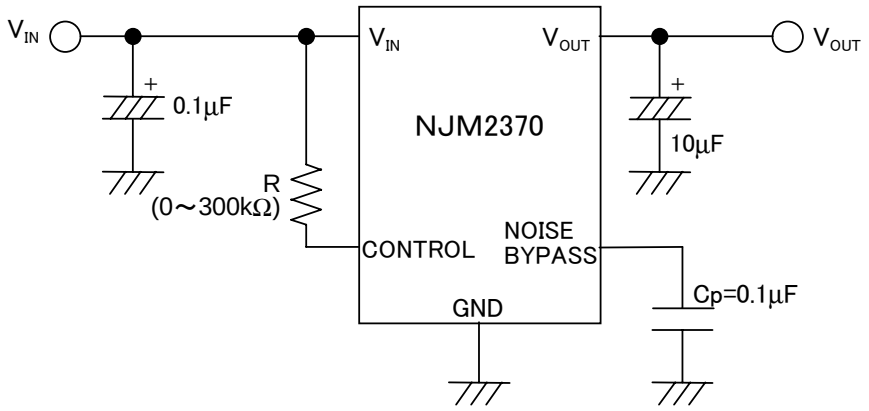
(note 2)Please confirm the specification separately because some parameters depend on output voltage.

■ TEST CIRCUIT



■ TYPICAL APPLICATION

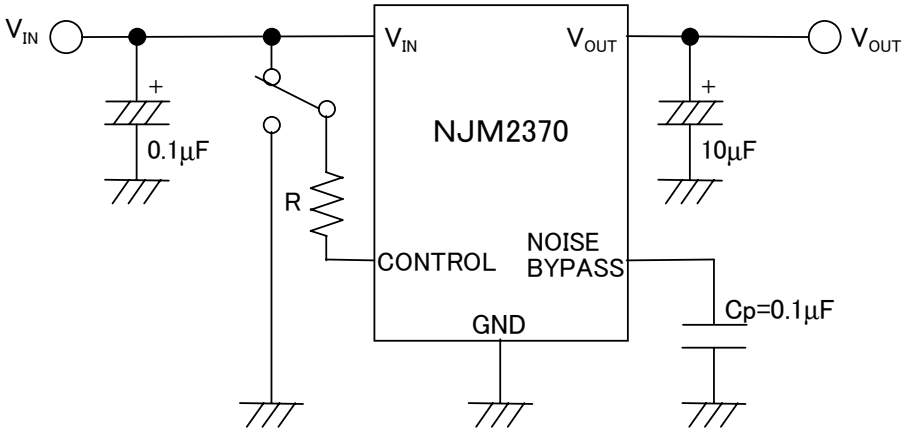
① In Nonuse of ON/OFF Control



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 Cp

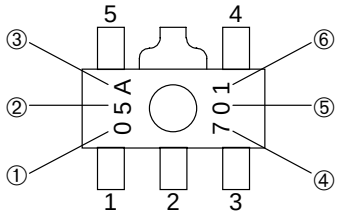
Noise bypass capacitance CP reduces noise generated by band-gap reference circuit.

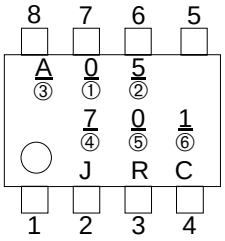
Noise level and ripple rejection will be improved when larger CP is used. Please refer to the typical characteristics to determine the value.

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





①, ② Output voltage rank
(Please refer to output voltage rank list)
③ Plant code.(NJM2370 is "A")
④ Last digit of the calendar year
⑤, ⑥ Lot Number

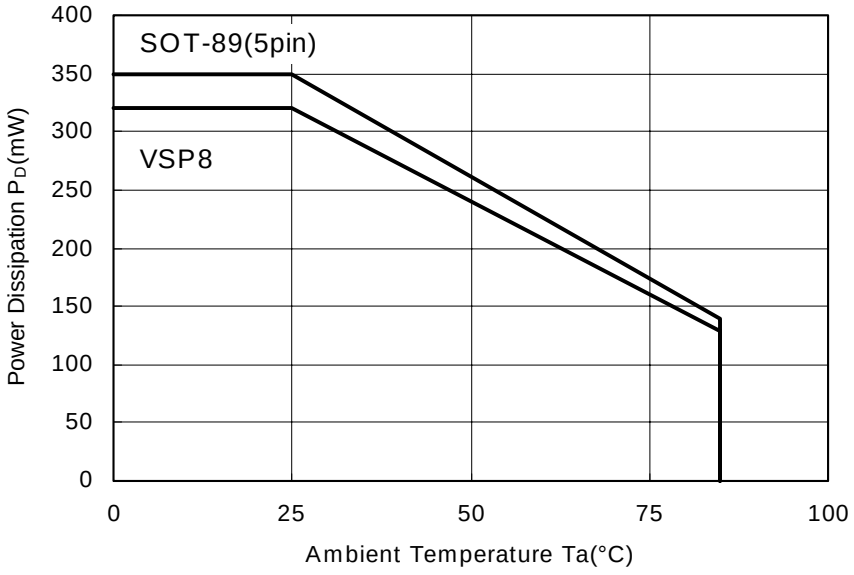
■ OUTPUT VOLTAGE RANK LIST

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

Output Voltage	Part Number	Marking ①	Marking ②	
3.6V	NJM2370X36	3	6	(✶1)
3.7V	NJM2370X37	3	7	(✶1)
3.8V	NJM2370X38	3	8	(✶1)
3.9V	NJM2370X39	3	9	(✶1)
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	(✶1)
9.0V	NJM2370X09	0	9	
10.0V	NJM2370X10	1	0	
12.0V	NJM2370X12	1	2	
13.0V	NJM2370X13	1	3	(✶2)
15.0V	NJM2370X15	1	5	

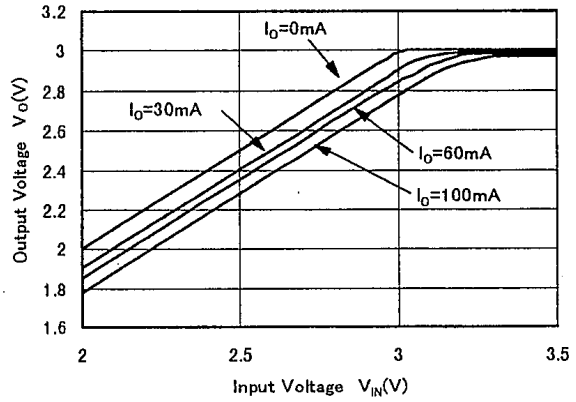
(✶1):SOT-89(5pin) ONLY
(✶2):VSP8 ONLY

■ POWER DISSIPATION VS. AMBIENT TEMPERATURE

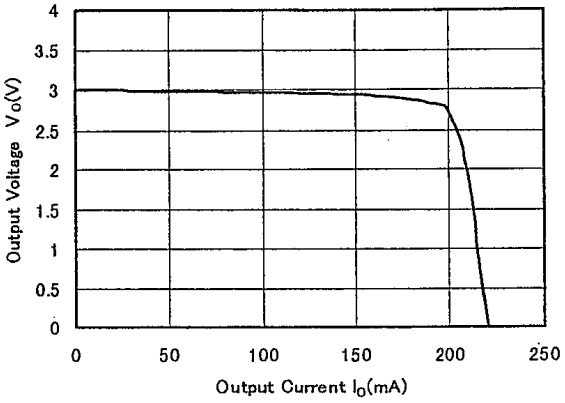


■TYPICAL CHARACTERISTICS

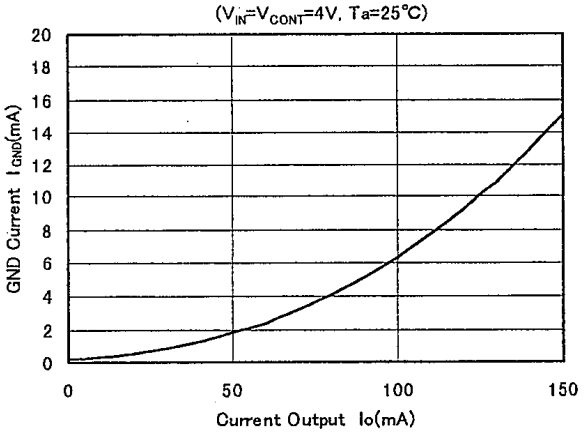
NJM2370U03/R03 Dropout Voltage
(V_{IN}=V_{CONT},Ta=25°C)



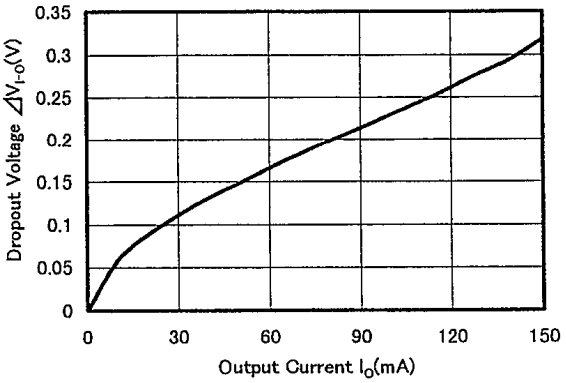
NJM2370U03/R03 Load Regulation
(V_{IN}=V_{CONT}=4V,Ta=25°C)



NJM2370U03/R03 GND Current vs. Output Current
(V_{IN}=V_{CONT}=4V, Ta=25°C)



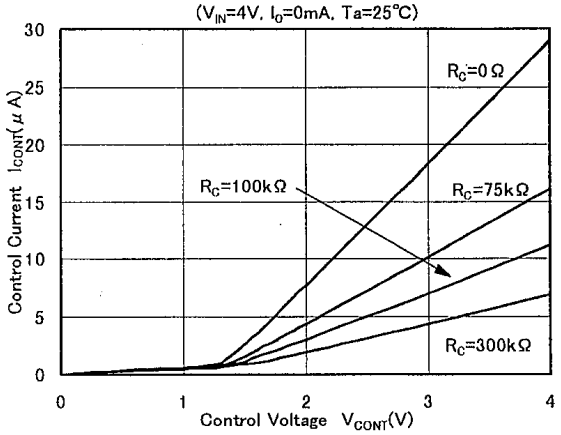
NJM2370U03/R03 Dropout Voltage vs. Output Current
(Ta=25°C)



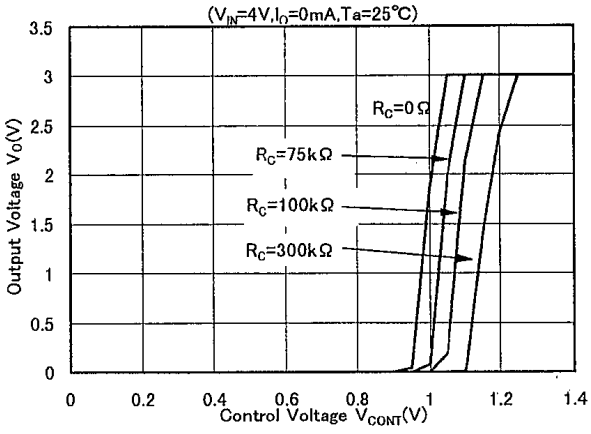
6

■TYPICAL CHARACTERISTICS

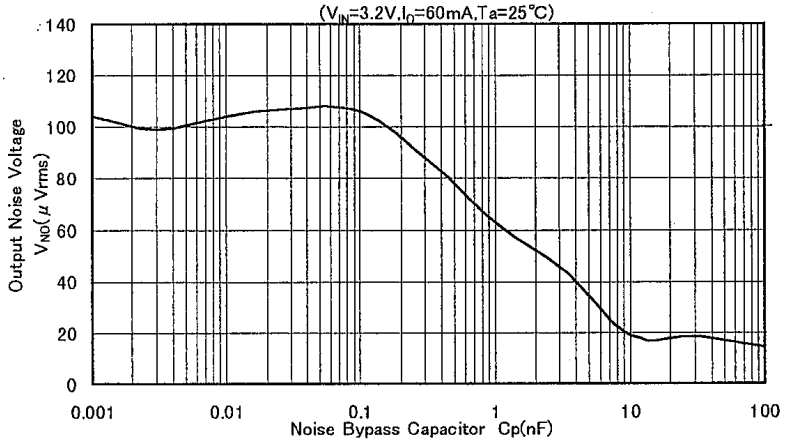
NJM2370U03/R03 Control Current vs. Control Voltage
(V_{IN}=4V, I_O=0mA, Ta=25°C)



NJM2370U03/R03 Output Voltage vs. Control Voltage
(V_{IN}=4V,I_O=0mA,Ta=25°C)

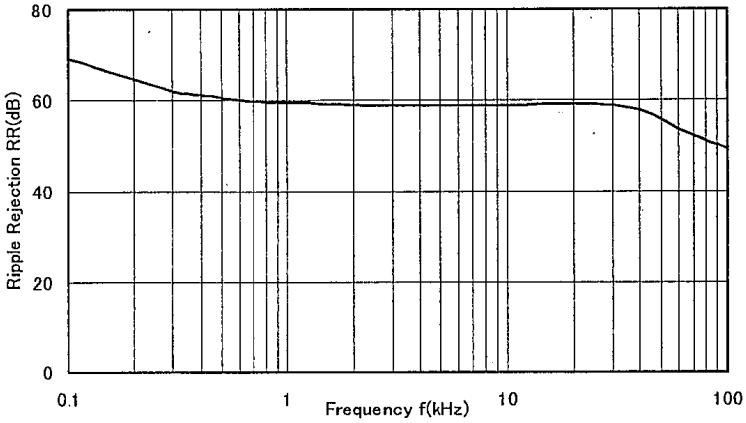


NJM2370U03/R03 Output Noise Voltage vs. Noise Bypass Capacitor
(V_{IN}=3.2V,I_O=60mA,Ta=25°C)



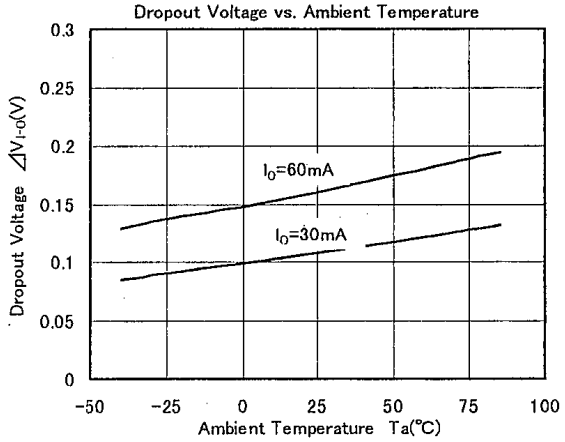
6

NJM2370U03/R03 Ripple Rejection vs. Frequency
(V_{IN}=V_O+1.5V,ein=100mVrms,Io=10mA,Ta=25°C)

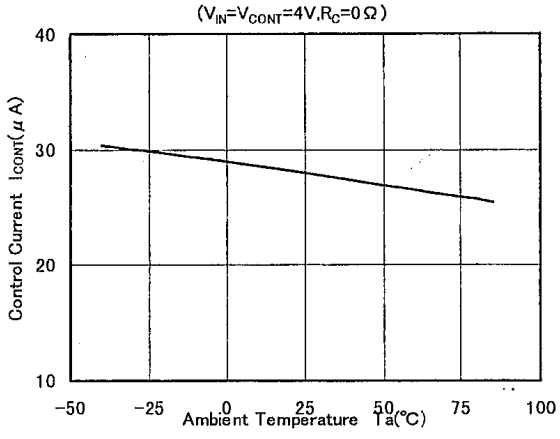


■TYPICAL CHARACTERISTICS

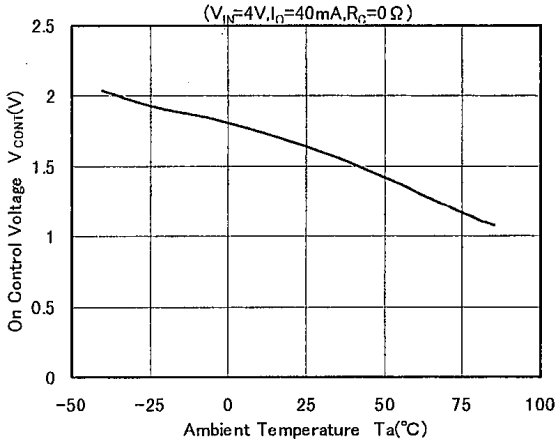
Dropout Voltage vs. Ambient Temperature



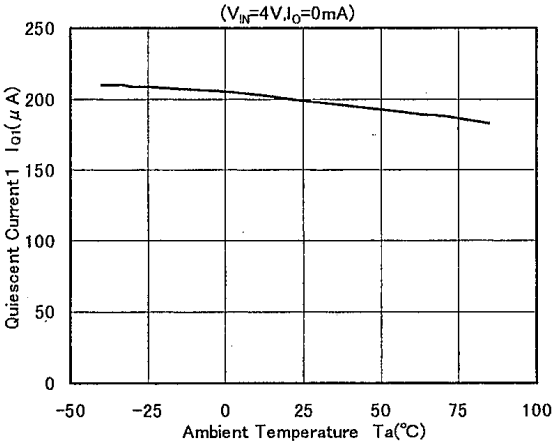
NJM2370U03/R03 Control Current vs. Ambient Temperature
(V_{IN}=V_{CONT}=4V,R_C=0Ω)



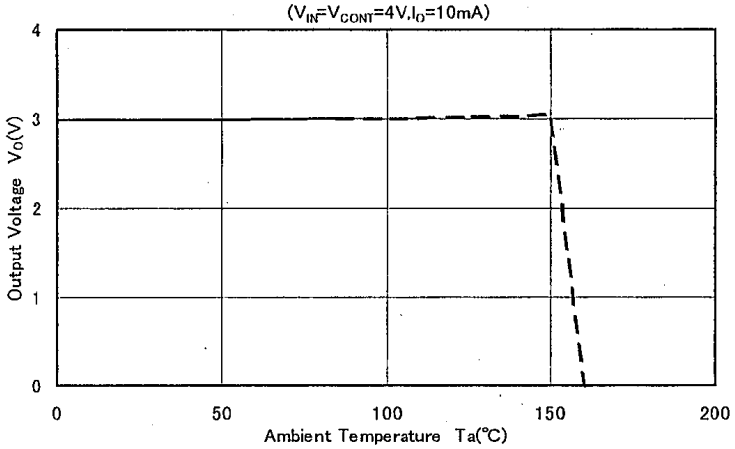
On Control Voltage vs. Temperature
(V_{IN}=4V,I_O=40mA,R_C=0Ω)



NJM2370U03/R03 Quiescent Current1 vs. Ambient Temperature
(V_{IN}=4V,I_O=0mA)



Thermal Shutdown
(V_{IN}=V_{CONT}=4V,I_O=10mA)



6

MEMO

[CAUTION]
The specifications on this databook are only given for information , without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.