

## LOW DROPOUT VOLTAGE REGULATOR

### ■ GENERAL DISCRIPTION

NJU7747/48 is a low dropout voltage regulator with ON/OFF control.

Advanced CMOS technology achieves ultra low quiescent current.

SC-82AB package and 0.1 $\mu$ F small output capacitor make the NJU7747/48 suitable for space conscious applications.

NJU7748 features shunt switch which improves turn off response of output voltage when ON/OFF control is used.

### ■ PACKAGE OUTLINE

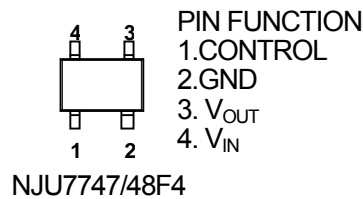


NJU7747/48F4

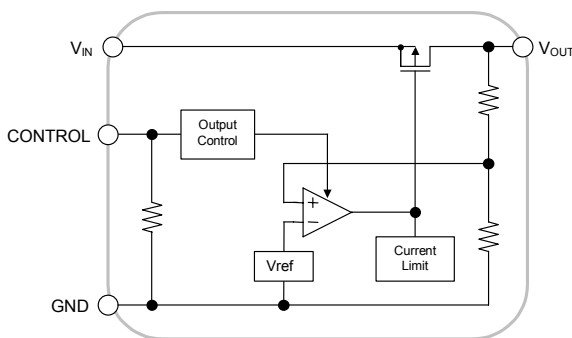
### ■ FEATURES

- Ultra Low quiescent Current  $I_q=1.5\mu A$  typ. ( $I_o=0mA$ )
- Output capacitor with 0.1 $\mu F$  ceramic capacitor
- Output Current  $I_o(max.)=100mA$
- High Precision Output  $V_o\pm 1.0\%$
- Low Dropout Voltage 0.17V typ. ( $I_o=40mA$ ,  $V_o=3V$  version)
- With ON/OFF Control (Active High)
- With Output Shunt Switch Only NJU7748
- Internal Short Circuit Current Limit
- CMOS Technology
- Package Outline SC-82AB

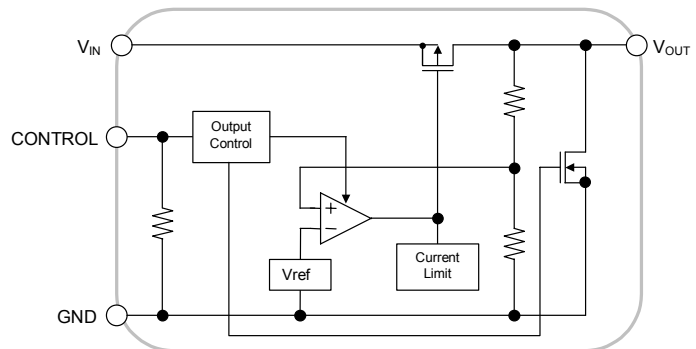
### ■ PIN CONFIGURATION



### ■ EQUIVALENT CIRCUIT



NJU7747



NJU7748

# NJU7747/48

## ■ OUTPUT VOLTAGE RANK LIST

DEVICE NAME	V <sub>OUT</sub>	DEVICE NAME	V <sub>OUT</sub>	DEVICE NAME	V <sub>OUT</sub>
NJU774*F4-15	1.5V	NJU774*F4-28	2.8V	NJU774*F4-04	4.0V
NJU774*F4-18	1.8V	NJU774*F4-29	2.9V	NJU774*F4-45	4.5V
NJU774*F4-19	1.9V	NJU774*F4-03	3.0V	NJU774*F4-05	5.0V
NJU774*F4-02	2.0V	NJU774*F4-31	3.1V		
NJU774*F4-25	2.5V	NJU774*F4-33	3.3V		
NJU774*F4-27	2.7V	NJU774*F4-37	3.7V		

## ■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V <sub>IN</sub>	+10	V
Control Voltage	V <sub>CONT</sub>	+10(*1)	V
Power Dissipation	P <sub>D</sub>	250(*2) 390(*3)	mW
Operating Temperature	T <sub>opr</sub>	-40 ~ +85	°C
Storage Temperature	T <sub>stg</sub>	-40 ~ +125	°C
Output Sink Current at OFF-state(*3)	I <sub>o</sub>	10	mA

(\*1) When input voltage is less than +10V, the absolute maximum control voltage is equal to the input voltage.

(\*2): Mounted on glass epoxy board. (76.2×114.3×1.6mm:based on EIA/JDEC standard, 2Layers)

(\*3): Mounted on glass epoxy board. (76.2×114.3×1.6mm:based on EIA/JDEC standard, 4Layers), internal Cu area: 74.2×74.2mm

(\*4): This maximum rating is applied to NJU7748.

## ■ ELECTRICAL CHARACTERISTICS (V<sub>IN</sub>=V<sub>O</sub>+1V, C<sub>IN</sub>=0.1μF, C<sub>O</sub>=0.1μF, Ta=25°C)

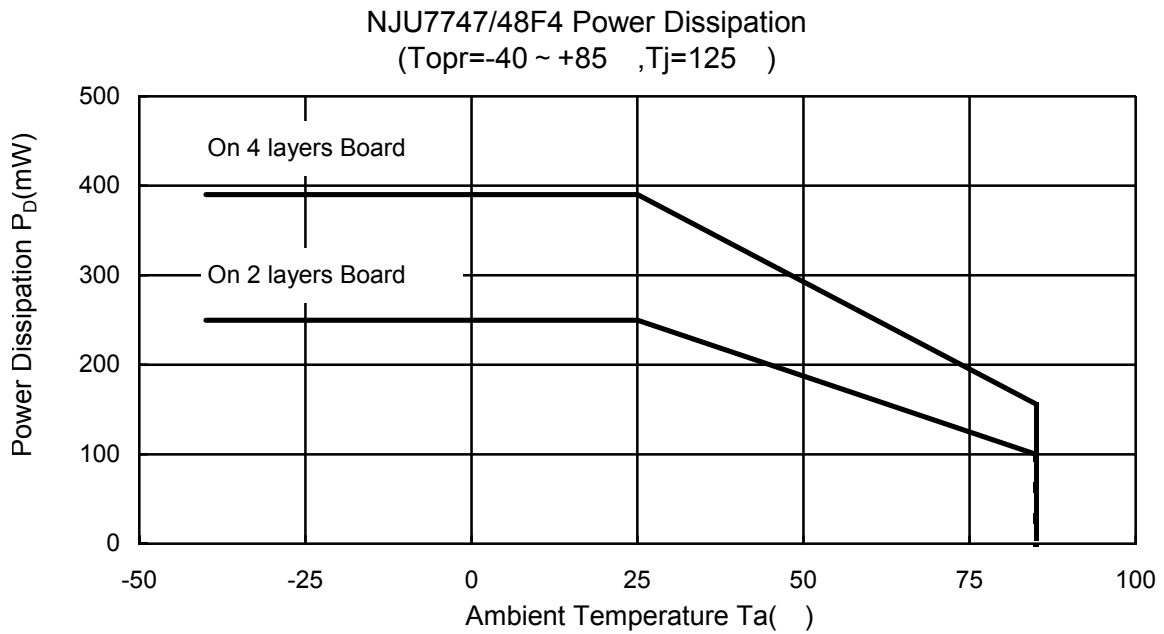
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V <sub>O</sub>	I <sub>o</sub> =30mA	-1.0%	-	+1.0%	V	
Input Voltage	V <sub>IN</sub>		-	-	9	V	
Quiescent Current	I <sub>Q</sub>	I <sub>o</sub> =0mA, V <sub>CONT</sub> =V <sub>IN</sub> , Except I <sub>CONT</sub>	-	1.5	3.5	μA	
Quiescent Current at Control OFF	I <sub>Q(OFF)</sub>	V <sub>CONT</sub> =0V	-	0.1	1	μA	
Output Current	I <sub>o</sub>	V <sub>O</sub> -0.3V	100	-	-	mA	
Short Circuit Limit	I <sub>LIM</sub>	V <sub>O</sub> =0V	-	25	-	mA	
Line Regulation	ΔV <sub>O</sub> /ΔV <sub>IN</sub>	V <sub>IN</sub> =V <sub>O</sub> +1V~V <sub>O</sub> +6.0V(V <sub>O</sub> <3.0V) V <sub>IN</sub> =V <sub>O</sub> +1V~9.0V(V <sub>O</sub> ≥3.0V), I <sub>o</sub> =30mA	-	-	0.30	%/V	
Load Regulation	ΔV <sub>O</sub> /ΔV <sub>O</sub>	I <sub>o</sub> =0~100mA	-	-	0.15	%/mA	
Dropout Voltage	ΔV <sub>I-O</sub>	I <sub>o</sub> =40mA	1.5V≤V <sub>O</sub> ≤2.0V	-	0.19	0.60	V
		I <sub>o</sub> =60mA	2.0V≤V <sub>O</sub> ≤2.4V	-	0.19	0.29	V
			2.5V≤V <sub>O</sub> ≤2.7V	-	0.18	0.27	V
			2.8V≤V <sub>O</sub> ≤3.3V	-	0.17	0.26	V
			3.4V≤V <sub>O</sub> ≤5.0V	-	0.16	0.24	V
Average Temperature Coefficient of Output Voltage	ΔV <sub>O</sub> /ΔTa	Ta=0~85°C, I <sub>o</sub> =10mA	-	±100	-	ppm/°C	
Pull-down Resistance	R <sub>CONT</sub>		2	5	10	MΩ	
Control Voltage for ON-State	V <sub>CONT(ON)</sub>		1.6	-	V <sub>IN</sub>	V	
Control Voltage for OFF-State	V <sub>CONT(OFF)</sub>		0	-	0.3	V	
Pull-down Resistance at OFF-state(*4)	R <sub>O(OFF)</sub>	V <sub>CONT</sub> =0V (V <sub>O</sub> =3.0V Version)	-	300	-	Ω	

(\*4) This electrical characteristics is applied to NJU7748.

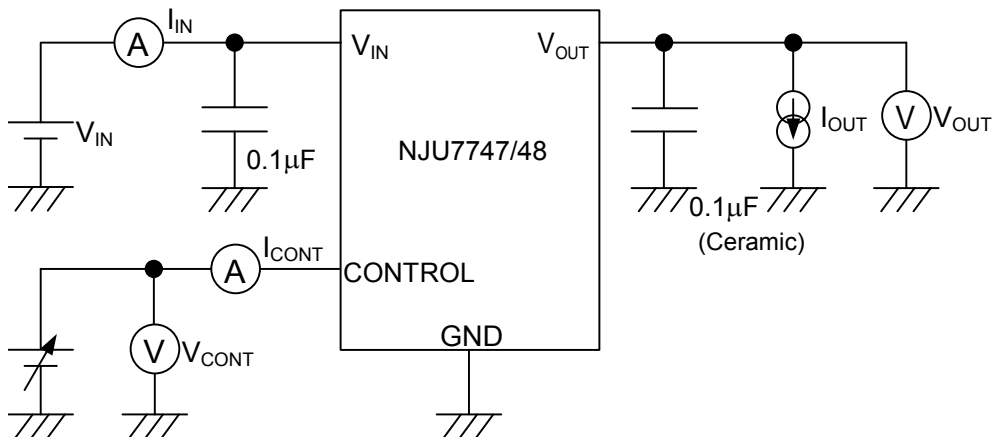
The above specification is a common specification for all voltages.

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

## POWER DISSIPATION vs. AMBIENT TEMPERATURE



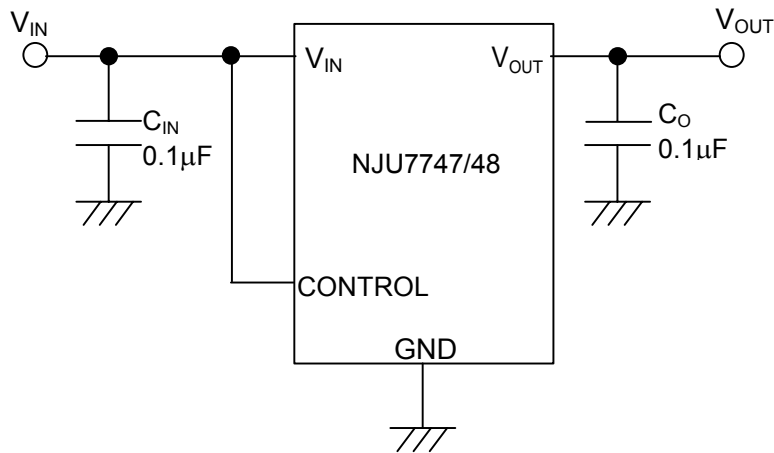
## TEST CIRCUIT



# NJU7747/48

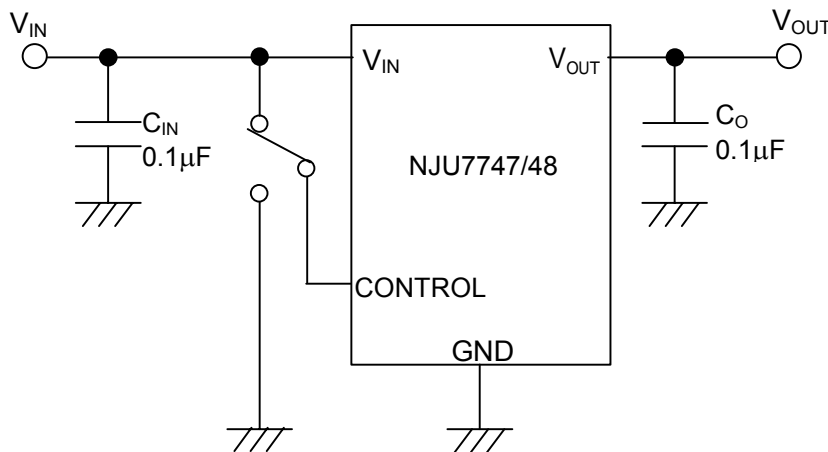
## ■ TYPICAL APPLICATION

① In case that ON/OFF Control is not required:



Connect control pin to  $V_{IN}$  pin.

② In use of ON/OFF Control



State of control pin:

- "H" → output is enabled.
- "L" or "open" → output is disabled.

## \*Input Capacitor $C_{IN}$

Input Capacitor  $C_{IN}$  is required to prevent oscillation and reduce power supply ripple for applications when high power supply impedance or a long power supply line.

Therefore, use the recommended  $C_{IN}$  value (refer to conditions of ELECTRIC CHARACTERISTIC) or larger and should connect between GND and  $V_{IN}$  as shortest path as possible to avoid the problem.

## \*Output Capacitor $C_O$

Output capacitor ( $C_O$ ) will be required for a phase compensation of the internal error amplifier.

The capacitance and the equivalent series resistance (ESR) influence to stable operation of the regulator.

Use of a smaller  $C_O$  may cause excess output noise or oscillation of the regulator due to lack of the phase compensation.

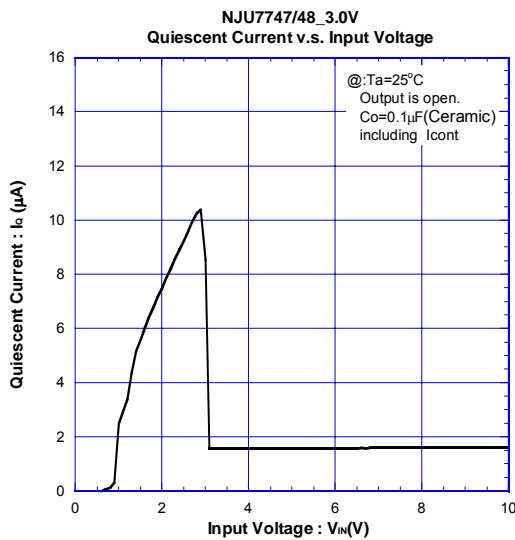
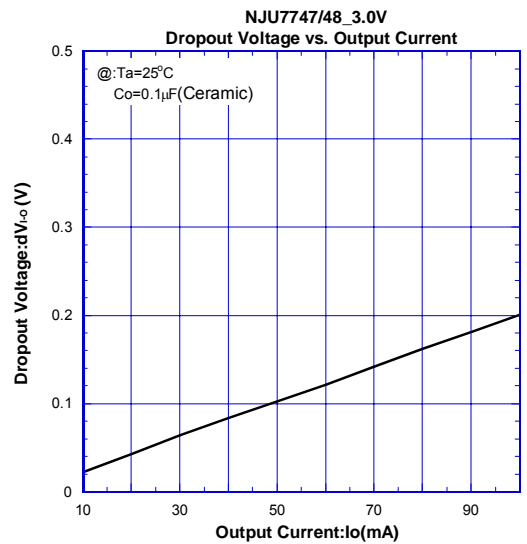
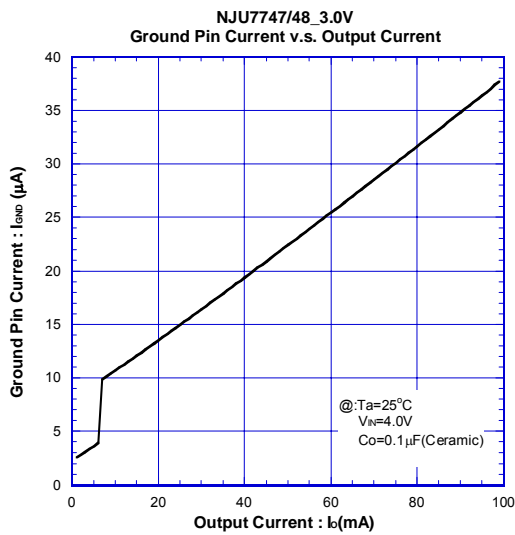
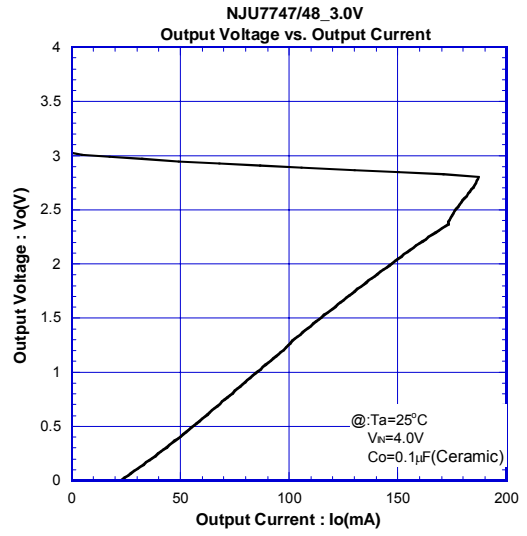
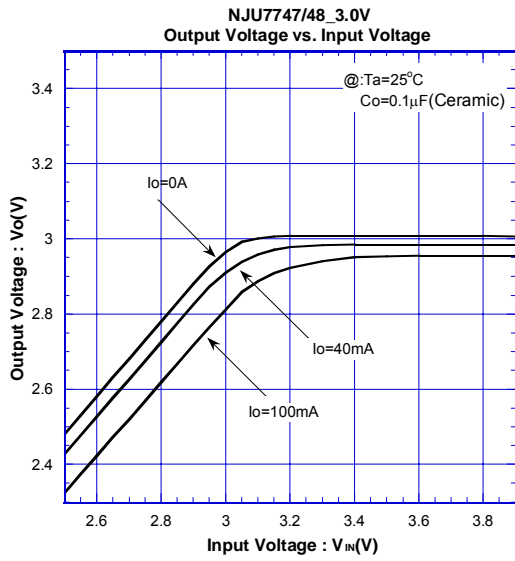
On the other hand, Use of a larger  $C_O$  reduces output noise and ripple output, and also improves output transient response when rapid load change.

Therefore, use the recommended  $C_O$  value (refer to conditions of ELECTRIC CHARACTERISTIC) or larger and should connect between GND and  $V_{OUT}$  as shortest path as possible for stable operation

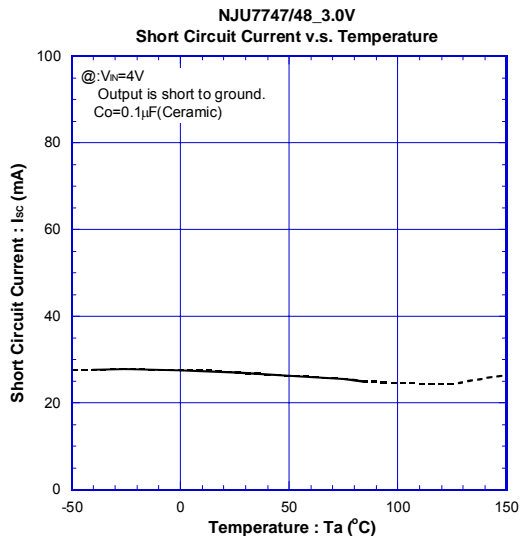
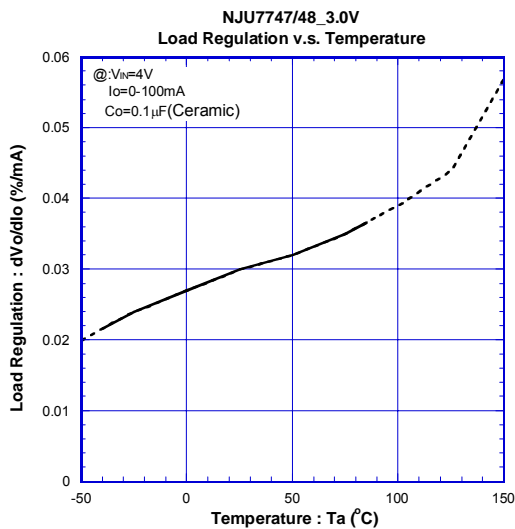
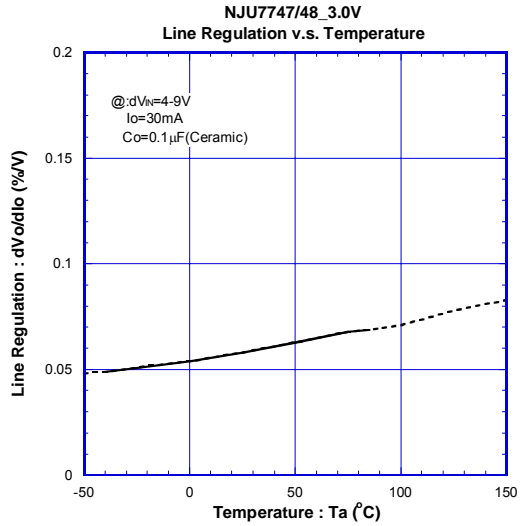
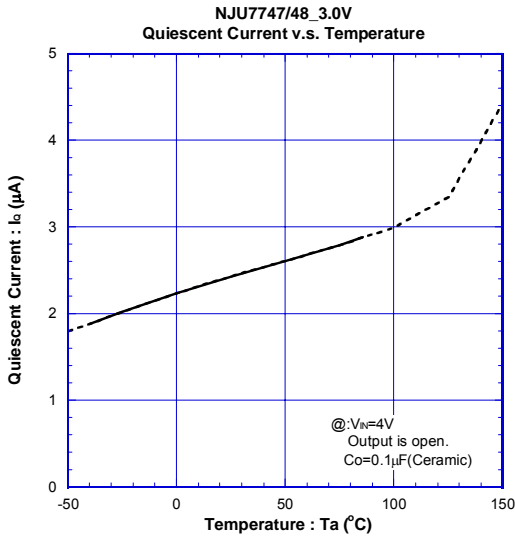
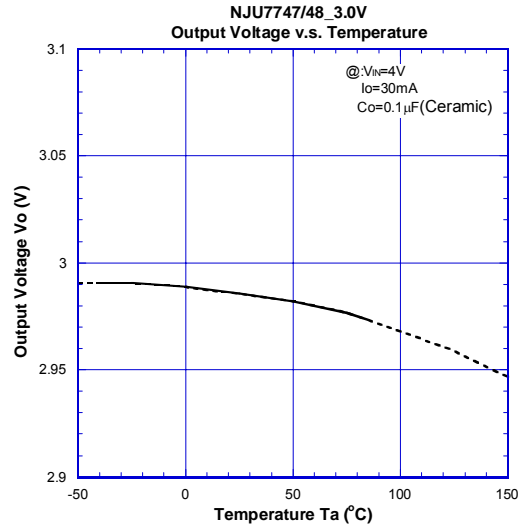
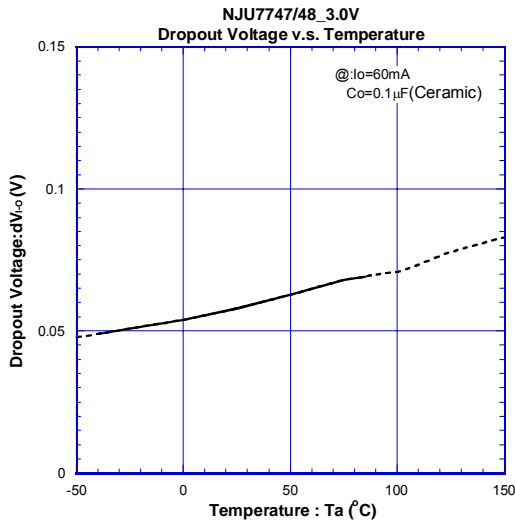
In addition, you should consider varied characteristics of capacitor (a frequency characteristic, a temperature characteristic, a DC bias characteristic and so on) and unevenness peculiar to a capacitor supplier enough.

When selecting  $C_O$ , recommend that have withstand voltage margin against output voltage and superior temperature characteristic though this product is designed stability works with wide range ESR of capacitor including low ESR products.

## TYPICAL CHARACTERISTICS



## TYPICAL CHARACTERISTICS



**[CAUTION]**

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