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 0.1μF 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.

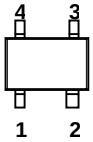
■ PACKAGE OUTLINE

NJU7747/48F4

■ FEATURES

- Ultra Low quiescent Current Iq=1.5μA typ.(I_O=0mA)
- Output capacitor with 0.1uF ceramic capacitor
- Output Current I_O(max.)=100mA
- High Precision Output V_O±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

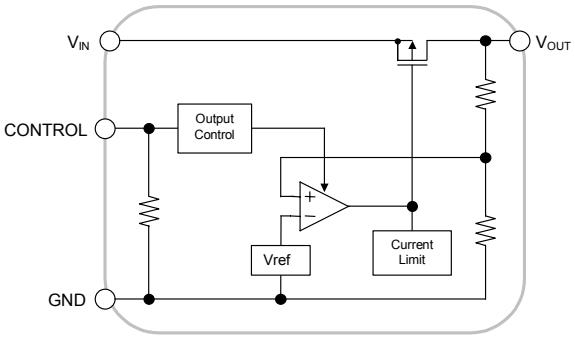
■ PIN CONFIGURATION



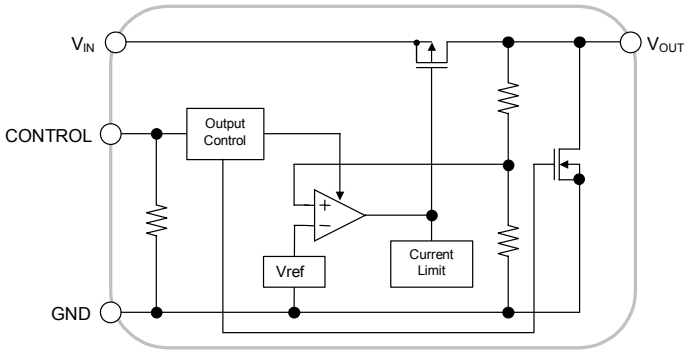
PIN FUNCTION
1.CONTROL
2.GND
3. V_{OUT}
4. V_{IN}

NJU7747/48F4

■ EQUIVALENT CIRCUIT



NJU7747



NJU7748

■ OUTPUT VOLTAGE RANK LIST

DEVICE NAME	V_{OUT}	DEVICE NAME	V_{OUT}	DEVICE NAME	V_{OUT}
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_{IN}	+10	V
Control Voltage	V_{CONT}	+10(*1)	V
Power Dissipation	P_D	250(*2) 390(*3)	mW
Operating Temperature	Topr	−40 ~ +85	°C
Storage Temperature	Tstg	−40 ~ +125	°C
Output Sink Current at OFF-state(*3)	I_O	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_{IN}=V_O+1V, C_{IN}=0.1μF, C_O=0.1μF, Ta=25°C)

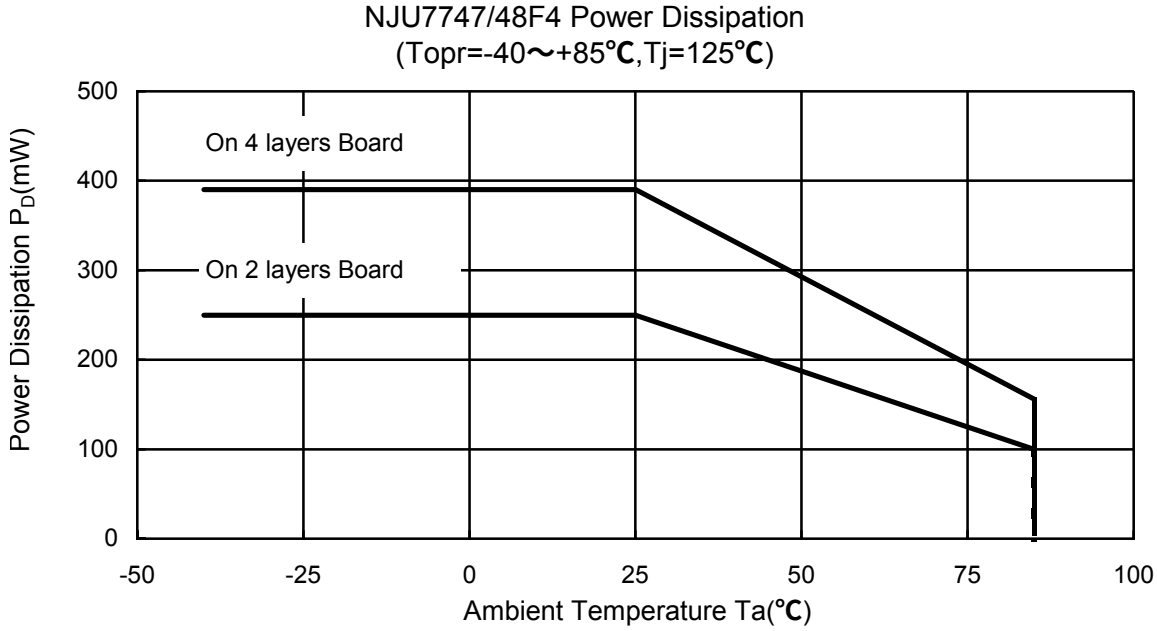
PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	I_O=30mA		−1.0%	–	+1.0%	V
Input Voltage	V_{IN}			–	–	9	V
Quiescent Current	I_Q	I_O =0mA, V_{CONT}=V_{IN}, Except I_{CONT}		–	1.5	3.5	μA
Quiescent Current at Control OFF	$I_{Q(OFF)}$	V_{CONT}=0V		–	0.1	1	μA
Output Current	I_O	V_O−0.3V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

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

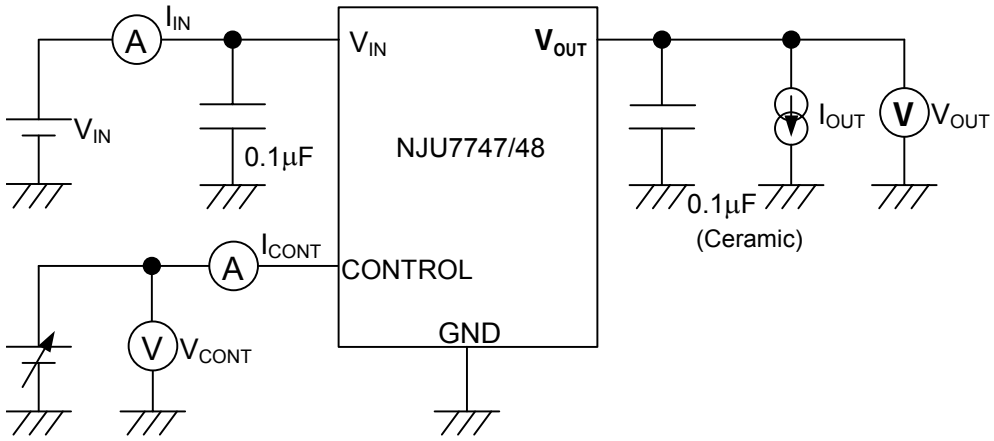
The above specification is a common specification for all voltages.

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

■ POWER DISSIPATION vs. AMBIENT TEMPERATURE

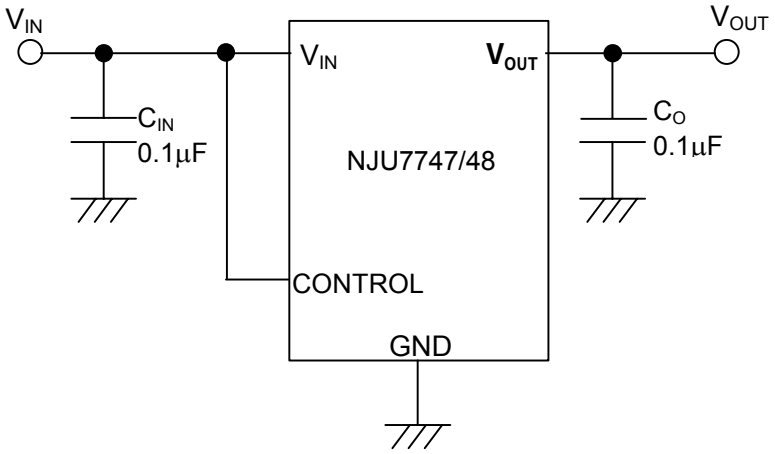


■ TEST CIRCUIT



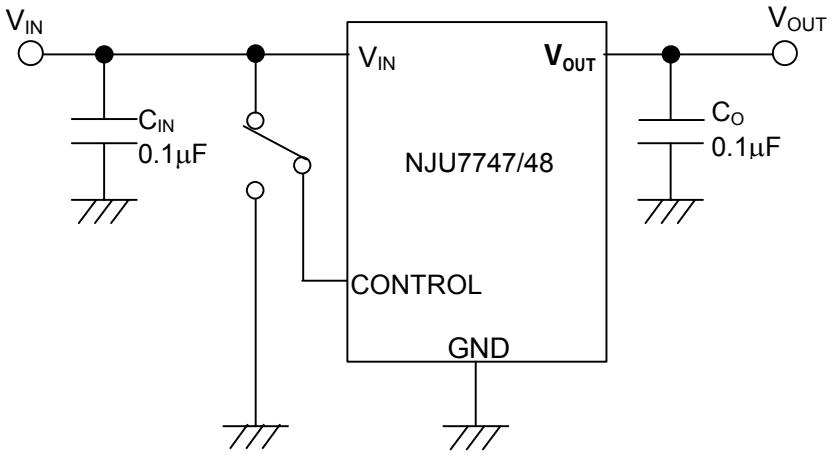
■ TYPICAL APPLICATION

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.

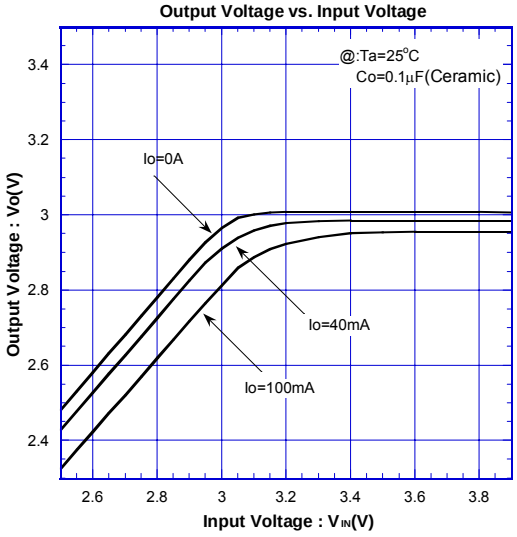
Therefore, use the recommended C_O value (refer to conditions of ELECTRIC CHARACTERISTIC) or larger and should connect between GND and V_{OUT} as shortest path as possible for stable operation

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.

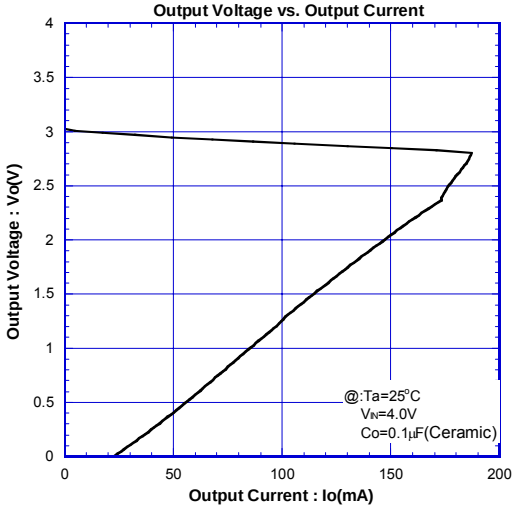
When selecting C_O, recommend that have withstand voltage margin against output voltage and superior temperature characteristic though this product is designed stability works with wide range ESR of capacitor including low ESR products.

■ TYPICAL CHARACTERISTICS

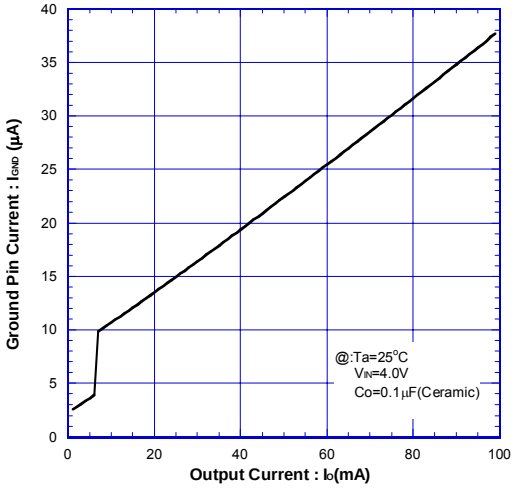
NJU7747/48_3.0V
Output Voltage vs. Input Voltage



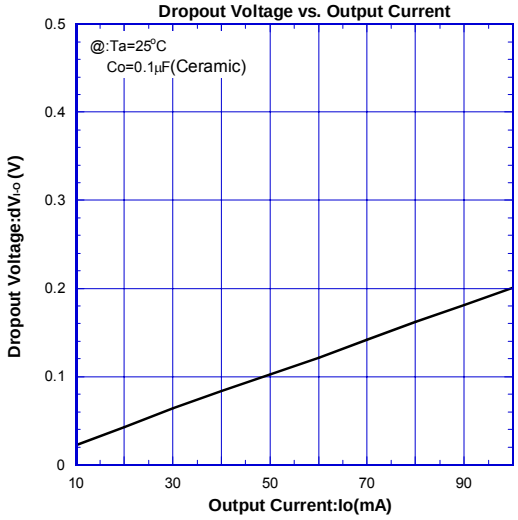
NJU7747/48_3.0V
Output Voltage vs. Output Current



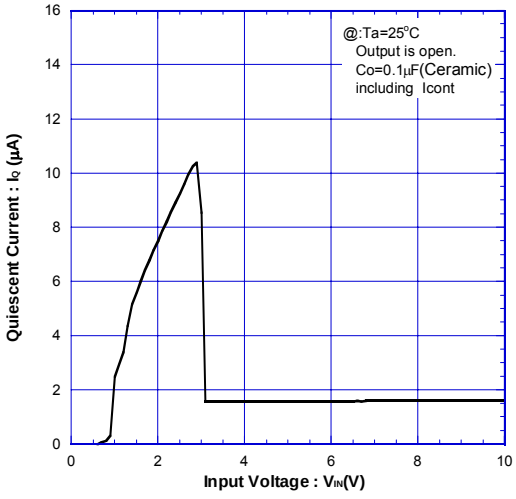
NJU7747/48_3.0V
Ground Pin Current v.s. Output Current



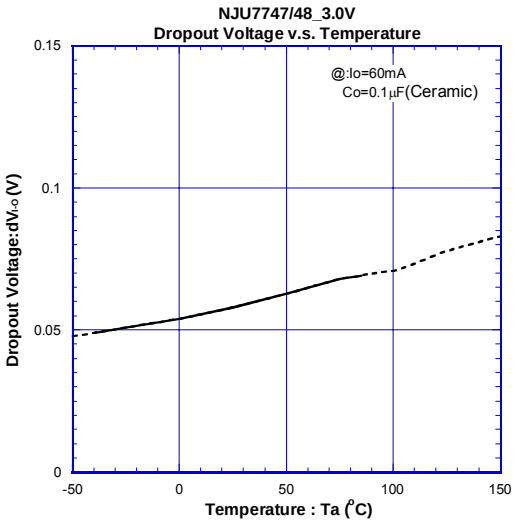
NJU7747/48_3.0V
Dropout Voltage vs. Output Current

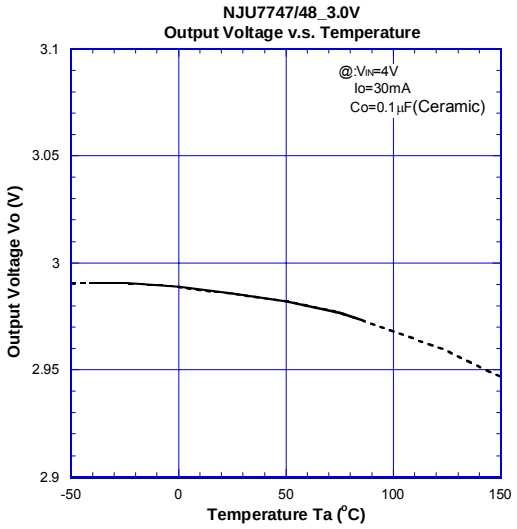


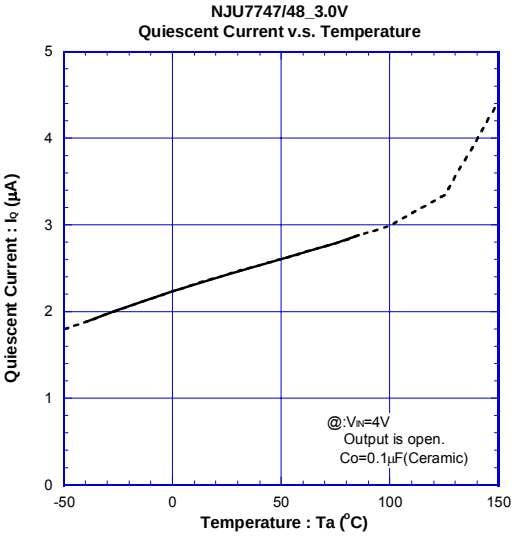
NJU7747/48_3.0V
Quiescent Current v.s. Input Voltage

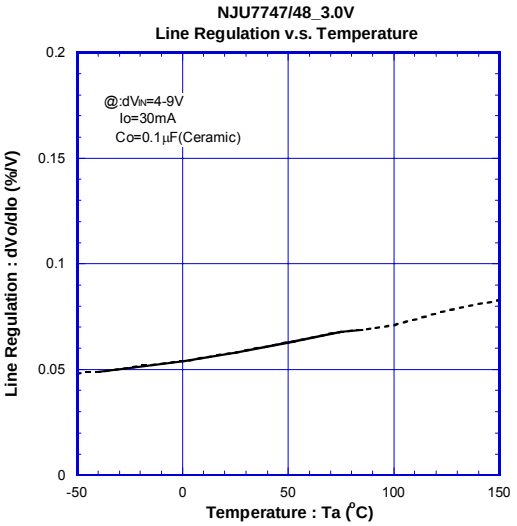


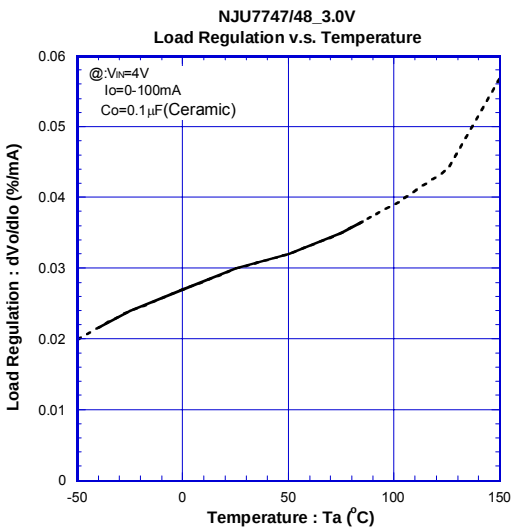
■ TYPICAL CHARACTERISTICS

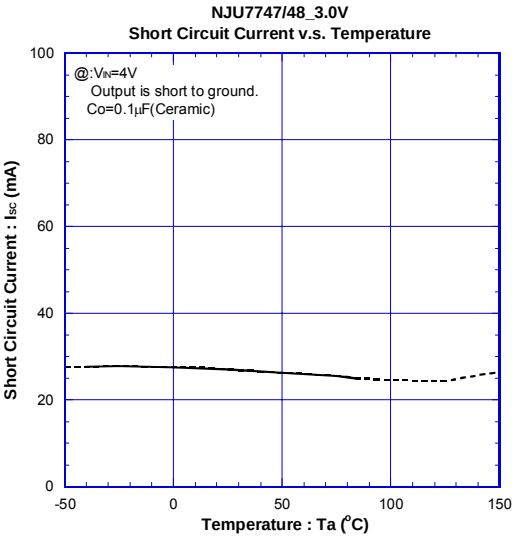












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