

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 μ 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

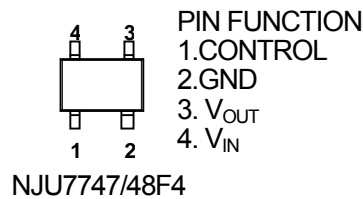


NJU7747/48F4

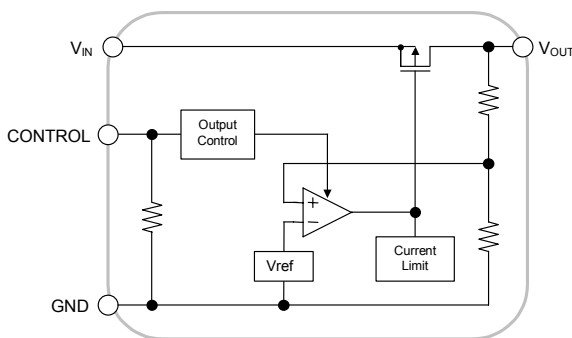
■ FEATURES

- Ultra Low quiescent Current $I_q=1.5\mu A$ typ. ($I_o=0mA$)
- Output capacitor with 0.1 μF 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

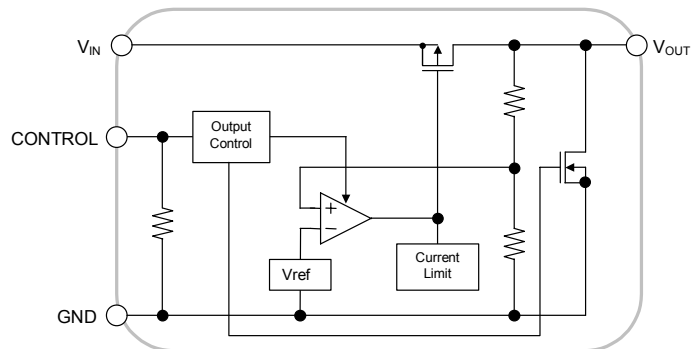
■ PIN CONFIGURATION



■ EQUIVALENT CIRCUIT



NJU7747



NJU7748

NJU7747/48

■ OUTPUT VOLTAGE RANK LIST

DEVICE NAME	V _{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	T _{opr}	-40 ~ +85	°C
Storage Temperature	T _{stg}	-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)

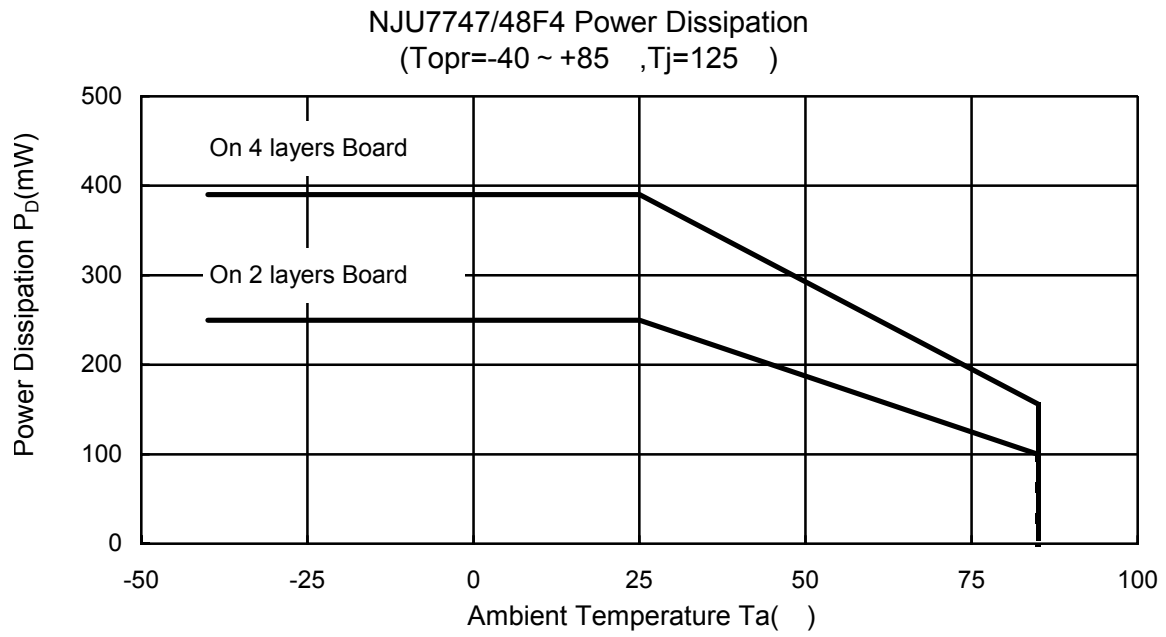
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V _O	I _o =30mA	-1.0%	-	+1.0%	V	
Input Voltage	V _{IN}		-	-	9	V	
Quiescent Current	I _Q	I _o =0mA, V _{CONT} =V _{IN} , Except I _{CONT}	-	1.5	3.5	μA	
Quiescent Current at Control OFF	I _{Q(OFF)}	V _{CONT} =0V	-	0.1	1	μA	
Output Current	I _o	V _O -0.3V	100	-	-	mA	
Short Circuit Limit	I _{LIM}	V _O =0V	-	25	-	mA	
Line Regulation	ΔV _O /ΔV _{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	ΔV _O /ΔV _O	I _o =0~100mA	-	-	0.15	%/mA	
Dropout Voltage	ΔV _{I-O}	I _o =40mA	1.5V≤V _O ≤2.0V	-	0.19	0.60	V
		I _o =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	ΔV _O /ΔTa	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.

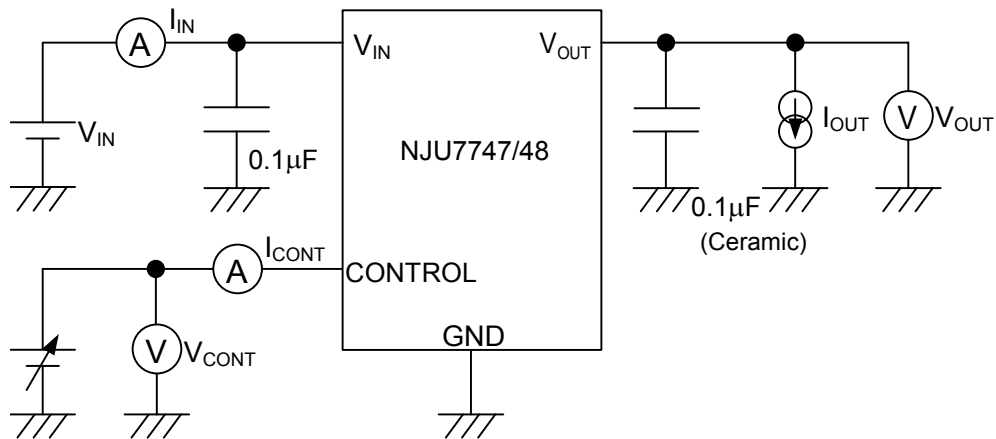
The above specification is a common specification for all voltages.

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

POWER DISSIPATION vs. AMBIENT TEMPERATURE



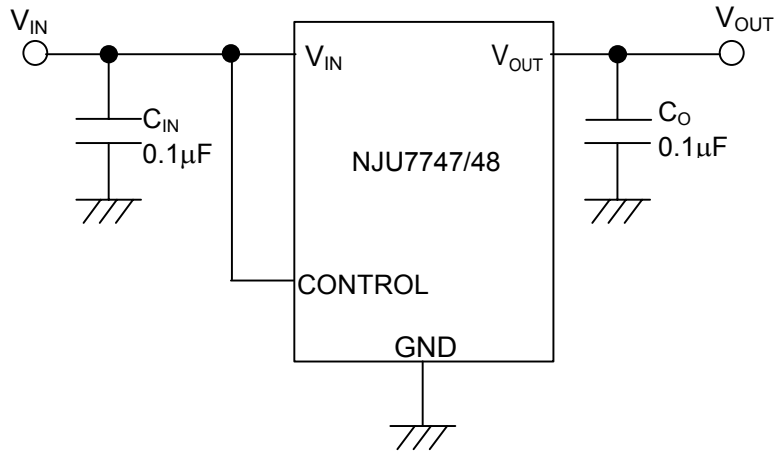
TEST CIRCUIT



NJU7747/48

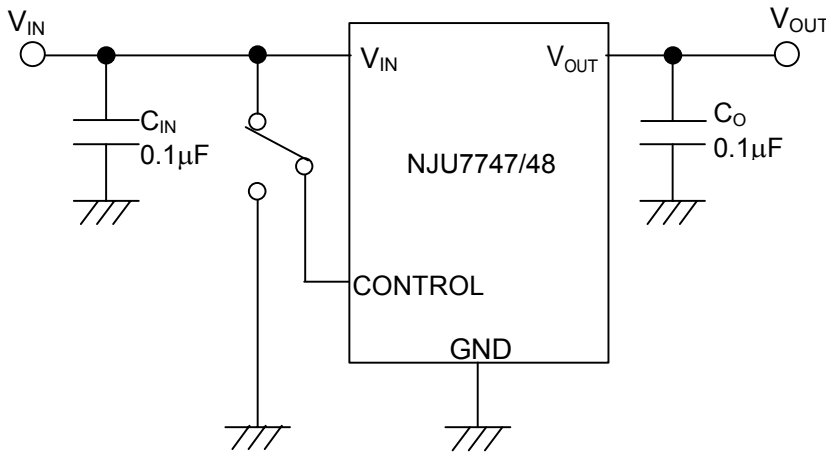
■ TYPICAL APPLICATION

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.

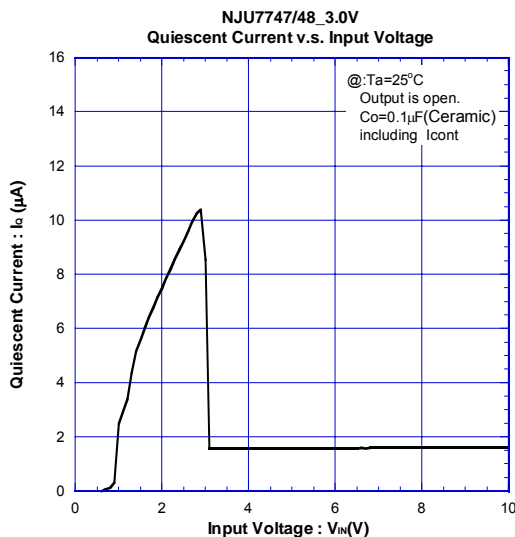
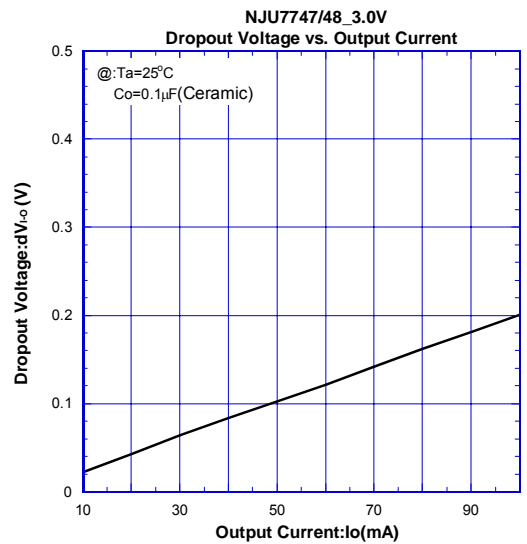
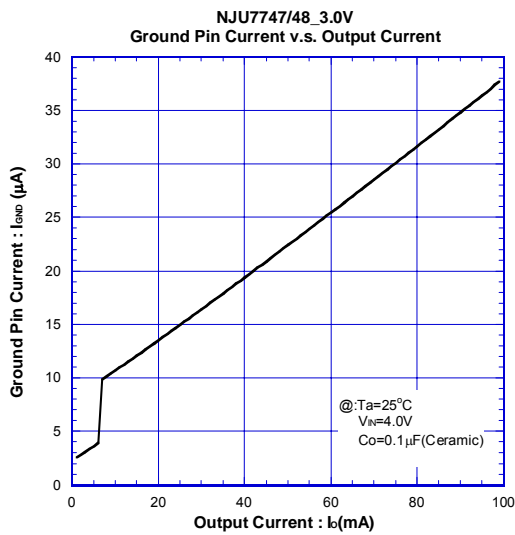
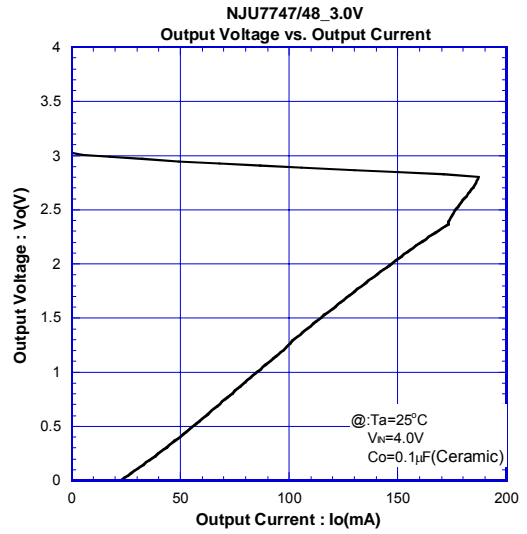
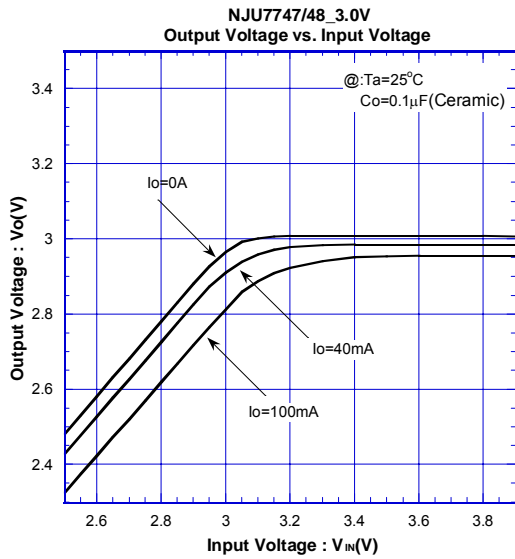
On the other hand, Use of a larger C_O reduces output noise and ripple output, and also improves output transient response when rapid load change.

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

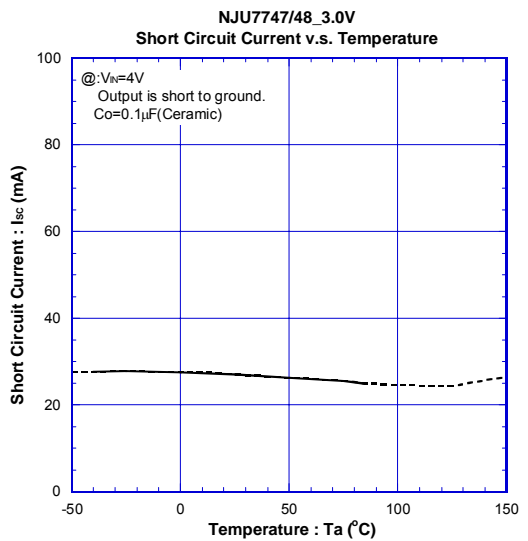
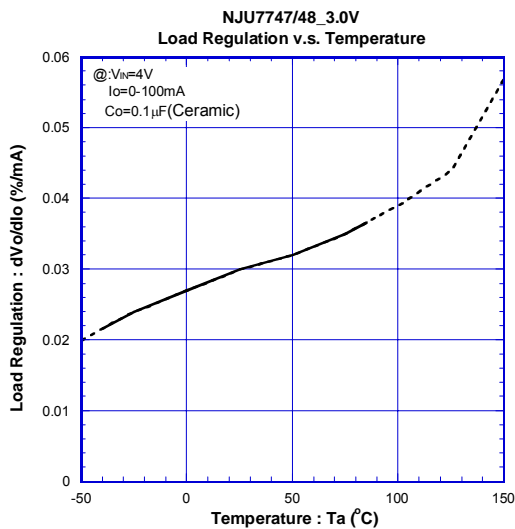
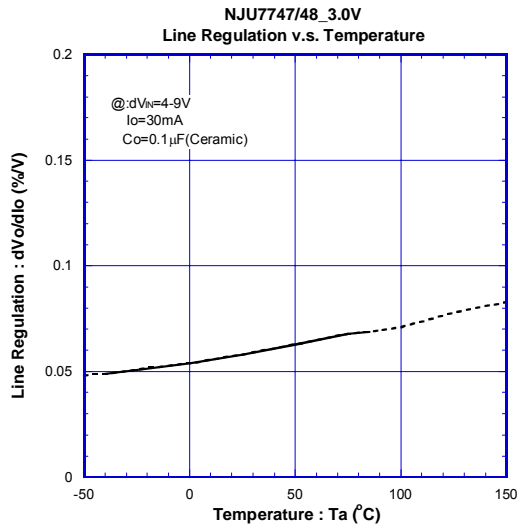
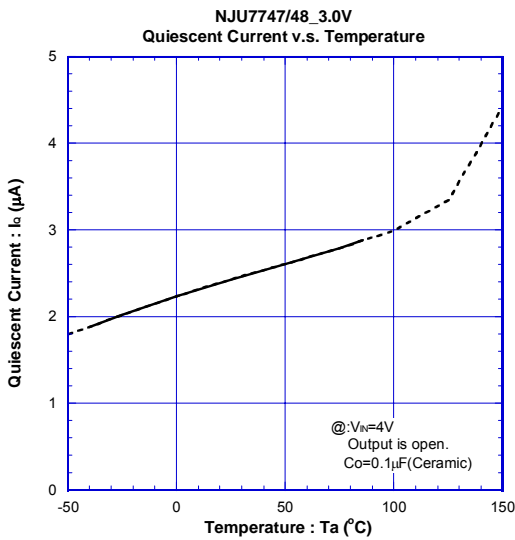
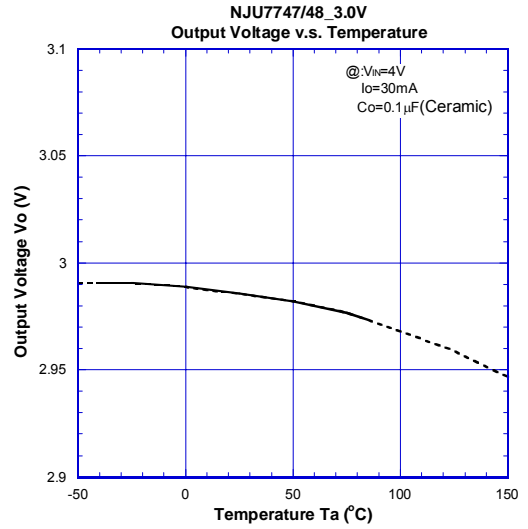
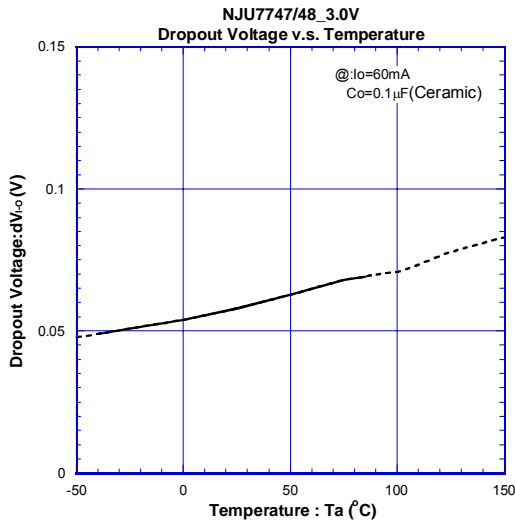
In addition, you should consider varied characteristics of capacitor (a frequency characteristic, a temperature characteristic, a DC bias characteristic and so on) and unevenness peculiar to a capacitor supplier enough.

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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