

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

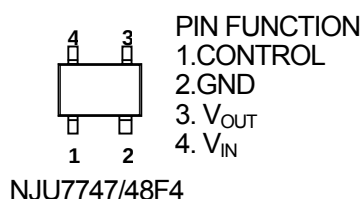


NJU7747/48F4

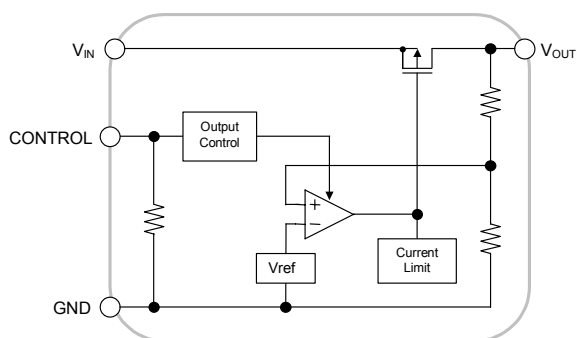
■ FEATURES

- 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

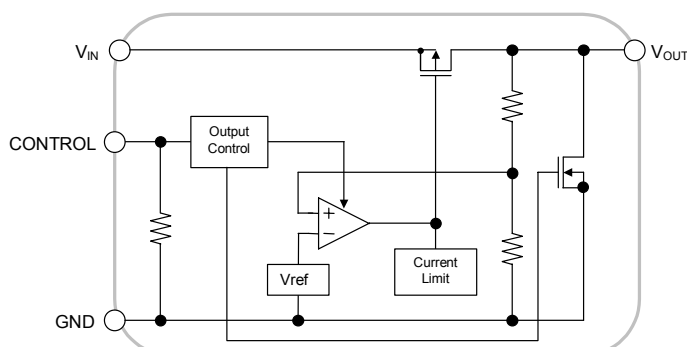
■ PIN CONFIGURATION



■ 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)

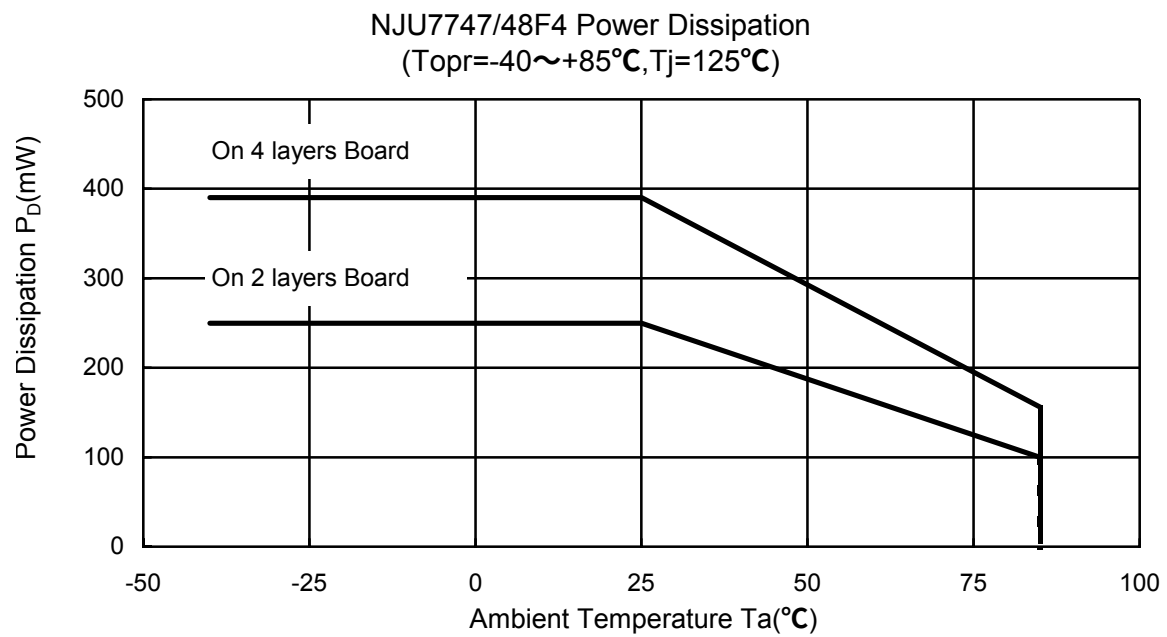
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V _O	I _O =30mA	-1.0%	—	+1.0%	V
Input Voltage	V _{IN}		—	—	9	V
Quiescent Current	I _Q	I _O =0mA, V _{CONT} =V _{IN} , Except I _{CONT}	—	1.5	3.5	μA
Quiescent Current at Control OFF	I _{Q(OFF)}	V _{CONT} =0V	—	0.1	1	μA
Output Current	I _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.

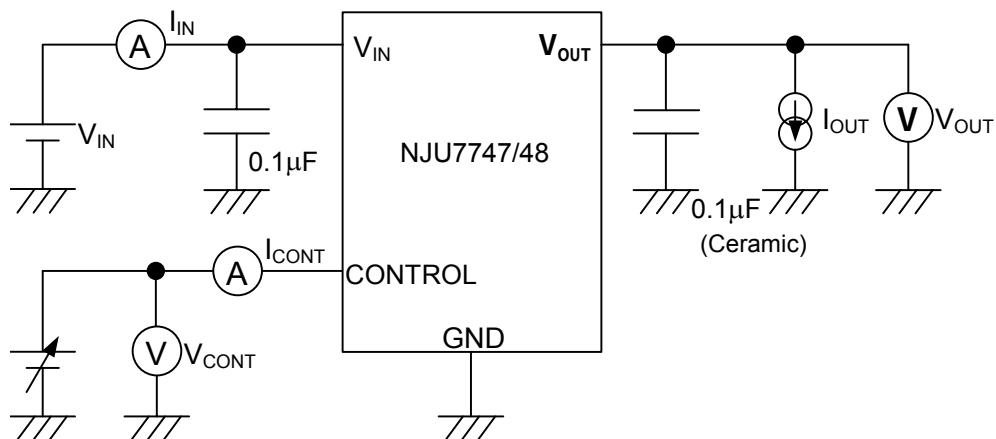
The above specification is a common specification for all voltages.

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

■ POWER DISSIPATION vs. AMBIENT TEMPERATURE

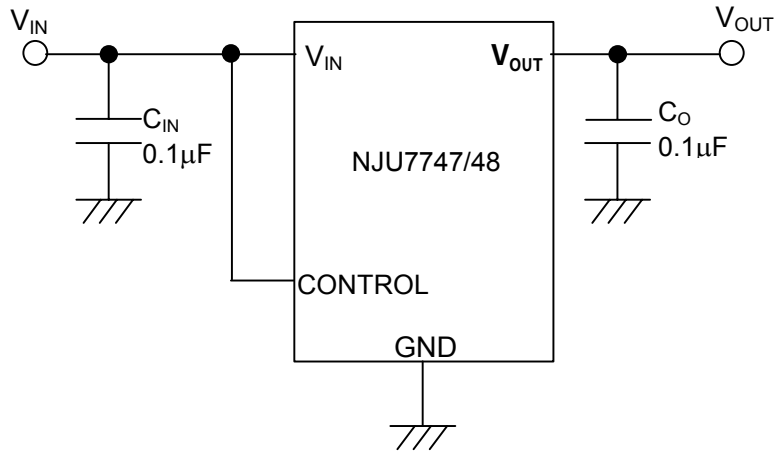


■ TEST CIRCUIT



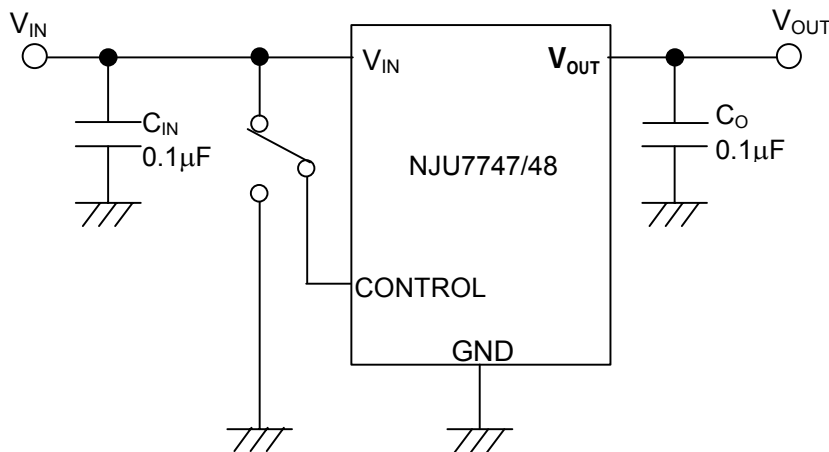
■ TYPICAL APPLICATION

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.

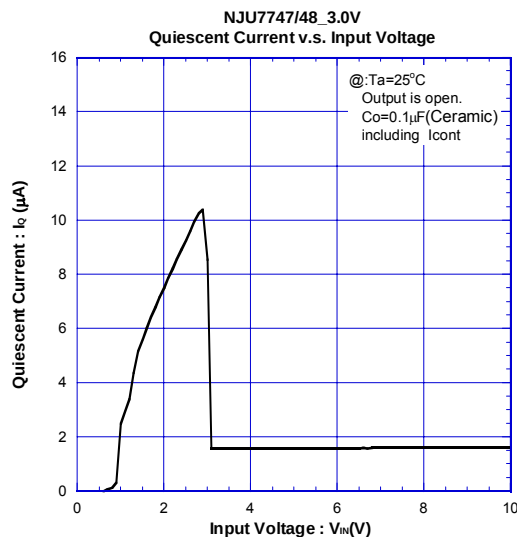
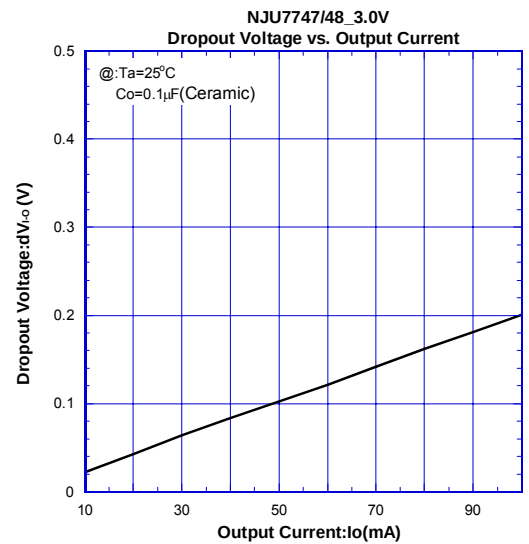
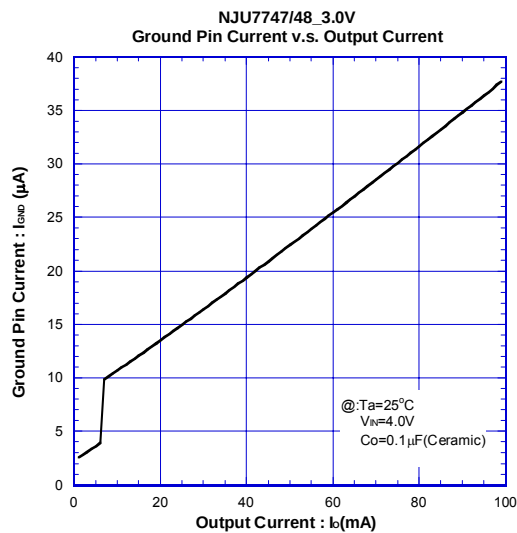
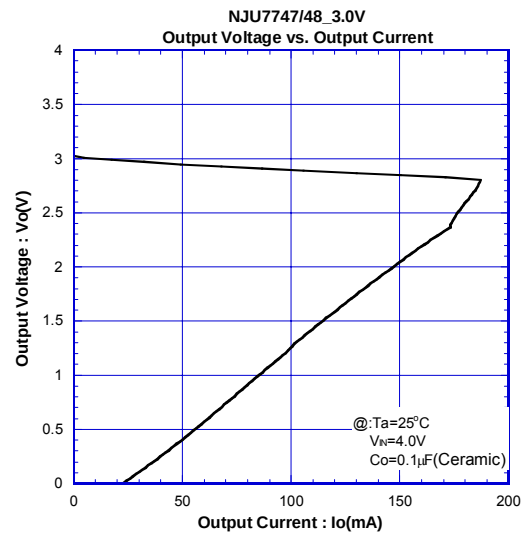
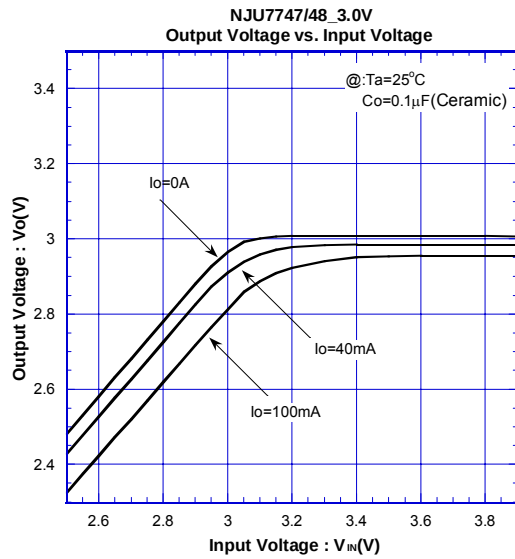
On the other hand, Use of a larger C_O reduces output noise and ripple output, and also improves output transient response when rapid load change.

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

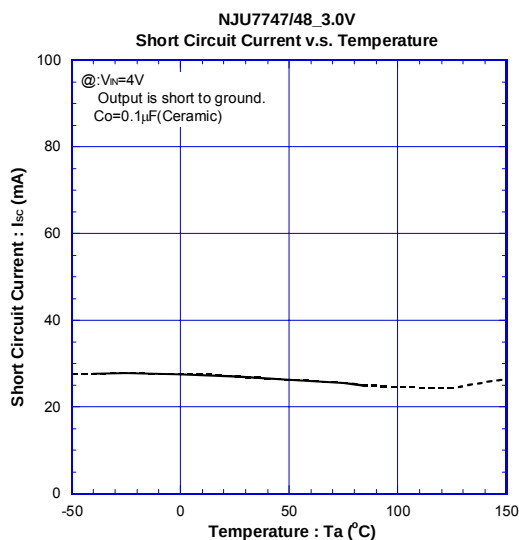
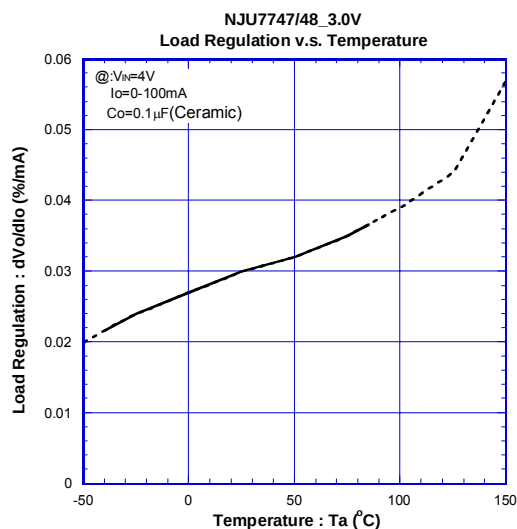
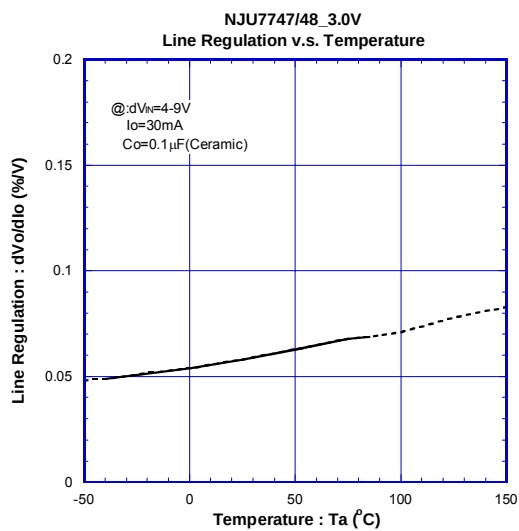
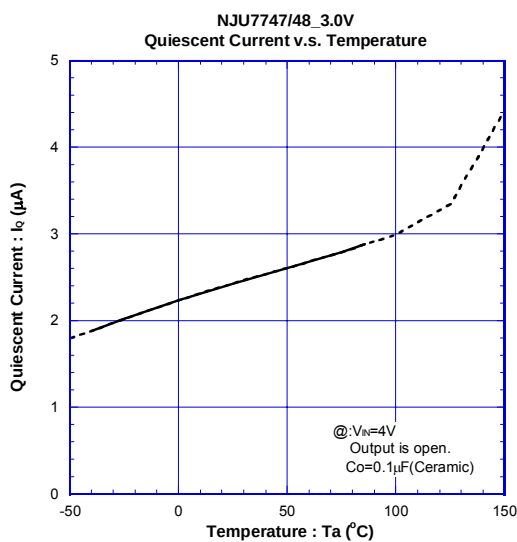
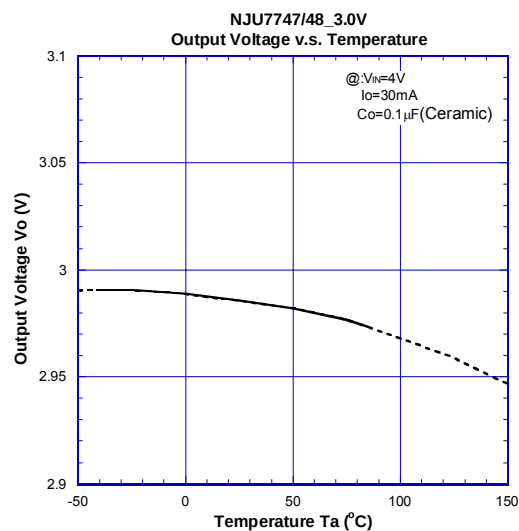
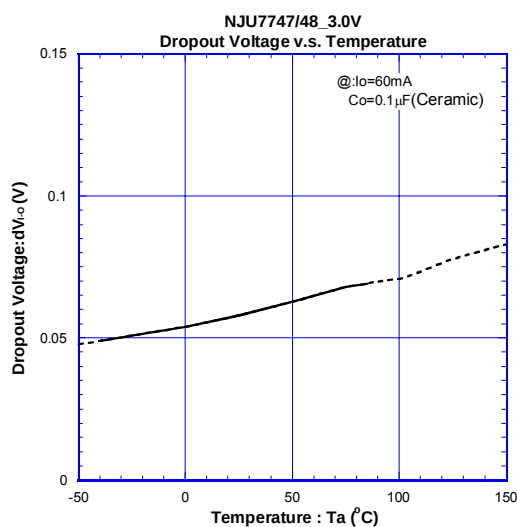
In addition, you should consider varied characteristics of capacitor (a frequency characteristic, a temperature characteristic, a DC bias characteristic and so on) and unevenness peculiar to a capacitor supplier enough.

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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