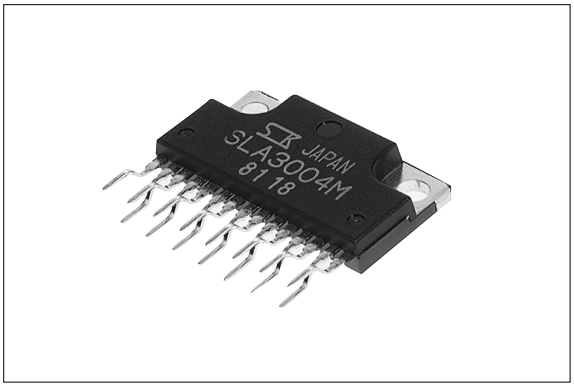
SLA3001M/3002M/3004M

3-Output Dropper/Switching Type

■Features

- 3 regulator ICs combined in 1 package
- Insulated single inline package
- Can be used with dropper type and switching type
- 3 independent circuits for input and output respectively. Internal dissipation can be reduced since different input voltages can be applied.
- Dropper type regulator IC is low-dropout voltage type with input/output voltage difference of 1V. Output ON/OFF control, variable output voltage (rise only) function
- Switching type: built-in separate excitation (60kHz), high efficiency of 80% or over
- Each regulator has overcurrent protection and thermal protection circuit.



■Applications

- For stabilization of the secondary stage of switching power supplies
- Electronic equipment

■Lineup

Part Number	SLA3001M			SLA3002M			SLA3004M		
	Type	V_O(V)	I_O(A)	Type	V_O (V)	I_O(A)	Type	V_O (V)	I_O (A)
Regulator 1	Dropper	12	1.5	Switching	5	0.5	Switching	5	0.5
Regulator 2	Dropper	5	1.5	Dropper	15.7	1.0	Switching	9	0.4
Regulator 3	Dropper	9	1.5	Switching	9	0.4	Switching	9	0.4

■Absolute Maximum Ratings

Parameter	Symbol	Ratings									Unit
		SLA3001M			SLA3002M			SLA3004M			
		Reg1	Reg2	Reg3	Reg1	Reg2	Reg3	Reg1	Reg2	Reg3	
DC Input Voltage	V_{IN}	35			35			35			V
Voltage of Output Control Terminal	V_C	V_{IN}			——	V_{IN}	——	————			V
SW Terminal Applied Reverse Voltage	V_{SW}	————			–1	——	–1	–1			V
Power Dissipation	P_D	40(T_C=25°C)			37.5(T_C=25°C)			37.5(T_C=25°C)			W
Junction Temperature	T_j	+125			+150			+150			°C
Storage Temperature	T_{stg}	–40 to +125			–40 to +150			–40 to +150			°C
Ambient Operating Temperature	T_{op}	–30 to +85			–30 to +85			–30 to +85			°C
Thermal Resistance(junction-to-case)	$R_{th(j-c)}$	7			10			10			°C/W

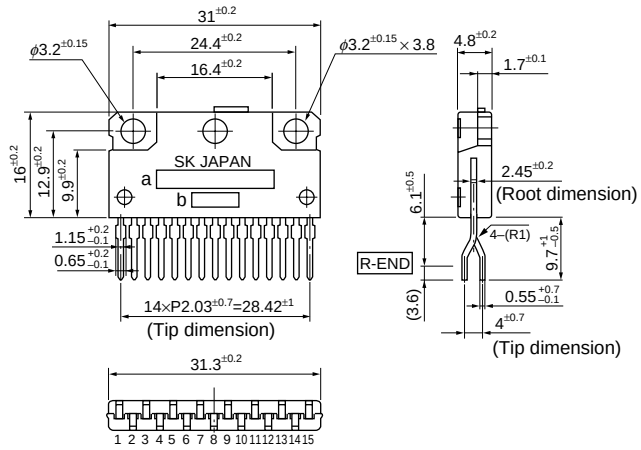
■Electrical Characteristics

(T_a=25°C unless otherwise specified)

	Parameter		Symbol	Ratings									Unit
				SLA3001M			SLA3002M			SLA3004M			
				min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	
Regulator 1	Recommended DC Input Voltage		$V_{IN}1$	13		25	7		33	7		33	V
	Output Voltage		V_O1	11.52	12.00	12.48	4.75	5.00	5.25	4.75	5.00	5.25	V
		Conditions		V_{IN}=15V, I_O=1.0A			V_{IN}=20V, I_O=0.3A			V_{IN}=20V, I_O=0.3A			
	Dropout Voltage		$V_{DIF}1$			1.0	———			———			V
		Conditions		I_O=1.5A			———			———			
	Efficiency		η1	———				80			80		%
		Conditions		———			V_{IN}=20V, I_O=0.3A			V_{IN}=20V, I_O=0.3A			
	Line Regulation		ΔV_{OLINE1}		24	64		80	100		80	110	mV
		Conditions		V_{IN}=13 to 25V, I_O=1.0A			V_{IN}=10 to 30V, I_O=0.3A			V_{IN}=10 to 30V, I_O=0.3A			
	Load Regulation		ΔV_{OLOAD1}		93	240		30	40		30	40	mV
		Conditions		V_{IN}=15V, I_O=0 to 1.5A			V_{IN}=20V, I_O=0.1 to 0.4A			V_{IN}=20V, I_O=0.1 to 0.4A			
	Switching Frequency		f1	———				60			60		kHz
		Conditions		———			V_{IN}=20V, I_O=0.3A			V_{IN}=20V, I_O=0.3A			
	Overcurrent Protection Starting Current*1		I_{S1}, 1	1.6			0.55			0.55			A
		Conditions		V_{IN}=15V			V_{IN}=10V			V_{IN}=10V			
	V_C Terminal*2	Control Voltage (Output ON)	V_{CIH}, 1	2.0			———			———			V
		Control Voltage (Output OFF)	V_{CIL}, 1			0.8	———			———			V
Regulator 2	Recommended DC Input Voltage		$V_{IN}2$	6		15	17		30	12		33	V
	Output Voltage		V_O2	4.85	5.00	5.15	14.92	15.70	16.48	8.55	9.00	9.45	V
		Conditions		V_{IN}=8V, I_O=1.0A			V_{IN}=19V, I_O=0.5A			V_{IN}=21V, I_O=0.3A			
	Dropout Voltage		$V_{DIF}2$			1.0			1.0	———			V
		Conditions		I_O=1.5A			I_O=1.0A			———			
	Efficiency		η2	———			———				85		%
		Conditions		———			———			V_{IN}=21V, I_O=0.3A			
	Line Regulation		ΔV_{OLINE2}		10	30		30	90		90	110	mV
		Conditions		V_{IN}=6 to 15V, I_O=1.0A			V_{IN}=17 to 25V, I_O=0.5A			V_{IN}=14 to 30V, I_O=0.3A			
	Load Regulation		ΔV_{OLOAD2}		40	100		120	300		50	80	mV
		Conditions		V_{IN}=8V, I_O=0 to 1.5A			V_{IN}=19V, I_O=0 to 0.1A			V_{IN}=21V, I_O=0.1 to 0.4A			
	Switching Frequency		f2	———			———				60		kHz
		Conditions		———			———			V_{IN}=21V, I_O=0.3A			
	Overcurrent Protection Starting Current*1		I_{S1}, 2	1.6			1.2			0.45			A
		Conditions		V_{IN}=8V			V_{IN}=19V			V_{IN}=14V			
	V_C Terminal*2	Control Voltage (Output ON)	V_{CIH}, 2	2.0			2.0			———			V
		Control Voltage (Output OFF)	V_{CIL}, 2			0.8			0.8	———			V
Regulator 3	Recommended DC Input Voltage		$V_{IN}3$	10		20	12		33	12		33	V
	Output Voltage		V_O3	8.64	9.00	9.36	8.55	9.00	9.45	8.64	9.00	9.36	V
		Conditions		V_{IN}=12V, I_O=1.0A			V_{IN}=21V, I_O=0.3A			V_{IN}=21V, I_O=0.3A			
	Dropout Voltage		$V_{DIF}3$			1.0	———			———			V
		Conditions		I_O=1.5A			———			———			
	Efficiency		η3	———				85			85		%
		Conditions		———			V_{IN}=21V, I_O=0.3A			V_{IN}=21V, I_O=0.3A			
	Line Regulation		ΔV_{OLINE3}		18	48		90	110		90	110	mV
		Conditions		V_{IN}=10 to 20V, I_O=1.0A			V_{IN}=14 to 30V, I_O=0.3A			V_{IN}=14 to 30V, I_O=0.3A			
	Load Regulation		ΔV_{OLOAD3}		70	180		50	80		50	80	mV
		Conditions		V_{IN}=15V, I_O=0 to 1.5A			V_{IN}=21V, I_O=0.1 to 0.4A			V_{IN}=21V, I_O=0.1 to 0.4A			
	Switching Frequency		f3	———				60			60		kHz
		Conditions		———			V_{IN}=21V, I_O=0.3A			V_{IN}=21V, I_O=0.3A			
	Overcurrent Protection Starting Current*1		I_{S1}, 3	1.6			0.45			0.45			A
		Conditions		V_{IN}=12V			V_{IN}=14V			V_{IN}=14V			
	V_C Terminal*2	Control Voltage (Output ON)	V_{CIH}, 3	2.0			———			———			V
		Control Voltage (Output OFF)	V_{CIL}, 3			0.8	———			———			V

*1: I_{S1} of Dropper Type is specified at –5(%) drop point of output voltage V_O. I_{S1} of Switching Type is specified at –10(%) drop point of output voltage V_O.
*2: Output is ON when V_C terminal is open.

■Outline Drawing

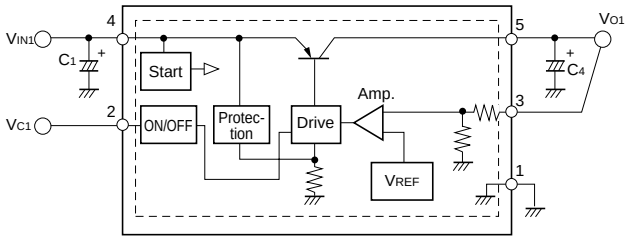


a : Part Number
b : Lot Number

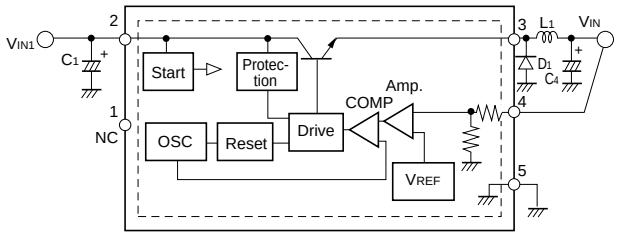
Forming No. LF861

■Block Diagram

One Dropper Type Circuit

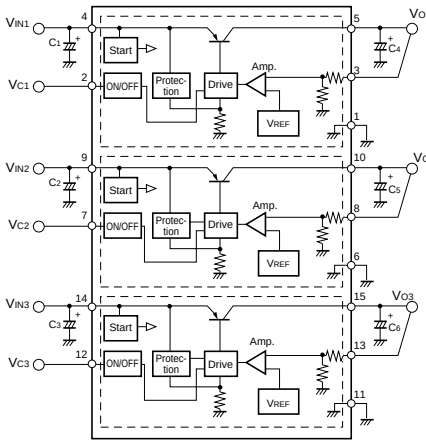


One Switching Type Circuit

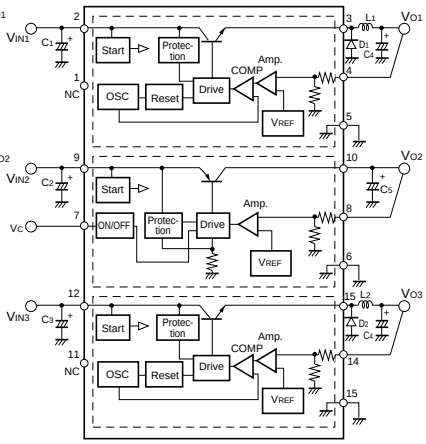


■Standard External Circuit

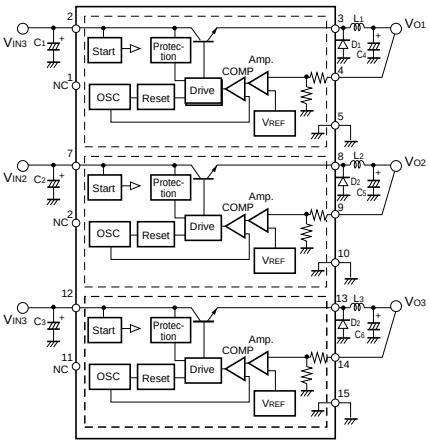
SLA3001M



SLA3002M



SLA3004M



■Selecting External components for dropper type regulator

Input capacitor (Approx. 47μF)

Output capacitor (Approx. 47 to 100μF)

●Low ESR capacitors are recommended for input and output when using them in low temperature conditions (0°C or less)

■Selecting External components for switching type regulator

Input capacitor (Approx. 100μF)

Output smoothing capacitor (Approx. 330μF)

●Input capacitor and output capacitor must satisfy allowable ripple current.

●Low ESR capacitors are recommended for reducing output ripple voltage.

●Low ESR capacitors are recommended for input and output when using them in low temperature conditions (0°C or less)

Choke coil (200μH when V_O is 3.3V or 5V, 300μH when V_O is not 3.3V or 5V)

●When its winding resistance is high, its efficiency may decrease and the rated value may not be achieved.

●Pay attention to heat from the choke coil due to magnetic saturation caused by overload, short circuit of load, etc. because the overcurrent protection starting current is approx. 1A.

Flywheel diode (Sanken AK04 recommended)

●Use a Schottky barrier diode for D_1, D_2 and D_3 and make sure that the reverse voltage applied to SW output terminal does not exceed the value (–1V) given in the maximum ratings.

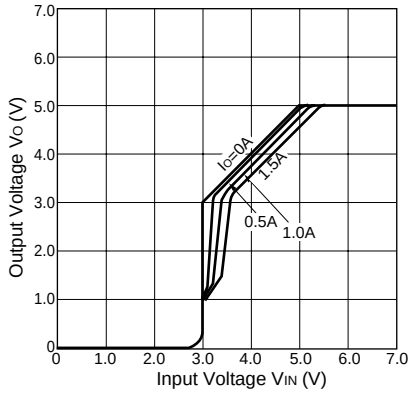
●If you use a fast recovery diode or any other diode, application of a reverse voltage generated from the recovery or ON voltage of the diode may damage the IC.

■Typical Characteristics

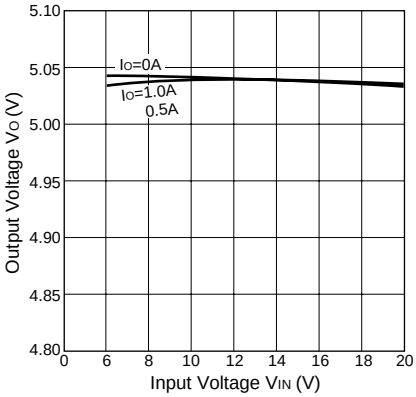
(T_a=25°C)

SLA3001M (Regulator 2, V_O=5V)

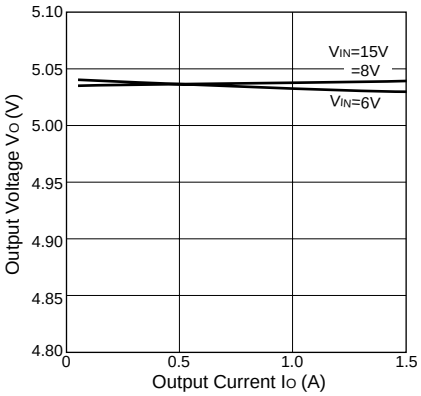
Rise Characteristics



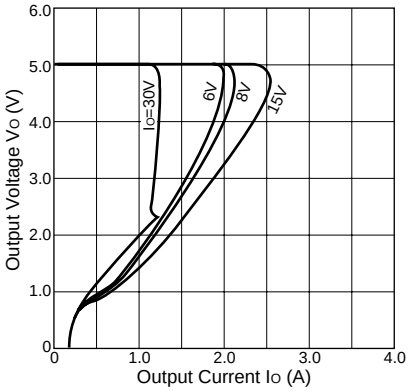
Line Regulation



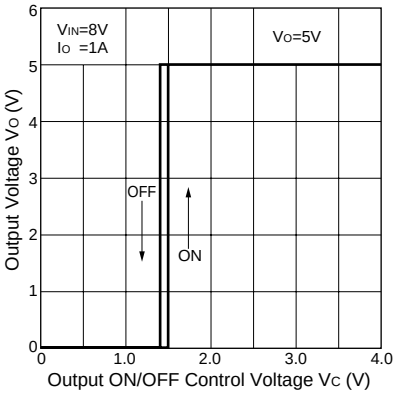
Load Regulation



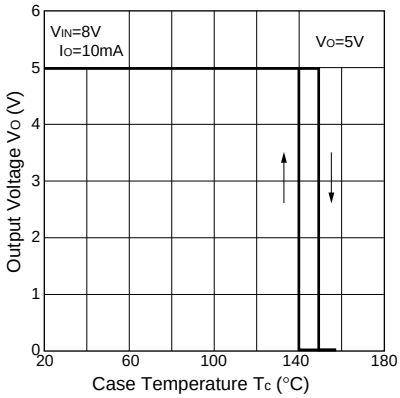
Overcurrent Protection Characteristics



ON/OFF Control Characteristics



Thermal Protection Characteristics

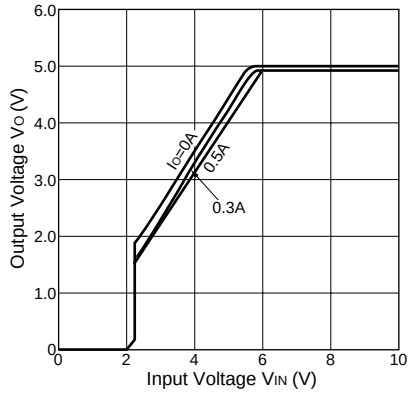


Note on Thermal Protection:

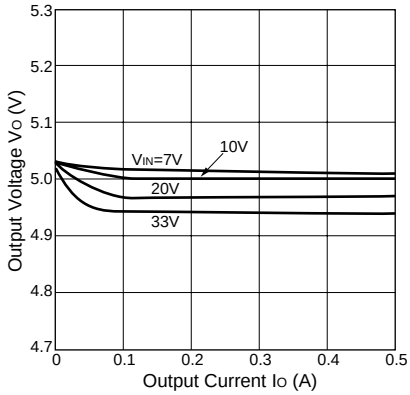
The thermal protection circuit is intended for protection against heat during instantaneous short-circuiting. Its operation is not guaranteed for short-circuiting over extended periods of time.

SLA3002M/SLA3004M(Regulator 1, V_O=5V)

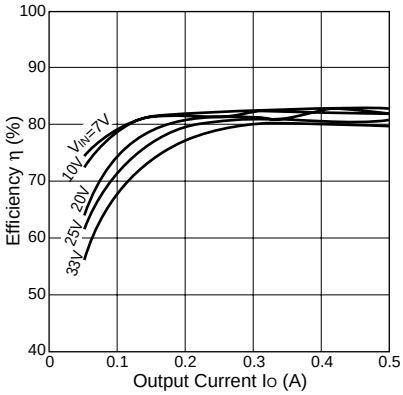
Rise Characteristics



Load Regulation



Efficiency Characteristics



Overcurrent Protection Characteristics