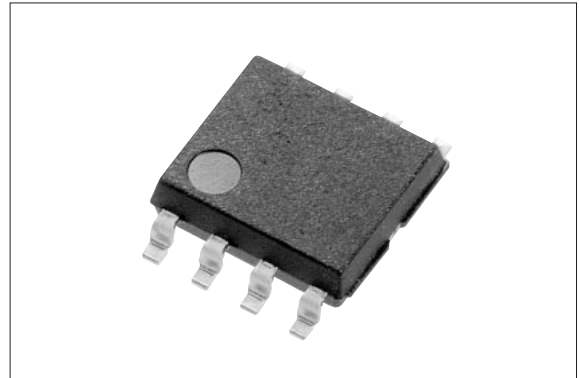


# SI-3000LSA Series

## Surface-Mount, Low Current Consumption, Low Dropout Voltage Dropper Type

### ■Features

- Compact surface-mount package (SOP-8)
- Output current: 1 A
- Low current consumption:  $I_{q(OFF)}$  ( 1  $\mu$ A ( $V_c = 0$  V)
- Low dropout voltage:  $V_{DIF} \leq 0.8$  V (at  $I_o = 1$  A)  
 $V_{DIF} \leq 1.2$  V ( $I_o = 1$  A) for SI-3018LSA
- 4 types of output voltages (1.8 V, 2.5 V, 3.3 V, 5.0 V) available
- Output ON/OFF control compatible with LS-TTL
- Built-in foldback overcurrent, thermal protection circuits



### ■Applications

- Auxiliary power supply for PC
- Battery-driven electronic equipment

### ■Absolute Maximum Ratings

( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Ratings	Unit
DC Input Voltage	$V_{IN}$	16	V
DC Output Current	$I_o$	1	A
Power Dissipation	$P_{D1}^{*1}$	1.16	W
	$P_{D2}^{*2}$	1.1	W
Junction Temperature	$T_j^{*3}$	-30 to +150	$^\circ\text{C}$
Ambient Operating Temperature	$T_{op}$	-30 to +150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-30 to +150	$^\circ\text{C}$
Thermal Resistance (Junction to Lead (pin 8))	$\theta_{j-l}$	36	$^\circ\text{C}/\text{W}$
Thermal Resistance (Junction to Ambient Air)	$\theta_{j-a}^{*2}$	100	$^\circ\text{C}/\text{W}$

\*1: When mounted on glass-epoxy board 56.5 × 56.5 mm (copper laminate area 100%)

\*2: When mounted on glass-epoxy board 40 × 40 mm (copper laminate area 100%).

\*3: Thermal protection circuits may operate if the junction temperature exceeds 135 $^\circ\text{C}$

### ■Recommended Operating Conditions

Parameter	Symbol	Ratings				Unit
		SI-3018LSA	SI-3025LSA	SI-3033LSA	SI-3050LSA	
DC Input Voltage Range	$V_{IN}$	3.1 to 3.5 <sup>*1</sup>	<sup>*2</sup> to 3.5 <sup>*1</sup>	<sup>*2</sup> to 5.2 <sup>*1</sup>	<sup>*2</sup> to 8.0	V
DC Output Current Range	$I_o$	0 to 1				A
Operating Junction Temperature	$T_{jop}$	-20 to +125				$^\circ\text{C}$
Ambient Operating Temperature	$T_{aop}$	-30 to +85				$^\circ\text{C}$

\*1:  $V_{IN}$  (max) and  $I_o$  (max) are restricted by the relationship  $P_D = (V_{IN} - V_o) \times I_o$ .

Calculate these values referring to the reference data.

\*2: Refer to the dropout voltage section.

■Electrical Characteristics

( $T_a=25^{\circ}\text{C}$ ,  $V_c=2\text{V}$  unless otherwise specified)

Parameter	Symbol	Ratings												Unit	
		SI-3018LSA			SI-3025LSA			SI-3033LSA			SI-3050LSA				
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.		
Output Voltage	$V_o$	1.764	1.800	1.836	2.450	2.500	2.550	3.234	3.300	3.366	4.90	5.00	5.10	V	
	Conditions	$V_{IN}=3.3\text{V}$ , $I_o=0.5\text{A}$			$V_{IN}=3.3\text{V}$ , $I_o=0.5\text{A}$			$V_{IN}=5\text{V}$ , $I_o=0.5\text{A}$			$V_{IN}=6.5\text{V}$ , $I_o=0.5\text{A}$				
Dropout Voltage	$V_{DIF}$		-				0.4			0.4			0.4	V	
	Conditions	-			$I_o \leq 0.5\text{A}$			$I_o \leq 0.5\text{A}$			$I_o \leq 0.5\text{A}$				
	Conditions	0.6			1.2			0.8			0.8				
Line Regulation	$\Delta V_{LINE}$		2	10		2	10		3	10			15	mV	
	Conditions	$V_{IN}=3.1$ to $3.5\text{V}$ , $I_o=0.3\text{A}$			$V_{IN}=3.1$ to $3.5\text{V}$ , $I_o=0.3\text{A}$			$V_{IN}=4.5$ to $5.5\text{V}$ , $I_o=0.3\text{A}$			$V_{IN}=6$ to $7\text{V}$ , $I_o=0.3\text{A}$				
Load Regulation	$\Delta V_{LOAD}$		10	20		10	20		10	20			30	mV	
	Conditions	$V_{IN}=3.3\text{V}$ , $I_o=0$ to $1\text{A}$			$V_{IN}=3.3\text{V}$ , $I_o=0$ to $1\text{A}$			$V_{IN}=5\text{V}$ , $I_o=0$ to $1\text{A}$			$V_{IN}=6.5\text{V}$ , $I_o=0$ to $1\text{A}$				
Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T_a$		$\pm 0.3$			$\pm 0.3$			$\pm 0.3$			$\pm 0.5$		mV/ $^{\circ}\text{C}$	
	Conditions	$V_{IN}=3.3\text{V}$ , $I_o=5\text{mA}$ , $T_j=0$ to $100^{\circ}\text{C}$			$V_{IN}=3.3\text{V}$ , $I_o=5\text{mA}$ , $T_j=0$ to $100^{\circ}\text{C}$			$V_{IN}=5\text{V}$ , $I_o=5\text{mA}$ , $T_j=0$ to $100^{\circ}\text{C}$			$V_{IN}=6.5\text{V}$ , $I_o=5\text{mA}$ , $T_j=0$ to $100^{\circ}\text{C}$				
Ripple Rejection	$R_{REJ}$		60			57			55			55		dB	
	Conditions	$V_{IN}=3.3\text{V}$ , $f=100$ to $120\text{Hz}$			$V_{IN}=3.3\text{V}$ , $f=100$ to $120\text{Hz}$			$V_{IN}=5\text{V}$ , $f=100$ to $120\text{Hz}$			$V_{IN}=6.5\text{V}$ , $f=100$ to $120\text{Hz}$				
Quiescent Circuit Current	$I_q$		1.7	2.5		1.7	2.5		1.7	2.5		1.7	2.5	mA	
	Conditions	$V_{IN}=3.3\text{V}$ , $I_o=0\text{A}$			$V_{IN}=3.3\text{V}$ , $I_o=0\text{A}$			$V_{IN}=5\text{V}$ , $I_o=0\text{A}$			$V_{IN}=6.5\text{V}$ , $I_o=0\text{A}$				
OFF Circuit Current	$I_q(\text{OFF})$			1			1			1			1	$\mu\text{A}$	
	Conditions	$V_{IN}=3.3\text{V}$ , $I_o=0\text{A}$ , $V_c=0\text{V}$			$V_{IN}=3.3\text{V}$ , $I_o=0\text{A}$ , $V_c=0\text{V}$			$V_{IN}=5\text{V}$ , $I_o=0\text{A}$ , $V_c=0\text{V}$			$V_{IN}=6.5\text{V}$ , $I_o=0\text{A}$ , $V_c=0\text{V}$				
Overcurrent Protection Starting Current*1,3	$I_{S1}$	1.2			1.2			1.2			1.2			A	
	Conditions	$V_{IN}=3.3\text{V}$			$V_{IN}=3.3\text{V}$			$V_{IN}=5\text{V}$			$V_{IN}=6\text{V}$				
Vc Pin	Control Voltage (Output ON)*2	$V_c, I_H$	2.0			2.0			2.0			2.0		V	
	Control Voltage (Output OFF)*2	$V_c, I_L$			0.8			0.8			0.8		0.8		
	Control Current (Output ON)	$I_c, I_H$		40	80		40	80		40	80		40	80	$\mu\text{A}$
		Conditions	$V_c=2\text{V}$												
	Control Current (Output OFF)	$I_c, I_L$		0	-5		0	-5		0	-5		0	-5	$\mu\text{A}$
Conditions		$V_c=0\text{V}$													
Output OFF Voltage	$V_o$			0.5			0.5			0.5			0.5	V	
	Conditions	$V_{IN}=3.3\text{V}$ , $I_o=0\text{A}$			$V_{IN}=3.3\text{V}$ , $I_o=0\text{A}$			$V_{IN}=5\text{V}$ , $I_o=0\text{A}$			$V_{IN}=6.5\text{V}$ , $I_o=0\text{A}$				

\*1:  $I_{S1}$  is specified as the 5% drop point of output voltage  $V_o$  on the condition that  $V_{IN} = 3.3\text{V}$  ( $5\text{V}$  for SI-3033LSA), and  $I_o = 0.5\text{A}$ .

\*2: Output is OFF when the output control terminal  $V_c$  is open. Each input level is equivalent to that for LS-TTL. Therefore, it is possible to be driven directly by an LS-TTL circuit.

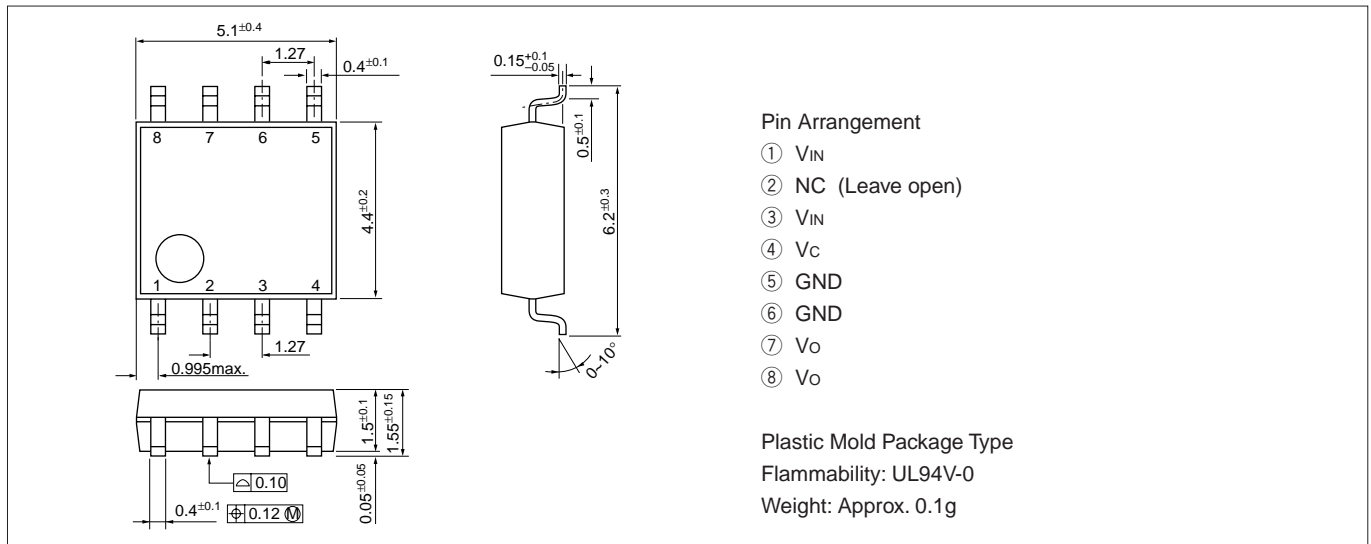
The SI-3000LSA series employs a foldback-type overcurrent protection circuit.

\*3: In applications in which a certain current is required for start-up, this circuit may cause a start-up error, and therefore the SI-3000LSA series is not recommended for use in such applications.

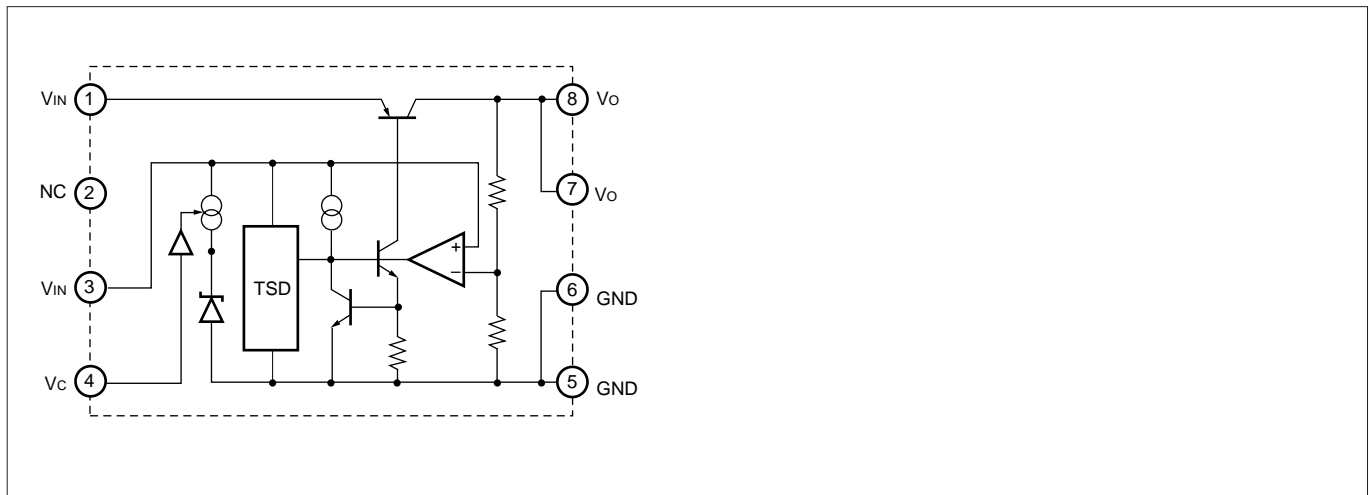
- (1) Constant current load (2) Dual polarity power supply (3) Series power supply (4)  $V_o$  adjustment by raising ground voltage

■External Dimensions

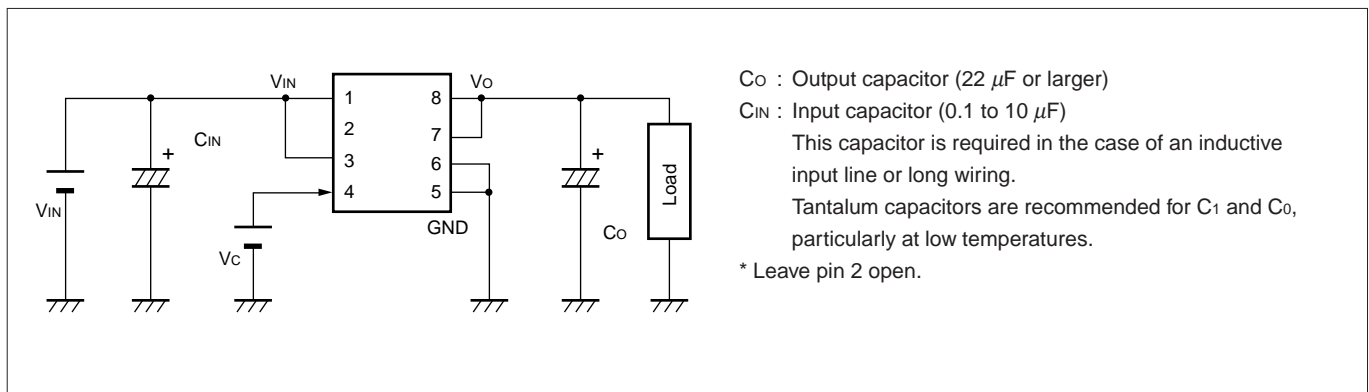
(Unit : mm)



■Block Diagram

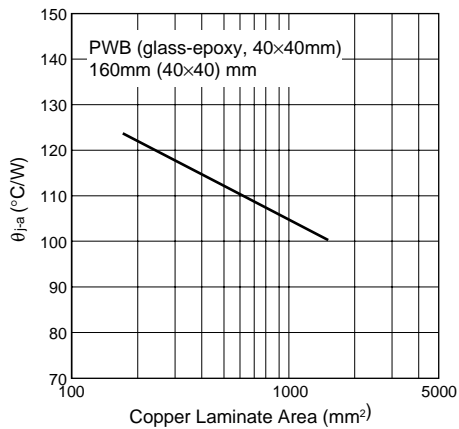


■Standard External Circuit

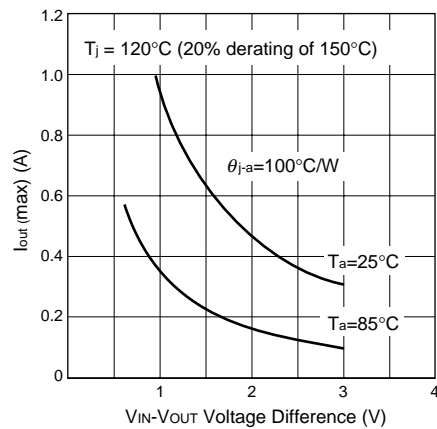


■Reference Data

PWB Copper Laminate Area vs. Junction to Ambient Air Thermal Resistance



Allowable Output Current (vs.  $V_{IN}-V_{OUT}$  Voltage Difference)  
 $V_{IN}-I_o$  max

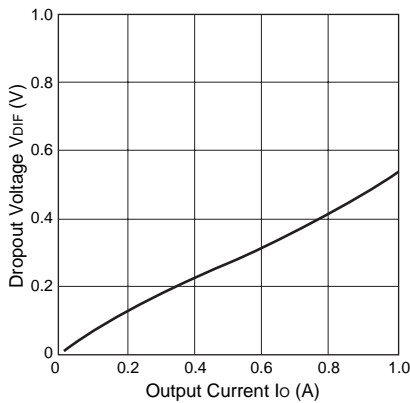


The inner frame stage, on which the PTr is mounted, is directly connected to the  $V_{OUT}$  pin. Therefore, enlarging the copper laminate area achieves a heat radiation effect of the  $V_{OUT}$  pin.

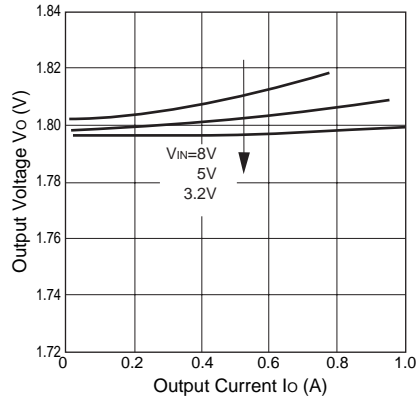
■Typical Characteristics of SI-3018LSA

( $T_a=25^\circ\text{C}$ )

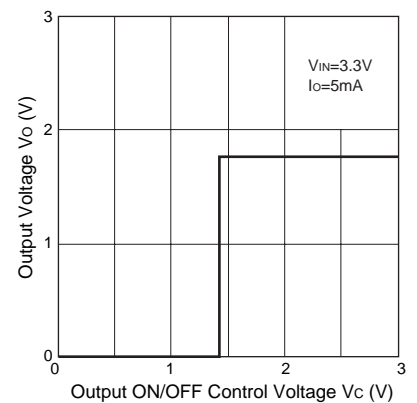
**$I_o$  vs.  $V_{DIF}$  Characteristics**



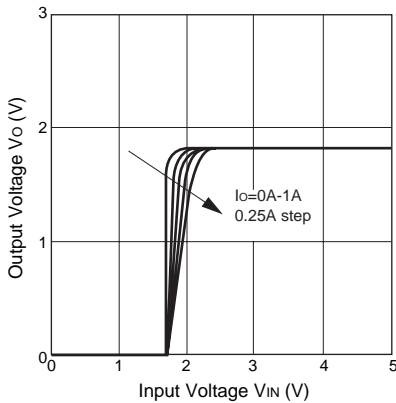
**Load Regulation**



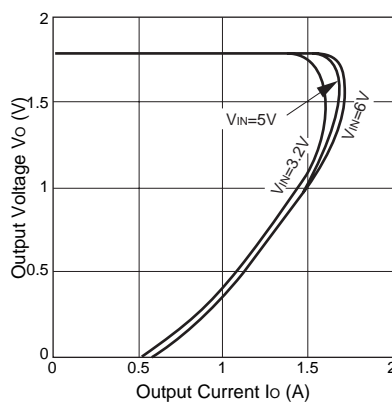
**Output ON/OFF Control**



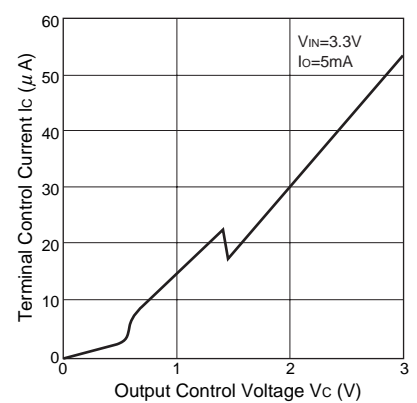
**Output Voltage Characteristics**



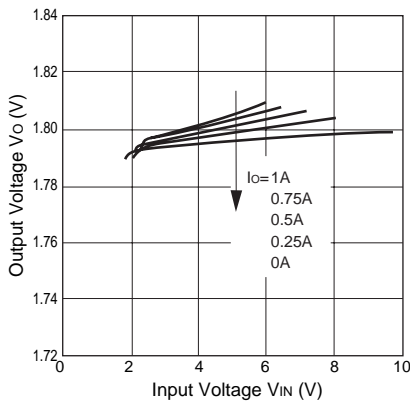
**Overcurrent Protection Characteristics**



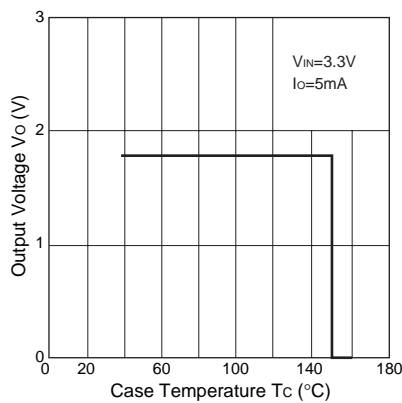
**Output ON/OFF Control Current**



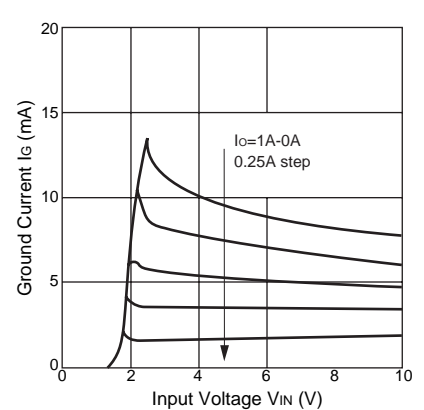
**Line Regulation**



**Thermal Protection Characteristics**



**Circuit Current**



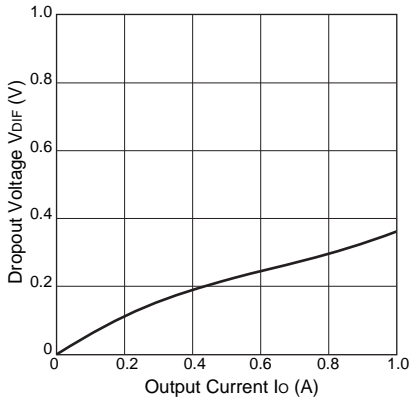
**[Note on Thermal Protection]**

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

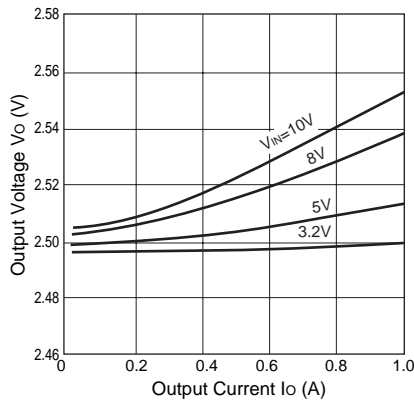
■Typical Characteristics of SI-3025LSA

( $T_a=25^\circ\text{C}$ )

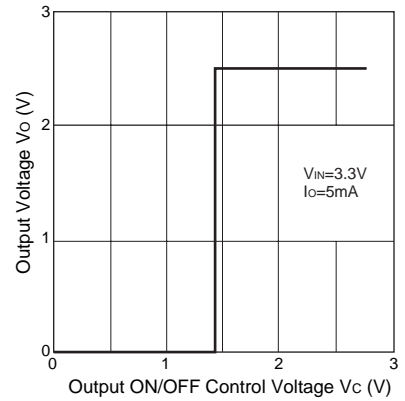
**$I_o$  vs.  $V_{DIF}$  Characteristics**



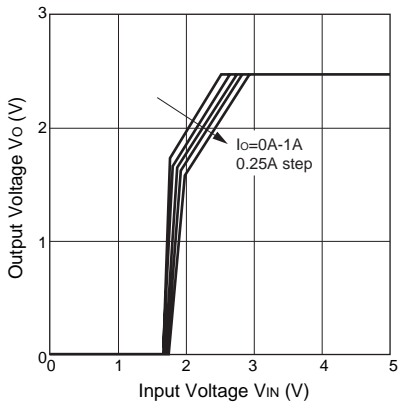
**Load Regulation**



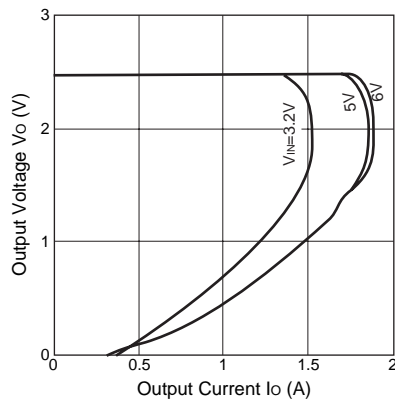
**Output ON/OFF Control**



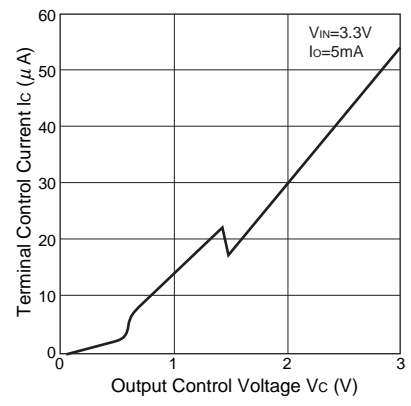
**Output Voltage Characteristics**



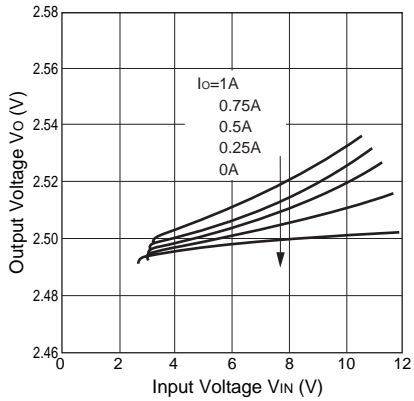
**Overcurrent Protection Characteristics**



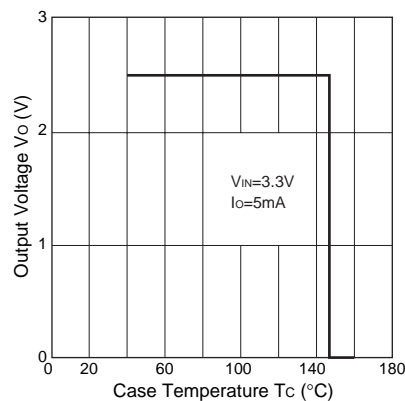
**Output ON/OFF Control Current**



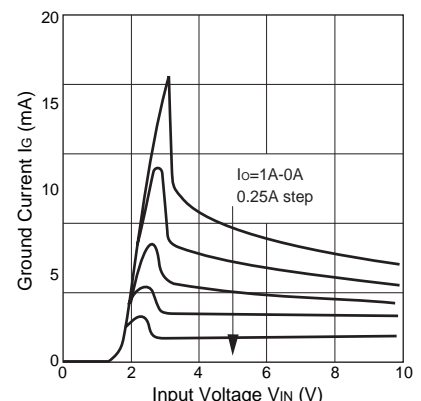
**Line Regulation**



**Thermal Protection Characteristics**



**Circuit Current**



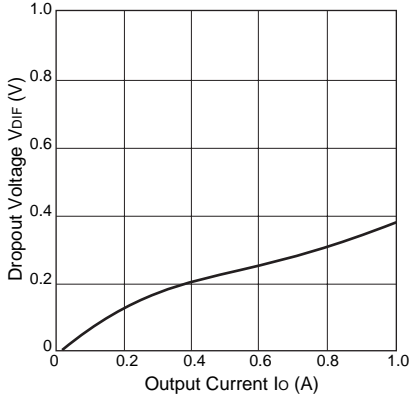
**[Note on Thermal Protection]**

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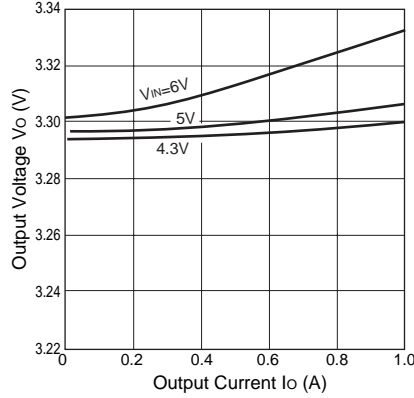
■Typical Characteristics of SI-3033LSA

( $T_a=25^\circ\text{C}$ )

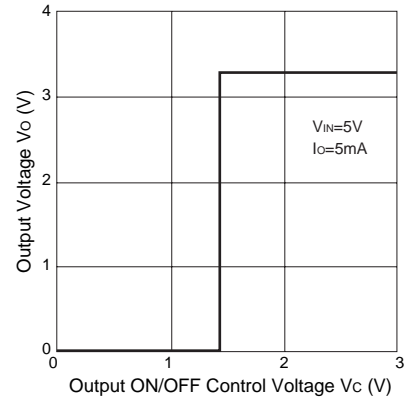
**$I_o$  vs.  $V_{DIF}$  Characteristics**



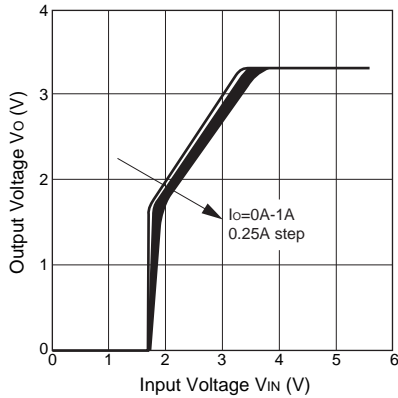
**Load Regulation**



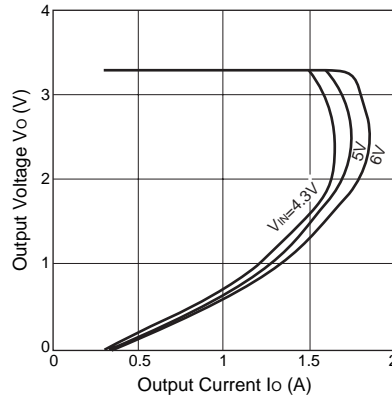
**Output ON/OFF Control**



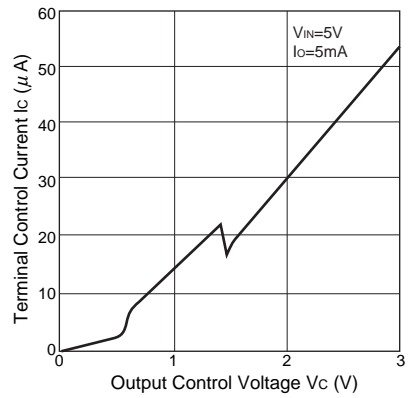
**Output Voltage Characteristics**



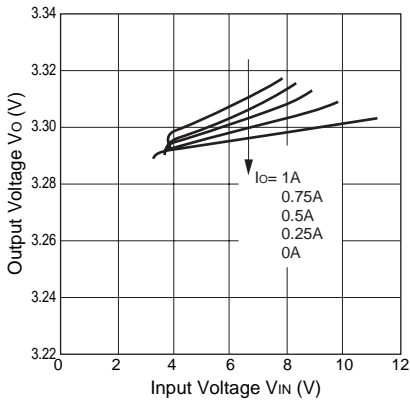
**Overcurrent Protection Characteristics**



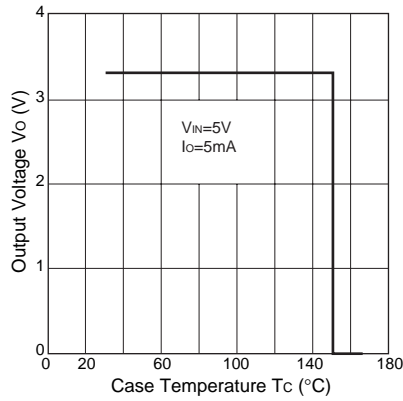
**Output ON/OFF Control Current**



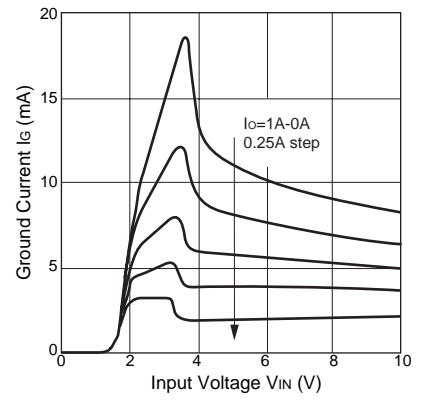
**Line Regulation**



**Thermal Protection Characteristics**



**Circuit Current**



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