# ≣ *SI-3002N Series* ≣

# 3-Terminal, Full-Mold, Low Dropout Voltage Dropper Type

## ■Features

- Compact full-mold package (equivalent to TO220)
- Output current: 2.0A
- Low dropout voltage: $V_{DIF} \leq 1V$ (at $I_O = 2.0A$)
- Built-in foldback overcurrent, overvoltage, thermal protection circuits

## ■Applications

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

## ■Absolute Maximum Ratings

($T_a = 25°C$)

| Parameter | Symbol | Ratings | | | Unit |
|---|---|---|---|---|---|
| | | SI-3052N | SI-3092N | SI-3122N/3152N | |
| DC Input Voltage | $V_{IN}$ | 25 | 30 | 35 | V |
| DC Output Current | $I_O$ | 2.0[*1] | | | A |
| Power Dissipation | $P_{D1}$ | 20(With infinite heatsink) | | | W |
| | $P_{D2}$ | 1.5(Without heatsink, stand-alone operation) | | | W |
| Junction Temperature | $T_j$ | −40 to +125 | | | °C |
| Ambient Operating Temperature | $T_{op}$ | −30 to +100 | | | °C |
| Storage Temperature | $T_{stg}$ | −40 to +125 | | | °C |
| Thermal Resistance (junction to case) | $R_{th(j-c)}$ | 5.0 | | | °C/W |
| Thermal Resistance (junction to ambient air) | $R_{th(j-a)}$ | 66.7(Without heatsink, stand-alone operation) | | | °C/W |

## ■Electrical Characteristics

(Ta=25°C unless otherwise specified)

| Parameter | Symbol | SI-3052N min. | SI-3052N typ. | SI-3052N max. | SI-3092N min. | SI-3092N typ. | SI-3092N max. | SI-3122N min. | SI-3122N typ. | SI-3122N max. | SI-3152N min. | SI-3152N typ. | SI-3152N max. | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Input Voltage | $V_{IN}$ | 6[*2] | | 15[*1] | 10[*2] | | 25[*1] | 13[*2] | | 27[*1] | 16[*2] | | 27[*1] | V |
| Output Voltage | $V_O$ | 4.90 | 5.00 | 5.10 | 8.82 | 9.00 | 9.18 | 11.76 | 12.00 | 12.24 | 14.70 | 15.00 | 15.30 | V |
| | Conditions | $V_{IN}$=8V, Io=1.0A | | | $V_{IN}$=12V, Io=1.0A | | | $V_{IN}$=15V, Io=1.0A | | | $V_{IN}$=18V, Io=1.0A | | | |
| Dropout Voltage | $V_{DIF}$ | | | 0.5 | | | 0.5 | | | 0.5 | | | 0.5 | V |
| | Conditions | Io≤1.5A | | | | | | | | | | | | |
| | | | | 1.0 | | | 1.0 | | | 1.0 | | | 1.0 | |
| | Conditions | Io≤2.0A | | | | | | | | | | | | |
| Line Regulation | $\Delta V_{OLINE}$ | | 10 | 30 | | 18 | 48 | | 24 | 64 | | 30 | 90 | mV |
| | Conditions | $V_{IN}$=6 to 15V, Io=1.0A | | | $V_{IN}$=10 to 20V, Io=1.0A | | | $V_{IN}$=13 to 25V, Io=1.0A | | | $V_{IN}$=16 to 25V, Io=1.0A | | | |
| Load Regulation | $\Delta V_{OLOAD}$ | | 40 | 100 | | 70 | 180 | | 93 | 240 | | 120 | 300 | mV |
| | Conditions | $V_{IN}$=8V, Io=0 to 2.0A | | | $V_{IN}$=12V, Io=0 to 2.0A | | | $V_{IN}$=15V, Io=0 to 2.0A | | | $V_{IN}$=18V, Io=0 to 2.0A | | | |
| Temperature Coefficient of Output Voltage | $\Delta V_O/\Delta T_a$ | | ±0.5 | | | ±1.0 | | | ±1.5 | | | ±1.5 | | mV/°C |
| | Conditions | $V_{IN}$=8V, Io=5mA, Tj=0 to 100°C | | | $V_{IN}$=12V, Io=5mA, Tj=0 to 100°C | | | $V_{IN}$=15V, Io=5mA, Tj=0 to 100°C | | | $V_{IN}$=18V, Io=5mA, Tj=0 to 100°C | | | |
| Ripple Rejection | $R_{REJ}$ | | 54 | | | 54 | | | 54 | | | 54 | | dB |
| | Conditions | $V_{IN}$=8V, f=100 to 120Hz | | | $V_{IN}$=12V, f=100 to 120Hz | | | $V_{IN}$=15V, f=100 to 120Hz | | | $V_{IN}$=18V, f=100 to 120Hz | | | |
| Quiescent Circuit Current | $I_q$ | | 3 | 10 | | 3 | 10 | | 3 | 10 | | 3 | 10 | mA |
| | Conditions | $V_{IN}$=8V, Io=0A | | | $V_{IN}$=12V, Io=0A | | | $V_{IN}$=15V, Io=0A | | | $V_{IN}$=18V, Io=0A | | | |
| Overcurrent Protection Starting Current[*3.4] | $I_{S1}$ | 2.1 | | | 2.1 | | | 2.1 | | | 2.1 | | | A |
| | Conditions | $V_{IN}$=8V | | | $V_{IN}$=12V | | | $V_{IN}$=15V | | | $V_{IN}$=18V | | | |

*1: $V_{IN(max)}$ and $I_{O(max)}$ are restricted by the relation $P_{D(max)}=(V_{IN}-V_O) \cdot I_O=20(W)$.

*2: Refer to the dropout voltage.(Refer to Setting DC Input Voltage on page 7.)

*3: $I_{S1}$ is specified at −5(%) drop point of output voltage $V_O$ on the condition that $V_{IN}=V_O+3V$, Io=1.0A.

*4: A foldback type overcurrent protection circuit is built into the IC regulator. Therefore, avoid using it for the following applications as it may cause starting errors:

(1) Constant current load (2) Plus/minus power (3) Series power (4)$V_O$ adjustment by raising ground voltage

## ■External Dimensions

(unit:mm)



a. Part Number
b. Lot Number
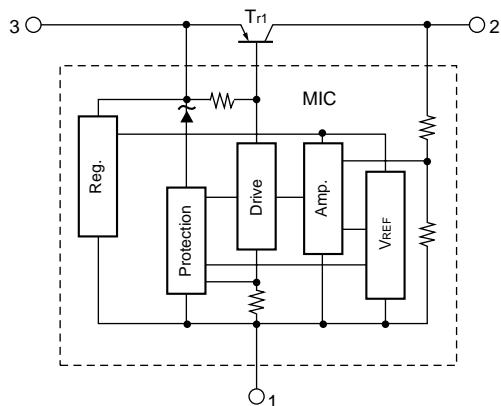
Pin Arrangement
① GND
② Vo
③ VIN

Plastic Mold Package Type
Flammability: UL94V-0
Weight: Approx. 2.3g
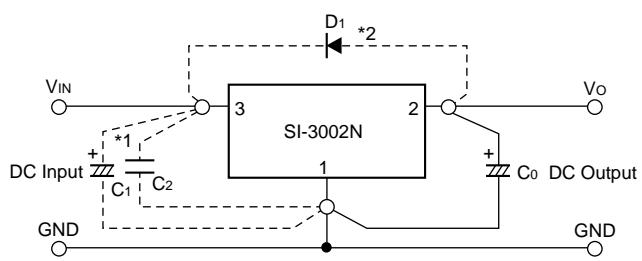
■**Block Diagram**



■**Standard External Circuit**



$C_0$ : Output capacitor (47 to 100μF)
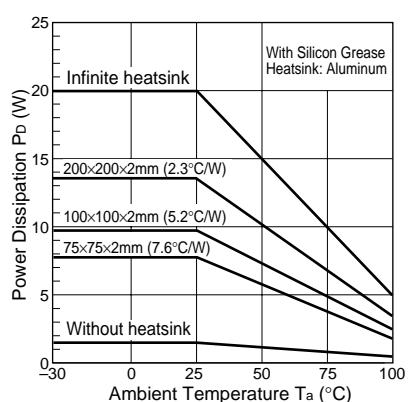
*1 $C_1$ ⎫ : Oscillation prevention capacitor
   $C_2$ ⎭ ($C_1$: Approx. 47μF, $C_2$: 0.33μF)

These capacitors are required if the input line is inductive and in the case of long wiring. Tantalum capacitors are recommended for $C_1$ and $C_0$, particularly at low temperatures.

*2 $D_1$ : Protection diode

This diode is required for protection against reverse biasing of the input and output. Sanken EU2Z is recommended.

■**$T_a$-$P_D$ Characteristics**
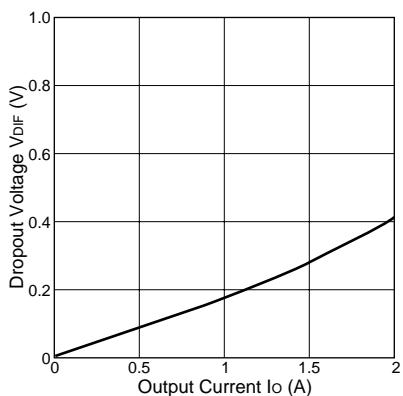


$$P_D = I_O \bullet [V_{IN}(mean) - V_O]$$
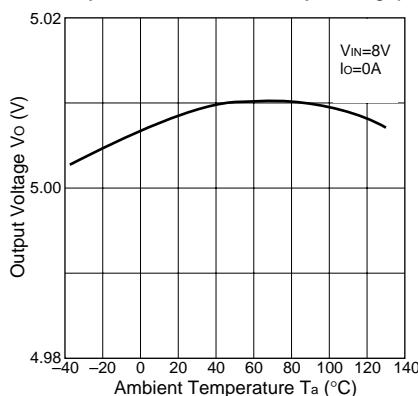
## ■Typical Characteristics

(T$_a$=25°C)
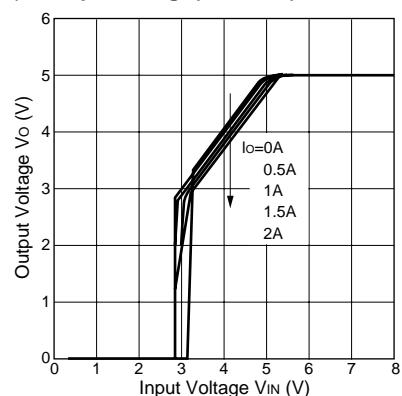
**I$_O$ vs. V$_{DIF}$ Characteristics**
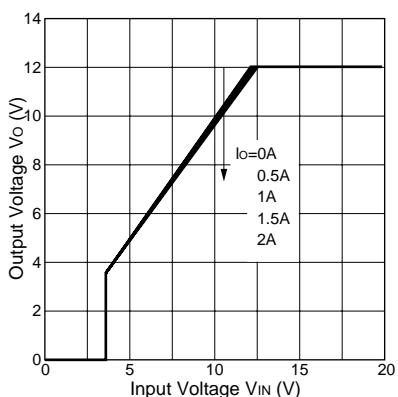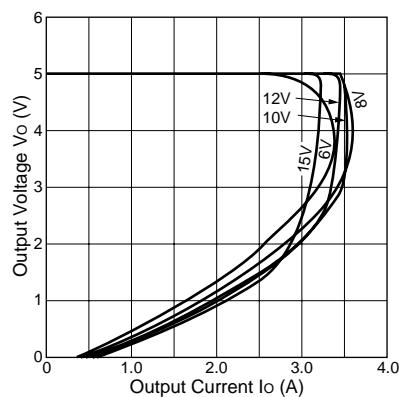


Output Current I$_O$ (A)
Dropout Voltage V$_{DIF}$ (V)

**Temperature Coefficient of Output Voltage(SI-3052N)**



V$_{IN}$=8V
I$_O$=0A

Ambient Temperature T$_a$ (°C)
Output Voltage V$_O$ (V)

**Output Voltage(SI-3052N)**



I$_O$=0A
0.5A
1A
1.5A
2A

Input Voltage V$_{IN}$ (V)
Output Voltage V$_O$ (V)

**Output Voltage(SI-3122N)**



I$_O$=0A
0.5A
1A
1.5A
2A

Input Voltage V$_{IN}$ (V)
Output Voltage V$_O$ (V)

**Overcurrent Protection Characteristics(SI-3052N)**



12V
10V
8V
15V
6V

Output Current I$_O$ (A)
Output Voltage V$_O$ (V)

**Overcurrent Protection Characteristics(SI-3122N)**



27V
25V
22V
13V
15V
18V

Output Current I$_O$ (A)
Output Voltage V$_O$ (V)

**Thermal Protection Characteristics(SI-3052N)**



V$_{IN}$=8V
I$_O$=10mA

Case Temperature T$_C$ (°C)
Output Voltage V$_O$ (V)
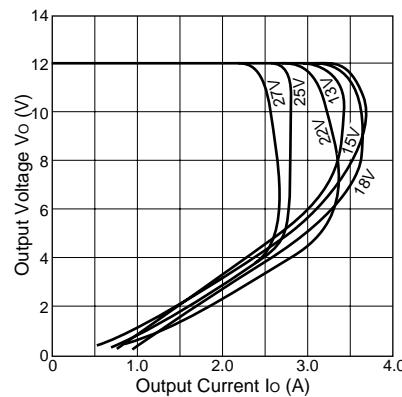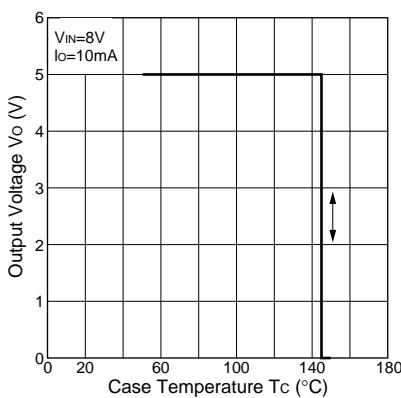
**Note on Thermal Protection:**

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