ABLIC
MinebeaMitsumi Group

# Product Catalogue

## Linear Regulators (LDO Regulators), Voltage Detectors, Watchdog Timers

2020-2021

INSPIRATIONAL SEMICONDUCTOR SOLUTIONS

ABLIC Inc.

## Table of Contents

# S-1317 Series

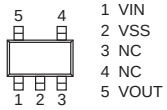
## 5.5 V INPUT, 100 mA CMOS VOLTAGE REGULATOR WITH 0.35 µA SUPER LOW CURRENT CONSUMPTION

### Features

- Output voltage: 1.0 V to 3.5 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: ±1.0% (1.0 V to 1.45 V output product: ±15 mV) (Ta = +25°C)
- Dropout voltage: 20 mV typ. (2.5 V output product, at $I_{OUT}$ = 10 mA) (Ta = +25°C)
- Current consumption during operation: 0.35 µA typ. (Ta = +25°C)
- Output current: Possible to output 100 mA (at $V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input capacitor: A ceramic capacitor can be used. (1.0 µF or more)
- Output capacitor: A ceramic capacitor can be used. (1.0 µF to 100 µF)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free (Sn 100%), halogen-free

***1.** Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

SOT-23-5




1 VIN
2 VSS
3 NC
4 NC
5 VOUT

HSNT-4(1010)


1 VOUT
2 VSS
3 NC
4 VIN

# S-1318 Series

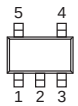
## 5.5 V INPUT, 100 mA, 95 nA SUPER LOW CURRENT CONSUMPTION VOLTAGE REGULATOR

### Features

- Output voltage: 1.2 V, 1.8 V, 2.2 V, 2.3 V, 2.5 V, 2.8 V, 3.0 V, 3.3 V
- Input voltage: 1.7 V to 5.5 V
- Output voltage accuracy: ±1.0% (1.2 V output product: ±15 mV) (Ta = +25°C)
- Dropout voltage: 45 mV typ. (2.5 V output product, at $I_{OUT}$ = 10 mA) (Ta = +25°C)
- Current consumption : During operation: 95 nA typ.
  During power-off: 2 nA typ.
- Output current: Possible to output 75 mA
  (1.2 V output product, at $V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
  Possible to output 100 mA (1.8 V, 2.2 V, 2.3 V, 2.5 V, 2.8 V, 3.0 V, 3.3 V output product, at $V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input capacitor: A ceramic capacitor can be used (1.0 µF or more)
- Output capacitor: A ceramic capacitor can be used (1.0 µF or more)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor
- Built-in ON / OFF circuit: Ensures long battery life
  Discharge shunt function "available" / "unavailable" is selectable.
  Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free (Sn 100%), halogen-free

***1.** Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 NC
5 VOUT

HSNT-4(1010)


1 VOUT
2 VSS
3 ON/OFF
4 VIN

# S-1112/1122 Series

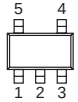
## HIGH RIPPLE-REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

### Features

- Output voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Output voltage accuracy: ±1.0%
- Dropout voltage: 190 mV typ. (3.0 V output product, $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 50 µA typ., 90 µA max.
  During power-off: 0.1 µA typ., 1.0 µA max.
- Output current: Possible to output 150 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Output capacitor: A ceramic capacitor of 0.47 µF or more can be used.
- Ripple rejection: 80 dB typ. (f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON/OFF circuit: Ensures long battery life.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

***1.** Attention should be paid to the power dissipation of the package when the output current is large.
***2.** Refer to "■ **Product Name Structure**" for details.

SOT-23-5




| | S-1112 | S-1122 |
|---|---|---|
| 1 | VIN | VOUT |
| 2 | VSS | VSS |
| 3 | ON/OFF | VIN |
| 4 | NC | ON/OFF |
| 5 | VOUT | NC |

SNT-6A(H)


S-1112
1 NC
2 VSS
3 ON/OFF
4 VIN
5 VSS
6 VOUT

# S-T111 Series

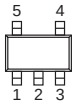
## HIGH RIPPLE-REJECTION LOW DROPOUT CMOS VOLTAGE REGULATOR

### Features

- Output voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Output voltage accuracy: ±1.0%
- Dropout voltage: 190 mV typ. (3.0 V output product, $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 50 µA typ., 90 µA max.
  During power-off: 0.1 µA typ., 1.0 µA max.
- Output current: Possible to output 150 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 0.1 µF or more can be used.
- Ripple rejection: 80 dB typ. (f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON/OFF circuit: Ensures long battery life.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

***1.** Attention should be paid to the power dissipation of the package when the output current is large.
***2.** Refer to "■ **Product Name Structure**" for details.

SOT-23-5




1 ON/OFF
2 VSS
3 NC
4 VOUT
5 VIN

# S-1167 Series

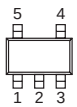
## ULTRA LOW CURRENT CONSUMPTION, HIGH RIPPLE REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

### Features

- Output voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Input voltage: 2.0 V to 6.5 V
- Output voltage accuracy: ±1.0%
- Dropout voltage: 150 mV typ. (3.0 V output product, $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 9 μA typ., 16 μA max.
  During power-off: 0.1 μA typ., 0.9 μA max.
- Output current: Possible to output 150 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Ripple rejection: 70 dB typ. (3.0 V output product, f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON / OFF circuit: Ensures long battery life.
- Operation temperature range: Ta = −40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

*1. Attention should be paid to the power dissipation of the package when the output current is large.
*2. Refer to "■ **Product Name Structure**" for details.

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 NC
5 VOUT

SNT-6A(H)


1 VOUT
2 VSS
3 NC
4 ON/OFF
5 VSS
6 VIN

# S-1323 Series

## HIGH RIPPLE-REJECTION AND SMALL PACKAGE CMOS VOLTAGE REGULATOR

### Features

- Output voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Output voltage accuracy: ±1.0%
- Current consumption: During operation: 70 μA typ., 90 μA max.
  During power-off: 0.1 μA typ., 1.0 μA max.
- Output current: Possible to output 150 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Ripple rejection: 70 dB typ. (f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON/OFF circuit: Ensures long battery life.
- Operation temperature range: Ta = −40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

*1. Attention should be paid to the power dissipation of the package when the output current is large.
*2. Refer to "■ **Product Name Structure**" for details.

SC-82AB


1 VOUT
2 VSS
3 ON/OFF
4 VIN

SNT-4A


1 VOUT
2 VIN
3 ON/OFF
4 VSS

# S-1200 Series

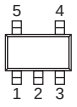
## HIGH RIPPLE-REJECTION LOW DROPOUT LOW INPUT-AND-OUTPUT CAPACITANCE CMOS VOLTAGE REGULATOR

### Features

- Output voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Input voltage: 2.0 V to 10.0 V
- Output voltage accuracy: ±1.0%
- Dropout voltage: 140 mV typ. (3.0 V output product, $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 18 μA typ., 40 μA max.
  During power-off: 0.01 μA typ., 1.0 μA max.
- Output current: Possible to output 150 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 0.1 μF or more can be used.
- Ripple rejection: 70 dB typ. (f = 1.0 kHz, 1.5 V ≤ $V_{OUT}$ ≤ 3.0 V)
  65 dB typ. (f = 1.0 kHz, 3.1 V ≤ $V_{OUT}$ ≤ 5.5 V)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON/OFF circuit: Ensures long battery life.
- Operation temperature range: Ta = −40°C to + 85°C
- Lead-free, Sn 100%, halogen-free*2

*1. Attention should be paid to the power dissipation of the package when the output current is large.
*2. Refer to "■ **Product Name Structure**" for details.

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 NC
5 VOUT

HSNT-6A


1 VOUT
2 NC
3 VSS
4 ON/OFF
5 NC
6 VIN

SNT-6A(H)


1 VOUT
2 VSS
3 NC
4 ON/OFF
5 VSS
6 VIN

# S-L2980 Series

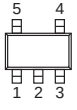
## HIGH RIPPLE-REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

### Features

- Output voltage: 1.5 V to 6.0 V, selectable in 0.1 V steps
- Output voltage accuracy: ±2.0 %
- Dropout voltage: 120 mV typ. (3.0 V output product, $I_{OUT}$=50 mA)
- Current consumption: During operation: 90 μA typ., 140 μA max.
  During power-off: 0.1 μA typ., 1.0 μA max.
- Output current: Possible to output 150 mA ($V_{IN} \geq V_{OUT(S)}$+1.0 V)*1
- Output capacitor: A ceramic capacitor of 1.0 μF or more can be used.
  (A ceramic capacitor of 2.2 μF or more can be used for the products whose output voltage is 1.7 V or less.)
- Ripple rejection: 70 dB typ. (f=1.0 kHz)
- Built-in ON/OFF circuit: Ensures long battery life.
- Operation temperature range: Ta=−40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

*1. Attention should be paid to the power dissipation of the package when the load is large.
*2. Refer to "■ **Product Name Structure**" for details.

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 NC
5 VOUT

# S-1312 Series

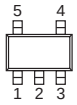
## 5.5 V INPUT, 150 mA VOLTAGE REGULATOR

## Features

- Output voltage: 1.0 V to 3.5 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: ±1.0% (1.0 V to 1.45 V output product: ±15 mV)
- Dropout voltage: 160 mV typ. (2.8 V output product, $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 20 µA typ., 30 µA max.
  During power-off: 0.1 µA typ., 1.0 µA max.
- Output current: Possible to output 150 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 0.22 µF or more can be used.
- Ripple rejection: 75 dB typ. (1.2 V output product, f = 1.0 kHz)
  70 dB typ. (2.85 V output product, f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in ON / OFF circuit: Ensures long battery life.
  Discharge shunt function "available" / "unavailable" is selectable.
  Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free (Sn 100%), halogen-free

***1.** Attention should be paid to the power dissipation of the package when the output current is large.

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 NC
5 VOUT

HSNT-4(1010)


1 VOUT
2 VSS
3 ON/OFF
4 VIN

HSNT-4(0808)


1 VOUT
2 VSS
3 ON/OFF
4 VIN

# S-1312xxxH Series

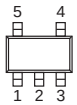
## 105°C OPERATION, 5.5 V INPUT, 150 mA VOLTAGE REGULATOR

## Features

- Output voltage: 1.0 V to 3.5 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: ±1.0% (1.0 V to 1.45 V output product: ±15 mV)
- Dropout voltage: 160 mV typ. (2.8 V output product, $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 20 µA typ., 30 µA max.
  During power-off: 0.1 µA typ., 1.0 µA max.
- Output current: Possible to output 150 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 0.22 µF or more can be used.
- Ripple rejection: 75 dB typ. (1.2 V output product, f = 1.0 kHz)
  70 dB typ. (2.85 V output product, f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in ON / OFF circuit: Ensures long battery life.
  Discharge shunt function "available" / "unavailable" is selectable.
  Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: Ta = –40°C to +105°C
- Lead-free (Sn 100%), halogen-free

***1.** Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 NC
5 VOUT

HSNT-4(1010)


1 VOUT
2 VSS
3 ON/OFF
4 VIN

# S-1335 Series

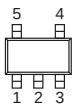
## 5.5 V INPUT, 150 mA VOLTAGE REGULATOR WITH SOFT-START FUNCTION

## Features

- Output voltage: 1.0 V to 3.6 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: ±1.0% (1.0 V to 1.45 V output product: ±15 mV)
- Dropout voltage: 70 mV typ. (2.8 V output product, $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 36 µA typ., 54 µA max.
  During power-off: 0.1 µA typ., 1.0 µA max.
- Output current: Possible to output 150 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 1.0 µF or more can be used.
- Ripple rejection: 70 dB typ. (f = 10 kHz, $V_{OUT(S)} \leq 2.5$ V)
  80 dB typ. (f = 1.0 kHz)
- Built-in soft-start circuit: The rising time of output voltage immediately after power-on or after the ON / OFF pin is set to ON is adjustable.
  The soft-start time of SOT-23-5 can be switched to $t_{SS0}$ = 0.1 ms typ. / $t_{SS1}$ = 1.0 ms typ. with the SST pin.
  The soft-start time of SC-82AB is fixed to $t_{SS0}$ = 0.1 ms typ.
  The soft-start time of HSNT-4 (1010) is fixed to either $t_{SS0}$ = 0.1 ms typ. or $t_{SS1}$ = 1.0 ms typ.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON / OFF circuit: Ensures long battery life.
  Discharge shunt function "available" / "unavailable" is selectable.
  Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free (Sn 100%), halogen-free

***1.** Attention should be paid to the power dissipation of the package when the output current is large.

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 SST
5 VOUT

SC-82AB


1 ON/OFF
2 VSS
3 VOUT
4 VIN

HSNT-4(1010)


1 VOUT
2 VSS
3 ON/OFF
4 VIN

# S-13R1 Series

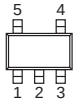
## 5.5 V INPUT, 150 mA VOLTAGE REGULATOR WITH REVERSE CURRENT PROTECTION

## Features

- Output voltage: 1.2 V to 4.0 V, selectable in 0.05 V step
- Input voltage: 2.0 V to 5.5 V
- Output voltage accuracy: ±1.0% (1.2 V to 1.45 V output product: ±15 mV)
- Dropout voltage: 150 mV typ. (3.0 V output product, $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 5 µA typ., 9 µA max.
  During power-off: 0.1 µA typ., 1.0 µA max.
- Output current: Possible to output 150 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 1.0 µF or more can be used.
- Ripple rejection: 70 dB typ. (3.0 V output product, f = 1.0 kHz)
- Reverse current protection function: $I_{REV}$ = 0.09 µA max.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in ON / OFF circuit: Ensures long battery life.
  Discharge shunt function "available" / "unavailable" is selectable.
  Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free (Sn 100%), halogen-free

***1.** Attention should be paid to the power dissipation of the package when the output current is large.

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 NC
5 VOUT

SC-82AB


1 ON/OFF
2 VSS
3 VOUT
4 VIN

HSNT-4(1010)


1 VOUT
2 VSS
3 ON/OFF
4 VIN

# S-1165 Series

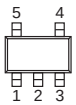
## HIGH RIPPLE-REJECTION LOW DROPOUT CMOS VOLTAGE REGULATOR

## Features

- Output voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Output voltage accuracy: ±1.0%
- Dropout voltage: 140 mV typ. (3.0 V output product, $I_{OUT}$ = 200 mA)
- Current consumption: During operation: 35 µA typ., 65 µA max.
  During power-off: 0.1 µA typ., 1.0 µA max.
- Output current: Possible to output 200 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Ripple rejection: 70 dB typ. (f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON/OFF circuit: Ensures long battery life.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

***1.** Attention should be paid to the power dissipation of the package when the output current is large.
***2.** Refer to "■ **Product Name Structure**" for details.

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 NC
5 VOUT

# S-1313 Series

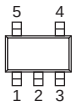
## 5.5 V INPUT, 200 mA VOLTAGE REGULATOR

## Features

- Output voltage: 1.0 V to 3.5 V, selectable in 0.05 V step.
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: ±1.0% (1.0 V to 1.45 V output product: ±15 mV)
- Dropout voltage: 170 mV typ. (2.8 V output product, $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 0.9 µA typ., 1.35 µA max.
  During power-off: 0.01 µA typ., 0.1 µA max.
- Output current: Possible to output 200 mA ($V_{OUT(S)} \geq 1.4$ V, $V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 0.1 µF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in ON / OFF circuit: Ensures long battery life.
  Discharge shunt function "available" / "unavailable" is selectable.
  Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free (Sn 100%), halogen-free

***1.** Attention should be paid to the power dissipation of the package when the output current is large.

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 NC
5 VOUT

SC-82AB


1 ON/OFF
2 VSS
3 VOUT
4 VIN

HSNT-4(1010)


1 VOUT
2 VSS
3 ON/OFF
4 VIN

HSNT-4(0808)


1 VOUT
2 VSS
3 ON/OFF
4 VIN

# S-1313xxxH Series

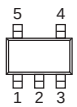
## 105°C OPERATION, 5.5 V INPUT, 200 mA VOLTAGE REGULATOR

## Features

- Output voltage: 1.0 V to 3.5 V, selectable in 0.05 V step.
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: ±1.0% (1.0 V to 1.45 V output product: ±15 mV)
- Dropout voltage: 170 mV typ. (2.8 V output product, $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 0.9 µA typ., 1.35 µA max.
  During power-off: 0.01 µA typ., 0.1 µA max.
- Output current: Possible to output 200 mA ($V_{OUT(S)} \geq 1.4$ V, $V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input capacitor: A ceramic capacitor can be used. (0.1 µF or more)
- Output capacitor: A ceramic capacitor can be used. (0.1 µF or more)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor
- Built-in thermal shutdown circuit: Detection temperature 150°C typ.
- Built-in ON / OFF circuit: Ensures long battery life
  Discharge shunt function "available" / "unavailable" is selectable.
  Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: Ta = –40°C to +105°C
- Lead-free (Sn 100%), halogen-free

***1.** Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 NC
5 VOUT

SC-82AB


1 ON/OFF
2 VSS
3 VOUT
4 VIN

HSNT-4(1010)


1 VOUT
2 VSS
3 ON/OFF
4 VIN

HSNT-4(0808)


1 VOUT
2 VSS
3 ON/OFF
4 VIN

# S-1315 Series

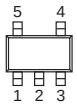
## 5.5 V INPUT, 200 mA, OUTPUT CAPACITOR-LESS VOLTAGE REGULATOR

## Features

- Output voltage: 1.0 V to 4.2 V, selectable in 0.05 V step
- Input voltage: 1.4 V to 5.5 V
- Output voltage accuracy: ±1.0% (1.0 V to 1.45 V output product: ±15 mV)
- Dropout voltage: 224 mV typ. (3.0 V output product, $I_{OUT}$ = 200 mA)
- Current consumption: During operation: 7 µA typ., 13 µA max.
  During power-off: 0.1 µA typ., 1.0 µA max.
- Output current: Possible to output 200 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 0.1 µF or more can be used for the input capacitor.
  Output capacitor is unnecessary, or a ceramic capacitor of 10 µF or less can be used.
- Ripple rejection: 65 dB typ. (1.0 V output product, f = 1.0 kHz)
  60 dB typ. (2.8 V output product, f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON / OFF circuit: Ensures long battery life.
  Discharge shunt function "available" / "unavailable" is selectable.
  Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free (Sn 100%), halogen-free

***1.** Attention should be paid to the power dissipation of the package when the output current is large.

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 NC
5 VOUT

HSNT-6(1212)


1 VOUT
2 VSS
3 NC
4 ON/OFF
5 NC
6 VIN

# S-1324 Series

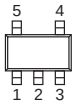
## 5.5 V INPUT, 200 mA, LOW NOISE VOLTAGE REGULATOR

## Features

- Output voltage: 1.0 V to 3.5 V, selectable in 0.05 V step.
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: ±1.0% (1.0 V to 1.45 V output product: ±15 mV)
- Dropout voltage: 170 mV typ. (2.8 V output product, at $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 7 µA typ., 12 µA max.
  During power-off: 0.01 µA typ., 0.1 µA max.
- Output current: Possible to output 100 mA
  (at 1.0 V ≤ $V_{OUT(S)}$ < 1.2 V, $V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
  Possible to output 200 mA
  (at $V_{OUT(S)} \geq 1.2$ V, $V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input capacitor: A ceramic capacitor can be used. (1.0 µF or more)
- Output capacitor: A ceramic capacitor can be used. (1.0 µF or more)
- Output noise: 17 µVrms typ. (at BW = 10 Hz to 100 kHz)
- Ripple rejection: 65 dB typ.(at f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor
- Built-in thermal shutdown circuit: Detection temperature 150°C typ.
- Built-in ON / OFF circuit: Ensures long battery life
  Discharge shunt function "available" / "unavailable" is selectable.
  Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free (Sn 100%), halogen-free

***1.** Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 NC
5 VOUT

SC-82AB


1 ON/OFF
2 VSS
3 VOUT
4 VIN

HSNT-4(1010)


1 VOUT
2 VSS
3 ON/OFF
4 VIN

# S-1206 Series

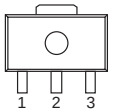
## ULTRA LOW CURRENT CONSUMPTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

## Features

- Output voltage: 1.2 V to 5.2 V, selectable in 0.05 V step
- Input voltage: 1.7 V to 6.5 V
- Output voltage accuracy: ±1.0% (1.2 V to 1.45 V output product: ±15 mV)
- Dropout voltage: 150 mV typ. (3.0 V output product, $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 1.0 µA typ., 1.5 µA max.
- Output current: Possible to output 250 mA (3.0 V output product, $V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 0.1 µF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

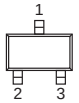
***1.** Attention should be paid to the power dissipation of the package when the output current is large.
***2.** Refer to "■ **Product Name Structure**" for details.

SOT-89-3




1 VSS
2 VIN
3 VOUT

SOT-23-3




1 VIN
2 VSS
3 VOUT

SNT-6A(H)


1 VOUT
2 VIN
3 VSS
4 NC
5 VIN
6 NC

# S-1131 Series

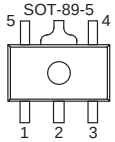
## HIGH RIPPLE-REJECTION AND LOW DROPOUT MIDDLE OUTPUT CURRENT CMOS VOLTAGE REGULATOR

## Features

- Output voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Output voltage accuracy: ±1.0%
- Dropout voltage: 250 mV typ. (3.0 V output product, $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 35 μA typ., 65 μA max.
  During power-off: 0.1 μA typ., 1.0 μA max.
- Output current: Possible to output 300 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Ripple rejection: 70 dB typ. (f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON/OFF circuit: Ensures long battery life.
- Operation temperature range: Ta = −40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

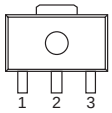
***1.** Attention should be paid to the power dissipation of the package when the output current is large.
***2.** Refer to "■ **Product Name Structure**" for details.

SOT-89-5




1 VOUT
2 VSS
3 NC
4 ON/OFF
5 VIN

SOT-89-3




1 VOUT
2 VSS
3 VIN

6-Pin HSON(A)


1 VOUT
2 VSS
3 NC
4 NC
5 ON/OFF
6 VIN

# S-1132 Series

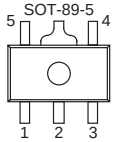
## HIGH RIPPLE-REJECTION AND LOW DROPOUT MIDDLE OUTPUT CURRENT CMOS VOLTAGE REGULATOR

## Features

- Output voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Input voltage: 2.0 V to 6.5 V
- Output voltage accuracy: ±1.0%
- Dropout voltage: 130 mV typ. (3.0 V output product, $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 20 μA typ., 40 μA max.
  During power-off: 0.01 μA typ., 1.0 μA max.
- Output current: Possible to output 300 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 0.1 μF or more can be used.
- Ripple rejection: 70 dB typ. (f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON/OFF circuit: Ensures long battery life.
- Operation temperature range: Ta = −40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

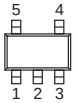
***1.** Attention should be paid to the power dissipation of the package when the output current is large.
***2.** Refer to "■ **Product Name Structure**" for details.

SOT-89-5




1 VOUT
2 VSS
3 NC
4 ON/OFF
5 VIN

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 NC
5 VOUT

SNT-6A(H)


1 VOUT
2 VSS
3 NC
4 ON/OFF
5 VSS
6 VIN

# S-1133 Series

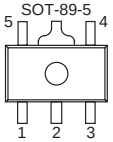
## HIGH RIPPLE-REJECTION AND LOW DROPOUT MIDDLE-OUTPUT CURRENT CMOS VOLTAGE REGULATOR

## Features

- Output voltage (internally set): 1.2 V to 6.0 V, selectable in 0.1 V step.
- Output voltage (externally set): 1.8 V to 8.2 V, settable via external resistor (S-1133B00/S-1133A00)
- Input voltage: 2.0 V to 10 V
- Output voltage accuracy: ±1.0% (1.2 V to 1.4 V output product: ±15 mV)
- Dropout voltage: 130 mV typ. (3.0 V output product, $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 60 μA typ., 90 μA max.
  During power-off: 0.1 μA typ., 1.0 μA max.
- Output current: Possible to output 300 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
  (A ceramic capacitor of 2.2 μF or more can be used for products whose output voltage is 1.7 V or less.)
- Ripple rejection: 70 dB typ. (1.2 V output product, f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in ON / OFF circuit: Ensures long battery life.
- Operation temperature range: Ta = −40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

***1.** Attention should be paid to the power dissipation of the package when the output current is large.
***2.** Refer to "■ **Product Name Structure**" for details.

SOT-89-5




S-1133x12~S-1133x60
1 NC
2 VSS
3 ON/OFF
4 VIN
5 VOUT

S-1133B00, S-1133A00
1 VADJ
2 VSS
3 ON/OFF
4 VIN
5 VOUT

SNT-8A


S-1133x12~S-1133x60
1 VOUT
2 VOUT
3 NC
4 NC
5 VSS
6 ON/OFF
7 VIN
8 VIN

S-1133B00, S-1133A00
1 VOUT
2 VOUT
3 VADJ
4 NC
5 VSS
6 ON/OFF
7 VIN
8 VIN

# S-1135 Series

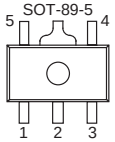
## 5.5 V INPUT, 300 mA VOLTAGE REGULATOR

## Features

- Output voltage: 1.0 V to 3.5 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: ±1.0% (1.0 V to 1.45 V output product : ±15 mV)
- Dropout voltage: 160 mV typ. (2.6 V output product, $I_{OUT}$ = 300 mA)
- Current consumption: During operation: 45 μA typ., 65 μA max.
  During power-off: 0.1 μA typ., 1.0 μA max.
- Output current: Possible to output 300 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors : A ceramic capacitor of 1.0 μF or more can be used.
- Ripple rejection: 70 dB typ. (1.0 V output product, f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON / OFF circuit: Ensures long battery life.
  Discharge shunt function "available" / "unavailable" is selectable.
  Pull-down / pull-up function "available" / "unavailable" is selectable.
- Operation temperature range: Ta = −40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

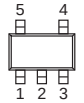
***1.** Attention should be paid to the power dissipation of the package when the output current is large.
***2.** Refer to "■ **Product Name Structure**" for details.

SOT-89-5



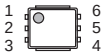

1 VOUT
2 VSS
3 NC
4 ON/OFF
5 VIN

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 NC
5 VOUT

HSNT-6A




1 VOUT
2 VSS
3 NC
4 ON/OFF
5 NC
6 VIN

# S-1137 Series

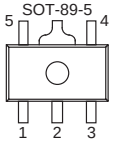
## 5.5 V INPUT, 300 mA VOLTAGE REGULATOR WITH SOFT-START FUNCTION

## Features

- Output voltage: 1.2 V to 3.5 V, selectable in 0.05 V step
- Input voltage: 1.7 V to 5.5 V
- Output voltage accuracy: ±1.0% (1.2 V to 1.45 V output product : ±15 mV)
- Dropout voltage: 210 mV typ. (2.8 V output product, $I_{OUT}$ = 300 mA)
- Current consumption: During operation: 45 µA typ., 65 µA max.
  During power-off: 0.1 µA typ., 1.0 µA max.
- Output current: Possible to output 300 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 1.0 µF or more can be used.
- Ripple rejection: 70 dB typ. (f = 1.0 kHz)
- Built-in soft-start circuit: Soft-start time : 0.7 ms typ. ($C_{SS}$ = 1.0 nF)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON / OFF circuit: Ensures long battery life.
  Discharge shunt function "available" / "unavailable" is selectable.
  Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

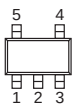
***1.** Attention should be paid to the power dissipation of the package when the output current is large.
***2.** Refer to "■ **Product Name Structure**" for details.

SOT-89-5




1 VOUT
2 VSS
3 SSC
4 ON/OFF
5 VIN

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 SSC
5 VOUT

SNT-6A(H)


1 VOUT
2 VSS
3 SSC
4 ON/OFF
5 VSS
6 VIN

# S-1333 Series

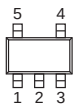
## 5.5 V INPUT, 300 mA VOLTAGE REGULATOR

## Features

- Output voltage: 1.0 V to 3.5 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: ±1.0% (1.0 V to 1.45 V output product: ±15 mV)
- Dropout voltage: 160 mV typ. (2.8 V output product, $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 25 µA typ., 38 µA max.
  During power-off: 0.1 µA typ., 1.0 µA max.
- Output current: Possible to output 300 mA ($V_{OUT(S)} \geq 1.3$ V, $V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 1.0 µF or more can be used.
- Ripple rejection: 75 dB typ. (1.6 V output product, f = 1.0 kHz)
  70 dB typ. (2.85 V output product, f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in ON / OFF circuit: Ensures long battery life.
  Discharge shunt function "available" / "unavailable" is selectable.
  Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free (Sn 100%), halogen-free

***1.** Attention should be paid to the power dissipation of the package when the output current is large.

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 NC
5 VOUT

HSNT-4(1010)


1 VOUT
2 VSS
3 ON/OFF
4 VIN

HSNT-4(0808)


1 VOUT
2 VSS
3 ON/OFF
4 VIN

# S-1213 Series

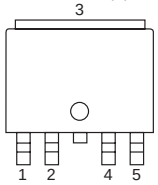
## 105°C OPERATION, 36 V INPUT, 500 mA VOLTAGE REGULATOR

## Features

- Output voltage (internally set): 1.8 V, 3.0 V, 3.3 V, 5.0 V, 8.0 V, 12.0 V, 15.0 V
- Output voltage (externally set): 1.8 V to 30.0 V, settable via external resistor
- Input voltage: 2.8 V to 36.0 V
- Output voltage accuracy: ±1.0% (Ta = +25°C)
- Current consumption: During operation: 5.0 µA typ.(Ta = +25°C)
  During power-off: 0.1 µA typ.(Ta = +25°C)
- Output current: Possible to output 500 mA (at $V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor can be used. (1.0 µF or more)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
  (with a detection function of the difference between input and output voltage)
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.
  Discharge shunt function is available.
  Pull-down function is available.
- Operation temperature range: Ta = –40°C to +105°C
- Lead-free (Sn 100%), halogen-free

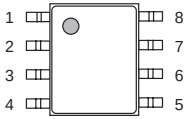
***1.** Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.
***2.** Contact our sales representatives for details.

TO-252-5S(A)




| S-1213B18,30,33, 50,80,C0,F0 | S-1213B00 |
|---|---|
| 1 VIN | VIN |
| 2 ON/OFF | ON/OFF |
| 3 VSS | VSS |
| 4 NC | VADJ |
| 5 VOUT | VOUT |

HSOP-8A




| S-1213B18,30,33, 50,80,C0,F0 | S-1213B00 |
|---|---|
| 1 VIN | VIN |
| 2 NC | NC |
| 3 NC | NC |
| 4 ON/OFF | ON/OFF |
| 5 VSS | VSS |
| 6 NC | NC |
| 7 NC | VADJ |
| 8 VOUT | VOUT |

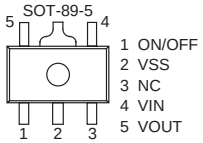
# S-1155 Series

## HIGH RIPPLE-REJECTION LOW DROPOUT HIGH OUTPUT CURRENT CMOS VOLTAGE REGULATOR

## Features

- Output voltage: 1.0 V to 5.0 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: ±1.0% (1.0 V to 1.45 V output product: ±15 mV)
- Dropout voltage: 70 mV typ. (3.0 V output product, $I_{OUT}$ = 200 mA)
- Current consumption: During operation: 70 μA typ., 90 μA max. (3.0 V output product)
  During power-off: 0.1 μA typ., 1.0 μA max.
- Output current: Possible to output 500 mA (3.0 V output product, $V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 4.7 μF or more can be used.
- Ripple rejection: 70 dB typ. (1.0 V output product, f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in inrush current limit circuit: Limits excessive inrush current at power-on.
- Built-in ON/OFF circuit: Ensures long battery life.
- Operation temperature range: Ta = −40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

***1.** Attention should be paid to the power dissipation of the package when the output current is large.
***2.** Refer to "■ **Product Name Structure**" for details.



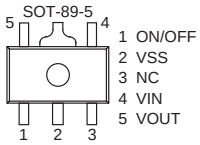

# S-1170 Series

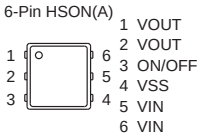
## HIGH RIPPLE-REJECTION AND LOW DROPOUT HIGH OUTPUT CURRENT CMOS VOLTAGE REGULATOR

## Features

- Output voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Output voltage accuracy: ±1.0%
- Dropout voltage: 120 mV typ. (3.0 V output product, $I_{OUT}$ = 300 mA)
- Current consumption: During operation: 80 μA typ., 160 μA max.
  During power-off: 0.1 μA typ., 1.0 μA max.
- Output current: Possible to output 800 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 4.7 μF or more can be used.
- Ripple rejection: 70 dB typ. (f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in ON/OFF circuit: Ensures long battery life.
- Operation temperature range: Ta = −40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

***1.** Attention should be paid to the power dissipation of the package when the output current is large.
***2.** Refer to "■ **Product Name Structure**" for details.



# S-1214 Series

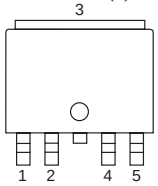
## 105°C OPERATION, 36 V INPUT, 1000 mA VOLTAGE REGULATOR

## Features

- Output voltage (internally set): 1.8 V, 3.0 V, 3.3 V, 5.0 V, 8.0 V, 12.0 V, 15.0 V
- Output voltage (externally set): 1.8 V to 30.0 V, settable via external resistor
- Input voltage: 2.8 V to 36.0 V
- Output voltage accuracy: ±1.0% (Ta = +25°C)
- Current consumption: During operation: 5.0 μA typ.(Ta = +25°C)
  During power-off: 0.1 μA typ.(Ta = +25°C)
- Output current: Possible to output 1000 mA (at $V_{IN} \geq V_{OUT(S)} + 2.0$ V)*1
- Input and output capacitors: A ceramic capacitor can be used. (1.0 μF or more)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor. (with a detection function of the difference between input and output voltage)
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in ON / OFF circuit: Ensures long battery life. Discharge shunt function is available. Pull-down function is available.
- Operation temperature range: Ta = −40°C to +105°C
- Lead-free (Sn 100%), halogen-free

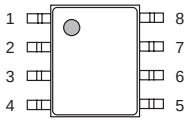
***1.** Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.
***2.** Contact our sales representatives for details.

TO-252-5S(A)




| S-1214B18,30,33, 50,80,C0,F0 | S-1214B00 |
|---|---|
| 1 VIN | VIN |
| 2 ON/OFF | ON/OFF |
| 3 VSS | VSS |
| 4 NC | VADJ |
| 5 VOUT | VOUT |

HSOP-8A




| S-1214B18,30,33, 50,80,C0,F0 | S-1214B00 |
|---|---|
| 1 VIN | VIN |
| 2 NC | NC |
| 3 NC | NC |
| 4 ON/OFF | ON/OFF |
| 5 VSS | VSS |
| 6 NC | NC |
| 7 NC | VADJ |
| 8 VOUT | VOUT |

# S-1172 Series

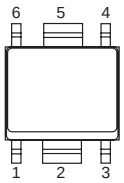
## HIGH RIPPLE-REJECTION LOW DROPOUT HIGH OUTPUT CURRENT CMOS VOLTAGE REGULATOR

## Features

- Output voltage: 1.0 V to 5.0 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: ±1.0% (1.0 V to 1.45 V output product: ±15 mV)
- Dropout voltage: 70 mV typ. (3.0 V output product, $I_{OUT}$ = 300 mA)
- Current consumption: During operation: 70 μA typ., 90 μA max. (3.0 V output product)
  During power-off: 0.1 μA typ., 1.0 μA max.
- Output current: Possible to output 1000 mA (3.0 V output product, $V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 4.7 μF or more can be used.
- Ripple rejection: 70 dB typ. (1.0 V output product, f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in inrush current limit circuit: Limits excessive inrush current at power-on.
- Built-in ON/OFF circuit: Ensures Long battery life.
- Operation temperature range: Ta = −40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

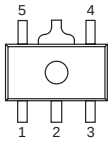
***1.** Attention should be paid to the power dissipation of the package when the output current is large.
***2.** Refer to "■ **Product Name Structure**" for details.

HSOP-6




1 VOUT
2 VSS
3 ON/OFF
4 NC
5 VSS
6 VIN

SOT-89-5




1 ON/OFF
2 VSS
3 NC
4 VIN
5 VOUT

# S-13A1 Series

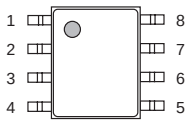
## 5.5 V INPUT, 1000 mA VOLTAGE REGULATOR

## Features

- Output voltage (internally set): 1.0 V to 3.5 V, selectable in 0.05 V step
- Output voltage (externally set): 1.05 V to 5.0 V, settable via external resistor (HSOP-8A, HSOP-6 and SOT-89-5 only)
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: ±1.0% (internally set, 1.0 V to 1.45 V output product: ±15 mV)
- Dropout voltage: 70 mV typ. (3.0 V output product, $I_{OUT}$ = 300 mA)
- Current consumption: During operation: 60 µA typ., 90 µA max.
  During power-off: 0.1 µA typ., 1.0 µA max.
- Output current: Possible to output 1000 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 2.2 µF or more can be used.
- Ripple rejection: 70 dB typ. (f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in inrush current limit circuit: Limits excessive inrush current generated at power-on or at the time when the ON / OFF pin is set to ON.
  For types in which output voltage is internally set of HSOP-8A, HSOP-6 and SOT-89-5 inrush current limit time can be changed via an external capacitor ($C_{SS}$).
  Inrush current limit time 0.7 ms typ.
  (types in which output voltage is internally set of HSOP-8A, HSOP-6 SOT-89-5, $C_{SS}$ = 1.0 nF)
  Inrush current limit time 0.4 ms typ.
  (types in which output voltage is internally set of HSOP-8A, HSOP-6, SOT-89-5, SSC pin = open)
  Inrush current limit time 0.4 ms typ.
  (types in which output voltage is externally set of HSOP-8A, HSOP-6, SOT-89-5, types in which output voltage is internally set of HSNT-6A*2)
- Built-in ON / OFF circuit: Ensures long battery life.
  Discharge shunt function "available" / "unavailable" is selectable.
  Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free (Sn 100%), halogen-free

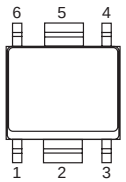
***1.** Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.
***2.** Types in which output voltage is externally set are unavailable.

HSOP-8A



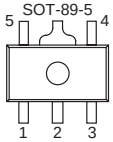

| | S-13A1x10~13A1x35 | S-13A1x00 |
|---|---|---|
| 1 | VOUT | VOUT |
| 2 | ON/OFF | VADJ |
| 3 | NC | NC |
| 4 | VSS | VSS |
| 5 | SSC | ON/OFF |
| 6 | NC | NC |
| 7 | NC | NC |
| 8 | VIN | VIN |

HSOP-6



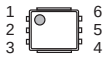

| | S-13A1x10~13A1x35 | S-13A1x00 |
|---|---|---|
| 1 | VOUT | VOUT |
| 2 | VSS | VSS |
| 3 | ON/OFF | VADJ |
| 4 | SSC | ON/OFF |
| 5 | VSS | VSS |
| 6 | VIN | VIN |

SOT-89-5




| | S-13A1x10~13A1x35 | S-13A1x00 |
|---|---|---|
| 1 | ON/OFF | VADJ |
| 2 | VSS | VSS |
| 3 | SSC | ON/OFF |
| 4 | VIN | VIN |
| 5 | VOUT | VOUT |

HSNT-6A




| | S-13A1x10~13A1x35 |
|---|---|
| 1 | VOUT |
| 2 | VOUT |
| 3 | ON/OFF |
| 4 | VSS |
| 5 | VIN |
| 6 | VIN |

# S-812C Series

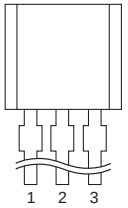
## 16 V INPUT, 75 mA VOLTAGE REGULATOR

## Features

- Output voltage: 2.0 V to 6.0 V, selectable in 0.1 V step
- Input voltage: 16 V max.
- Output voltage accuracy: ±2.0%
- Dropout voltage: 120 mV typ. (5.0 V output product, $I_{OUT}$ = 10 mA)
- Current consumption: During operation: 1.0 µA typ., 1.8 µA max. (3.0 V output product)
- Output current: Possible to output 50 mA (3.0 V output product, $V_{IN}$ = 5 V)*1
  Possible to output 75 mA (5.0 V output product, $V_{IN}$ = 7 V)*1
- Built-in ON/OFF circuit: Selectable available / unavailable of power-off function
  Selectable active “H” / “L” in the regulator
- Built-in short-circuit protection circuit: Selectable available / unavailable of short-circuit protection circuit
  Available short-circuit protection: Short-circuit current 40 mA typ.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

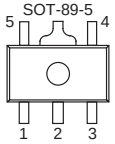
***1.** Attention should be paid to the power dissipation of the package when the load is large.
***2.** Refer to “■ **Product Name Structure**” for details.

TO-92



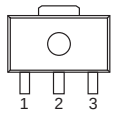

| | |
|---|---|
| 1 | VSS |
| 2 | VIN |
| 3 | VOUT |

SOT-89-5



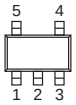

| | B type | A/E type |
|---|---|---|
| 1 | VOUT | VOUT |
| 2 | VIN | VIN |
| 3 | VSS | VSS |
| 4 | ON/OFF | NC |
| 5 | NC | NC |

SOT-89-3



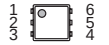

| | |
|---|---|
| 1 | VSS |
| 2 | VIN |
| 3 | VOUT |

SOT-23-5



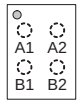

| | B type | A/E type |
|---|---|---|
| 1 | VSS | VSS |
| 2 | VIN | VIN |
| 3 | VOUT | VOUT |
| 4 | NC | NC |
| 5 | ON/OFF | NC |

SNT-6A(H)




| | |
|---|---|
| 1 | NC |
| 2 | VIN |
| 3 | VOUT |
| 4 | VSS |
| 5 | VIN |
| 6 | ON/OFF |

WLP-4R




| | |
|---|---|
| A1 | VOUT |
| B1 | VIN |
| A2 | VSS |
| B2 | ON/OFF |

# S-817 Series

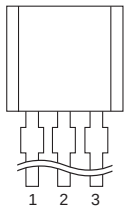
**SUPER-SMALL PACKAGE CMOS VOLTAGE REGULATOR**

## Features

- Output voltage: 1.1 V to 6.0 V, selectable in 0.1 V step
- Output voltage accuracy: ±2.0%
- Dropout voltage: 160 mV typ. (5.0 V output product, $I_{OUT}$ = 10 mA)
- Current consumption: During operation: 1.2 μA typ., 2.5 μA max.
- Output current: Possible to output 50 mA (3.0 V output product, $V_{IN}$=5 V)*1
  Possible to output 75 mA (5.0 V output product, $V_{IN}$=7 V)*1
- Output capacitor: A ceramic capacitor of 0.1 μF or more can be used.
- Built-in short circuit protection: Only S-817A Series
- Line regulation: Stable operation at low load of 1 μA
- Operation temperature range: Ta = −40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

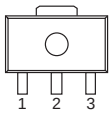
***1.** Attention should be paid to the power dissipation of the package when the load is large.
***2.** Refer to "■ **Product Name Structure**" for details.

TO-92



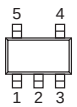

1 VSS
2 VIN
3 VOUT

SOT-89-3




1 VSS
2 VIN
3 VOUT

SOT-23-5




1 VSS
2 VIN
3 VOUT
4 NC
5 NC

SC-82AB


1 VSS
2 VIN
3 VOUT
4 NC

SNT-4A


1 VOUT
2 VIN
3 VSS
4 NC

# S-816 Series

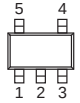
**EXTERNAL TRANSISTOR TYPE CMOS VOLTAGE REGULATOR**

## Features

- Output voltage: 2.5 V to 6.0 V, selectable in 0.1 V step
- Input voltage: 16 V max.
- Output voltage accuracy: ± 2.0%
- Current consumption: During operation: 30 μA typ., 40 μA max.
  During power-off: 1 μA max.
- Built-in overcurrent (base current) protection circuit
- Built-in ON/OFF circuit: Ensures long battery life.
- Built-in current source (10 μA): No need for a base-emitter resistance.
- Operation temperature range: Ta =−40°C to +85°C
- Lead-free, Sn 100%, halogen-free*1

***1.** Refer to "■ **Product Name Structure**" for details.

SOT-23-5




1 EXT
2 VSS
3 ON/OFF
4 VIN
5 VOUT

# S-818 Series

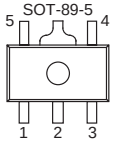
**LOW DROPOUT CMOS VOLTAGE REGULATOR**

## Features

- Output voltage: 2.0 V to 6.0 V, selectable in 0.1 V step
- Output voltage accuracy: ±2.0%
- Dropout voltage: 170 mV typ. (5.0 V output product, $I_{OUT}$ = 60 mA)
- Current consumption: During operation: 30 μA typ., 40 μA max.
  During power-off: 100 nA typ., 500 nA max.
- Output current: Possible to output 200 mA (3.0 V output product, $V_{IN}$ = 4 V)*1
  Possible to output 300 mA (5.0 V output product, $V_{IN}$ = 6 V)*1
- Output capacitor: A ceramic capacitor of 2 μF or more can be used.
- Built-in ON/OFF circuit: Ensures long battery life.
- Operation temperature range: Ta = −40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

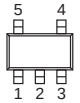
***1.** Attention should be paid to the power dissipation of the package when the output current is large.
***2.** Refer to "■ **Product Name Structure**" for details.

SOT-89-5




1 VOUT
2 VSS
3 NC
4 ON/OFF
5 VIN

SOT-23-5




1 VIN
2 VSS
3 ON/OFF
4 NC
5 VOUT

# S-87x Series

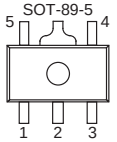
**HIGH WITHSTAND-VOLTAGE VOLTAGE REGULATOR WITH RESET FUNCTION**

## Features

- Accuracy of output voltage: ±2.4 %
  2.5 V to 5.8 V (0.1 V step)
- Accuracy of detection voltage: ±2.4 % (For the F type, the release voltage is ±1.1 %)
  2.1 V to 11.3 V (0.1 V step)
- Low I/O voltage difference: 0.15 V typ. (at $I_{OUT}$=30 mA, $V_{OUT}$=5.0 V)
  0.45 V typ. (at $I_{OUT}$=30 mA, $V_{OUT}$=3.0 V)
- Low current consumption: At Operation mode: 8 μA max.
  At Shutdown mode: 3.5 μA max. (Available for the C/E/G type)
- Wide operating voltage range: 24 V max.
- Wide operating temperature range: −40°C to +85°C
- Built-in delay circuit or shutdown circuit
- Built-in short-circuit protection circuit
- Lead-free, Sn 100%, halogen-free*1

***1.** Refer to "■ **Product Name Structure**" for details.

SOT-89-5




| | A/B/F type | C/G type | E type |
|---|---|---|---|
| 1 | VOUT | VOUT | VOUT |
| 2 | VSS | VSS | VSS |
| 3 | CD | VPF | SENSE |
| 4 | VOR | VOR | VOR |
| 5 | VIN | VIN | VIN |

# S-1740/1741 Series

## 5.5 V INPUT, 100 mA VOLTAGE REGULATOR WITH SUPPLY VOLTAGE DIVIDED OUTPUT

## Features

**Regulator block**

- Output voltage: $V_{OUT}$ = 1.0 V to 3.5 V, selectable in 0.05 V step
- Input voltage: $V_{IN}$ = 1.5 V to 5.5 V
- Output voltage accuracy: ±1.0% (1.0 V to 1.45 V output product: ±15 mV) (Ta = +25°C)
- Dropout voltage: 20 mV typ. (2.5 V output product, at $I_{OUT}$ = 10 mA) (Ta = +25°C)
- Current consumption during operation: $I_{SS1}$ = 0.35 µA typ. (Ta = +25°C)
- Output current: Possible to output 100 mA ( at $V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1
- Input capacitor: A ceramic capacitor can be used. (1.0 µF or more)
- Output capacitor: A ceramic capacitor can be used. (1.0 µF to 100 µF)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.

**Supply voltage divider block**

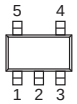
- Output voltage: $V_{PMOUT} = V_{IN}/2$ (S-1740 Series)
  $V_{PMOUT} = V_{IN}/3$ (S-1741 Series)
- Current consumption during operation: $I_{SS1P}$ = 0.15 µA typ. (Ta = +25°C)
- Output capacitor: A ceramic capacitor can be used. (100 nF to 220 nF)
- Built-in enable circuit: Ensures long battery life.

**Overall**

- Operation temperature range: Ta = –40°C to +85°C
- Lead-free (Sn 100%), halogen-free

***1.*** Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

SOT-23-5 A/C type




| | |
|---|---|
| 1 | VIN |
| 2 | VSS |
| 3 | PMEN |
| 4 | PMOUT |
| 5 | VOUT |

HSNT-6(1212) A/C type


| | |
|---|---|
| 1 | VOUT |
| 2 | VSS |
| 3 | PMOUT |
| 4 | PMEN |
| 5 | NC |
| 6 | VIN |

HSNT-4(1010) G type


| | |
|---|---|
| 1 | VOUT |
| 2 | VSS |
| 3 | PMOUT |
| 4 | VIN |

# S-1701 Series

## HIGH RIPPLE-REJECTION LOW DROPOUT CMOS VOLTAGE REGULATOR WITH RESET FUNCTION

## Features

**Regulator block**

- Output voltage: 1.5 V to 5.0 V, selectable in 0.1 V step
- Input voltage: 2.0 V to 6.5 V
- Output voltage accuracy: ±1.0%
- Current consumption During power-off: 0.1 µA typ., 1.0 µA max.
- Output current: Possible to output 400 mA ($V_{IN} \geq V_{OUT(S)} + 2.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 1.0 µF or more can be used.
- Ripple rejection: 70 dB typ. (f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON/OFF circuit: Ensures long battery life.

**Detector block**

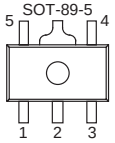
- Detection voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Detection voltage accuracy: ±1.0%
- Input voltage: 0.8 V to 6.5 V
- Output mode: Nch open-drain active low output
- No need of an external capacitor for delay
- Three delay time settings: No delay (60 µs), 50 ms, 100 ms

**Whole regulator**

- Current consumption During operation: 85 µA typ.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

***1.*** Attention should be paid to the power dissipation of the package when the output current is large.
***2.*** Refer to "■ **Product Name Structure**" for details.

SOT-89-5




| | A~M type | N~T type | U~Z type |
|---|---|---|---|
| 1 | VIN | VIN | VIN |
| 2 | VSS | VSS | VSS |
| 3 | VOUT | VOUT | VOUT |
| 4 | VDOUT | VDOUT | VDOUT |
| 5 | ON/OFF | SENSE | NC |

SOT-23-5


| | A~M type | N~T type | U~Z type |
|---|---|---|---|
| 1 | VIN | VIN | VIN |
| 2 | VSS | VSS | VSS |
| 3 | ON/OFF | SENSE | NC |
| 4 | VDOUT | VDOUT | VDOUT |
| 5 | VOUT | VOUT | VOUT |

# S-1711 Series

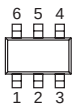
**6.5 V INPUT, 150 mA, 2-CIRCUIT VOLTAGE REGULATOR**

## Features

- Output voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Input voltage: 2.0 V to 6.5 V
- Output voltage accuracy: ±1.0%
- Dropout voltage: 200 mV typ. (3.0 V output product, $I_{OUT}$ = 150 mA)
- Current consumption: During operation: 70 µA typ., 90 µA max. (Per circuit)
  During power-off: 0.1 µA typ., 1.0 µA max.
- Output current: Possible to output 150 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1 (Per circuit)
- Input and output capacitors: A ceramic capacitor of 1.0 µF or more can be used.
- Ripple rejection: 70 dB typ. (f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON/OFF circuit: Ensures long battery life.
  Discharge shunt function "available" / "unavailable" is selectable.
  Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

***1.** Attention should be paid to the power dissipation of the package when the output current is large.
***2.** Refer to "■ **Product Name Structure**" for details.

SOT-23-6




1 VOUT1
2 VIN
3 VOUT2
4 ON/OFF2
5 VSS
6 ON/OFF1

SNT-6A


1 VOUT1
2 VIN
3 VOUT2
4 ON/OFF2
5 VSS
6 ON/OFF1

# S-13D1 Series

**5.5 V INPUT, 150 mA, 2-CIRCUIT VOLTAGE REGULATOR WITH DELAY FUNCTION**

## Features

- Output voltage: 1.0 V to 3.6 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: ±1.0% (1.0 V to 1.45 V output product : ±15 mV)
- Dropout voltage: 80 mV typ. (2.8 V output product, $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 39 µA typ., 58 µA max. (per circuit)
  During power-off: 0.1 µA typ., 1.0 µA max.
- Output current: Possible to output 150 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1 (per circuit)
- Input and output capacitors: A ceramic capacitor of 0.22 µF or more can be used.
- Ripple rejection: 70 dB typ. (3.6 V output product, f = 1.0 kHz)
- Delay function is selectable.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in ON / OFF circuit: Ensures long battery life
  Discharge shunt function "available" / "unavailable" is selectable.
  Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free (Sn 100%), halogen-free

***1.** Attention should be paid to the power dissipation of the package when the output current is large.

SOT-23-6


1 ON/OFF1
2 VIN
3 ON/OFF2
4 VOUT2
5 VSS
6 VOUT1

HSNT-6(1212)


1 VOUT1
2 VOUT2
3 VSS
4 ON/OFF2
5 VIN
6 ON/OFF1

# S-1721 Series

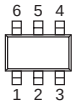
SUPER-SMALL PACKAGE 2-CIRCUIT HIGH RIPPLE-REJECTION LOW CURRENT CONSUMPTION LOW DROPOUT CMOS VOLTAGE REGULATOR

## Features

- Output voltage: 1.2 V to 5.0 V, selectable in 0.05 V step
- Input voltage: 1.7 V to 6.5 V
- Output voltage accuracy: ±1.0%
- Dropout voltage: 130 mV typ. (3.0 V output product, $I_{OUT}$ = 100 mA)
- Current consumption: During operation: 25 µA typ., 45 µA max. (3.0 V output product, per circuit)
  During power-off: 0.1 µA typ., 1.0 µA max.
- Output current: Possible to output 150 mA ($V_{IN} \geq V_{OUT(S)} + 1.0$ V)*1 (per circuit)
- Input and output capacitors: A ceramic capacitor of 1.0 µF or more can be used.
- Ripple rejection: 80 dB typ. (products having the output under 1.8 V, f = 1.0 kHz)
- Built-in overcurrent protection circuit: limits overcurrent of output transistor.
- Built-in ON/OFF circuit: Ensures long battery life.
- Pull-up or pull-down resistor is selectable.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free, Sn 100%, halogen-free*2

***1.** Attention should be paid to the power dissipation of the package when the output current is large.
***2.** Refer to "■ **Product Name Structure**" for details.

SOT-23-6




1 ON/OFF1
2 VIN
3 ON/OFF2
4 VOUT2
5 VSS
6 VOUT1

SNT-6A


1 ON/OFF2
2 VIN
3 ON/OFF1
4 VSS
5 VOUT1
6 VOUT2

# S-1222B/D Series

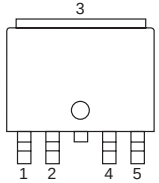
28 V INPUT, 200 mA VOLTAGE REGULATOR

## Features

- Output voltage: 2.3 V to 12.0 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 28 V
- Output voltage accuracy: ±1.0% (Ta = +25°C)
- Current consumption: During operation: 6.5 µA typ. (Ta = +25°C)
  During power-off: 0.1 µA typ. (Ta = +25°C)
- Output current: Possible to output 200 mA (at $V_{IN} \geq V_{OUT(S)} + 2.0$ V)*1
- Input capacitor: A ceramic capacitor can be used. (1.0 µF or more)
- Output capacitor: A ceramic capacitor can be used. (1.0 µF to 100 µF)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 165°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.
  Discharge shunt function is available.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free, Sn 100%, halogen-free

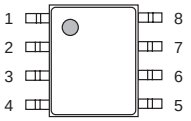
***1.** Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

TO-252-5S(A)



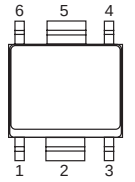

1 VOUT
2 ON/OFF
3 VSS
4 NC
5 VIN

HSOP-8A



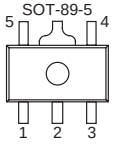

1 VOUT
2 NC
3 NC
4 ON/OFF
5 VSS
6 NC
7 NC
8 VIN

HSOP-6



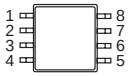

1 VOUT
2 VSS
3 ON/OFF
4 NC
5 VSS
6 VIN

SOT-89-5



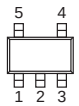

1 NC
2 VSS
3 VIN
4 VOUT
5 ON/OFF

HTMSOP-8




1 VOUT
2 NC
3 NC
4 ON/OFF
5 VSS
6 NC
7 NC
8 VIN

SOT-23-5




1 VIN
2 VSS
3 NC
4 ON/OFF
5 VOUT

DFN-6(1518)A


1 VOUT
2 NC
3 ON/OFF
4 NC
5 VSS
6 VIN

# S-1212B/D Series

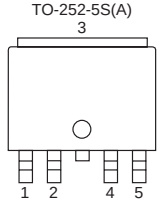
## 105°C OPERATION, 36 V INPUT, 250 mA VOLTAGE REGULATOR

## Features

- Output voltage: 2.5 V to 16.0 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 36 V
- Output voltage accuracy: ±2.0% (Ta = +25°C)
- Current consumption: During operation: 6.5 µA typ. (Ta = +25°C)
  During power-off: 0.1 µA typ. (Ta = +25°C)
- Output current: Possible to output 250 mA (at $V_{IN} \geq V_{OUT(S)} + 2.0$ V)*1
- Input capacitor: A ceramic capacitor can be used. (1.0 µF or more)
- Output capacitor: A ceramic capacitor can be used. (1.0 µF to 100 µF)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 165°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.
  Discharge shunt function is available.
- Operation temperature range: Ta = –40°C to +105°C
- Lead-free (Sn 100%), halogen-free

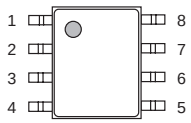
***1.** Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

TO-252-5S(A)



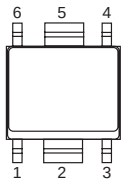

1 VOUT
2 ON/OFF
3 VSS
4 NC
5 VIN

HSOP-8A



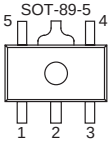

1 VOUT
2 NC
3 NC
4 ON/OFF
5 VSS
6 NC
7 NC
8 VIN

HSOP-6



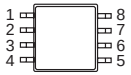

1 VOUT
2 VSS
3 ON/OFF
4 NC
5 VSS
6 VIN

SOT-89-5



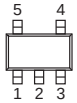

1 NC
2 VSS
3 VIN
4 VOUT
5 ON/OFF

HTMSOP-8




1 VOUT
2 NC
3 NC
4 ON/OFF
5 VSS
6 NC
7 NC
8 VIN

SOT-23-5




1 VIN
2 VSS
3 NC
4 ON/OFF
5 VOUT

# S-1142A/B Series

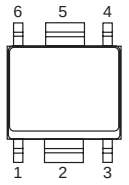
## HIGH-WITHSTAND VOLTAGE LOW CURRENT CONSUMPTION LOW DROPOUT CMOS VOLTAGE REGULATOR

## Features

- Output voltage: 2.0 V to 15.0 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 50 V
- Output voltage accuracy: ±1.0% (Tj = +25°C)
  ±3.0% (Tj = –40°C to +105°C)
- Current consumption: During operation: 4.0 µA typ., 9.0 µA max. (Ta = –40°C to +85°C)
  During power-off: 0.1 µA typ., 1.0 µA max. (Ta = –40°C to +85°C)
- Output current: Possible to output 200 mA ($V_{IN} \geq V_{OUT(S)} + 2.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 0.1 µF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in ON / OFF circuit: Ensures long battery life.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free (Sn 100%), halogen-free

***1.** Attention should be paid to the power dissipation of the package when the output current is large.

HSOP-6




1 VOUT
2 VSS
3 ON/OFF
4 NC
5 VSS
6 VIN

# S-1142C/D Series

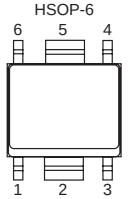
## HIGH-WITHSTAND VOLTAGE LOW CURRENT CONSUMPTION LOW DROPOUT CMOS VOLTAGE REGULATOR

## Features

- Output voltage: 2.0 V to 15.0 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 50 V
- Output voltage accuracy: ±1.0% (Tj = +25°C)
  ±3.0% (Tj = –40°C to +105°C)
- Current consumption: During operation: 4.0 µA typ., 9.0 µA max. (Ta = –40°C to +85°C)
  During power-off: 0.1 µA typ., 1.0 µA max. (Ta = –40°C to +85°C)
- Output current: Possible to output 200 mA ($V_{IN} \geq V_{OUT(S)} + 2.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 0.1 µF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in ON / OFF circuit: Ensures long battery life.
- Operation temperature range: Ta = –40°C to +85°C
- Lead-free (Sn 100%), halogen-free

***1.** Attention should be paid to the power dissipation of the package when the output current is large.

HSOP-6




1 VOUT
2 VSS
3 ON/OFF
4 NC
5 VSS
6 VIN

# S-1000 Series

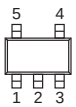
## ULTRA-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR

## Features

- Ultra-low current consumption: 350 nA typ. ($V_{DD}$ = detection voltage + 1.5 V)
- High-precision detection voltage: ±1.0%
- Operating voltage range: 0.95 to 5.5 V
- Hysteresis characteristics: 5% typ.
- Detection voltage: 1.5 to 4.6 V (0.1 V step)
- Output form: Nch open-drain output (Active “L”)
  CMOS output (Active “L”)
- Lead-free, Sn 100%, halogen-free*1

***1.** Refer to “■ **Product Name Structure**” for details.

SOT-23-5




1 OUT
2 VDD
3 VSS
4 NC
5 NC

SC-82AB


1 OUT
2 VDD
3 NC
4 VSS

SNT-4A


1 OUT
2 VSS
3 NC
4 VDD

# S-808xxC Series

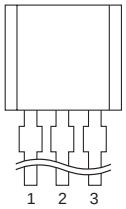
## SUPER-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR

## Features

- Super-low current consumption: 1.3 µA typ. (detection voltage≤1.4 V, at $V_{DD}$ = 1.5 V)
  0.8 µA typ. (detection voltage≥1.5 V, at $V_{DD}$ = 3.5 V)
- High-precision detection voltage: ±2.0%
- Operating voltage range: 0.65 V to 5.0 V (detection voltage≤1.4 V)
  0.95 V to 10.0 V (detection voltage≥1.5 V)
- Hysteresis characteristics: 5% typ.
- Detection voltage: 0.8 V to 6.0 V (0.1 V step)
- Output form: Nch open-drain output (Active Low)
  CMOS output (Active Low)
- Lead-free, Sn 100%, halogen-free*1

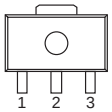
***1.** Refer to “■ **Product Name Structure**” for details.

TO-92



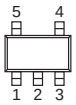

1 OUT
2 VDD
3 VSS

SOT-89-3




1 OUT
2 VDD
3 VSS

SOT-23-5




1 OUT
2 VDD
3 VSS
4 NC
5 NC

SC-82AB


1 OUT
2 VDD
3 NC
4 VSS

SNT-4A


1 OUT
2 VSS
3 NC
4 VDD

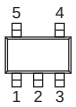
# S-1009 Series

## 0.27 µA CURRENT CONSUMPTION VOLTAGE DETECTOR WITH DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)

## Features

- Detection voltage: 0.8 V to 4.6 V (0.1 V step)
- Detection voltage accuracy: ±0.5% (2.4 V ≤ $-V_{DET}$ ≤ 4.6 V)
  ±12 mV (0.8 V ≤ $-V_{DET}$ < 2.4 V)
- Current consumption: 270 nA typ. (1.2 V ≤ $-V_{DET}$ < 2.3 V)
- Operation voltage range: 0.6 V to 10.0 V (CMOS output product)
- Hysteresis width: 5% ±1%
- Delay time accuracy: ±15% ($C_D$ = 4.7 nF)
- Output form: Nch open-drain output (active "L")
  CMOS output (active "L")
- Operation temperature range: Ta = −40°C to +85°C
- Lead-free (Sn 100%), halogen-free

SOT-23-5




1 OUT
2 VDD
3 VSS
4 NC
5 CD

SC-82AB


1 VSS
2 VDD
3 CD
4 OUT

SNT-4A


1 VSS
2 OUT
3 CD
4 VDD

## S-809xxC Series

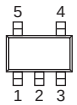
ULTRA-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR WITH DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING)

### Features

- Ultra-low current consumption: 1.0 μA typ. (Detection voltage ≤ 1.4 V, at $V_{DD}$=2.0 V)
  1.1 μA typ. (Detection voltage ≥ 1.5 V, at $V_{DD}$=3.5 V)
- High-precision detection voltage: ±2.0 %
- Operating voltage range: 0.7 V to 10.0 V
- Hysteresis characteristics: 5 % typ.
- Detection voltage: 1.3 V to 6.0 V (0.1 V step)
- Output forms: Nch open-drain output (Active Low)
  CMOS output (Active Low)
- Lead-free, Sn 100%, halogen-free*1

***1.** Refer to "■ **Product Name Structure**" for details.

SOT-23-5




1 OUT
2 VDD
3 VSS
4 NC
5 CD

SC-82AB


1 VSS
2 VDD
3 CD
4 OUT

SNT-4A


1 VSS
2 OUT
3 CD
4 VDD

## S-801 Series

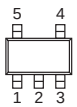
ULTRA-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR WITH DELAY CIRCUIT (INTERNAL DELAY TIME SETTING)

### Features

- Ultra-low current consumption: 1.3 μA typ. (at $V_{DD}$=3.5 V)
- High-precision detection voltage: ±2.0 %
- Operating voltage range: 0.95 V to 10.0 V
- Hysteresis characteristics: 60 mV typ.
- Detection voltage: 2.2 V to 6.0 V (0.1 V step)
- Three delay times: A type 50 ms typ.
  B type 100 ms typ.
  C type 200 ms typ.
- ON/OFF switching function of delay time (DS pin)
- Output forms: Nch open-drain output (Active Low)
  CMOS output (Active Low)
- Lead-free, Sn 100%, halogen-free*1

***1.** Refer to "■ **Product Name Structure**" for details.

SOT-23-5




1 DS
2 VSS
3 NC
4 OUT
5 VDD

SNT-4A


1 VSS
2 DS
3 VDD
4 OUT

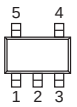
## S-1003 Series

MANUAL RESET BUILT-IN DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING) HIGH-ACCURACY VOLTAGE DETECTOR

### Features

- Detection voltage: 1.2 V to 5.0 V (0.1 V step)
- Detection voltage accuracy: ±1.0% (2.2 V ≤ $-V_{DET}$ ≤ 5.0 V)
  ±22 mV (1.2 V ≤ $-V_{DET}$ < 2.2 V)
- Current consumption: 500 nA typ.
- Operation voltage range: 0.95 V to 10.0 V
- Hysteresis width: 5% ± 2%
- Manual reset function: MR pin logic active "L", active "H"
- Delay time accuracy: ±15% ($C_D$ = 4.7 nF)
- Output form: Nch open-drain output (Active "L")
  CMOS output (Active "L")
- Operation temperature range: Ta = −40°C to +85°C
- Lead-free (Sn 100%), halogen-free

SOT-23-5




1 CD
2 VSS
3 MR
4 OUT
5 VDD

SNT-6A


1 CD
2 VDD
3 OUT
4 MR
5 NC
6 VSS

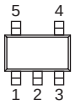
## S-1002 Series

**VOLTAGE DETECTOR WITH SENSE PIN**

### Features

- Detection voltage: 1.0 V to 5.0 V (0.1 V step)
- Detection voltage accuracy: ±1.0% (2.2 V ≤ $-V_{DET(S)}$ ≤ 5.0 V)
  ±22 mV (1.0 V ≤ $-V_{DET(S)}$ < 2.2 V)
- Current consumption: 500 nA typ.
- Operation voltage range: 0.95 V to 10.0 V
- Hysteresis width: 5% ± 2%
- Output form: Nch open-drain output (Active "L")
  CMOS output (Active "L")
- Operation temperature range: Ta = −40°C to +85°C
- Lead-free (Sn 100%), halogen-free

SOT-23-5




| | NA/CA type | NB/CB type |
|---|---|---|
| 1 | OUT | OUT |
| 2 | VDD | VSS |
| 3 | VSS | VDD |
| 4 | NC | SENSE |
| 5 | SENSE | NC |

SC-82AB


| | NB/CB type |
|---|---|
| 1 | SENSE |
| 2 | VDD |
| 3 | OUT |
| 4 | VSS |

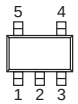
## S-1004 Series

**BUILT-IN DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING) VOLTAGE DETECTOR WITH SENSE PIN**

### Features

- Detection voltage: 1.0 V to 5.0 V (0.1 V step)
- Detection voltage accuracy: ±1.0% (2.2 V ≤ $-V_{DET(S)}$ ≤ 5.0 V)
  ±22 mV (1.0 V ≤ $-V_{DET(S)}$ < 2.2 V)
- Current consumption: 500 nA typ.
- Operation voltage range: 0.95 V to 10.0 V
- Hysteresis width: 5% ± 2%
- Release delay time accuracy: ±15% ($C_D$ = 4.7 nF, Ta = +25°C)
- Output form: Nch open-drain output (Active "L")
  CMOS output (Active "L")
- Operation temperature range: Ta = −40°C to +85°C
- Lead-free (Sn 100%), halogen-free

SOT-23-5




| | NA/CA type | NB/CB type |
|---|---|---|
| 1 | OUT | OUT |
| 2 | VDD | VSS |
| 3 | VSS | VDD |
| 4 | CD | SENSE |
| 5 | SENSE | CD |

SNT-6A


| | NA/CA type |
|---|---|
| 1 | OUT |
| 2 | VDD |
| 3 | SENSE |
| 4 | CD |
| 5 | NC |
| 6 | VSS |

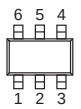
## S-1011 Series

**HIGH-WITHSTAND VOLTAGE BUILT-IN DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING) VOLTAGE DETECTOR**

### Features

- Detection voltage: 3.0 V to 10.0 V (0.05 V step) (SENSE detection product)
  3.6 V to 10.0 V (0.05 V step) (VDD detection product)
- Detection voltage accuracy: ±1.5% (A / C / E / G type)
- Detection delay time accuracy: ±20% ($C_N$ = 3.3 nF)
- Release delay time accuracy: ±20% ($C_P$ = 3.3 nF)
- Current consumption: 600 nA typ.
- Operation voltage range: 1.8 V to 36.0 V
- Hysteresis width: "Available" (5.0% typ.) / "unavailable" is selectable.
- Output form: Nch open-drain output
- Operation temperature range: Ta = −40°C to +85°C
- Lead-free (Sn 100%), halogen-free

SOT-23-6




| | A/C/J/L type | E/G/N/Q type |
|---|---|---|
| 1 | VDD | VDD |
| 2 | NC | SENSE |
| 3 | OUT | OUT |
| 4 | CP | CP |
| 5 | VSS | VSS |
| 6 | CN | CN |

# S-1410/1411 Series

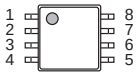
## 105°C OPERATION, 3.8 µA CURRENT CONSUMPTION WATCHDOG TIMER WITH RESET FUNCTION

## Features

- Detection voltage: 2.0 V to 5.0 V, selectable in 0.1 V step
- Detection voltage accuracy: ±1.5%
- Input voltage: $V_{DD}$ = 0.9 V to 6.0 V
- Hysteresis width: 5% typ.
- Current consumption during watchdog timer operation: 3.8 µA typ.
- Reset time-out period: 14.5 ms typ. ($C_{POR}$ = 2200 pF)
- Watchdog time-out period: 24.6 ms typ. ($C_{WDT}$ = 470 pF)
- Watchdog operation is switchable: Enable, Disable
- Watchdog operation voltage range: $V_{DD}$ = 2.5 V to 6.0 V
- Watchdog mode switching function*1: Time-out mode, window mode
- Watchdog input edge is selectable: Rising edge, falling edge, both rising and falling edges
- Product type is selectable: S-1410 Series
  (Product with $\overline{W}$ / T pin (Output: $\overline{WDO}$ pin))
  S-1411 Series
  (Product without $\overline{W}$ / T pin (Output: $\overline{RST}$ pin, $\overline{WDO}$ pin))
- Operation temperature range: Ta = –40°C to +105°C
- Lead-free (Sn 100%), halogen-free

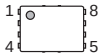
***1.** The S-1411 Series is fixed to the window mode.

TMSOP-8




| | S-1410 | S-1411 |
|---|---|---|
| 1 | $\overline{W}$/T | $\overline{RST}$ |
| 2 | CPOR | CPOR |
| 3 | CWDT | CWDT |
| 4 | VSS | VSS |
| 5 | $\overline{WEN}$ | $\overline{WEN}$ |
| 6 | $\overline{WDO}$ | $\overline{WDO}$ |
| 7 | WDI | WDI |
| 8 | VDD | VDD |

HSNT-8(2030)



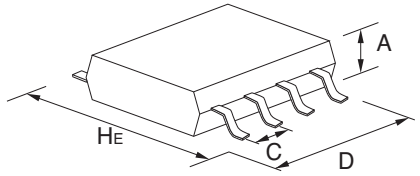

| | S-1410 | S-1411 |
|---|---|---|
| 1 | $\overline{W}$/T | $\overline{RST}$ |
| 2 | CPOR | CPOR |
| 3 | CWDT | CWDT |
| 4 | VSS | VSS |
| 5 | $\overline{WEN}$ | $\overline{WEN}$ |
| 6 | $\overline{WDO}$ | $\overline{WDO}$ |
| 7 | WDI | WDI |
| 8 | VDD | VDD |

## Package List

| Package Type | Pin Count | Package Name | Package Size (mm) | | | Pitch (mm) |
|---|---|---|---|---|---|---|
| | | | HE | D | A (max.) | C |
| Lead insertion type | 3 | TO-92 | 7.0 | 5.2 | 4.2 | 2.5/1.27 |
| | 3 | TO-92S | 4.95 | 4.1 | 1.62 | 2.5/1.27 |
| Flat-lead type | 3 | SOT-89-3 | 4.0 | 4.5 | 1.6 | 1.5 |
| | 5 | SOT-89-5 | 4.5 | 4.5 | 1.6 | 1.5 |
| Gull-wing type | 4 | SC-82AB | 2.1 | 2.0 | 1.1 | 1.3 |
| | 5 | SC-88A | 2.1 | 2.0 | 1.1 | 0.65 |
| | 3 | SOT-23-3 | 2.8 | 2.9 | 1.3 | 1.9 |
| | 3 | SOT-23-3S | 2.8 | 2.9 | 1.2 | 1.9 |
| | 3 | TSOT-23-3S | 2.85 | 2.9 | 0.8 | 1.9 |
| | 5 | SOT-23-5 | 2.8 | 2.9 | 1.3 | 0.95 |
| | 6 | SOT-23-6 | 2.8 | 2.9 | 1.35 | 0.95 |
| | 6 | SOT-23-6W | 2.8 | 2.9 | 1.3 | 0.95 |
| | 8 | 8-Pin SOP (JEDEC) | 6.0 | 5.02 | 1.75 | 1.27 |
| | 8 | 8-Pin TSSOP | 6.4 | 3.0 | 1.1 | 0.65 |
| | 8 | 8-Pin TSSOP | 6.4 | 3.0 | 1.1 | 0.65 |
| | 16 | 16-Pin TSSOP | 6.4 | 5.1 | 1.1 | 0.65 |
| | 20 | 20-Pin TSSOP | 6.4 | 6.5 | 1.2 | 0.65 |
| | 24 | 24-Pin SSOP | 7.6 | 7.9 | 1.4 | 0.65 |
| | 8 | TMSOP-8 | 4.0 | 2.9 | 0.8 | 0.65 |
| | 8 | HTMSOP-8 | 4.0 | 2.9 | 0.8 | 0.65 |
| | 16 | HTSSOP-16 | 6.4 | 5.12 | 1.1 | 0.65 |
| | 6 | HSOP-6 | 6.0 | 5.02 | 1.75 | 1.91 |
| | 8 | HSOP-8A | 6.0 | 5.02 | 1.68 | 1.27 |
| | 8 | HSOP-8A | 6.0 | 5.02 | 1.65 | 1.27 |
| | 8 | HSOP-8Q | 6.0 | 5.02 | 1.68 | 1.27 |
| | 5 | TO-252-5S(A) | 6.5 | 6.5 | 1.4 | 1.27 |
| | 9 | TO-252-9S | 6.5 | 6.5 | 1.4 | 0.65 |

| Package Type | Pin Count | Package Name | Package Size (mm) | | | Pitch (mm) |
|---|---|---|---|---|---|---|
| | | | HE | D | A (max.) | C |
| Non-lead type | 6 | 6-Pin HSON(A) | 3.0 | 2.9 | 0.9 | 0.95 |
| | 6 | SON-6C | 2.55 | 1.56 | 0.65 | 0.5 |
| | 4 | SNT-4A | 1.6 | 1.2 | 0.5 | 0.65 |
| | 6 | SNT-6A<br>SNT-6A(H) | 1.8 | 1.57 | 0.5 | 0.5 |
| | 8 | SNT-8A | 2.46 | 1.97 | 0.5 | 0.5 |
| | 4 | HSNT-4(0808) | 0.8 | 0.8 | 0.4 | 0.4 |
| | 4 | HSNT-4(0808)B | 0.8 | 0.8 | 0.41 | 0.4 |
| | 4 | HSNT-4(1010) | 1.0 | 1.0 | 0.4 | 0.65 |
| | 4 | HSNT-4(1010)B | 1.0 | 1.0 | 0.41 | 0.65 |
| | 6 | HSNT-6(1212) | 1.2 | 1.2 | 0.4 | 0.4 |
| | 6 | HSNT-6A | 2.46 | 1.96 | 0.5 | 0.5 |
| | 6 | HSNT-6(2025) | 2.46 | 1.96 | 0.5 | 0.5 |
| | 8 | HSNT-8(1616) | 1.6 | 1.6 | 0.4 | 0.4 |
| | 8 | HSNT-8(2030) | 3.0 | 2.0 | 0.5 | 0.5 |
| | 6 | DFN-6(1414)A | 1.4 | 1.4 | 0.6 | 0.5 |
| | 6 | DFN-6(1518)A | 1.8 | 1.5 | 0.33 | 0.5 |
| | 8 | DFN-8(1616)A | 1.6 | 1.6 | 0.6 | 0.4 |
| | 8 | DFN-8(2030) | 3.0 | 2.0 | 0.5 | 0.5 |
| | 8 | DFN-8(2030)A | 3.0 | 2.0 | 0.6 | 0.5 |
| | 8 | DFN-8(2030)B | 3.0 | 2.0 | 0.8 | 0.5 |

**Remark** Please contact our sales representatives regarding WLP package products.



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