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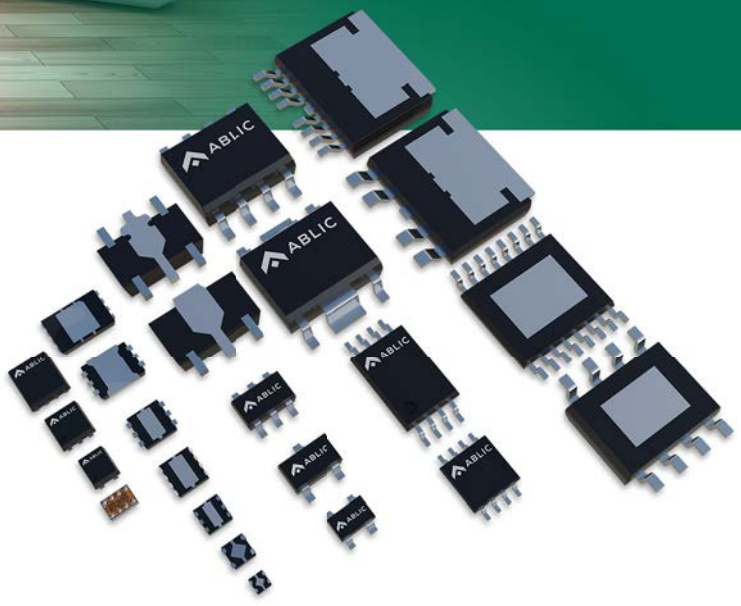
MinebeaMitsumi Group

Product Catalog

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

2025



ABLIC Inc.

Table of Contents

Linear Regulators (LDO Regulators)

Linear Regulators (LDO Regulators) on ablic.com

Series Name	Features	VIN min. [V]	VIN max. [V]	Absolute maximum rating [V]	IOUT [mA]	VOUT min. [V]	VOUT max. [V]	Accuracy ±[%]	VDROP [V]	Tj max. [°C]	ISS [µA]	RR @1kHz [dB]	COUT [µF]	Type	Operation temp. min. [°C]	Operation temp. max. [°C]	Package	Page
S-1112/1122	Conventional product with high ripple rejection	2.0	6.5	7.0	150	1.5	5.5	1.0	0.19	-	50.0	80	0.47	LDO*	-40	85	SOT-23-5, SNT-6A(H)	1
S-1132	0.1µF capacitor available	2.0	6.5	7.0	300	1.5	5.5	1.0	0.13	-	20.0	70	0.1	LDO*	-40	85	SOT-23-5, SOT-89-5, SNT-6A(H)	2
S-1133	External setting of Vout support, TS*	2.0	10.0	12.0	300	1.2	8.2	1.0	0.13	-	60.0	70	1.0	LDO*	-40	85	SOT-89-5, SNT-8A	3
S-1142A/B	50V high input (low current consumption), TS*	3.0	50.0	60.0	200	2.0	15.0	1.0	0.35	125	4.0	50	0.1	LDO*	-40	85	HSOP-6	4
S-1142C/D	50V high input (low current consumption), TS*	3.0	50.0	60.0	200	2.0	15.0	1.0	0.35	125	4.0	50	0.1	LDO*	-40	85	HSOP-6	5
S-1167	Low current consumption, high ripple rejection	2.0	6.5	7.0	150	1.5	5.5	1.0	0.15	-	9.0	70	1.0	LDO*	-40	85	SOT-23-5, SNT-6A(H)	6
S-1170	TS*	2.0	6.5	7.0	800	1.5	5.5	1.0	0.12	-	80.0	70	4.7	LDO*	-40	85	SOT-89-5, 6-Pin HSON(A)	7
S-1200	10V input support	2.0	10.0	12.0	150	1.5	5.5	1.0	0.14	-	18.0	70	0.1	LDO*	-40	85	SOT-23-5, SNT-6A(H)	8
S-1206	Super-low current consumption	1.7	6.5	7.0	250	1.2	5.2	1.0	0.15	-	1.0	-	0.1	LDO*	-40	85	SOT-23-3, SOT-89-3, SNT-6A(H)	9
S-1212B/D	36V high input, 105°C operation, TS*, DS*	3.0	36.0	45.0	250	2.5	16.0	2.0	0.35	150	6.5	40	1.0	LDO*	-40	105	TO-252-5S(A), SOT-23-5, SOT-89-5, HSOP-6, HSOP-8A, HTMSOP-8	10
S-1213	External setting of Vout support, 36V high input, 105°C operation, TS*, DS*	2.8	36.0	45.0	500	1.8	30.0	1.0	0.13	150	5.0	-	1.0	LDO*	-40	105	TO-252-5S(A), HSOP-8A	11
S-1214	External setting of Vout support, 36V high input, 105°C operation, TS*, DS*	2.8	36.0	45.0	1000	1.8	30.0	1.0	0.13	150	5.0	-	1.0	LDO*	-40	105	TO-252-5S(A), HSOP-8A	12
S-1222B/D	Low-profile 0.33mm(max.), low consumption, TS*, DS*	3.0	28.0	30.0	200	2.3	12.0	1.0	0.35	150	6.5	-	1.0	LDO*	-40	85	TO-252-5S(A), HSOP-8A, HSOP-6, SOT-89-5, HTMSOP-8, SOT-23-5, DFN-6(1518)A	13
S-1312	0.8mm super-small package, TS*, DS*	1.5	5.5	6.0	150	1.0	3.5	1.0	0.16	-	20.0	75	0.22	LDO*	-40	85	SOT-23-5, HSNT-4(0808), HSNT-4(1010)	14
S-1312xxxH	105°C operation, TS*, DS*	1.5	5.5	6.0	150	1.0	3.5	1.0	0.16	-	20.0	75	0.22	LDO*	-40	105	SOT-23-5, HSNT-4(1010)	15
S-1313	0.8mm super-small package, TS*, DS*	1.5	5.5	6.0	200	1.0	3.5	1.0	0.16	-	0.9	-	0.1	LDO*	-40	85	SOT-23-5, SC-82AB, HSNT-4(0808), HSNT-4(1010)	16
S-1313xxxH	105°C Operation, 0.8mm super-small package, TS*, DS*	1.5	5.5	6.0	200	1.0	3.5	1.0	0.16	-	0.9	-	0.1	LDO*	-40	105	SOT-23-5, SC-82AB, HSNT-4(0808), HSNT-4(1010)	17
S-1317	Super-low current consumption, overcurrent protection	1.5	5.5	6.0	100	1.0	3.5	1.0	0.02	-	0.35	-	1.0	LDO*	-40	85	SOT-23-5, HSNT-4(1010)	18
S-1318	Super-low current consumption, overcurrent protection	1.7	5.5	6.0	100	1.2	3.3	1.0	0.045	-	0.095	-	1.0	LDO*	-40	85	SOT-23-5, HSNT-4(1010)	19
S-1324	Low consump., low noise 17µVrms	1.5	5.5	6.0	200	1.0	3.5	1.0	0.17	-	7.0	65	1.0	LDO*	-40	85	SOT-23-5, SC-82AB, HSNT-4(1010)	20

Series Name	Features	VIN min. [V]	VIN max. [V]	Absolute maximum rating [V]	IOUT [mA]	VOUT min. [V]	VOUT max. [V]	Accuracy ±[%]	VDROP [V]	Tj max. [°C]	ISS [µA]	RR @1kHz [dB]	COUT [µF]	Type	Operation temp. min. [°C]	Operation temp. max. [°C]	Package	Page
S-1333	0.8mm super-small package, TS*, DS*	1.5	5.5	6.0	300	1.0	3.5	1.0	0.14	-	25.0	75	1.0	LDO*	-40	85	SOT-23-5, HSNT-4(0808), HSNT-4(1010)	21
S-1335	High ripple rejection, Soft start function, DS*	1.5	5.5	6.0	150	1.0	3.6	1.0	0.07	-	36.0	80	1.0	LDO*	-40	85	SOT-23-5, SC-82AB, HSNT-4(1010)	22
S-13A1	External setting of Vout support, ICL*, TS*, DS*	1.5	5.5	6.0	1000	1.0	5.0	1.0	0.07	-	60.0	70	2.2	LDO*	-40	85	HSOP-8A, HSOP-6, SOT-89-5	23
S-13D1	2 LDO circuits, delay function, TS*, DS*	1.5	5.5	6.0	150	1.0	3.6	1.0	0.08	-	39.0	70	0.22	2 LDOs*	-40	85	SOT-23-6, HSNT-6(1212)	24
S-13R1	Reverse current protection, TS*, DS*	2.0	5.5	6.0	150	1.2	4.0	1.0	0.15	-	5.0	70	1.0	LDO*	-40	85	SOT-23-5, SC-82AB, HSNT-4(1010)	25
S-1701	1 LDO circuit + 1 detector circuit	2.0	6.5	7.0	400	1.5	5.0	1.0	0.14	-	85.0	70	1.0	LDO+VD*	-40	85	SOT-23-5, SOT-89-5	26
S-1740/1741	Supply voltage divided output	1.5	5.5	6.0	100	1.0	3.5	1.0	0.02	-	0.5	-	1.0	LDO*	-40	85	SOT-23-5, HSNT-6(1212), HSNT-4(1010)	27
S-812C	Low output current, 16V input	-	16.0	18.0	75	2.0	6.0	2.0	0.23	-	1.0	-	-	LDO*	-40	85	SOT-23-5, SOT-89-3, SOT-89-5, SNT-6A(H), TO-92, WLP-4R	28
S-816	With an external transistor	2.5	16.0	18.0	1000	2.5	6.0	2.0	0.10	-	30.0	-	4.7	LDO*	-40	85	SOT-23-5	29
S-817	Low output current	-	10.0	12.0	75	1.1	6.0	2.0	0.25	-	1.2	-	0.1	LDO*	-40	85	SOT-23-5, SOT-89-3, SC-82AB, SNT-4A, TO-92	30
S-818		-	10.0	12.0	300	2.0	6.0	2.0	0.30	-	30.0	-	2.0	LDO*	-40	85	SOT-23-5, SOT-89-5	31
S-87x	24V input support VR + detector	-	24.0	26.0	50	2.5	5.8	2.4	0.45	-	3.0	-	-	LDO+VD*	-40	85	SOT-89-5	32
S-L2980	LP2980-equivalent	2.0	10.0	12.0	150	1.5	6.0	2.0	0.12	-	90.0	70	1.0	LDO*	-40	85	SOT-23-5	33
S-T111	TK111-equivalent	2.0	6.5	7.0	150	1.5	5.5	1.0	0.19	-	50.0	80	0.1	LDO*	-40	85	SOT-23-5	34

*Type — LDO: Low-dropout regulator, VD: Voltage detector (Reset IC)
*Additional function — ICL: Inrush current control, DS: Discharge shunt, TS: Thermal shutdown

Series Name	Features	Composition	Setting voltage	Accuracy	Current consumption	Package	Page
S-8424A	Battery backup switching IC	2 voltage regulators + 3 voltage detectors + switch	Output voltage: 2.3 to 5.4 V (0.1V step) Detection voltage: 2.4 to 5.3 V (CS), 1.7 to 3.4 V (/PREEND, /RESET)	±2%	15µA max. (Operating) 2.1µA max. (Back up)	8-Pin TSSOP	35

Voltage Detectors (Reset ICs)

Voltage Detectors (Reset ICs) on ablic.com

Series Name	Features	Detection voltage min. [V]	Detection voltage max. [V]	Detection voltage step [V]	Accuracy ±[%]	VDD min. [V]	VDD max. [V]	Absolute max rated voltage [V]	Delay time	Current consumption typ. [µA]	Operation temp. min. [°C]	Operation temp. max. [°C]	Package	Page
S-1000	High accuracy	1.5	4.6	0.1	1.0	0.95	5.5	6	-	0.35	-40	85	SNT-4A, SC-82AB, SOT-23-5	36
S-1002	SENSE pin	1.0	5.0	0.1	1.0	0.95	10.0	12	-	0.50	-40	85	SC-82AB, SOT-23-5	37
S-1003	Manual reset	1.2	5.0	0.1	1.0	0.95	10.0	12	External setting	0.50	-40	85	SNT-6A, SOT-23-5	38
S-1004	SENSE pin	1.0	5.0	0.1	1.0	0.95	10.0	12	External setting	0.50	-40	85	SNT-6A, SOT-23-5	39
S-1009	High accuracy	0.8	4.6	0.1	0.5	0.60	10.0	12	External setting	0.27	-40	85	SNT-4A, SC-82AB, SOT-23-5	40
S-1011	High-withstand voltage, SENSE pin	3.0	10.0	0.05	1.5	1.80	36.0	45	External setting	0.60	-40	85	SOT-23-6	41
S-1410/1411	VD+WDT (Window / Timeout) (Window)	2.0	5.0	0.1	1.5	0.90	6.0	7	External setting	3.80	-40	105	TMSOP-8, HSNT-8(2030)	42
S-801		2.2	6.0	0.1	2.0	0.95	10.0	12	Internal setting	1.30	-40	85	SNT-4A, SOT-23-5	43
S-808xxC		0.8	6.0	0.1	2.0	0.65	10.0	12	-	0.80	-40	85	SNT-4A, SC-82AB, SOT-23-5, SOT-89-3, TO-92	44
S-809xxC		1.3	6.0	0.1	2.0	0.70	10.0	12	External setting	1.10	-40	85	SNT-4A, SC-82AB, SOT-23-5	45

Watchdog Timer

Watchdog Timer on ablic.com

Series Name	Type	[WDT] Watchdog mode	[WDT] Watchdog enable	[VD] Detection voltage min. [V]	[VD] Detection voltage max. [V]	[VD] Detection voltage step [V]	[VD] Detection voltage accuracy ±[%]	[Overall] Input voltage min. [V]	[Overall] Input voltage max. [V]	[Overall] Current consumption typ. [µA]	Operation temp. min. [°C]	Operation temp. max. [°C]	Package	Page
S-1410/1411	WDT+VD*	Window/Time-out switchable, Window mode	Yes	2.0	5.0	0.1	1.5	0.9	6.0	3.8	-40	105	TMSOP-8, HSNT-8(2030)	46

*WDT: Watchdog timer

*VD: Voltage detector (Reset IC)

S-1112/1122 Series

HIGH RIPPLE-REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

The S-1112/1122 Series is a positive voltage regulator with a low dropout voltage, high-accuracy output voltage, and low current consumption developed based on CMOS technology.
A built-in low on-resistance transistor provides a low dropout voltage and large output current, and a built-in overcurrent protection circuit prevents the load current from exceeding the current capacity of the output transistor. An ON/OFF circuit ensures a long battery life. Compared with the voltage regulators using the conventional CMOS technology, a larger variety of capacitors are available, including small ceramic capacitors. Small SNT-6A(H) (S-1112 Series only) and SOT-23-5 packages realize high-density mounting. In SOT-23-5, the lineup includes the S-1112 and S-1122 Series, which differ in pin configuration.

■ 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.

■ Applications

- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for personal communication device
- Constant-voltage power supply for home electric appliance
- Constant-voltage power supply for cellular phone

■ Packages

- SNT-6A(H)
- SOT-23-5

S-1132 Series

6.5 V INPUT, 300 mA VOLTAGE REGULATOR

The S-1132 Series is a positive voltage regulator with a low dropout voltage, high-accuracy output voltage, and low current consumption (300 mA output current) developed based on CMOS technology.
A 0.1 μF small ceramic capacitor can be used. It operates with low current consumption of 20 μA typ. A built-in overcurrent protection circuit prevents the output current from exceeding the current capacity of the output transistor.
Compared with the conventional 300 mA output current CMOS voltage regulators, high-density mounting is realized by using the super-small SNT-6A(H) package and a 0.1μF small ceramic capacitor.
Also, the low current consumption makes the S-1132 Series ideal for mobile devices.

■ 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.

■ Applications

- Power supply for battery-powered device
- Power supply for personal communication device
- Power supply for home electric appliance
- Power supply for cellular phone

■ Packages

- SOT-23-5
- SOT-89-5
- SNT-6A(H)

S-1133 Series

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

The S-1133 Series is a positive voltage regulator with a low dropout voltage, high output voltage accuracy, and low current consumption (300 mA output current) developed based on CMOS technology.
A 1 μF small ceramic capacitor can be used[*1]. It operates with low current consumption of 60 μA typ. The S-1133 Series includes an overcurrent protection circuit that prevents the output current from exceeding the current capacity of the output transistor and a thermal shutdown circuit that prevents damage due to overheating.
In addition to the types in which output voltage is set inside the IC, a type for which output voltage can be set via an external resistor is added to a lineup (S-1133x00 Series). SOT-89-5 and super-small SNT-8A packages realize high-density mounting. This, in addition to low current consumption, makes the S-1133 Series ideal for mobile devices.

***1.** A ceramic capacitor of 2.2 μF or more can be used for products whose output voltage is 1.7 V or less.

■ 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.

■ Applications

- Power supply for battery-powered devices
- Power supply for communication devices
- Power supply for home electric appliances

■ Packages

- SOT-89-5
- SNT-8A

S-1142A/B Series

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

The S-1142A/B Series, developed by using high-withstand voltage CMOS technology, is a positive voltage regulator with a high-withstand voltage, low current consumption, and high-accuracy output voltage.
The S-1142A/B Series operates at a high maximum operating voltage of 50 V and a low current consumption of 4.0 μA typ.
In addition to a built-in low on-resistance transistor which provides a very small dropout voltage and a large output current, this voltage regulator also has a built-in ON / OFF circuit.
An overcurrent protection circuit prevents the load current from exceeding the capacitance of the output transistor, and a built-in thermal shutdown circuit prevents damage caused by heat.
A high heat radiation HSOP-6 package enables high-density mounting.

■ 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.

■ Application

- Constant-voltage power supply for home electric appliance

■ Package

- HSOP-6

S-1142C/D Series

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

The S-1142C/D Series, developed by using high-withstand voltage CMOS technology, is a positive voltage regulator with a high-withstand voltage, low current consumption, and high-accuracy output voltage.
The S-1142C/D Series operates at a high maximum operating voltage of 50 V and a low current consumption of 4.0 µA typ. In addition to a built-in low on-resistance transistor which provides a very small dropout voltage and a large output current, this voltage regulator also has a built-in ON / OFF circuit.
An overcurrent protection circuit prevents the load current from exceeding the current capacity of the output transistor, and a built-in thermal shutdown circuit prevents damage caused by heat.
A high heat radiation HSOP-6 package enables high-density mounting.

■ 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.

■ Application

- Constant-voltage power supply for home electric appliance

■ Package

- HSOP-6

S-1167 Series

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

The S-1167 Series is a positive voltage regulator with ultra low current consumption, high ripple rejection, low dropout voltage and high-accuracy output voltage developed based on CMOS technology.
Although current consumption is very small with 9 μA typ., the S-1167 Series realized the 70 dB of high ripple rejection rate. Besides, a ceramic capacitor of 1.0 μF can be used as the input and output capacitors.
Moreover, dropout voltage is also small since output voltage accuracy realizes ±1.0% of high accuracy, and the low-on-resistance transistor is built-in. A built-in overcurrent protection circuit prevents that the load current from exceeding the current capacity of the output transistor. The ON / OFF circuit ensures long battery life.
Two packages, SOT-23-5 and SNT-6A(H) are available.
Compared with the voltage regulators using the conventional CMOS technology, the S-1167 Series is the most suitable for the portable equipments with ultra low current consumption and corresponding to the small package.

■ 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.

■ Applications

- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for cellular phone
- Constant-voltage power supply for portable equipment

■ Packages

- SOT-23-5
- SNT-6A(H)

S-1170 Series

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

The S-1170 Series is a positive voltage regulator with a low dropout voltage, high-accuracy output voltage, and low current consumption developed based on CMOS technology.
A built-in low on-resistance transistor provides a low dropout voltage and large output current, a built-in overcurrent protection circuit prevents the load current from exceeding the current capacity of the output transistor, and a built-in thermal shutdown circuit prevents damage caused by the heat. An ON/OFF circuit ensures a long battery life. Compared with the voltage regulators using the conventional CMOS technology, a larger variety of capacitors are available, including small ceramic capacitors. Small SOT-89-5 and 6-Pin HSON(A) packages realize high-density mounting.

■ 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.

■ Applications

- Constant-voltage power supply for DVD and CD-ROM drive
- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for personal communication device
- Constant-voltage power supply for notebook PC

■ Packages

- SOT-89-5
- 6-Pin HSON(A)

S-1200 Series

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

The S-1200 Series, developed by using CMOS technology, is a positive voltage regulator with a low dropout voltage, high accuracy output voltage.
A 0.1 µF small ceramic capacitor can be used. It operates with low current consumption of 18 µA typ.
The built-in output current protection circuit prevents the load current from exceeding the current capacity of the output transistor.
Compared with the voltage regulators using the conventional CMOS technology, small ceramic capacitors are also available.

■ 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.

■ Applications

- Power supply for battery-powered device
- Power supply for personal communication device
- Power supply for home electric appliance
- Power supply for cellular phone

■ Packages

- SNT-6A(H)
- SOT-23-5

S-1206 Series

ULTRA LOW CURRENT CONSUMPTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

The S-1206 Series is a positive voltage regulator with ultra low current consumption, low dropout voltage, high-accuracy output voltage, and 250 mA output current developed based on CMOS technology.
I/O capacitors are as small as 0.1 μF. S-1206 Series operates at ultra low current consumption of 1.0 μA (typ.).
The built-in low-on-resistance transistor realizes low dropout voltage and a large output current. A built-in overcurrent protection circuit prevents the load current from exceeding the current capacity of the output transistor.
Three packages, SOT-23-3, SOT-89-3, and SNT-6A(H) are available.
Compared with voltage regulators using a conventional CMOS technology, more types of capacitors, including small I/O capacitors, can be used with the S-1206 Series. The S-1206 Series features ultra low current consumption and comes in a small package, making them most suitable for portable equipment.

■ 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.

■ Applications

- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for cellular phone
- Constant-voltage power supply for portable equipment

■ Packages

- SOT-23-3
- SOT-89-3
- SNT-6A(H)

S-1212B/D Series

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

The S-1212B/D Series, developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with a high-withstand voltage, low current consumption and high-accuracy output voltage, and has a built-in ON / OFF circuit.
The S-1212B/D Series operates at the maximum operation voltage of 36 V and a low current consumption of 6.5 μA typ., and has a built-in low on-resistance output transistor which provides a very small dropout voltage and a large output current.
Also, a built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included.

■ 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.

■ Applications

- Constant-voltage power supply for industrial equipment
- Constant-voltage power supply for home electric appliance

■ Packages

- TO-252-5S(A)
- HSOP-8A
- HSOP-6
- SOT-89-5
- HTMSOP-8
- SOT-23-5

S-1213 Series

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

The S-1213 Series developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with a high-withstand voltage, low current consumption and high-accuracy output voltage.
The S-1213 Series operates at the maximum operation voltage of 36 V and a low current consumption of 5.0 µA typ. and has a built-in low on-resistance output transistor, which provides a very small dropout voltage and a large output current. In addition to the type in which output voltage is set inside the IC, the type for which output voltage can be set via an external resistor is added to a lineup. Also, a built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included.

■ 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.

■ Applications

- Constant-voltage power supply for industrial equipment
- Constant-voltage power supply for home electric appliance

■ Packages

- TO-252-5S(A)
- HSOP-8A

S-1214 Series

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

The S-1214 Series developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with a high-withstand voltage, low current consumption and high-accuracy output voltage.
The S-1214 Series operates at the maximum operation voltage of 36 V and a low current consumption of 5.0 µA typ. and has a built-in low on-resistance output transistor, which provides a very small dropout voltage and a large output current. In addition to the type in which output voltage is set inside the IC, the type for which output voltage can be set via an external resistor is added to a lineup. Also, a built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included.

■ 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.

■ Applications

- Constant-voltage power supply for industrial equipment
- Constant-voltage power supply for home electric appliance

■ Packages

- TO-252-5S(A)
- HSOP-8A

S-1222B/D Series

28 V INPUT, 200 mA VOLTAGE REGULATOR

The S-1222B/D Series, developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with a high-withstand voltage, low current consumption and high-accuracy output voltage, and has a built-in ON / OFF circuit.
The S-1222B/D Series operates at the maximum operation voltage of 28 V and a low current consumption of 6.5 μA typ., and has a built-in low on-resistance output transistor which provides a very small dropout voltage and a large output current.
Also, a built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included.

■ 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.

■ Applications

- Constant-voltage power supply for industrial equipment
- Constant-voltage power supply for home electric appliance
- Constant-voltage power supply for smartcard

■ Packages

- TO-252-5S(A)
- HSOP-8A
- HSOP-6
- SOT-89-5
- HTMSOP-8
- SOT-23-5
- DFN-6(1518)A

S-1312 Series

5.5 V INPUT, 150 mA VOLTAGE REGULATOR

The S-1312 Series, developed by using the CMOS technology, is a positive voltage regulator IC which has low current consumption, high ripple-rejection and low dropout voltage.
Even with low current consumption of 20 μA typ., it has high ripple-rejection of 75 dB typ., and a ceramic capacitor of 0.22 μF or more can be used as the input and output capacitors.
It also has high-accuracy output voltage of ±1.0%.

■ 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.

■ Applications

- Constant-voltage power supply for portable communication device, digital camera, and digital audio player
- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for home electric appliance

■ Packages

- SOT-23-5
- HSNT-4 (1010)
- HSNT-4 (0808)

S-1312xxxH Series

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

The S-1312xxxH Series, developed by using the CMOS technology, is a positive voltage regulator IC which has low current consumption, high ripple-rejection and low dropout voltage.

Even with low current consumption of 20 μA typ., it has high ripple-rejection of 75 dB typ., and a ceramic capacitor of 0.22 μF or more can be used as the input and output capacitors.
It also has high-accuracy output voltage of ±1.0%.

■ 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.

■ Applications

- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for home electric appliance

■ Packages

- SOT-23-5
- HSNT-4 (1010)

S-1313 Series

5.5 V INPUT, 200 mA VOLTAGE REGULATOR

The S-1313 Series, developed by using the CMOS technology, is a positive voltage regulator IC which has the super low current consumption and the low dropout voltage.
Current consumption is as low as 0.9 μA typ., and a ceramic capacitor of 0.1 μF or more can be used as the input and output capacitors.
It also has high-accuracy output voltage of ±1.0%.

■ 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.

■ Applications

- Constant-voltage power supply for portable communication device, digital camera, and digital audio player
- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for home electric appliance

■ Packages

- SOT-23-5
- SC-82AB
- HSNT-4 (1010)
- HSNT-4 (0808)

S-1313xxxH Series

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

The S-1313xxxH Series, developed by using the CMOS technology, is a positive voltage regulator IC which has the super low current consumption and the low dropout voltage.
Current consumption is as low as 0.9 μA typ., and a ceramic capacitor of 0.1 μF or more can be used as the input and output capacitors.
It also has high-accuracy output voltage of ±1.0%.

■ 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.

■ Applications

- Constant-voltage power supply for portable communication device, digital camera, and digital audio player
- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for home electric / electronic appliance
- Constant-voltage power supply for industrial equipment

■ Packages

- SOT-23-5
- SC-82AB
- HSNT-4(1010)
- HSNT-4(0808)

S-1317 Series

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

The S-1317 Series, developed by using the CMOS technology, is a positive voltage regulator IC, which features super low current consumption and low dropout voltage. This IC has low current consumption of 0.35 μA typ. and high-accuracy output voltage of ±1.0%. It is most suitable for use in portable equipment and battery-powered devices.

■ 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.

■ Applications

- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for portable communication device, digital camera, and digital audio player
- Constant-voltage power supply for home electric appliance

■ Packages

- SOT-23-5
- HSNT-4(1010)

S-1318 Series

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

The S-1318 Series, developed by using the CMOS technology, is a positive voltage regulator IC, which features super low current consumption and low dropout voltage. This IC has low current consumption of 95 nA typ. and high-accuracy output voltage of ±1.0%. It is most suitable for use in portable equipment and battery-powered devices.

■ Features

- Output voltage: 1.2 V, 1.5 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 (1.5 V, 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.

■ Applications

- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for portable communication device, digital camera, and digital audio player
- Constant-voltage power supply for home electric appliance

■ Packages

- SOT-23-5
- HSNT-4(1010)

S-1324 Series

5.5 V INPUT, 200 mA, LOW NOISE VOLTAGE REGULATOR

The S-1324 Series, developed by using the CMOS technology, is a positive voltage regulator IC which has low noise and low dropout voltage.
Output noise is as low as 17 μVrms typ., and a ceramic capacitor of 1.0 μF or more can be used as the input and output capacitors.
It also has high-accuracy output voltage of ±1.0%.

■ 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} ≥ $V_{OUT(S)}$ + 1.0 V)*1
  Possible to output 200 mA
  (at $V_{OUT(S)}$ ≥ 1.2 V, V_{IN} ≥ $V_{OUT(S)}$ + 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.

■ Applications

- Constant-voltage power supply for communication module and home electric appliance with communication function
- Constant-voltage power supply for portable communication device, digital camera, and digital audio player
- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for home electric appliance

■ Packages

- SOT-23-5
- SC-82AB
- HSNT-4(1010)

S-1333 Series

5.5 V INPUT, 300 mA VOLTAGE REGULATOR

The S-1333 Series, developed by using the CMOS technology, is a positive voltage regulator IC which has low current consumption, high ripple-rejection and low dropout voltage.
Even with low current consumption of 25 μA typ., it has high ripple-rejection of 75 dB typ., and a ceramic capacitor of 1.0 μF or more can be used as the input and output capacitors.
It also has high-accuracy output voltage of ±1.0%.

■ 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.

■ Applications

- Constant-voltage power supply for portable communication device, digital camera, and digital audio player
- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for home electric appliance

■ Packages

- SOT-23-5
- HSNT-4 (1010)
- HSNT-4 (0808)

S-1335 Series

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

The S-1335 Series, developed by using the CMOS technology, is a positive voltage regulator IC of 150 mA output current, which has low dropout voltage, high-accuracy output voltage and soft-start function.
The rising time of output voltage immediately after power-on or after the ON / OFF pin is set to ON is adjustable. A 1.0 µF small ceramic capacitor can be used. It operates with low current consumption of 36 µA typ. Furthermore the overcurrent protection circuit prevents the load current from exceeding the capacity of output transistor.
SOT-23-5, SC-82AB and super small HSNT-4 (1010) packages realize high-density mounting.

■ 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.

■ Applications

- Constant-voltage power supply for digital still camera, TV
- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for cellular phone
- Constant-voltage power supply for portable equipment

■ Packages

- SOT-23-5
- SC-82AB
- HSNT-4 (1010)

S-13A1 Series

5.5 V INPUT, 1000 mA VOLTAGE REGULATOR

The S-13A1 Series is a positive voltage regulator with a low dropout voltage, high-accuracy output voltage, and low current consumption developed based on CMOS technology.
A 2.2 μF small ceramic capacitor can be used, and the very small dropout voltage and the large output current due to the built-in transistor with low on-resistance are provided. The S-13A1 Series includes a load current protection circuit that prevents the output current from exceeding the current capacity of the output transistor and a thermal shutdown circuit that prevents damage due to overheating. In addition to the types in which output voltage is set inside the IC, a type for which output voltage can be set via an external resistor is added to a lineup. Also, the S-13A1 Series includes an inrush current limit circuit to limit the excess inrush current generated at power-on or at the time when the ON / OFF pin is set to ON. High heat radiation HSOP-8A and HSOP-6 or small SOT-89-5 packages realize high-density mounting.

■ 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
- 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, the 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, C_{SS} = 1.0 nF)
  Inrush current limit time 0.4 ms typ.
  (Types in which output voltage is internally set, SSC pin = open)
  Inrush current limit time 0.4 ms typ.
  (Types in which output voltage is externally set)
- 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.

■ Applications

- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for TV, notebook PC and home electric appliance
- Constant-voltage power supply for portable equipment

■ Packages

- HSOP-8A
- HSOP-6
- SOT-89-5

S-13D1 Series

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

The S-13D1 Series, developed by using the CMOS technology, is a 2-channel positive voltage regulator IC which has low dropout voltage, high accuracy output voltage and low current consumption.
A 0.22 µF small ceramic capacitor can be used, and the S-13D1 Series includes a load current protection circuit that prevents the output current from exceeding the current capacity of the output transistor and a thermal shutdown circuit that prevents damage due to overheating. Also, C / F type in the S-13D1 Series has a built-in delay function that sets the difference of rising time between channels.

■ 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.

■ Applications

- Constant-voltage power supply for digital camera
- Constant-voltage power supply for mobile phone
- Constant-voltage power supply for portable equipment

■ Packages

- SOT-23-6
- HSNT-6 (1212)

S-13R1 Series

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

The S-13R1 Series, developed by using the CMOS technology, is a positive voltage regulator IC of 150 mA output current, which has low dropout voltage, high-accuracy output voltage and low current consumption.
Even with low current consumption of 5 μA typ., it has high ripple-rejection of 70 dB typ., and a ceramic capacitor of 1.0 μF or more can be used as the input and output capacitors.
The S-13R1 Series includes an overcurrent protection circuit that prevents the load current from exceeding the current capacity of the output transistor and a thermal shutdown circuit that prevents damage because of overheating.
Due to the built-in reverse current protection function, the reverse current flowing from the VOUT pin to the VIN pin can be controlled as the small value 0.09 μA max. Therefore, IC protection diode is not needed.

■ 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.

■ Applications

- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for portable equipment
- Constant-voltage power supply for home electric appliance
- Constant-voltage power supply for mobile phone

■ Packages

- SOT-23-5
- SC-82AB
- HSNT-4 (1010)

S-1701 Series

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

The S-1701 Series, developed based on CMOS technology, is a voltage regulator with a reset function and integrates a high-accuracy voltage detector with on-chip delay circuit and a positive voltage regulator with a low dropout voltage and high output voltage on one chip.
The S-1701 Series is available in many types according to the selection of the voltage detector block of the voltage detector, including a SENSE pin input product. A built-in low on-resistance transistor provides a low dropout voltage and large output current.
Small ceramic capacitors are available and an external capacitor for delay is needless. Small SOT-23-5 and SOT-89-5 packages realize high-density mounting.

■ 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.

■ Applications

- Constant-voltage power supply and reset circuit for battery-powered device
- Constant-voltage power supply for personal communication device
- Constant-voltage power supply for home appliance

■ Packages

- SOT-23-5
- SOT-89-5

S-1740/1741 Series

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

The S-1740/1741 Series, developed using CMOS technology, is a positive voltage regulator with the supply voltage divided output, which features super low current consumption and low dropout voltage.
The regulator block has low current consumption of 0.35 μA typ. and high-accuracy output voltage of ±1.0%.
The function of the supply voltage divided output is prepared in the S-1740/1741 Series. The supply voltage divided output is a function that divides the input voltage (V_{IN}) of the regulator into $V_{IN}/2$ or $V_{IN}/3$ and outputs the voltage. For example, this function makes it possible that the IC connects to a low voltage microcontroller A/D converter directly and the microcontroller monitors a battery voltage.

■ 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.

■ Applications

- Constant-voltage power supply and battery voltage monitoring support for battery-powered device
- Constant-voltage power supply for portable communication device, digital camera, and digital audio player
- Constant-voltage power supply for home electric appliance

■ Packages

- SOT-23-5
- HSNT-6(1212)
- HSNT-4(1010)

S-812C Series

16 V INPUT, 75 mA VOLTAGE REGULATOR

The S-812C Series is a high-withstand voltage regulator IC which is developed by using the CMOS technology. This IC is suitable for applications which require withstand because its maximum voltage for operation is as high as 16 V, also for portable device having the low current consumption because this IC not only has the low current consumption but also a ON/OFF circuit. This IC operates stably due to the internal phase compensation circuit so that users are able to use ceramic capacitor as the output capacitor.

■ 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.

■ Applications

- Constant-voltage power supply for home electric appliance
- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for communication device

■ Packages

- SNT-6A(H)
- SOT-23-5
- SOT-89-3
- SOT-89-5
- TO-92
- WLP-4R

S-816 Series

EXTERNAL TRANSISTOR TYPE CMOS VOLTAGE REGULATOR

The S-816 Series, developed using the CMOS technology, is an external transistor type positive voltage regulator which incorporates an overcurrent protection circuit and an ON/OFF circuit. A low drop-out type regulator with an output current ranging from several hundreds of mA to 1 A can be configured with the PNP transistor driven by this IC.
Despite the features of the S-816 Series, which is low current consumption, the improvement in its transient response characteristics of the IC with a newly deviced phase compensation circuit made it possible to employ the products of the S-816 Series even in applications where heavy input variation or load variation is experienced.
The S-816 Series regulator serves as an ideal power supply unit for portable devices when coupled with the small SOT-23-5 package, providing numerous outstanding features, including low current consumption. Since the S-816 Series can accommodate an input voltage of up to 16 V, it is also suitable when operating via an AC adapter.

■ 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.

■ Applications

- Power supply for on-board such as battery device for portable telephone, electronic notebook, PDA
- Constant voltage power supply for camera, video equipment and portable communication equipment
- Power supply for CPU
- Post-regulator for switching regulator
- Main regulator in multiple-power supply system

■ Package

- SOT-23-5

S-817 Series

SUPER-SMALL PACKAGE CMOS VOLTAGE REGULATOR

The S-817 Series is a 3-terminal positive voltage regulator, developed using CMOS technology. Small ceramic capacitors can be used as the output capacitor, and the S-817 Series provides stable operation with low loads down to 1 μA.
Compared with the conventional voltage regulator, it is low current consumption, and with a lineup of the super small package (SNT-4A:1.2 mm × 1.6 mm). It is optimal as a power supply of small portable device.

■ 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.

■ Applications

- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for personal communication device
- Constant-voltage power supply for home electric appliance

■ Packages

- SNT-4A
- SC-82AB
- SOT-23-5
- SOT-89-3
- TO-92

S-818 Series

LOW DROPOUT CMOS VOLTAGE REGULATOR

The S-818 Series is a positive voltage regulator developed by CMOS technology and featured by low dropout voltage, high output voltage accuracy and low current consumption.
Built-in low on-resistance transistor provides low dropout voltage and large output current. A ceramic capacitor of 2 μF or more can be used as an output capacitor. An ON/OFF circuit ensures long battery life.
The SOT-23-5 miniaturized package and the SOT-89-5 package are recommended for configuring portable devices and large output current applications, respectively.

■ 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.

■ Applications

- Constant-voltage power supply for battery-powered device, personal communication device and home electric appliance

■ Packages

- SOT-23-5
- SOT-89-5

S-87x Series

HIGH WITHSTAND-VOLTAGE VOLTAGE REGULATOR WITH RESET FUNCTION

The S-87x Series is a low-power high withstand-voltage regulators with a reset function, which integrates high-precision voltage detection and voltage regulation circuits on a single chip.
The S-87x Series has lineups for lithium-ion battery packs.

■ 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.

■ Applications

- Constant voltage power supply or reset circuit of battery-powered equipment, VTR, camera, communications equipment and others.
- Lithium-ion secondary battery pack

■ Package

- SOT-89-5

S-L2980 Series

HIGH RIPPLE-REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

The S-L2980 Series is a positive voltage regulator with a low dropout voltage, high output voltage accuracy, and low current consumption developed based on CMOS technology.
A built-in low on-resistance transistor provides a low dropout voltage and a large output current. A ON/OFF circuit ensures long battery life.
Various types of output capacitors can be used in the S-L2980 Series compared with the conventional CMOS voltage regulators. A small ceramic capacitor can also be used.

■ 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.

■ Applications

- Power supply for battery-powered device
- Power supply for personal communication device
- Power supply for home electric appliance
- Power supply for cellular phone

■ Package

- SOT-23-5

S-T111 Series

HIGH RIPPLE-REJECTION LOW DROPOUT CMOS VOLTAGE REGULATOR

The S-T111 Series is a positive voltage regulator with a low dropout voltage, high-accuracy output voltage, and low current consumption developed based on CMOS technology.
A built-in low on-resistance transistor provides a low dropout voltage and large output current, and a built-in overcurrent protection circuit prevents the load current from exceeding the current capacity of the output transistor. An ON/OFF circuit ensures a long battery life. Compared with the voltage regulators using the conventional CMOS technology, a larger variety of capacitors are available, including small ceramic capacitors. A small SOT-23-5 package realizes high-density mounting.

■ 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.

■ Applications

- Constant-voltage power supply for battery-powered device
- Constant-voltage power supply for personal communication device
- Constant-voltage power supply for home electric appliance
- Constant-voltage power supply for cellular phone

■ Package

- SOT-23-5

S-8424A Series

BATTERY BACKUP SWITCHING IC

The S-8424A Series is a CMOS IC designed for use in the switching circuits of primary and backup power supplies on a single chip. It consists of two voltage regulators, three voltage detectors, a power supply switch and its controller, as well as other functions.
In addition to the switching function between the primary and backup power supply, the S-8424A Series can provide the micro controllers with three types of voltage detection output signals corresponding to the power supply voltage.
Moreover adopting a special sequence for switch control enables the effective use of the backup power supply, making this IC ideal for configuring a backup system.

■ Features

- Low power consumption
  Normal operation: 15 μA Max. (V_{IN} = 6 V)
  Backup: 2.1 μA Max.
- Voltage regulator
  Output voltage tolerance : ±2 %
  Output voltage: Independently selectable in 0.1 V steps in the range of 2.3 V to 5.4 V
- Three built-in voltage detectors (CS, $\overline{\text{PREEND}}$, $\overline{\text{RESET}}$)
  Detection voltage precision: ±2 %
  Detection voltage: Selectable in 0.1 V steps in the range of 2.4 V to 5.3 V (CS voltage detector)
  Selectable in 0.1 V steps in the range of 1.7 V to 3.4 V ($\overline{\text{PREEND}}$, $\overline{\text{RESET}}$ voltage detector)
- Switching circuit for primary power supply and backup power supply configurable on one chip
- Efficient use of backup power supply possible
- Special sequence
  Backup voltage is not output when the primary power supply voltage does not reach the initial voltage at which the switch unit operates.
- Lead-free, Sn 100%, halogen-free*1

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

■ Package

- 8-Pin TSSOP

■ Applications

- Video camera recorders
- Still video cameras
- Memory cards
- SRAM backup equipment

S-1000 Series

ULTRA-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR

The S-1000 series is a series of high-precision voltage detectors developed using CMOS process. The detection voltage is fixed internally with an accuracy of ±1.0%. It operates with low current consumption of 350 nA typ. Two output forms, Nch open-drain and CMOS output, are available. CMOS voltage detector, S-1000 Series is the most suitable for the portable equipments with ultra low current consumption, high precision and corresponding to the small package.

■ 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.

■ Applications

- Power monitor for microcomputers and reset for CPUs.
- Power monitor for portable equipments such as cellular phones, digital still cameras and PDAs.
- Constant voltage power monitor for cameras, video equipments and communication devices.

■ Packages

- SC-82AB
- SOT-23-5
- SNT-4A

S-1002 Series

VOLTAGE DETECTOR WITH SENSE PIN

The S-1002 Series is a high-accuracy voltage detector developed using CMOS technology. The detection voltage is fixed internally with an accuracy of ±1.0% ($-V_{DET(S)} \geq 2.2$ V). It operates with current consumption of 500 nA typ.
Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin falls to 0 V.
Two output forms Nch open-drain output and CMOS output are available.

■ Features

- Detection voltage: 1.0 V to 5.0 V (0.1 V step)
- Detection voltage accuracy: ±1.0% ($2.2\ V \leq -V_{DET(S)} \leq 5.0\ V$)
  ±22 mV ($1.0\ V \leq -V_{DET(S)} < 2.2\ V$)
- 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

■ Applications

- Power supply monitor for microcomputer and reset for CPU
- Constant voltage power supply monitor for TV, Blu-ray recorder and home appliance
- Power supply monitor for portable devices such as notebook PC, digital still camera and mobile phone

■ Packages

- SOT-23-5
- SC-82AB

S-1003 Series

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

The S-1003 Series is a high-accuracy voltage detector developed using CMOS technology. The detection voltage is fixed internally with an accuracy of ±1.0% ($-V_{DET} \geq 2.2$ V). It operates with current consumption of 500 nA typ.
The release signal can be delayed by setting a capacitor externally. Delay time accuracy is ±15%.
Moreover, since the S-1003 Series includes the manual reset function, the reset signal can be also output forcibly.
Two output forms Nch open-drain output and CMOS output are available.

■ 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

■ Applications

- Power supply monitor for microcomputer and reset for CPU
- Constant voltage power supply monitor for TV, Blu-ray recorder and home appliance
- Power supply monitor for portable devices such as notebook PC, digital still camera and mobile phone

■ Packages

- SOT-23-5
- SNT-6A

S-1004 Series

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

The S-1004 Series is a high-accuracy voltage detector developed using CMOS technology. The detection voltage is fixed internally with an accuracy of ±1.0% ($-V_{DET(S)} \geq 2.2$ V). It operates with current consumption of 500 nA typ.
Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin falls to 0 V.
The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy at Ta = +25°C is ±15%.
Two output forms Nch open-drain output and CMOS output are available.

■ Features

- Detection voltage: 1.0 V to 5.0 V (0.1 V step)
- Detection voltage accuracy: ±1.0% (2.2 V ≤ $-V_{DET(S)} \leq$ 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

■ Applications

- Power supply monitor for microcomputer and reset for CPU
- Constant voltage power supply monitor for TV, Blu-ray recorder and home appliance
- Power supply monitor for portable devices such as notebook PC, digital still camera and mobile phone

■ Packages

- SOT-23-5
- SNT-6A

S-1009 Series

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

The S-1009 Series is a super high-accuracy voltage detector developed using CMOS technology. The detection voltage is fixed internally with an accuracy of ±0.5%. It operates with super low current consumption of 270 nA typ.
The release signal can be delayed by setting a capacitor externally. Delay time accuracy is ±15%. Two output forms Nch open-drain and CMOS output are available.
Compared with conventional CMOS voltage detectors, the S-1009 Series is the most suitable for the portable devices due to the super-low current consumption, super high-accuracy and small packages.

■ 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

■ Applications

- Power monitor and reset for CPU and microcomputer
- Constant voltage power monitor for TV, DVD recorder and home appliance
- Power supply monitor for portable device such as notebook PC, digital still camera and mobile phone

■ Packages

- SOT-23-5
- SC-82AB
- SNT-4A

S-1011 Series

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

The S-1011 Series is a high-accuracy voltage detector developed using CMOS technology. The detection voltage is fixed internally, and the accuracy of the S-1011 Series A / C / E / G type is ±1.5%. It operates with current consumption of 600 nA typ.
Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared in the SENSE detection product, so the output is stable even if the SENSE pin falls to 0 V.
The detection signal and release signal can be delayed by setting a capacitor externally, and the detection delay time accuracy is ±20% (C_N = 3.3 nF, Ta = +25°C), the release delay time accuracy is ±20% (C_P = 3.3 nF, Ta = +25°C).
Output form is Nch open-drain output.

■ 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

■ Applications

- Power supply monitor for microcomputer and reset for CPU
- Constant voltage power supply monitor for TV and home appliance etc.
- Power supply monitor for Blu-ray recorder, notebook PC and digital still camera
- Industrial equipment, housing equipment

■ Package

- SOT-23-6

S-1410/1411 Series

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

The S-1410/1411 Series is a watchdog timer developed using CMOS technology, which can operate with low current consumption of 3.8 μA typ. The reset function and the low voltage detection function are available.

■ 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.

■ Application

- Power supply monitoring and system monitoring in microcontroller mounted apparatus

■ Packages

- TMSOP-8
- HSNT-8(2030)

S-801 Series

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

The S-801 Series is a series of high-precision voltage detectors with a built-in delay time generator of fixed time developed using CMOS process. The detection voltage is fixed internally, with an accuracy of ±2.0 %. Internal oscillator and counter timer can delay the release signal without external parts. Three delay times 50 ms, 100 ms, and 200 ms are available. Two output forms, Nch open-drain and CMOS output, are available.

■ 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.

■ Applications

- Power monitor for portable equipment such as notebook computers, digital still cameras, PDA, and cellular phones.
- Constant voltage power monitor for cameras, video equipment and communication devices.
- Power monitor for microcomputers and reset for CPUs.

■ Packages

- SOT-23-5
- SNT-4A

S-808xxC Series

SUPER-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR

The S-808xxC series is a series of high-precision voltage detectors developed using CMOS process. The detection voltage is fixed internally with an accuracy of ±2.0%. Two output forms, Nch open-drain and CMOS output, are available. Super-low current consumption and miniature package lineup can meet demand from the portable device applications.

■ 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.

■ Applications

- Battery checkers
- Power failure detectors
- Power monitor for portable equipments such as pagers, calculators, electronic notebooks and remote controllers.
- Constant voltage power monitor for cameras, video equipments and communication devices.
- Power monitor for microcomputers and reset for CPUs.

■ Packages

- SC-82AB
- SOT-23-5
- SOT-89-3
- SNT-4A
- TO-92

S-809xxC Series

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

The S-809xxC Series is a high-precision voltage detector developed using CMOS process. The detection voltage is fixed internally with an accuracy of ±2.0 %. A time delayed reset can be accomplished with the addition of an external capacitor. Two output forms, Nch open-drain and CMOS output, are available.

■ 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.

■ Applications

- Power supply monitor for portable equipment such as notebook PCs, digital still cameras, PDAs and cellular phones
- Constant voltage power monitor for cameras, video equipment and communication equipment
- Power monitor and reset for CPUs and microcomputers

■ Packages

- SC-82AB
- SOT-23-5
- SNT-4A

S-1410/1411 Series

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

The S-1410/1411 Series is a watchdog timer developed using CMOS technology, which can operate with low current consumption of 3.8 µA typ. The reset function and the low voltage detection function are available.

■ 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.

■ Application

- Power supply monitoring and system monitoring in microcontroller mounted apparatus

■ Packages

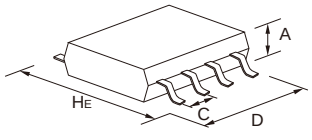
- TMSOP-8
- HSNT-8(2030)

Package List

Package Type	Pin Count	Package Name	Package Size (mm)			Pitch (mm)
			H_E	D	A (max.)	C
Lead insertion type	3	TO-92	14.5	5.2	4.2	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
	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-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
Non-lead type	6	6-Pin HSON(A)	3.0	2.9	0.9	0.95
	4	SNT-4A	1.6	1.2	0.5	0.65
	6	SNT-6A	1.8	1.57	0.5	0.5
	6	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-6A	2.46	1.96	0.5	0.5
	6	HSNT-6(1212)	1.2	1.2	0.4	0.4
	6	HSNT-6D (HSNT-6(1618))	1.8	1.6	0.4	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(1616)B	1.6	1.6	0.41	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(2020)A	2.0	2.0	0.6	0.5
	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

Remarks 1. For more details, please refer to our website. Package List on ablic.com

2. Please contact our sales representatives regarding WLP package products.



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