

Product Catalog

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

2023



Features	Series Name	Page
Linear Regulators (LDO Regulators)		
5.5 V INPUT, 100 mA CMOS VOLTAGE REGULATOR WITH 0.35 μ A SUPER LOW CURRENT CONSUMPTION	S-1317 Series	2-3
5.5 V INPUT, 100 mA, 95 nA SUPER LOW CURRENT CONSUMPTION VOLTAGE REGULATOR	S-1318 Series	2-3
HIGH RIPPLE-REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR	S-1112/1122 Series	2-3
HIGH RIPPLE-REJECTION LOW DROPOUT CMOS VOLTAGE REGULATOR	S-T111 Series	2-3
ULTRA LOW CURRENT CONSUMPTION, HIGH RIPPLE REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR	S-1167 Series	2-4
HIGH RIPPLE-REJECTION AND SMALL PACKAGE CMOS VOLTAGE REGULATOR	S-1323 Series	2-4
HIGH RIPPLE-REJECTION LOW DROPOUT LOW INPUT-AND-OUTPUT CAPACITANCE CMOS VOLTAGE REGULATOR	S-1200 Series	2-4
HIGH RIPPLE-REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR	S-L2980 Series	2-4
5.5 V INPUT, 150 mA VOLTAGE REGULATOR	S-1312 Series	2-5
105°C OPERATION, 5.5 V INPUT, 150 mA VOLTAGE REGULATOR	S-1312xxxH Series	2-5
5.5 V INPUT, 150 mA VOLTAGE REGULATOR WITH SOFT-START FUNCTION	S-1335 Series	2-5
5.5 V INPUT, 150 mA VOLTAGE REGULATOR WITH REVERSE CURRENT PROTECTION	S-13R1 Series	2-6
5.5 V INPUT, 200 mA VOLTAGE REGULATOR	S-1313 Series	2-6
105°C OPERATION, 5.5 V INPUT, 200 mA VOLTAGE REGULATOR	S-1313xxxH Series	2-7
5.5 V INPUT, 200 mA, OUTPUT CAPACITOR-LESS VOLTAGE REGULATOR	S-1315 Series	2-7
5.5 V INPUT, 200 mA, LOW NOISE VOLTAGE REGULATOR	S-1324 Series	2-7
ULTRA LOW CURRENT CONSUMPTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR	S-1206 Series	2-7
HIGH RIPPLE-REJECTION AND LOW DROPOUT MIDDLE OUTPUT CURRENT CMOS VOLTAGE REGULATOR	S-1132 Series	2-8
HIGH RIPPLE-REJECTION AND LOW DROPOUT MIDDLE-OUTPUT CURRENT CMOS VOLTAGE REGULATOR	S-1133 Series	2-8
5.5 V INPUT, 300 mA VOLTAGE REGULATOR	S-1135 Series	2-8
5.5 V INPUT, 300 mA VOLTAGE REGULATOR WITH SOFT-START FUNCTION	S-1137 Series	2-9
5.5 V INPUT, 300 mA VOLTAGE REGULATOR	S-1333 Series	2-9
105°C OPERATION, 36 V INPUT, 500 mA VOLTAGE REGULATOR	S-1213 Series	2-9
HIGH RIPPLE-REJECTION LOW DROPOUT HIGH OUTPUT CURRENT CMOS VOLTAGE REGULATOR	S-1155 Series	2-10
HIGH RIPPLE-REJECTION AND LOW DROPOUT HIGH OUTPUT CURRENT CMOS VOLTAGE REGULATOR	S-1170 Series	2-10
105°C OPERATION, 36 V INPUT, 1000 mA VOLTAGE REGULATOR	S-1214 Series	2-11
HIGH RIPPLE-REJECTION LOW DROPOUT HIGH OUTPUT CURRENT CMOS VOLTAGE REGULATOR	S-1172 Series	2-11

Features	Series Name	Page
5.5 V INPUT, 1000 mA VOLTAGE REGULATOR	S-13A1 Series	2-12
16 V INPUT, 75 mA VOLTAGE REGULATOR	S-812C Series	2-12
SUPER-SMALL PACKAGE CMOS VOLTAGE REGULATOR	S-817 Series	2-13
EXTERNAL TRANSISTOR TYPE CMOS VOLTAGE REGULATOR	S-816 Series	2-13
LOW DROPOUT CMOS VOLTAGE REGULATOR	S-818 Series	2-13
HIGH WITHSTAND-VOLTAGE VOLTAGE REGULATOR WITH RESET FUNCTION	S-87x Series	2-13
5.5 V INPUT, 100 mA VOLTAGE REGULATOR WITH SUPPLY VOLTAGE DIVIDED OUTPUT	S-1740/1741 Series	2-14
HIGH RIPPLE-REJECTION LOW DROPOUT CMOS VOLTAGE REGULATOR WITH RESET FUNCTION	S-1701 Series	2-14
5.5 V INPUT, 150 mA, 2-CIRCUIT VOLTAGE REGULATOR WITH DELAY FUNCTION	S-13D1 Series	2-15
SUPER-SMALL PACKAGE 2-CIRCUIT HIGH RIPPLE-REJECTION LOW CURRENT CONSUMPTION LOW DROPOUT CMOS VOLTAGE REGULATOR	S-1721 Series	2-16
28 V INPUT, 200 mA VOLTAGE REGULATOR	S-1222B/D Series	2-16
105°C OPERATION, 36 V INPUT, 250 mA VOLTAGE REGULATOR	S-1212B/D Series	2-17
HIGH-WITHSTAND VOLTAGE LOW CURRENT CONSUMPTION LOW DROPOUT CMOS VOLTAGE REGULATOR	S-1142A/B Series	2-17
HIGH-WITHSTAND VOLTAGE LOW CURRENT CONSUMPTION LOW DROPOUT CMOS VOLTAGE REGULATOR	S-1142C/D Series	2-17
Voltage Detectors		
ULTRA-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR	S-1000 Series	2-18
SUPER-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR	S-808xxC Series	2-18
0.27 μ A CURRENT CONSUMPTION VOLTAGE DETECTOR WITH DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)	S-1009 Series	2-18
ULTRA-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR WITH DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING)	S-809xxC Series	2-19
ULTRA-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR WITH DELAY CIRCUIT (INTERNAL DELAY TIME SETTING)	S-801 Series	2-19
MANUAL RESET BUILT-IN DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING) HIGH-ACCURACY VOLTAGE DETECTOR	S-1003 Series	2-19
VOLTAGE DETECTOR WITH SENSE PIN	S-1002 Series	2-20
BUILT-IN DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING) VOLTAGE DETECTOR WITH SENSE PIN	S-1004 Series	2-20
HIGH-WITHSTAND VOLTAGE BUILT-IN DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING) VOLTAGE DETECTOR	S-1011 Series	2-20
Watchdog Timers		
105°C OPERATION, 3.8 μ A CURRENT CONSUMPTION WATCHDOG TIMER WITH RESET FUNCTION	S-1410/1411 Series	2-21
CMOS IC Packages		
Package List		2-22

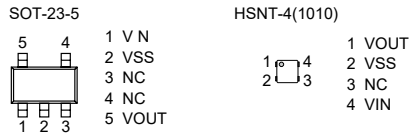
S-1317 Series

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

Features

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



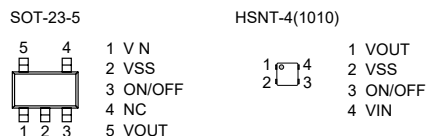
S-1318 Series

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

Features

- Output voltage: 1.2 V, 1.8 V, 2.2 V, 2.3 V, 2.5 V, 2.8 V, 3.0 V, 3.3 V
- Input voltage: 1.7 V to 5.5 V
- Output voltage accuracy: $\pm 1.0\%$ (1.2 V output product: ± 15 mV) ($T_a = +25^\circ\text{C}$)
- Dropout voltage: 45 mV typ. (2.5 V output product, at $I_{\text{OUT}} = 10$ mA) ($T_a = +25^\circ\text{C}$)
- 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 $V_{\text{IN}} \geq V_{\text{OUT(S)}} + 1.0$ V)^{*1} Possible to output 100 mA (1.8 V, 2.2 V, 2.3 V, 2.5 V, 2.8 V, 3.0 V, 3.3 V output product, at $V_{\text{IN}} \geq V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input capacitor: A ceramic capacitor can be used (1.0 μ F or more)
- Output capacitor: A ceramic capacitor can be used (1.0 μ F 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: $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- 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.



S-1112/1122 Series

HIGH RIPPLE-REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

Features

- Output voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Output voltage accuracy: $\pm 1.0\%$
- Dropout voltage: 190 mV typ. (3.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Current consumption: During operation: 50 μ A typ., 90 μ A max. During power-off: 0.1 μ A typ., 1.0 μ A max. Possible to output 150 mA ($V_{\text{IN}} \geq V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Output current: A ceramic capacitor of 0.47 μ F 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: $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- Lead-free, Sn 100%, halogen-free^{*2}

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

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



S-T11 Series

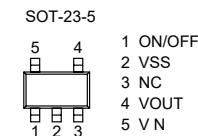
HIGH RIPPLE-REJECTION LOW DROPOUT CMOS VOLTAGE REGULATOR

Features

- Output voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Output voltage accuracy: $\pm 1.0\%$
- Dropout voltage: 190 mV typ. (3.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Current consumption: During operation: 50 μ A typ., 90 μ A max. During power-off: 0.1 μ A typ., 1.0 μ A max. Possible to output 150 mA ($V_{\text{IN}} \geq V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Output current: A ceramic capacitor of 0.1 μ F 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: $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- Lead-free, Sn 100%, halogen-free^{*2}

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

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



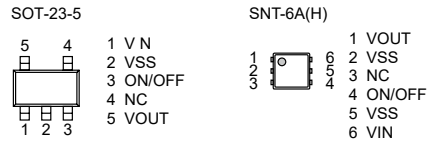
S-1167 Series

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

Features

- Output voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Input voltage: 2.0 V to 6.5 V
- Output voltage accuracy: $\pm 1.0\%$
- Dropout voltage: 150 mV typ. (3.0 V output product, $I_{OUT} = 100$ mA)
- Current consumption:
 - During operation: 9 μ A typ., 16 μ A max.
 - During power-off: 0.1 μ A typ., 0.9 μ A 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 μ F 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: $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- Lead-free, Sn 100%, halogen-free^{*2}

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



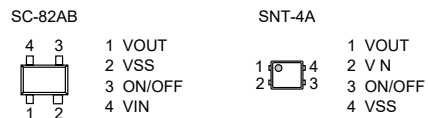
S-1323 Series

HIGH RIPPLE-REJECTION AND SMALL PACKAGE CMOS VOLTAGE REGULATOR

Features

- Output voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Output voltage accuracy: $\pm 1.0\%$
- Current consumption:
 - During operation: 70 μ A typ., 90 μ A max.
 - During power-off: 0.1 μ A typ., 1.0 μ A 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 μ F 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: $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- Lead-free, Sn 100%, halogen-free^{*2}

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



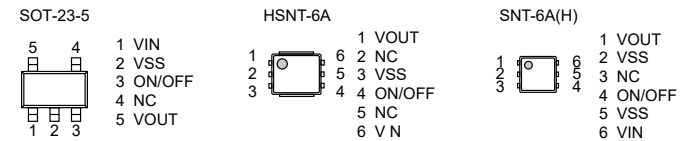
S-1200 Series

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

Features

- Output voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Input voltage: 2.0 V to 10.0 V
- Output voltage accuracy: $\pm 1.0\%$
- Dropout voltage: 140 mV typ. (3.0 V output product, $I_{OUT} = 100$ mA)
- Current consumption:
 - During operation: 18 μ A typ., 40 μ A max.
 - During power-off: 0.01 μ A typ., 1.0 μ A 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 μ F or more can be used.
- Ripple rejection: 70 dB typ. ($f = 1.0$ kHz, 1.5 V $\leq V_{OUT} \leq 3.0$ V)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON/OFF circuit: Ensures long battery life.
- Operation temperature range: $T_a = -40$ C to $+85$ C
- Lead-free, Sn 100%, halogen-free^{*2}

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



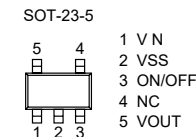
S-L2980 Series

HIGH RIPPLE-REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

Features

- Output voltage: 1.5 V to 6.0 V, selectable in 0.1 V steps
- Output voltage accuracy: $\pm 2.0\%$
- Dropout voltage: 120 mV typ. (3.0 V output product, $I_{OUT} = 50$ mA)
- Current consumption:
 - During operation: 90 μ A typ., 140 μ A max.
 - During power-off: 0.1 μ A typ., 1.0 μ A 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 μ F or more can be used. (A ceramic capacitor of 2.2 μ F 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: $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- 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.



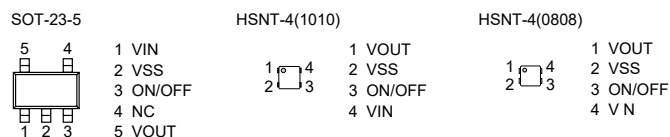
S-1312 Series

5.5 V INPUT, 150 mA VOLTAGE REGULATOR

Features

- Output voltage: 1.0 V to 3.5 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: $\pm 1.0\%$ (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 μ A typ., 30 μ A max.
 - During power-off: 0.1 μ A typ., 1.0 μ A 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 μ F 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.
- Ta = -40°C to $+85^{\circ}\text{C}$
- Operation temperature range:
- Lead-free (Sn 100%), halogen-free

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



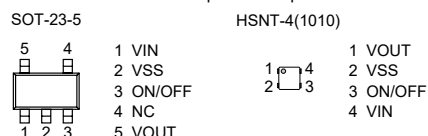
S-1312xxxH Series

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

Features

- Output voltage: 1.0 V to 3.5 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: $\pm 1.0\%$ (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 μ A typ., 30 μ A max.
 - During power-off: 0.1 μ A typ., 1.0 μ A 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 μ F 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.
- Ta = -40°C to $+105^{\circ}\text{C}$
- Operation temperature range:
- 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.



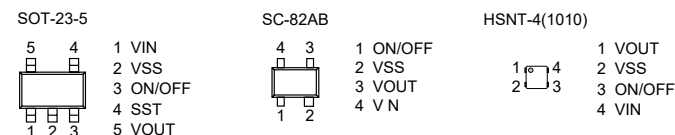
S-1335 Series

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

Features

- Output voltage: 1.0 V to 3.6 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: $\pm 1.0\%$ (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 μ A typ., 54 μ A max.
 - During power-off: 0.1 μ A typ., 1.0 μ A 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 μ F 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.
- Ta = -40°C to $+85^{\circ}\text{C}$
- Operation temperature range:
- Lead-free (Sn 100%), halogen-free

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



S-13R1 Series

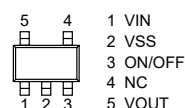
5.5 V INPUT, 150 mA VOLTAGE REGULATOR WITH REVERSE CURRENT PROTECTION

Features

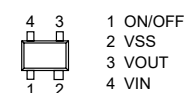
- Output voltage: 1.2 V to 4.0 V, selectable in 0.05 V step
- Input voltage: 2.0 V to 5.5 V
- Output voltage accuracy: $\pm 1.0\%$ (1.2 V to 1.45 V output product: ± 15 mV)
- Dropout voltage: 150 mV typ. (3.0 V output product, $I_{OUT} = 100$ mA)
- Current consumption: During operation: 5 μ A typ., 9 μ A max.
During power-off: 0.1 μ A typ., 1.0 μ A 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 μ F or more can be used.
- Ripple rejection: 70 dB typ. (3.0 V output product, $f = 1.0$ kHz)
- Reverse current protection function: $I_{REV} = 0.09$ μ A 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.
- Operation temperature range: Discharge shunt function "available" / "unavailable" is selectable.
Pull-down function "available" / "unavailable" is selectable.
 $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free

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

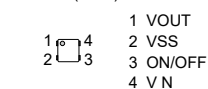
SOT-23-5



SC-82AB



HSNT-4(1010)



S-1313 Series

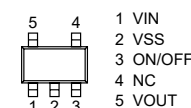
5.5 V INPUT, 200 mA VOLTAGE REGULATOR

Features

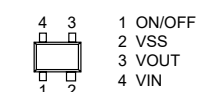
- Output voltage: 1.0 V to 3.5 V, selectable in 0.05 V step.
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: $\pm 1.0\%$ (1.0 V to 1.45 V output product: ± 15 mV)
- Dropout voltage: 170 mV typ. (2.8 V output product, $I_{OUT} = 100$ mA)
- Current consumption: During operation: 0.9 μ A typ., 1.35 μ A max.
During power-off: 0.01 μ A typ., 0.1 μ A 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 μ F 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: Discharge shunt function "available" / "unavailable" is selectable.
Pull-down function "available" / "unavailable" is selectable.
 $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free

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

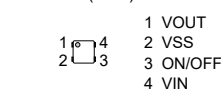
SOT-23-5



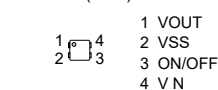
SC-82AB



HSNT-4(1010)



HSNT-4(0808)



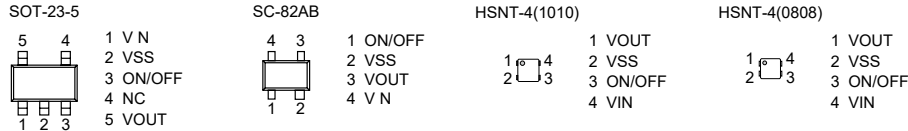
S-1313xxxH Series

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

Features

- Output voltage: 1.0 V to 3.5 V, selectable in 0.05 V step.
 - Input voltage: 1.5 V to 5.5 V
 - Output voltage accuracy: $\pm 1.0\%$ (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 μ A typ., 1.35 μ A max.
During power-off: 0.01 μ A typ., 0.1 μ A 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 μ F or more)
 - Output capacitor: A ceramic capacitor can be used. (0.1 μ F 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
Ta = -40°C to +105°C

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



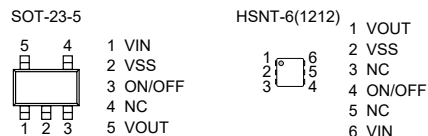
S-1315 Series

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

Features

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

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



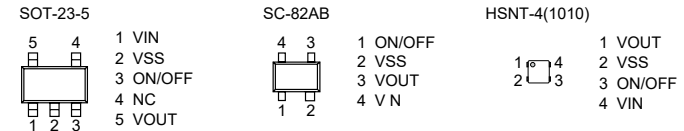
S-1324 Series

5.5 V INPUT, 200 mA,
LOW NOISE VOLTAGE REGULATOR

Features

- Output voltage: 1.0 V to 3.5 V, selectable in 0.05 V step.
 - Input voltage: 1.5 V to 5.5 V
 - Output voltage accuracy: $\pm 1.0\%$ (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 μ A typ., 12 μ A max.
During power-off: 0.01 μ A typ., 0.1 μ A max.
 - Output current: Possible to output 100 mA
(at 1.0 V $\leq V_{OUT(S)} < 1.2$ V, $V_{IN} \geq V_{OUT(S)} + 1.0$ V)¹
Possible to output 200 mA
(at $V_{OUT(S)} \geq 1.2$ V, $V_{IN} \geq V_{OUT(S)} + 1.0$ V)¹
 - Input capacitor: A ceramic capacitor can be used. (1.0 μ F or more)
 - Output capacitor: A ceramic capacitor can be used. (1.0 μ F or more)
 - Output noise: 17 μ Vrms 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.
Ta = -40°C to +85°C

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



S-1206 Series

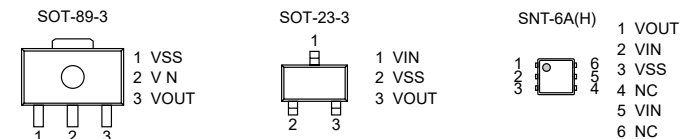
ULTRA LOW CURRENT CONSUMPTION AND
LOW DROPOUT CMOS VOLTAGE REGULATOR

Features

- Output voltage: 1.2 V to 5.2 V, selectable in 0.05 V step
- Input voltage: 1.7 V to 6.5 V
- Output voltage accuracy: $\pm 1.0\%$ (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 μ A typ., 1.5 μ A 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 μ F 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-free²

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

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



S-1132 Series

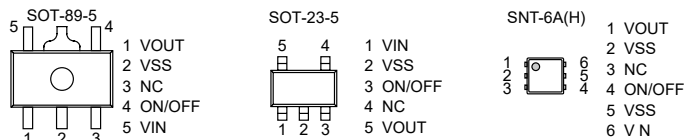
HIGH RIPPLE-REJECTION AND LOW DROPOUT MIDDLE OUTPUT CURRENT CMOS VOLTAGE REGULATOR

Features

- Output voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Input voltage: 2.0 V to 6.5 V
- Output voltage accuracy: $\pm 1.0\%$
- Dropout voltage: 130 mV typ. (3.0 V output product, $I_{OUT} = 100$ mA)
- Current consumption: During operation: 20 μ A typ., 40 μ A max.
During power-off: 0.01 μ A typ., 1.0 μ A 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 μ F 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-free²

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

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



S-1135 Series

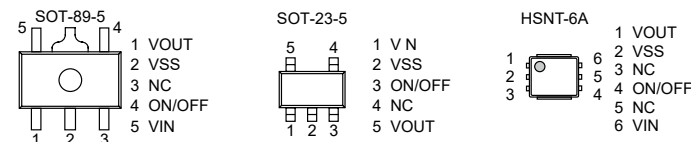
5.5 V INPUT, 300 mA VOLTAGE REGULATOR

Features

- Output voltage: 1.0 V to 3.5 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: $\pm 1.0\%$ (1.0 V to 1.45 V output product : ± 15 mV)
- Dropout voltage: 160 mV typ. (2.6 V output product, $I_{OUT} = 300$ mA)
- Current consumption: During operation: 45 μ A typ., 65 μ A max.
During power-off: 0.1 μ A typ., 1.0 μ A 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 μ F or more can be used.
- Ripple rejection: 70 dB typ. (1.0 V output product, f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON / OFF circuit: Ensures long battery life.
- Operation temperature range: Discharge shunt function "available" / "unavailable" is selectable.
Pull-down / pull-up function "available" / "unavailable" is selectable.
Ta = -40°C to +85°C
- Lead-free, Sn 100%, halogen-free²

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

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



S-1133 Series

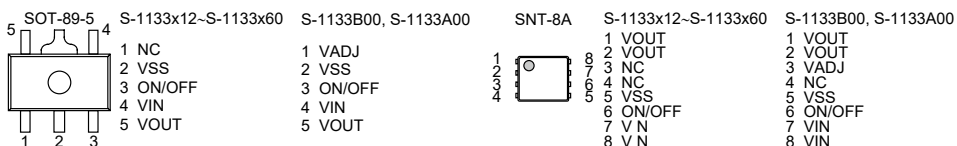
HIGH RIPPLE-REJECTION AND LOW DROPOUT MIDDLE-OUTPUT CURRENT CMOS VOLTAGE REGULATOR

Features

- Output voltage (internally set): 1.2 V to 6.0 V, selectable in 0.1 V step.
- Output voltage (externally set): 1.8 V to 8.2 V, settable via external resistor (S-1133B00/S-1133A00)
- Input voltage: 2.0 V to 10 V
- Output voltage accuracy: $\pm 1.0\%$ (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 μ A typ., 90 μ A max.
During power-off: 0.1 μ A typ., 1.0 μ A 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 μ F or more can be used.
(A ceramic capacitor of 2.2 μ F 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-free²

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

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



S-1137 Series

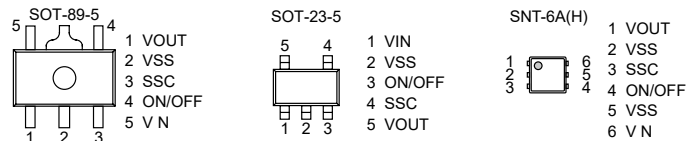
5.5 V INPUT, 300 mA VOLTAGE REGULATOR WITH SOFT-START FUNCTION

Features

- Output voltage: 1.2 V to 3.5 V, selectable in 0.05 V step
- Input voltage: 1.7 V to 5.5 V
- Output voltage accuracy: $\pm 1.0\%$ (1.2 V to 1.45 V output product: ± 15 mV)
- Dropout voltage: 210 mV typ. (2.8 V output product, $I_{OUT} = 300$ mA)
- Current consumption:
 - During operation: 45 μ A typ., 65 μ A max.
 - During power-off: 0.1 μ A typ., 1.0 μ A 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 μ F or more can be used.
- Ripple rejection: 70 dB typ. (f = 1.0 kHz)
- Built-in soft-start circuit: Soft-start time : 0.7 ms typ. ($C_{SS} = 1.0$ nF)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON / OFF circuit: Ensures long battery life.
- Discharge shunt function "available" / "unavailable" is selectable.
- Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: Ta = -40°C to +85°C
- Lead-free, Sn 100%, halogen-free²

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

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



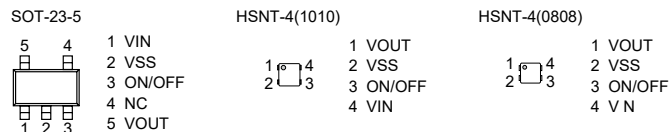
S-1333 Series

5.5 V INPUT, 300 mA VOLTAGE REGULATOR

Features

- Output voltage: 1.0 V to 3.5 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: $\pm 1.0\%$ (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 μ A typ., 38 μ A max.
 - During power-off: 0.1 μ A typ., 1.0 μ A 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 μ F or more can be used.
- Ripple rejection: 75 dB typ. (1.6 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.



S-1213 Series

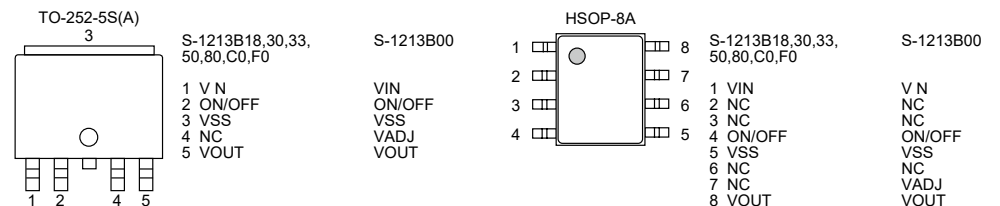
105°C OPERATION, 36 V INPUT, 500 mA VOLTAGE REGULATOR

Features

- Output voltage (internally set): 1.8 V, 3.0 V, 3.3 V, 5.0 V, 8.0 V, 12.0 V, 15.0 V
- Output voltage (externally set): 1.8 V to 30.0 V, settable via external resistor
- Input voltage: 2.8 V to 36.0 V
- Output voltage accuracy: $\pm 1.0\%$ (Ta = +25°C)
- Current consumption:
 - During operation: 5.0 μ A typ. (Ta = +25°C)
 - During power-off: 0.1 μ A 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 μ F 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.



S-1155 Series

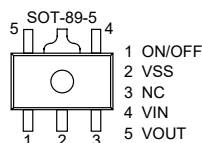
HIGH RIPPLE-REJECTION LOW DROPOUT HIGH OUTPUT CURRENT CMOS VOLTAGE REGULATOR

Features

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

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

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



S-1170 Series

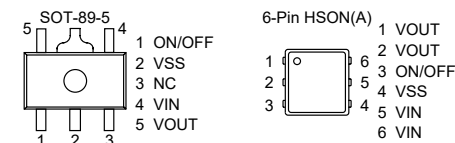
HIGH RIPPLE-REJECTION AND LOW DROPOUT HIGH OUTPUT CURRENT CMOS VOLTAGE REGULATOR

Features

- Output voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Output voltage accuracy: $\pm 1.0\%$
- Dropout voltage: 120 mV typ. (3.0 V output product, $I_{OUT} = 300$ mA)
- Current consumption: During operation: 80 μ A typ., 160 μ A max.
During power-off: 0.1 μ A typ., 1.0 μ A 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 μ F 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: $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- Lead-free, Sn 100%, halogen-free^{*2}

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

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



S-1214 Series

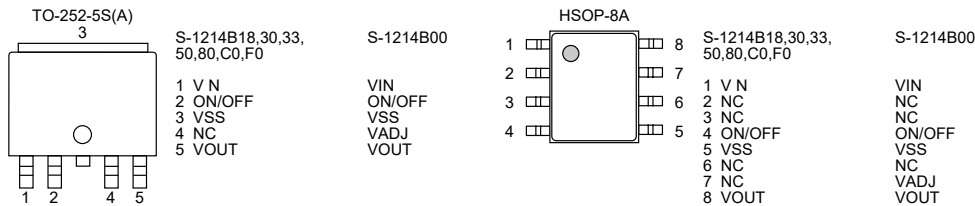
105°C OPERATION,
36 V INPUT, 1000 mA VOLTAGE REGULATOR

Features

- Output voltage (internally set): 1.8 V, 3.0 V, 3.3 V, 5.0 V, 8.0 V, 12.0 V, 15.0 V
- Output voltage (externally set): 1.8 V to 30.0 V, settable via external resistor
- Input voltage: 2.8 V to 36.0 V
- Output voltage accuracy: $\pm 1.0\%$ ($T_a = +25^\circ\text{C}$)
- Current consumption:
 - During operation: 5.0 μA typ ($T_a = +25^\circ\text{C}$)
 - During power-off: 0.1 μA typ ($T_a = +25^\circ\text{C}$)
- Output current: Possible to output 1000 mA (at $V_{IN} \geq V_{OUT(S)} + 2.0 \text{ V}$)^{*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: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- 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.



S-1172 Series

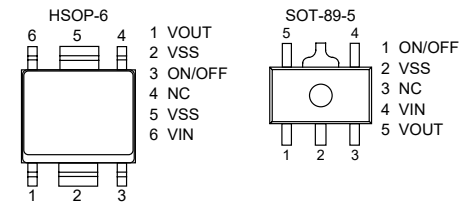
HIGH RIPPLE-REJECTION LOW DROPOUT
HIGH OUTPUT CURRENT CMOS VOLTAGE REGULATOR

Features

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

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

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



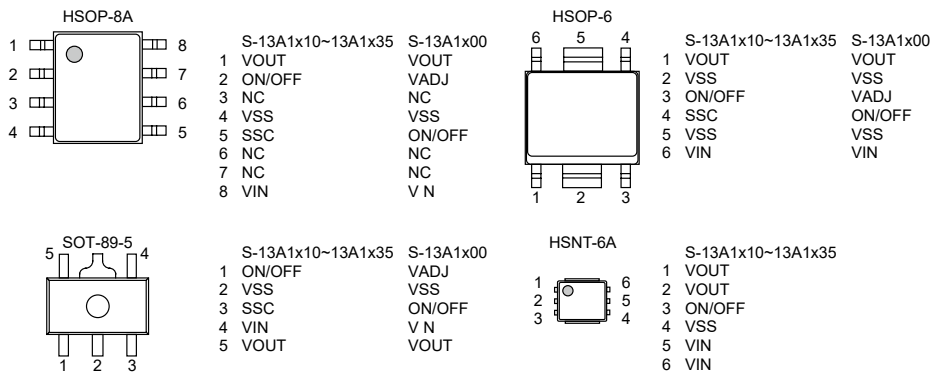
S-13A1 Series

5.5 V INPUT, 1000 mA VOLTAGE REGULATOR

Features

- Output voltage (internally set): 1.0 V to 3.5 V, selectable in 0.05 V step
- Output voltage (externally set): 1.05 V to 5.0 V, settable via external resistor (HSOP-8A, HSOP-6 and SOT-89-5 only)
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: ±1.0% (internally set, 1.0 V to 1.45 V output product: ±15 mV)
- Dropout voltage: 70 mV typ. (3.0 V output product, I_{OUT} = 300 mA)
- Current consumption: During operation: 60 μA typ., 90 μA max. During power-off: 0.1 μA typ., 1.0 μA max.
- Output current: Possible to output 1000 mA (V_{IN} ≥ V_{OUT(S)} + 1.0 V)^{*1}
- Input and output capacitors: A ceramic capacitor of 2.2 μF or more can be used.
- Ripple rejection: 70 dB typ. (f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in inrush current limit circuit: Limits excessive inrush current generated at power-on or at the time when the ON / OFF pin is set to ON. For types in which output voltage is internally set of HSOP-8A, HSOP-6 and SOT-89-5 inrush current limit time can be changed via an external capacitor (C_{SS}). Inrush current limit time 0.7 ms typ. (types in which output voltage is internally set of HSOP-8A, HSOP-6 and SOT-89-5, C_{SS} = 10 nF) Inrush current limit time 0.4 ms typ. (types in which output voltage is internally set of HSOP-8A, HSOP-6, SOT-89-5, SSC pin = open) Inrush current limit time 0.4 ms typ. (types in which output voltage is externally set of HSOP-8A, HSOP-6, SOT-89-5, types in which output voltage is internally set of HSNT-6A^{*2})
- Built-in ON / OFF circuit: Ensures long battery life. Discharge shunt function "available" / "unavailable" is selectable. Pull-down function "available" / "unavailable" is selectable. Ta = -40°C to +85°C
- Operation temperature range: Ta = -40°C to +85°C
- Lead-free (Sn 100%), halogen-free

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



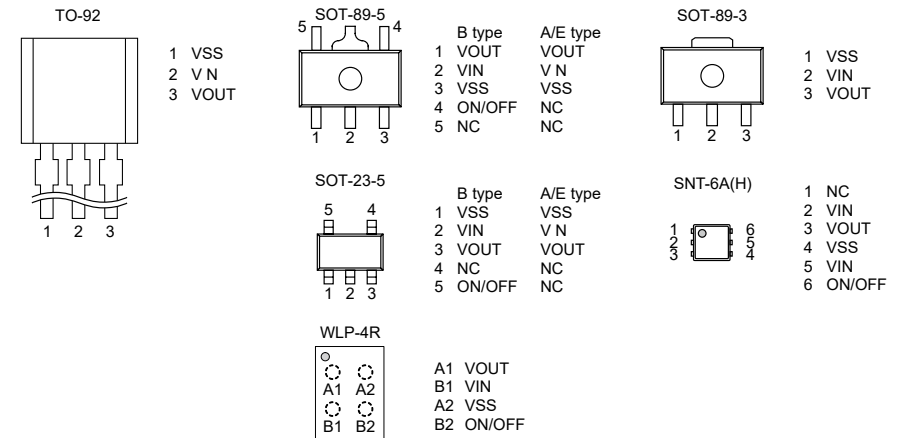
S-812C Series

16 V INPUT, 75 mA VOLTAGE REGULATOR

Features

- Output voltage: 2.0 V to 6.0 V, selectable in 0.1 V step
- Input voltage: 16 V max.
- Output voltage accuracy: ±2.0%
- Dropout voltage: 120 mV typ. (5.0 V output product, I_{OUT} = 10 mA)
- Current consumption: During operation: 1.0 μA typ., 1.8 μA max. (3.0 V output product) 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 current:
- 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.



S-817 Series

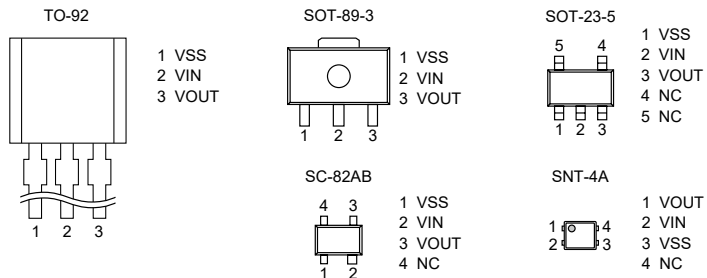
SUPER-SMALL PACKAGE CMOS VOLTAGE REGULATOR

Features

- Output voltage: 1.1 V to 6.0 V, selectable in 0.1 V step
- Output voltage accuracy: $\pm 2.0\%$
- Dropout voltage: 160 mV typ. (5.0 V output product, $I_{OUT} = 10$ mA)
- Current consumption: During operation: 1.2 μ A typ., 2.5 μ A 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 μ F or more can be used.
- Built-in short circuit protection: Only S-817A Series
- Line regulation: Stable operation at low load of 1 μ A
- Operation temperature range: $T_a = -40$ 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.



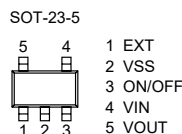
S-816 Series

EXTERNAL TRANSISTOR TYPE CMOS VOLTAGE REGULATOR

Features

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

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



S-818 Series

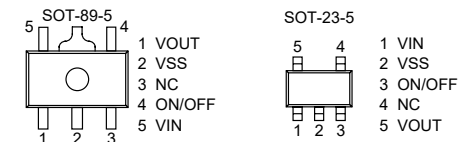
LOW DROPOUT CMOS VOLTAGE REGULATOR

Features

- Output voltage: 2.0 V to 6.0 V, selectable in 0.1 V step
- Output voltage accuracy: $\pm 2.0\%$
- Dropout voltage: 170 mV typ. (5.0 V output product, $I_{OUT} = 60$ mA)
- Current consumption: During operation: 30 μ A typ., 40 μ A 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 μ F or more can be used.
- Built-in ON/OFF circuit: Ensures long battery life.
- Operation temperature range: $T_a = -40$ C to +85 C
- Lead-free, Sn 100%, halogen-free^{*2}

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

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



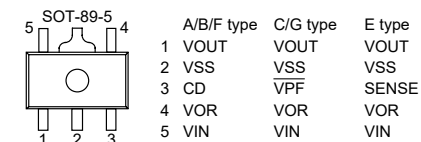
S-87x Series

HIGH WITHSTAND-VOLTAGE VOLTAGE REGULATOR WITH RESET FUNCTION

Features

- Accuracy of output voltage: $\pm 2.4\%$
2.5 V to 5.8 V (0.1 V step)
- Accuracy of detection voltage: $\pm 2.4\%$ (For the F type, the release voltage is $\pm 1.1\%$)
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 μ A max.
At Shutdown mode: 3.5 μ A 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.



S-1740/1741 Series

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

Features

Regulator block

- Output voltage: $V_{OUT} = 1.0\text{ V to }3.5\text{ V}$, selectable in 0.05 V step
- Input voltage: $V_{IN} = 1.5\text{ V to }5.5\text{ V}$
- Output voltage accuracy: $\pm 1.0\%$ (1.0 V to 1.45 V output product: $\pm 15\text{ mV}$) ($T_a = +25^\circ\text{C}$)
- Dropout voltage: 20 mV typ. (2.5 V output product, at $I_{OUT} = 10\text{ mA}$) ($T_a = +25^\circ\text{C}$)
- Current consumption during operation: $I_{SS1} = 0.35\text{ }\mu\text{A typ.}$ ($T_a = +25^\circ\text{C}$)
- Output current: Possible to output 100 mA (at $V_{IN} \geq V_{OUT(S)} + 1.0\text{ V}$)^{*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.

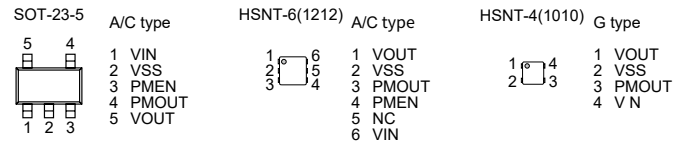
Supply voltage divider block

- Output voltage: $V_{PMOUT} = V_{IN}/2$ (S-1740 Series)
 $V_{PMOUT} = V_{IN}/3$ (S-1741 Series)
- Current consumption during operation: $I_{SS1P} = 0.15\text{ }\mu\text{A typ.}$ ($T_a = +25^\circ\text{C}$)
- 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: $T_a = -40^\circ\text{C to }+85^\circ\text{C}$
- 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.



S-1701 Series

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

Features

Regulator block

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

Detector block

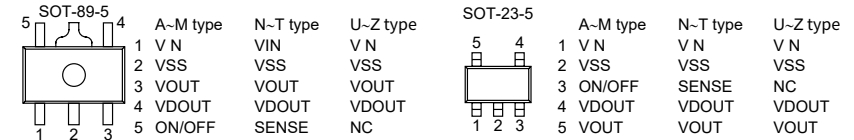
- Detection voltage: 1.5 V to 5.5 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 1.0\%$
- Input voltage: 0.8 V to 6.5 V
- Output mode: Nch open-drain active low output
- No need of an external capacitor for delay
- Three delay time settings: No delay (60 μs), 50 ms, 100 ms

Whole regulator

- Current consumption: During operation: 85 $\mu\text{A typ.}$
- Operation temperature range: $T_a = -40^\circ\text{C to }+85^\circ\text{C}$
- Lead-free, Sn 100%, halogen-free^{*2}

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

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



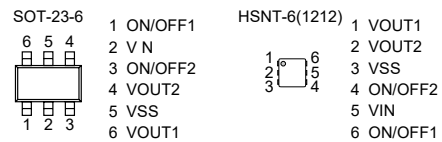
S-13D1 Series

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

● Features

- Output voltage: 1.0 V to 3.6 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: $\pm 1.0\%$ (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 μ A typ., 58 μ A max. (per circuit)
 - During power-off: 0.1 μ A typ., 1.0 μ A 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 μ F 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: $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free

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



S-1721 Series

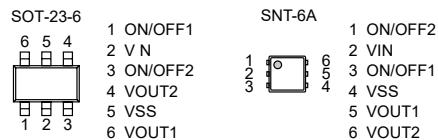
**SUPER-SMALL PACKAGE 2-CIRCUIT HIGH RIPPLE-REJECTION
LOW CURRENT CONSUMPTION LOW DROPOUT CMOS VOLTAGE REGULATOR**

Features

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

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

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



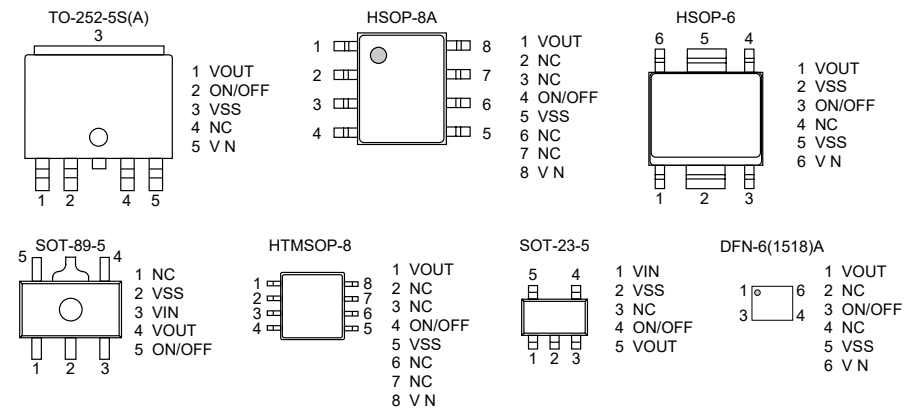
S-1222B/D Series

28 V INPUT, 200 mA VOLTAGE REGULATOR

Features

- Output voltage: 2.3 V to 12.0 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 28 V
- Output voltage accuracy: $\pm 1.0\%$ ($T_a = +25^\circ\text{C}$)
- Current consumption: During operation: 6.5 μ A typ. ($T_a = +25^\circ\text{C}$)
During power-off: 0.1 μ A typ. ($T_a = +25^\circ\text{C}$)
- 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 μ F or more)
- Output capacitor: A ceramic capacitor can be used. (1.0 μ F to 100 μ F)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detect ion temperature 165 $^\circ\text{C}$ typ.
- Built-in ON / OFF circuit: Ensures long battery life.
Discharge shunt function is available.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- 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.



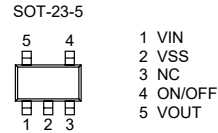
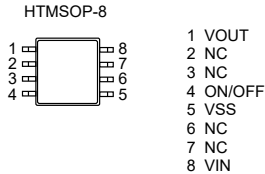
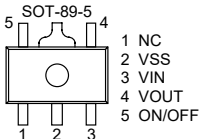
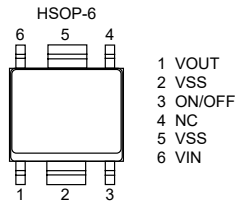
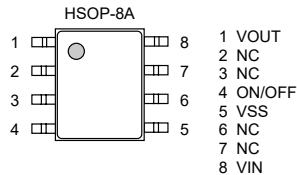
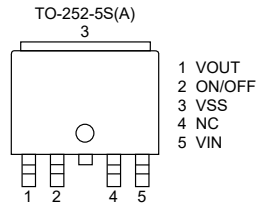
S-1212B/D Series

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

Features

- Output voltage: 2.5 V to 16.0 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 36 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_a = +25^\circ\text{C}$)
- Current consumption: During operation: 6.5 μA typ. ($T_a = +25^\circ\text{C}$)
During power-off: 0.1 μA typ. ($T_a = +25^\circ\text{C}$)
- Output current: Possible to output 250 mA (at $V_{IN} \geq V_{OUT(S)} + 2.0 \text{ V}$)¹
A ceramic capacitor can be used. (1.0 μF or more)
- Input capacitor: A ceramic capacitor can be used. (1.0 μF to 100 μF)
- 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.
 $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- 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.



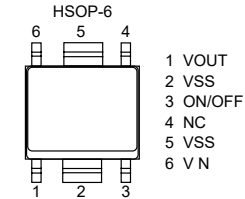
S-1142A/B Series

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

Features

- Output voltage: 2.0 V to 15.0 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 50 V
- Output voltage accuracy: $\pm 1.0\%$ ($T_j = +25^\circ\text{C}$)
 $\pm 3.0\%$ ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Current consumption: During operation: 4.0 μA typ., 9.0 μA max. ($T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$)
During power-off: 0.1 μA typ., 1.0 μA max. ($T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$)
Possible to output 200 mA ($V_{IN} \geq V_{OUT(S)} + 2.0 \text{ V}$)¹
A ceramic capacitor of 0.1 μF or more can be used.
- Output current: A ceramic capacitor of 0.1 μF or more can be used.
- 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: $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free

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



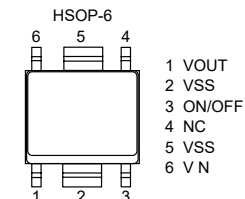
S-1142C/D Series

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

Features

- Output voltage: 2.0 V to 15.0 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 50 V
- Output voltage accuracy: $\pm 1.0\%$ ($T_j = +25^\circ\text{C}$)
 $\pm 3.0\%$ ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Current consumption: During operation: 4.0 μA typ., 9.0 μA max. ($T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$)
During power-off: 0.1 μA typ., 1.0 μA max. ($T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$)
Possible to output 200 mA ($V_{IN} \geq V_{OUT(S)} + 2.0 \text{ V}$)¹
A ceramic capacitor of 0.1 μF or more can be used.
- Output current: A ceramic capacitor of 0.1 μF or more can be used.
- 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: $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free

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



S-1000 Series

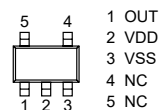
ULTRA-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR

Features

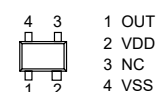
- Ultra-low current consumption 350 nA typ. (V_{DD} = detection voltage + 1.5 V)
- High-precision detection voltage $\pm 1.0\%$
- Operating voltage range 0.95 to 5.5 V
- Hysteresis characteristics 5% typ.
- Detection voltage 1.5 to 4.6 V (0.1 V step)
- Output form Nch open-drain output (Active "L")
CMOS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

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

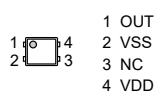
SOT-23-5



SC-82AB



SNT-4A



S-808xxC Series

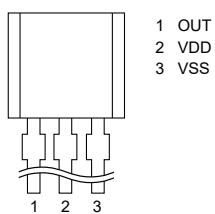
SUPER-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR

Features

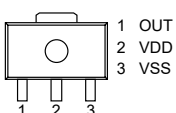
- Super-low current consumption 1.3 μ A typ. (detection voltage ≤ 1.4 V, at $V_{DD} = 1.5$ V)
0.8 μ A typ. (detection voltage ≥ 1.5 V, at $V_{DD} = 3.5$ V)
- High-precision detection voltage $\pm 2.0\%$
- Operating voltage range 0.65 V to 5.0 V (detection voltage ≤ 1.4 V)
0.95 V to 10.0 V (detection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

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

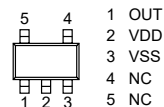
TO-92



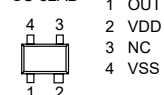
SOT-89-3



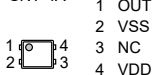
SOT-23-5



SC-82AB



SNT-4A



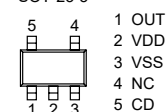
S-1009 Series

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

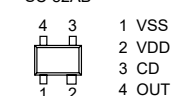
Features

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

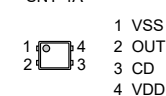
SOT-23-5



SC-82AB



SNT-4A

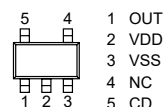


S-809xxC Series**ULTRA-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR
WITH DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING)****Features**

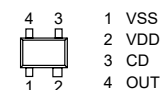
- Ultra-low current consumption 1.0 μ A typ. (Detection voltage \leq 1.4 V, at $V_{DD}=2.0$ V)
1.1 μ A typ. (Detection voltage \geq 1.5 V, at $V_{DD}=3.5$ V)
- High-precision detection voltage ± 2.0 %
- Operating voltage range 0.7 V to 10.0 V
- Hysteresis characteristics 5 % typ.
- Detection voltage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

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

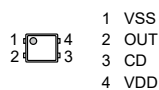
SOT-23-5



SC-82AB



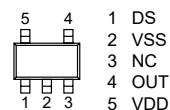
SNT-4A

**S-801 Series****ULTRA-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR
WITH DELAY CIRCUIT (INTERNAL DELAY TIME SETTING)****Features**

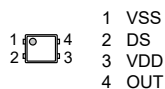
- Ultra-low current consumption 1.3 μ A typ. (at $V_{DD}=3.5$ V)
- High-precision detection voltage ± 2.0 %
- Operating voltage range 0.95 V to 10.0 V
- Hysteresis characteristics 60 mV typ.
- Detection voltage 2.2 V to 6.0 V (0.1 V step)
- Three delay times
A type 50 ms typ.
B type 100 ms typ.
C type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

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

SOT-23-5

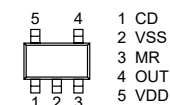


SNT-4A

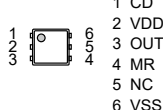
**S-1003 Series****MANUAL RESET BUILT-IN DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING)
HIGH-ACCURACY VOLTAGE DETECTOR****Features**

- Detection voltage: 1.2 V to 5.0 V (0.1 V step)
- Detection voltage accuracy: ± 1.0 % (2.2 V $\leq -V_{DET} \leq 5.0$ V)
 ± 22 mV (1.2 V $\leq -V_{DET} < 2.2$ V)
- Current consumption: 500 nA typ.
- Operation voltage range: 0.95 V to 10.0 V
- Hysteresis width: 5% \pm 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: $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free

SOT-23-5



SNT-6A



S-1002 Series

VOLTAGE DETECTOR WITH SENSE PIN

Features

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



S-1004 Series

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

Features

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

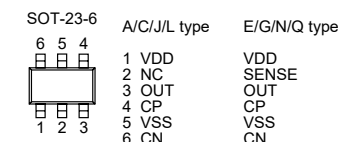


S-1011 Series

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

Features

- Detection voltage: 3.0 V to 10.0 V (0.05 V step) (SENSE detection product)
3.6 V to 10.0 V (0.05 V step) (VDD detection product)
- Detection voltage accuracy: $\pm 1.5\%$ (A / C / E / G type)
- Detection delay time accuracy: $\pm 20\%$ ($C_N = 3.3\text{ nF}$)
- Release delay time accuracy: $\pm 20\%$ ($C_P = 3.3\text{ nF}$)
- 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: $T_a = -40^\circ\text{C}$ to $+85^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free



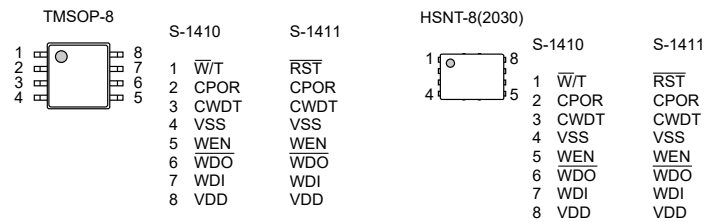
S-1410/1411 Series

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

● Features

- Detection voltage: 2.0 V to 5.0 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 1.5\%$
- Input voltage: $V_{DD} = 0.9$ V to 6.0 V
- Hysteresis width: 5% typ.
- Current consumption during watchdog timer operation: 3.8 μ A 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: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free

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

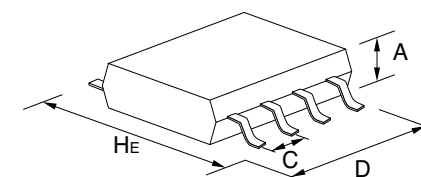


Package List

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

Package Type	Pin Count	Package Name	Package Size (mm)			Pitch (mm)
			He	D	A (max.)	C
Non-lead type	6	6-Pin HSON(A)	3.0	2.9	0.9	0.95
	6	SON-6C	2.55	1.56	0.65	0.5
	4	SNT-4A	1.6	1.2	0.5	0.65
	6	SNT-6A 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(2030)	3.0	2.0	0.5	0.5
	6	DFN-6(1414)A	1.4	1.4	0.6	0.5
	6	DFN-6(1518)A	1.8	1.5	0.33	0.5
	8	DFN-8(1616)A	1.6	1.6	0.6	0.4
	8	DFN-8(2030)	3.0	2.0	0.5	0.5
	8	DFN-8(2030)A	3.0	2.0	0.6	0.5
8	DFN-8(2030)B	3.0	2.0	0.8	0.5	

Remark Please contact our sales representatives regarding WLP package products.



- The information herein is subject to change without notice.
- Neither reproduction, duplication nor unauthorized use of this catalog in whole or part is allowed without the prior written approval of ABLIC Inc.
- The colors of the products reproduced herein (“Products”) may be different from the actual colors. Check colors on actual products before using the Products.
- Circuits and respective application methods described herein are for reference only. ABLIC Inc. shall not be liable for any damages or losses resulting from any claim by third parties that any Products or application methods described herein infringe any right intellectual property right. All intellectual property rights with respect to the Products belong exclusively to ABLIC Inc. ABLIC Inc. does not grant users of the Products any right or license to the Products hereunder.
- When Products include Strategic Products (or Services) stipulated in the Foreign Exchange and Trade Control Law, they shall not be exported without permission of governmental authorities.
- The Products cannot be used as part of any device or equipment which influences the human body or requires a significantly high reliability, such as physical exercise equipment, medical equipment, disaster prevention equipment, gas related equipment, vehicles, in-vehicle equipment, aviation equipment, aerospace equipment, and nuclear-related equipment.
- The products described herein are not designed to be radiation-proof.
- Although ABLIC Inc. exerts the greatest possible effort to ensure high quality and reliability, the failure or malfunction of semiconductor products may occur. The user of these products should therefore give thorough consideration to safety design, including redundancy, fire-prevention measures, and malfunction prevention, to prevent any accidents, fires, or community damage that may ensue.



Smaller footprint. Energy efficiency. Safe, reliable, dependable.

ABLIC world class watch manufacturing yielded ultra low current consumption, low voltage operation, and super-small package technology for ABLIC's solutions.

Fine craftsmanship delivering the highest quality and reliability semiconductor products meeting and exceeding industry standards for automotive, consumer, and other demanding applications. ABLIC's solutions - moving technology forward.



ABLIC Inc.

www.ablic.com

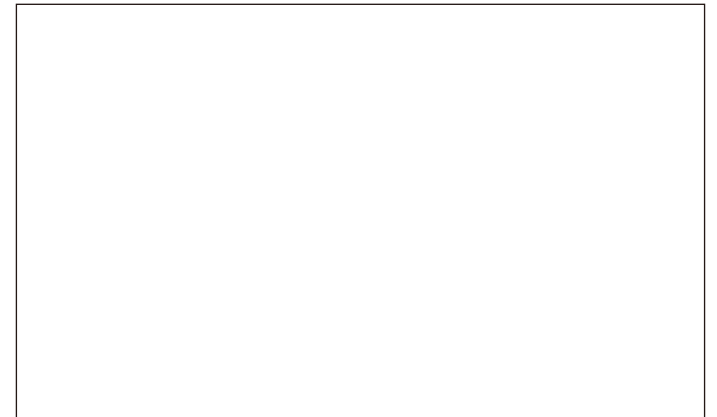
Contact us

www.ablic.com/en/semicon/sales



Released in March 2023

ABLIC Inc. is a group company of MinebeaMitsumi Inc.



(Specifications are subject to change without notice.)