**History of SII Semiconductor Corporation**

Starting with a CMOS IC for quartz watches in the 1960s, we have been manufacturing and supplying power supply ICs, microcomputer ICs, E²PROMs and other general-purpose semiconductor products for many years.

On January 1, 2016, the semiconductor business of Seiko Instruments Inc. was separated and started its operation as a new company called SII Semiconductor Corporation.

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**Our History**

Our history begins with the development of a CMOS IC for quartz watches.

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**Organization of This Catalogue**

This catalogue is organized into three sections.

### GENERAL APPLICATIONS

P.11

Introduces CMOS IC product groups used for a wide variety of general applications.

### AUTOMOTIVE APPLICATIONS

P.115

Introduces SII’s high-reliability semiconductor products corresponding to automotive specifications.

### RELATED INFORMATION

P.181

Provides information about discontinued products, package lists, and an index.

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For detailed information about products, refer to SII Semiconductor Corporation website.

www.sii-ic.com
Contents

This catalogue contains descriptions of the features, major specifications, pin configurations, applications, and other information of each series. A list of part numbers for each series can be found in the separate Part Number List.

This catalogue and the Part Number List have a common layout. After selecting the product that matches your application from this catalogue, confirm the detailed specifications of each model in the Part Number List.

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- TO-92
- SNT-8A
- HSOP-8A
- HTMSOP-8
- TO-252-5
- S(A)HSOP-6
- 6-Pin HSON(A)
- SOT-89-5
- SOT-89-3
- SOT-23-6
- SOT-23-5
- SOT-23-3
- HSNT-6(1212)
- SC-82AB
- HSNT-4(1010)
- SNT-4A
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*1. S-1112 series only
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<td>0.1μA</td>
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<td>1.05 to 5.0V (for externally set type) 1.0 to 3.5V (for fixed output type)</td>
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<td>1μA</td>
<td>0.10V</td>
<td>Tantalum</td>
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<td>Output current up to 300mA</td>
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</tr>
<tr>
<td>Composite (Up to 150mA)</td>
<td>S-17601741 series</td>
<td>With built-in power monitoring function</td>
<td>1.5 to 5.5V</td>
<td>1.0 to 3.5V</td>
<td>±1.0%</td>
<td>0.5μA</td>
<td>–</td>
<td>0.20V</td>
<td>Ceramic</td>
<td>1.0μF</td>
<td>SOT-23-5</td>
<td>31</td>
</tr>
<tr>
<td>Composite (Up to 150mA)</td>
<td>S-877 series</td>
<td>VD+VR</td>
<td>24V max.</td>
<td>2.5 to 5.8V (VR) 2.1 to 11.3V (VD)</td>
<td>±2.4%</td>
<td>3μA</td>
<td>1.5μA</td>
<td>0.45V</td>
<td>Tantalum</td>
<td>Tantalum</td>
<td>SOT-89-5</td>
<td>32</td>
</tr>
<tr>
<td>Composite (Up to 150mA)</td>
<td>S-1702 series</td>
<td>VD+VR, Ripple rejection rate: 70dB</td>
<td>2.0 to 6.5V (VR) 0.8 to 6.5V (VD)</td>
<td>1.5 to 5.5V (VR) 1.3 to 5.2V (VD)</td>
<td>±1.0%</td>
<td>10μA</td>
<td>–</td>
<td>0.20V</td>
<td>Ceramic</td>
<td>1.0μF</td>
<td>SOT-23-5</td>
<td>33</td>
</tr>
<tr>
<td>Composite (Up to 150mA)</td>
<td>S-1711 series</td>
<td>2VR, Ripple rejection rate: 70dB</td>
<td>2.0 to 6.5V</td>
<td>1.5 to 5.5V</td>
<td>±1.0%</td>
<td>70μA (1VR)</td>
<td>0.1μA</td>
<td>0.20V</td>
<td>Ceramic</td>
<td>1.0μF</td>
<td>SOT-23-6</td>
<td>33</td>
</tr>
<tr>
<td>Composite (Up to 150mA)</td>
<td>S-13D1 series</td>
<td>2VR, Built-in delay function</td>
<td>1.5 to 5.5V</td>
<td>1.0 to 3.6V</td>
<td>±1.0%</td>
<td>39μA</td>
<td>0.1μA</td>
<td>0.08V</td>
<td>Ceramic</td>
<td>0.22μF</td>
<td>SOT-23-6</td>
<td>34</td>
</tr>
<tr>
<td>Composite (Up to 400mA)</td>
<td>S-1701 series</td>
<td>VD+VR, Ripple rejection rate: 70dB</td>
<td>2.0 to 6.5V (VR) 0.8 to 6.5V (VD)</td>
<td>1.5 to 5.0V (VR) 1.5 to 5.5V (VD)</td>
<td>±1.0%</td>
<td>85μA</td>
<td>–</td>
<td>0.14V</td>
<td>Ceramic</td>
<td>1.0μF</td>
<td>SOT-23-5</td>
<td>32</td>
</tr>
<tr>
<td>High-withstand voltage (Up to 200mA)</td>
<td>S-1142 series</td>
<td>50V input voltage</td>
<td>3.0 to 50V</td>
<td>2.0 to 15.0V</td>
<td>±1.0%</td>
<td>40μA</td>
<td>0.1μA</td>
<td>0.23V</td>
<td>Ceramic</td>
<td>0.1μF</td>
<td>HSOUP-6</td>
<td>35</td>
</tr>
<tr>
<td>High-withstand voltage (Up to 250mA)</td>
<td>S-1212B/D series</td>
<td>36V input voltage</td>
<td>3.0 to 36V</td>
<td>2.5 to 16.0V</td>
<td>±2.0%</td>
<td>6.5μA</td>
<td>0.1μA</td>
<td>0.35V (IOUT=125mA)</td>
<td>Ceramic</td>
<td>0.1μF</td>
<td>HSOUP-6</td>
<td>35</td>
</tr>
</tbody>
</table>
**100mA OUTPUT CURRENT SUPER-LOW CURRENT CONSUMPTION (0.35μA) CMOS VOLTAGE REGULATOR**

**FEATURES**
- Output voltage: 1.0 to 3.5V, selectable in 0.05V step
- Wide input voltage range: 1.5 to 5.5V
- High-accuracy output voltage: ±1.0% (1.0 to 1.45V output product : ±15mV)
- Dropout voltage
  - 20mV typ. (2.5V output product, when IOUT=10mA)
- Low current consumption:
  - During operation: 0.35μA typ.
  - Output current: 100mA (at VOUT=VSS+1.0V)**1
  - Input capacitor: A ceramic capacitor can be used. (1.0μF or more)
  - Output capacitor: A ceramic capacitor can be used. (1.0μF to 100μF)
- Built-in overcurrent protection circuit:
  - limits overcurrent of output transistor
  - *1. Attention should be paid to the power dissipation of the package when the load is large.

**APPLICATIONS**
- Constant-voltage power supply for portable communication devices, digital cameras, and digital audio players
- Power supply for battery-powered devices
- Constant-voltage power supplies for home electric appliances

**PIN CONFIGURATIONS**

![SOT-23-5 Top view](HSNT-4(1010) Top view)

1  VIN  2  VSS  3  NC  4  VIN  5  VOUT

![S-1112/1122 series](S-1112)

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

**S-1112/1122 series**

**FEATURES**
- Low current consumption
  - 50μA typ., 90μA max. (during operation)
  - 0.1μA typ., 1μA max. (during power-off)
- Output voltage: 1.5 to 5.5V (selectable in 0.1V step)
- High output voltage accuracy: ±1.0%
- Output current
  - 150mA capable (product with 3.0V output, when VIN=4V)**1
  - 190mA typ. (product with 3.0V output, when IOUT=100mA)
- Ripple rejection rate: 80dB typ. (f=1kHz, VOUT=3V)
- Built-in power-off circuit: Active high or low in the regulator is selectable.
- Built-in overcurrent protection circuit
- Use of a low ESR capacitor is possible.
- Output capacitor: Use of a ceramic capacitor of 0.47μF or more is possible.

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

**APPLICATIONS**
- Power supply for battery-powered devices
- Power supply for communication devices
- Power supply for household electrical appliances
- Power supply for mobile phones

**PIN CONFIGURATIONS**

![S-1112 S-1122 Top view](S-1112 S-1122 Top view)

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

**Contents**
- Voltage Regulators
- Voltage Detectors
- Lithium-ion Rechargeable Battery Protection ICs
- Switching Regulators (DC-DC Converters)
- Memory ICs
- Sensors
- Temperature Sensor ICs
- Magnetic Sensor ICs
- Faint Signal Detection ICs
- E2PROMs
- Programmable Port Controller
- Power Sequencer

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POWER SUPPLY ICs

150mA OUTPUT CURRENT
HIGH RIPPLE REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

S-T111 series

FEATURES
- Low current consumption
  50μA typ., 90μA max. (during operation)
  0.1μA typ., 1μA max. (during power-off)
- Output voltage: 1.5 to 5.5V (selectable in 0.1V step)
- High output voltage accuracy: ±1.0%
- Output current
  150mA capable (product with 3.0V output, when VIN=4V)\(^1\)
- Dropout voltage
  190mV typ. (product with 3.0V output, when IOUT=100mA)
- Ripple rejection rate: 80dB typ. (f=1kHz, VOUT=3V)
- Built-in power-off circuit: Active high or low in the regulator is selectable.
- Built-in overcurrent protection circuit
- Use of a low ESR capacitor is possible.
- Input/output capacitor: Use of a ceramic capacitor of 0.1μF or more is possible.

\(^1\) Attention should be paid to the power dissipation of the package when the load is large.

APPLICATIONS
- Power supply for battery-powered devices
- Power supply for communication devices
- Power supply for household electrical appliances
- Power supply for mobile phones

PIN CONFIGURATION

SOT-23-5 Top view

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

S-1167 series

FEATURES
- Low current consumption
  9μA typ., 16μA max. (during operation)
  0.1μA typ., 0.9μA max. (during power-off)
- Output voltage: 1.5 to 5.5V (selectable in 0.1V step)
- High output voltage accuracy: ±1.0%
- Output current
  150mA capable (product with 3.0V output, when VIN=4V)\(^1\)
- Dropout voltage
  150mV typ. (product with 3.0V output, when IOUT=100mA)
- Ripple rejection rate: 70dB typ. (f=1kHz, VOUT=3V)
- Built-in power-off circuit: Active high or low in the regulator is selectable.
- Built-in overcurrent protection circuit
- Use of a low ESR capacitor is possible.
- Input/output capacitor: Use of a ceramic capacitor of 1.0μF or more is possible.

\(^1\) Attention should be paid to the power dissipation of the package when the load is large.

APPLICATIONS
- Power supply for battery-powered devices
- Power supply for mobile phones
- Power supply for portable equipment

PIN CONFIGURATIONS

SNT-6A(H) Top view

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

SOT-23-5 Top view

1  VOUT
2  VSS
3  ON/OFF
4  NC
5  VOUT
150mA OUTPUT CURRENT
HIGH RIPPLE REJECTION AND SMALL PACKAGE CMOS VOLTAGE REGULATOR

S-1323 series

FEATURES

• Low current consumption
  70μA typ., 90μA max. (during operation)
  0.1μA typ., 1μA max. (during power-off)
• Output voltage: 1.5 to 5.5V (selectable in 0.1V step)
• High output voltage accuracy: ±1.0%
• Output current
  150mA capable (product with 3.0V output, when Vin=4V)\(^1\)
• Dropout voltage
  500mV typ. (product with 3.0V output, when Iout=150mA)
• Ripple rejection rate: 70dB typ. (f=1kHz, Vout=3V)
• Built-in power-off circuit: Active high or low in the regulator
  is selectable.
• Built-in overcurrent protection circuit
• Use of a low ESR capacitor is possible.
• Input/output capacitor: Use of a ceramic capacitor of 1.0μF
  or more is possible.

\(^1\) Attention should be paid to the power dissipation of the package
when the load is large.

PIN CONFIGURATIONS

APPLICATIONS

• Power supply for battery-powered devices
• Power supply for communication devices
• Power supply for household electrical appliances
• Power supply for mobile phones

150mA OUTPUT CURRENT, 10V INPUT VOLTAGE
HIGH RIPPLE REJECTION LOW DROPOUT LOW INPUT AND OUTPUT CAPACITANCE CMOS VOLTAGE REGULATOR

S-1200 series

FEATURES

• Input voltage: 2 to 10V
• Low current consumption
  18μA typ., 40μA max. (during operation)
  0.01μA typ., 1μA max. (during power-off)
• Output voltage: 1.5 to 5.5V (selectable in 0.1V step)
• High output voltage accuracy: ±1.0%
• Output current
  150mA capable (product with 3.0V output, when Vin=4V)\(^1\)
• Dropout voltage
  140mV typ. (product with 3.0V output, when Iout=100mA)
• Ripple rejection rate: 70dB typ. (f=1kHz, Vout=3V)
• Built-in power-off circuit: Active high or low in the regulator
  is selectable.
• Built-in overcurrent protection circuit
• Use of a low ESR capacitor is possible.
• Input/output capacitor: Use of a ceramic capacitor of 0.1μF
  or more is possible.

\(^1\) Attention should be paid to the power dissipation of the package
when the load is large.

PIN CONFIGURATIONS

APPLICATIONS

• Power supply for battery-powered devices
• Power supply for communication devices
• Power supply for home electric/electronic appliances
• Power supply for mobile phones
150mA OUTPUT CURRENT, 10V INPUT VOLTAGE
HIGH RIPPLE REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

S-L2980 series

FEATURES
• Input voltage: 2 to 10V
• Low current consumption
  90μA typ., 140μA max. (during operation)
  0.1μA typ., 1μA max. (during power-off)
• Output voltage: 1.5 to 6.0V (selectable in 0.1V step)
• Output voltage accuracy: ±2.0%
• Output current
  150mA capable (product with 3.0V output, when VIN=4V)*
• Ripple rejection rate: 70dB typ. (f=1kHz, VOUT=3V)
• Built-in power-off circuit: Active high or low in the regulator is selectable.
• Built-in short-circuit protection circuit
• Use of a low ESR capacitor is possible.
• Output capacitor: Use of a ceramic capacitor of 1.0μF or more is possible.
  *1. Attention should be paid to the power dissipation of the package when the load is large.

PIN CONFIGURATION
SOT-23-5 Top view

APPLICATIONS
• Power supply for battery-powered devices
• Power supply for communication devices
• Power supply for household electrical appliances
• Power supply for mobile phones

150mA OUTPUT CURRENT
SUPER-LOW OUTPUT VOLTAGE AND LOW DROPOUT CMOS VOLTAGE REGULATOR

S-11L10 series

FEATURES
• Output voltage selectable in fine steps: 0.8 to 3.3V, in 0.05V step
• Low equivalent series resistance capacitor:
  Ceramic capacitor of 1.0μF or more can be used as the I/O capacitor.
• Input voltage: 1.2 to 3.65V
• High-accuracy output voltage: ±1.0% (±15mV for 0.8 to 1.45V output products)
• Low dropout voltage: 210mV typ. (for 1.5V products, IOUT=100mA)
• Low current consumption: During operation: 9.0μA typ., 16μA max.
  During power-off: 0.1μA typ., 0.2μA max.
• Output current: 190mA capable (product with 3.0V output, when VOUT=4V)*
• Ripple rejection: 60dB typ. (at 1.0kHz, VOUT=1.25V)
• Built-in overcurrent protection circuit:
  limits overcurrent of output transistor
• Built-in power-off circuit: Ensures long battery life.
• Built-in discharge shunt circuit
• Selectable constant current source pull-down
*1. Attention should be paid to the power dissipation of the package when the load is large.

PIN CONFIGURATIONS
SOT-23-5 Top view
SNT-6A(H) Top view

APPLICATIONS
• Power supply for battery-powered devices
• Power supply for mobile phones
• Power supply for portable equipment
150mA OUTPUT CURRENT LOW CURRENT CONSUMPTION HIGH RIPPLE REJECTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR

S-1312 series

FEATURES
- Output voltage: 1.0 to 3.5V, selectable in 0.05V step.
- Low equivalent series resistance capacitor: Ceramic capacitor of 0.22μF or more can be used as the I/O capacitor.
- Wide input voltage range: 1.5 to 5.5V
- High-accuracy output voltage: ±1.0% (1.0 to 1.45V output product: ±15mV)
- Low dropout voltage: 160mV typ. (products having the output of 2.8V, IOUT=100mA)
- Low current consumption:
  - During operation: 20μA typ., 30μA max.
  - During power-off: 0.1μA typ., 1.0μA max.
- Output current: 150mA capable (product with 3.0V output, when VIN=4V)*1
- High ripple rejection: 75dB typ. (at f=1kHz, VOUT=1.2V)
- Built-in overcurrent protection circuit:
  - Limits overcurrent of output transistor
- Built-in thermal shutdown circuit:
  - Prevents damage caused by heat.
- Built-in power-off circuit: Ensures long battery life.
- Discharge shunt circuit can be selected.
- Pull-down resistor is selectable
- Operating temperature range: -40 to +85°C
*1. Attention should be paid to the power dissipation of the package when the load is large.

APPLICATIONS
- Constant-voltage power supply for portable communication devices, digital cameras, and digital audio players
- Constant-voltage power supply for battery-powered devices
- Constant-voltage power supply for home electric/electronic appliances

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**150mA OUTPUT CURRENT HIGH RIPPLE REJECTION**
**SOFTWARE FUNCTION CMOS VOLTAGE REGULATOR**

**S-1335 series**

**FEATURES**
- Output voltage: 1.0 to 3.6V, selectable in 0.05V step.
- Low equivalent series resistance capacitor:
  Ceramic capacitor of 1.0μF or more can be used as the I/O capacitor.
- Wide input voltage range: 1.5 to 5.5V
- High-accuracy output voltage:
  ±1.0% (1.0 to 1.45V output product: ±15mV)
- Low dropout voltage:
  70mV typ. (products having the output of 2.8V, I_out=100mA)
- Low current consumption:
  During operation: 36μA typ., 54μA max.
  During power-off: 0.1μA typ., 1.0μA max.
- Output current:
  150mA capable (product with 3.0V output, when V_{IN}=4V)\(^1\)
- High ripple rejection:
  70dB typ. (f=10kHz, V_{out}=2.5V)
  80dB typ. (f=1.0kHz)
- Built-in overcurrent protection circuit:
  Limits overcurrent of output transistor
- Built-in soft-start circuit:
  At power-on and when the ON/OFF pin is ON, the rising speeds of output voltage are adjustable.
  The soft-start time of SOT-23-5 can be switched to t_{SS}=0.1ms typ. or t_{SS}=1.0ms typ.
  The soft-start time of SC-82AB is fixed to t_{SS}=0.1ms typ.
  The soft-start time of HSNT-4(1010) is fixed to either t_{SS}=0.1ms typ. or t_{SS}=1.0ms typ.
- Built-in power-off circuit: Ensures long battery life.
- Discharge shunt circuit can be selected.
- Pull-down resistor is selectable
  *1. Attention should be paid to the power dissipation of the package when the load 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

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**150mA OUTPUT CURRENT REVERSE CURRENT PROTECTION**
**CMOS VOLTAGE REGULATOR**

**S-13R1 series**

**FEATURES**
- Output voltage: 1.2 to 4.0V, selectable in 0.05V step.
- Low equivalent series resistance capacitor:
  Ceramic capacitor of 1.0μF or more can be used as the I/O capacitor.
- Wide input voltage range: 2.0 to 5.5V
- High-accuracy output voltage:
  ±1.0% (1.2 to 1.45V output product: ±15mV)
- Low dropout voltage:
  150mV typ. (products having the output of 3.0V, I_{out}=100mA)
- Low current consumption:
  During operation: 5μA typ., 9μA max.
  During power-off: 0.1μA typ., 1.0μA max.
- Output current:
  150mA capable (product with 3.0V output, when V_{IN}=4V)\(^1\)
- High ripple rejection:
  70dB typ. (f=1kHz, V_{out}=3.0V)
- Reverse current protection function:
  I_{REV}=0.09μA max.
- Built-in overcurrent protection circuit:
  Limits overcurrent of output transistor
- Built-in thermal shutdown circuit:
  Prevents damage caused by heat.
- Built-in power-off circuit: Ensures long battery life.
- Discharge shunt circuit can be selected.
- Constant current source pull-down is selectable
  *1. Attention should be paid to the power dissipation of the package when the load 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
### FEATURES

- **Low current consumption**
  - 35μA typ., 65μA max. (during operation)
  - 0.1μA typ., 1μA max. (during power-off)
- **Output voltage**:
  - 1.5 to 5.5V (selectable in 0.1V step)
- **High output voltage accuracy**:
  - ±1.0%
- **Output current**
  - 200mA capable (product with 3.0V output, when VIN=4V)*1
- **Dropout voltage**
  - 140mV typ. (product with 3.0V output, when IOUT=200mA)
- **Ripple rejection rate**: 70dB typ. (f=1kHz, VOUT=3V)
- **Built-in power-off circuit**: Active high or low in the regulator is selectable.
- **Built-in overcurrent protection circuit**
  - *1. Attention should be paid to the power dissipation of the package when the load is large.

### APPLICATIONS

- **Power supply for battery-powered devices**
- **Power supply for communication devices**
- **Power supply for household electrical appliances**
- **Power supply for mobile phones**

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### FEATURES

- **Output voltage**: 1.0 to 3.5V, selectable in 0.05V step.
- **Low equivalent series resistance capacitor**:
  - Ceramic capacitor of 0.1μF or more can be used as the I/O capacitor.
- **Wide input voltage range**: 1.5 to 5.5V
- **High-accuracy output voltage**: ±1.0% (1.0 to 1.45V output product: ±15mV)
- **Low dropout voltage**:
  - 170mV typ. (products having the output of 2.8V, IOUT=100mA)
- **Low current consumption**
  - During operation: 0.9μA typ., 1.35μA max.
  - During power-off: 0.01μA typ., 0.1μA max.
- **Output current**
  - 200mA capable (product with 3.0V output, when VIN=4V)*1
- **Built-in overcurrent protection circuit**: Limits overcurrent of output transistor
- **Built-in thermal shutdown circuit**: Prevents damage caused by heat.
- **Built-in power-off circuit**: Ensures long battery life.
- **Discharge shunt circuit can be selected**.
- **Constant current source pull-down is selectable**
  - *1. Attention should be paid to the power dissipation of the package when the load is large.

### APPLICATIONS

- **Constant-voltage power supply for portable communication devices, digital cameras, and digital audio players**
- **Constant-voltage power supply for battery-powered devices**
- **Constant-voltage power supply for home electric/electronic appliances**
**FEATURES**

- **Output voltage:** 1.0 to 4.2V, selectable in 0.05V step.
- **Low equivalent series resistance capacitor:**
  
  Output capacitor is unnecessary, or a ceramic capacitor of 10μF or less can be used.
- **Wide input voltage range:** 1.4 to 5.5V
- **High-accuracy output voltage:** ±1.0% (1.0 to 1.45V output product: ±15mV)
- **Low dropout voltage:** 224mV typ. (products having the output of 3.0V, IOUT=200mA)
- **Low current consumption:**
  - During operation: 7μA typ., 13μA max.
  - During power-off: 0.1μA typ., 1.0μA max.
- **Output current:** 200mA capable (product with 3.0V output, when Vin=4V)*1
- **Built-in overcurrent protection circuit:**
  - Limits overcurrent of output transistor
- **Built-in power-off circuit:**
  - Ensures long battery life.
- **Discharge shunt circuit can be selected.**
- **Constant current source pull-down is selectable**
  
  *1. Attention should be paid to the power dissipation of the package when the load is large.

**APPLICATIONS**

- Constant-voltage power supply for battery-powered devices
- Constant-voltage power supply for communication device
- Constant-voltage power supply for mobile phone
- Constant-voltage power supply for module

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**250mA OUTPUT CURRENT**

**SUPER-LOW CURRENT CONSUMPTION AND LOW DROPOUT CMOS VOLTAGE REGULATOR**

**FEATURES**

- **Super low current consumption**
  
  1.0μA typ., 1.5μA max. (during operation)
- **Output voltage:** 1.2 to 5.2V (selectable in 0.05V step)
- **High output voltage accuracy:** ±1.0% (product with 1.2 to 1.45V output: ±15mV)
- **Output current:** 250mA capable (product with 3.0V output, when Vin=4V)*1
- **Dropout voltage:**
  
  150mV typ. (product with 3.0V output, when IOUT=100mA)
- **Built-in overcurrent protection circuit**
- **Use of a low ESR capacitor is possible.**
- **Input/output capacitor:**
  
  Use of a ceramic capacitor of 0.1μF or more is possible.
  
  *1. Attention should be paid to the power dissipation of the package when the load is large.

**APPLICATIONS**

- Power supply for battery-powered devices
- Power supply for mobile phones
- Power supply for portable equipment

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FEATURES

- Low current consumption:
  - S-1131 series: 35μA typ., 65μA max. (during operation)
  - 0.1μA typ., 1μA max. (during power-off)
- Output voltage: 1.5 to 5.5V (selectable in 0.1V step)
- High output voltage accuracy: ±1.0%
- Output current:
  - S-1131 series: 300mA capable (product with 3.0V output, when \( \text{Vin}=4\text{V} \))
  - Dropout voltage:
    - 250mV typ. (product with 3.0V output, when \( \text{Iout}=100\text{mA} \))
    - Ripple rejection rate: 70dB typ. \((f=1\text{kHz}, \text{Vout}=3\text{V})\)
    - Built-in power-off circuit: Active high or low in the regulator is selectable.
    - Built-in overcurrent protection circuit
  - *1. Attention should be paid to the power dissipation of the package when the load is large.

APPLICATIONS

- Power supply for DVD, CD-ROM drivers
- Power supply for battery-powered devices
- Power supply for communication devices
- Power supply for notebook PCs

FEATURES

- Low current consumption:
  - S-1132 series: 20μA typ., 40μA max. (during operation)
  - 0.01μA typ., 1μA max. (during power-off)
- Output voltage: 1.5 to 5.5V (selectable in 0.1V step)
- High output voltage accuracy: ±1.0%
- Output current:
  - 300mA capable (product with 3.0V output, when \( \text{Vin}=4\text{V} \))
- Dropout voltage:
  - 130mV typ. (product with 3.0V output, when \( \text{Iout}=100\text{mA} \))
  - Ripple rejection rate: 70dB typ. \((f=1\text{kHz}, \text{Vout}=3\text{V})\)
  - Built-in power-off circuit: Active high or low in the regulator is selectable.
  - Built-in overcurrent protection circuit
  - Use of a low ESR capacitor is possible.
  - Input/output capacitor: Use of a ceramic capacitor of 0.1μF or more is possible.
  - *1. Attention should be paid to the power dissipation of the package when the load is large.
### FEATURES

- **Low current consumption**
  - 60μA typ., 90μA max. (during operation)
  - 0.1μA typ., 1μA max. (during power-off)
- **Output voltage**
  - 1.2 to 6.0V (selectable in 0.1V step)
- **Configurable external output voltage**
  - 1.8 to 8.2V (selectable arbitrarily)
  - (S-1133B00/S-1133A00)
- **High output voltage accuracy**
  - ±1.0% (product with 1.2 to 1.4V output: ±15mV)
- **Output current**
  - 300mA capable (product with 3.0V output, when V_in=4V)²
- **Dropout voltage**
  - 130mV typ. (product with 3.0V output, when I_out=100mA)
- **Ripple rejection rate**
  - 70dB typ. (f=1kHz, V_out=1.2V)
- **Built-in power-off circuit**: Active high or low in the regulator is selectable.
- **Built-in overcurrent protection circuit**
- **Built-in thermal shutdown circuit**
- **Use of a low ESR capacitor is possible.**
- **Input/output capacitor**: Use of a ceramic capacitor of 1.0μF or more is possible.¹

¹. A ceramic capacitor of 2.2μF or more can be used for products with an output voltage of 1.7V or lower.

². Attention should be paid to the power dissipation of the package when the load is large.

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### APPLICATIONS

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

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### S-1135 series

- **Output voltage**: 1.0 to 3.5V, selectable in 0.05V step.
- **Low equivalent series resistance capacitor**: Ceramic capacitor of 1.0μF or more can be used as the I/O capacitor.
- **Wide input voltage range**: 1.5 to 5.5V
- **High-accuracy output voltage**: ±1.0% (1.0 to 1.45V output product: ±15mV)
- **Low dropout voltage**: 160mV typ. (products having the output of 2.6V, I_out=300mA)
- **Current consumption**
  - During operation: 45μA typ., 65μA max.
  - During power-off: 0.1μA typ., 1.0μA max.
- **Output current**
  - 300mA capable (product with 3.0V output, when V_in=4V)¹
  - **High ripple rejection**: 70dB typ. (at 1.0kHz, V_out=1.0V)
  - **Built-in overcurrent protection circuit**: limits overcurrent of output transistor
  - **Built-in power-off circuit**: Ensures long battery life.
  - **Discharge shunt circuit can be selected.**
  - **Resistor is selectable in pull-up or pull-down**

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

- **Output voltage:** 1.2 to 3.5V, selectable in 0.05V step.
- **Low equivalent series resistance capacitor:**
  Ceramic capacitor of 1.0μF or more can be used as the I/O capacitor.
- **Wide input voltage range:** 1.7 to 5.5V
- **High-accuracy output voltage:** ±1.0% (1.2 to 1.45V output product: ±15mV)
- **Low dropout voltage:** 210mV typ. (products having the output of 2.8V, \( \text{I}_{\text{OUT}} = 300\text{mA} \))
- **Low current consumption:**
  - During operation: \( 48\mu\text{A} \) typ., \( 65\mu\text{A} \) max.
  - During power-off: \( 0.1\mu\text{A} \) typ., \( 1.0\mu\text{A} \) max.
- **Output current:** 300mA capable (product with 3.0V output, when \( V_{\text{IN}} = 4V \))
- **Soft-start circuit with external capacitor:**
  Soft-start time: 0.7ms typ. (\( C_{\text{SS}} = 1.0\text{nF} \))
- **High ripple rejection:** 70dB typ. (at 1.0kHz)
- **Built-in overcurrent protection circuit:**
  limits overcurrent of output transistor
- **Built-in power-off circuit:** Ensures long battery life.
- **Discharge shunt circuit can be selected.**
- **Pull-down resistor is selectable**

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

**APPLICATIONS**

- Power supply for battery-powered devices
- Power supply for mobile phones, portable devices
- Power supply for digital still cameras, TVs, DVD recorders

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**FEATURES**

- **Output voltage:** 1.0 to 3.5V, selectable in 0.05V step.
- **Low equivalent series resistance capacitor:**
  Ceramic capacitor of 1.0μF or more can be used as the I/O capacitor.
- **Wide input voltage range:** 1.5 to 5.5V
- **High-accuracy output voltage:** ±1.0% (1.0 to 1.45V output product: ±15mV)
- **Low dropout voltage:** 160mV typ. (products having the output of 2.8V, \( \text{I}_{\text{OUT}} = 100\text{mA} \))
- **Low current consumption:**
  - During operation: \( 25\mu\text{A} \) typ., \( 38\mu\text{A} \) max.
  - During power-off: \( 0.1\mu\text{A} \) typ., \( 1.0\mu\text{A} \) max.
- **Output current:** 300mA capable (product with 3.0V output, when \( V_{\text{IN}} = 4V \))
- **High ripple rejection:** 75dB typ. (at 1kHz, \( \text{V}_{\text{OUT}} = 1.6V \))
- **Built-in overcurrent protection circuit:**
  limits overcurrent of output transistor
- **Built-in thermal shutdown circuit:**
  Prevents damage caused by heat.
- **Built-in power-off circuit:** Ensures long battery life.
- **Discharge shunt circuit can be selected.**
- **Pull-down resistor is selectable**

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

**APPLICATIONS**

- Constant-voltage power supply for portable communication devices, digital cameras, and digital audio players
- Constant-voltage power supply for battery-powered devices
- Constant-voltage power supply for home electric/electronic appliances
500mA OUTPUT CURRENT
HIGH RIPPLE REJECTION AND LOW DROPOUT HIGH OUTPUT CURRENT CMOS VOLTAGE REGULATOR
S-1155 series

FEATURES
- Output voltage: 1.0 to 5.0V, selectable in 0.05V step.
- Low equivalent series resistance capacitor:
Ceramic capacitor of 4.7μF or more can be used as the I/O capacitor.
- Input voltage: 1.5 to 5.5V
- High-accuracy output voltage: ±1.0% (1.0 to 1.45V output product: ±15mV)
- Low dropout voltage: 70mV typ. (3.0V output product, at IOUT=200mA)
- Low current consumption:
  - During operation: 70μA typ., 90μA max. (3.0V output product)
  - During power-off: 0.1μA typ., 1.0μA max.
- Output current: 500mA (3.0V output product, at VIN=4V)*1
- High ripple rejection: 70dB typ. (at 1.0kHz, VOUT=1.0V)
- Built-in overcurrent protection circuit:
  - limits overcurrent of output transistor
  - Built-in thermal shutdown circuit:
  - prevents damage caused by heat
- Built-in rush current control circuit:
  - limits excessive rush current during start-up
- Built-in power-off circuit: Active high or low in the regulator is selectable.
*1. Attention should be paid to the power dissipation of the package when the load is large.

APPLICATIONS
- Power supply for battery-powered devices
- Power supply for TV, notebook PCs and home electric appliances
- Constant-voltage power supply for portable equipment

PIN CONFIGURATION
- SOT-89-5 Top view
- 6-Pin HSON(A) Top view

800mA OUTPUT CURRENT
HIGH RIPPLE REJECTION AND LOW DROPOUT HIGH OUTPUT CURRENT CMOS VOLTAGE REGULATOR
S-1170 series

FEATURES
- Low current consumption
  - 80μA typ., 160μA max. (during operation)
  - 0.1μA typ., 1μA max. (during power-off)
- Output voltage: 1.5 to 5.5V (selectable in 0.1V step)
- High output voltage accuracy: ±1.0%
- Output current
  - 800mA capable (product with 3.0V output, when VIN=4V)*1
- Dropout voltage
  - 120mV typ. (product with 3.0V output, when IOUT=300mA)
- Ripple rejection rate: 70dB typ. (f=1kHz, VOUT=3V)
- Built-in power-off circuit: Active high or low in the regulator is selectable.
- Built-in overcurrent protection circuit
- Built-in thermal shutdown circuit
- Input/output capacitor: Use of a ceramic capacitor of 4.7μF or more is possible.
*1. Attention should be paid to the power dissipation of the package when the load is large.

APPLICATIONS
- Power supply for DVD, CD-ROM drivers
- Power supply for battery-powered devices
- Power supply for communication devices
- Power supply for notebook PCs
1000mA OUTPUT CURRENT
HIGH RIPPLE REJECTION AND LOW DROPOUT
HIGH OUTPUT CURRENT CMOS VOLTAGE REGULATOR

S-1172 series

FEATURES
- Output voltage: 1.0 to 5.0V, selectable in 0.05V step.
- Low equivalent series resistance capacitor: Ceramic capacitor of 4.7μF or more can be used as the I/O capacitor.
- Input voltage: 1.5 to 5.5V
- High-accuracy output voltage: ±1.0% (1.0 to 1.45V output product, ±15mV)
- Low dropout voltage: 70mV typ. (3.0V output product, at IOUT=300mA)
- Low current consumption:
  - During operation: 70μA typ., 90μA max. (3.0V output product)
  - During power-off: 0.1μA typ., 1.0μA max.
- Output current: 1000mA (3.0V output product, at VIN=4V)*
- High ripple rejection: 70dB typ. (at 1.0kHz, VOUT=1.0V)
- Built-in overcurrent protection circuit:
  - limits overcurrent of output transistor
  - Built-in thermal shutdown circuit: prevents damage caused by heat
  - Built-in rush current control circuit:
  - limits excessive rush current during start-up
  - Built-in power-off circuit: Active high or low in the regulator is selectable.

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

PIN CONFIGURATIONS

APPLICATIONS
- Power supply for battery-powered devices
- Power supply for TV, notebook PCs and home electric appliances
- Constant-voltage power supply for portable equipment

Ceramic capacitor of 4.7μF or more can be used as the I/O capacitor.

During operation: 70μA typ., 90μA max. (3.0V output product)
During power-off: 0.1μA typ., 1.0μA max.
Output current: 1000mA (3.0V output product, at VIN=4V)*
High ripple rejection: 70dB typ. (at 1.0kHz, VOUT=1.0V)
Built-in overcurrent protection circuit:
- limits overcurrent of output transistor
- Built-in thermal shutdown circuit: prevents damage caused by heat
- Built-in rush current control circuit:
- limits excessive rush current during start-up
- Built-in power-off circuit: Active high or low in the regulator is selectable.

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

- Output voltage: 1.0 to 3.5V, selectable in 0.05V step.
- Configurable external output voltage:
  1.05 to 5.0V (selectable arbitrarily) (HSOP-8A, HSOP-6, SOT-89-5 only)
- Low equivalent series resistance capacitor:
  Ceramic capacitor of 2.2μF or more can be used as the I/O capacitor.
- Wide input voltage range: 1.5 to 5.5V
- High-accuracy output voltage: ±1.0% (1.0 to 1.45V output product: ±15mV)
- Low dropout voltage: 70mV typ. (products having the output of 3.0V, Iout=300mA)
- Low current consumption:
  - During operation: 60μA typ., 90μA max.
  - During power-off: 0.1μA typ., 1.0μA max.
- Output current: 1000mA capable (product with 3.0V output, when VIN=4V)\(^1\)
- High ripple rejection: 70dB typ. (at f=1kHz, Vouts=1.1V)
- Built-in overcurrent protection circuit:
  - Limits overcurrent of output transistor
  - Prevents damage caused by heat.
  - Built-in inrush current limit circuit:
    - Limits excessive inrush current during start-up.
    - For types in which output voltage is internally set:
      - HSOP-8A, HSOP-6, SOT-89-5, inrush current limit time can be changed via external resistor (Ciss).
      - Inrush current limit time: 0.7ms typ.
    - (types in which output voltage is internally set of HSOP-8A, HSOP-6, SOT-89-5, at Ciss = 1.0nF)
    - Inrush current limit time: 0.4ms typ.
    - (types in which output voltage is internally set of HSOP-8A, HSOP-6, SOT-89-5, types in which output voltage is externally set of HSNT-6A)\(^2\)
- Built-in power-off circuit: Ensures long battery life.
- Discharge shunt circuit can be selected.
- Pull-down resistor is selectable
  - *1. Attention should be paid to the power dissipation of the package when the load is large.
  - *2. Types in which output voltage is externally set are unavaialable.

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
HIGH-WITHSTAND VOLTAGE CMOS VOLTAGE REGULATOR

**S-812C series**

**FEATURES**
- Low current consumption: 1.0µA typ., 1.8µA max. (Product with 3.0V output, during operation)
- Output voltage range: 2.0 to 6.0V (Selectable in 0.1V step)
- Output voltage accuracy: ±2.0%
- Input voltage: 16V max.
- Output current
  - 50mA capable (Product with 3.0V output, when \( V_{IN}=5V \))
  - 75mA capable (Product with 5.0V output, when \( V_{IN}=7V \))
- Dropout voltage: 120mV typ. (Product with 5.0V output, when \( I_{OUT}=10mA \))
- Output capacitor: A ceramic capacitor can be used.
- Built-in power-off circuit: Selectable if power-off function is available or not. Active high or low in the regulator is selectable.
- Short-circuit protection: Function selectable
  - Short-circuit current: 40mA typ. (With protection function)

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

**APPLICATIONS**
- Power supply for battery-powered devices
- Power supply for communication devices
- Power supply for household electrical appliances

**PIN CONFIGURATIONS**


**SUPER-SMALL PACKAGE VOLTAGE REGULATOR**

**S-817 series**

**FEATURES**
- Low current consumption: 1.2µA typ., 2.5µA max. (during operation)
- Output voltage: 1.1 to 6.0V (selectable in 0.1V step)
- Output voltage accuracy: ±2.0%
- Input voltage: 10V max.
- Output current
  - 50mA capable (3.0V output product, when \( V_{IN}=5V \))
  - 75mA capable (5.0V output product, when \( V_{IN}=7V \))
- Dropout voltage: 160mV typ. (5.0V output product, \( I_{OUT}=10mA \))
- Low ESR capacitor: A ceramic capacitor of 0.1µF or higher.
- Short-circuit protection: Only for A series
- Excellent line regulation: Stable even with low load (1µA)

*1. Attention should be paid to low load (1µA) when the load is large.

**APPLICATIONS**
- Power supply for battery-powered devices
- Power supply for communication devices
- Power supply for household electrical appliances

**PIN CONFIGURATIONS**
EXTERNAL TRANSISTOR TYPE VOLTAGE REGULATOR  

**S-816 series**

**FEATURES**
- Low current consumption
  - 30μA typ., 40μA max. (during operation)
  - 1μA max. (during power-off)
- Input voltage: 16V max.
- Output voltage accuracy: ±2.0%
- Output voltage range: 2.5 to 6.0V
  (selectable in 0.1V step)
- Built-in power-off circuit
- Built-in current source (10μA): no need a resistor between the base-emitters.
- Overcurrent (base current) protection

**APPLICATIONS**
- On-board power supply of battery devices for mobile phones, electronic organizers, and PDAs
- Constant voltage power supply for portable communication equipment, cameras, and video equipment
- Power supply for CPUs
- Post-regulators for switching regulators
- Main regulator for multi power supply system

**PIN CONFIGURATION**

![SOT-23-5 Top view](image)

### Low Dropout CMOS Voltage Regulator  

**S-814 series**

**FEATURES**
- Low current consumption
  - 30μA typ., 40μA max. (during operation)
  - 100nA typ., 500nA max. (during power-off)
- Output voltage: 2.0 to 6.0V (selectable in 0.1V step)
- Output voltage accuracy: ±2.0%
- Input voltage: 10V max.
- Output current:
  - 110mA capable (product with 3.0V output, when V_IN=4V)
  - 180mA capable (product with 5.0V output, when V_IN=6V)
- Low dropout voltage:
  - 170mV typ. (product with 5.0V output, when I_OUT=60mA)
- Built-in power-off circuit
- Built-in short-circuit protection circuit
- Low ESR capacitor: A ceramic capacitor of 0.47μF or more can be used as the output capacitor
  *Attention should be paid to the power dissipation of the package when the load is large.

**APPLICATIONS**
- Power supply for battery-powered devices
- Power supply for communication devices
- Power supply for household electrical appliances

**PIN CONFIGURATIONS**

![SOT-32-5 Top view](image) ![SOT-23-5 Top view](image)

**Remark** Refer to data sheet for product names.
LOW DROPOUT CMOS VOLTAGE REGULATOR

S-818 series

**FEATURES**

- Low current consumption
  - 30μA typ., 40μA max. (during operation)
  - 100nA typ., 500nA max. (during power-off)
- Output voltage: 2.0 to 6.0V (selectable in 0.1V step)
- Output voltage accuracy: ±2.0%
- Input voltage: 10V max.
- Output current
  - 200mA capable (product with 3.0V output, when V(n=4V))
  - 300mA capable (product with 5.0V output, when V(n=6V))
- Low dropout voltage
  - 170mV typ. (product with 5.0V output, when I(n)=60mA)
- Built-in power-off circuit
- Low ESR capacitor: A ceramic capacitor of 2μF or more can be used as the output capacitor

*Attention should be paid to the power dissipation of the package when the load is large.

**APPLICATIONS**

- Power supply for battery-powered devices
- Power supply for communication devices
- Power supply for household electrical appliances

**SUPER-LOW CURRENT CONSUMPTION (0.5μA) CMOS VOLTAGE REGULATOR WITH BUILT-IN POWER MONITORING OUTPUT FUNCTION**

**NEW S-1740/1741 series**

**FEATURES**

- Overall
  - Super-low current consumption: 0.5μA typ. (During operation)
- Regulator block
  - Output voltage: 1.0 to 3.5V, selectable in 0.05V step
  - Input voltage: V(n)=1.5 to 5.5V
  - Output voltage accuracy: ±1.0% (1.0 to 1.45V output product: ±15mV (Ta=-25°C)
  - Dropout voltage: 20mV typ. (2.5V output product, at I(n)=10mA) (Ta=-25°C)
  - Current consumption during operation:
    - ISS=0.35μA typ. (Ta=-25°C)
  - Output current: Possible to output 100mA (at V(n)=VOUT(3.5V) +1.0V)
  - Input capacitor: A ceramic capacitor can be used. (1.0μF or more)
  - Output capacitor: A ceramic capacitor can be used. (1.0 to 100μF)
  - Built-in overcurrent protector: limits overcurrent of output transistor
- Power monitor block
  - Output voltage: VPMOUT = V(n)/2 (S-1740 series)
  - VPMOUT = V(n)/3 (S-1741 series)
  - Current consumption during operation:
    - I(S2F)=0.15μA typ. (Ta=-25°C)
  - Output capacitor: A ceramic capacitor can be used. (100 to 220nF)
  - Built-in enable circuit: Ensures long battery life

*Attention should be paid to the power dissipation of the package when the load is large.

**APPLICATIONS**

- Constant-voltage power supply and battery voltage monitoring support for battery-powered devices
- Constant-voltage power supply for portable communication devices, digital cameras, and digital audio players
- Constant-voltage power supplies for home electric appliances

Specs described herein are subject to change without notice. For information about new products, refer to our SII Semiconductor Corporation website.

www.sii-ic.com SII Semiconductor Corporation Web site
**POWER SUPPLY ICs**

**Voltage Regulators**

### FEATURES

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

**S-87x series**

- **Features**
  - Output voltage range: 2.5 to 5.8V (0.1V step)
  - Output voltage accuracy: ±2.4%
  - Detection voltage range: 2.1 to 11.3V (0.1V step)
  - Detection voltage accuracy: ±2.4% (for S-87xxxxF series, release voltage ±1.1%)
  - Low I/O voltage difference: 0.15V typ. (Io=30mA, Vout=5.0V)
  - Low current consumption: 8μA max. (during operation)
  - Wide operating voltage range: 24V max.
  - Wide operating temperature range: -40°C to +85°C
  - Built-in delay circuit or power-off circuit:
    - Delay time: 27ms typ.
    - (S-87xxxxA/B/F series, C2=4.7nF)
  - Built-in short-circuit protection

### APPLICATIONS

- Constant voltage power supply or reset circuit of battery-powered equipment
- VTRs, cameras, communication equipment
- Lithium-ion rechargeable battery packs

### PIN CONFIGURATION

**SOT-89-5 Top view**

1. **VOUT**
2. **VSS**
3. **CD(VPF, SENSE)**
4. **VOR**
5. **VIN**

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

**S-1701 series**

- **Features**
  - Output voltage: 1.5 to 5.0V (selectable in 0.1V step)
  - High output voltage accuracy: ±1.0%
  - Operating voltage range: 2.0 to 6.5V
  - Output current
    - 400mA capable (product with 3.0V output, when VIN=5V)
    - Dropout voltage
      - 140mV typ. (product with 3.0V output, when IOUT=100mA)
  - Ripple rejection rate: 70dB typ. (f=1kHz, VOUT=3V)
  - Built-in power-off circuit: Active high or low in the regulator is selectable.
  - Built-in overcurrent protection circuit
  - Use of a low ESR capacitor is possible.
  - Input/output capacitor: Use of a ceramic capacitor of 1.0μF or more is possible.

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

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

### APPLICATIONS

- Power supply and reset circuit for battery-powered devices
- Power supply for communication devices
- Power supply for home appliances

### PIN CONFIGURATIONS

**SOT-23-5 Top view**

1. **VIN**
2. **VSS**
3. **CD(VPF, SENSE)**
4. **VOR**

**SOT-89-5 Top view**

1. **VOUT**
2. **VSS**
3. **CD(VPF, SENSE)**
4. **VOR**
5. **VIN**
POWER SUPPLY ICs

Voltage Regulators

SUPER-LOW CURRENT CONSUMPTION CMOS VOLTAGE REGULATOR WITH BUILT-IN HIGH-ACCURACY VOLTAGE DETECTOR AND RESET INPUT FUNCTION

S-1702 series

FEATURES

Overall
- Correlation temperature gradient in the regulator and the detector blocks
- Super-low current consumption:
  - During operation*: 10μA typ., 18μA max.

Regulator block
- Output voltage: 1.5 to 5.5V, selectable in 0.05V step
- High-accuracy output voltage: ±1.0%
- Super-low current consumption:
  - Current consumption of regulator block: 9μA typ., 16μA max.
- High peak current capability:
  - 150mA output (product with 3.0V output, when \( V_{IN}=4V \))^2
- Built-in on/off discharge circuit:
  - Longer battery life, discharges output load instantaneously
- High ripple rejection: 70dB typ. (at 1.0kHz)
- Built-in overcurrent protector:
  - Limits overcurrent of output transistor

Detector block
- Output voltage: 1.3 to 5.2V, selectable in 0.05V step
- Built-in high-accuracy voltage detector:
  - ±1.0%
  - Monitoring output/input or monitoring external input by option (detector output)
- External reset input:
  - Forcible assertion of detector output by external reset pin (RESX) input
  - *1. The current that flows into the pull-up and pull-down resistors connected to the ON/OFF and RESX pins is excluded.
  - *2. Attention should be paid to the power dissipation of the package when the load large.

S-1711 series

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

FEATURES

- Low current consumption (Per circuit)
  - 70μA typ., 90μA max. (during operation)
  - 0.1μA typ., 1μA max. (during power-off)
- Output voltage: 1.5 to 5.5V (selectable in 0.1V step)
- High output voltage accuracy: ±1.0%
- Output current
  - 150mA capable (product with 3.0V output, when \( V_{IN}=4V \))^1
- Dropout voltage
  - 200mV typ. (product with 3.0V output, when \( I_{OUT}=150mA \))
  - Ripple rejection rate: 70dB typ. (f=1kHz, \( V_{OUT}=3V \))
- Built-in power-off circuit: Active high or low in the regulator is selectable.
- Discharge shunt circuit can be selected.
- Built-in overcurrent protection circuit
- Use of a low ESR capacitor is possible.
- Input/output capacitor:
  - Use of a ceramic capacitor of 1.0μF or more is possible.
  - *1. Attention should be paid to the power dissipation of the package when the load large.

APPLICATIONS

- Wireless power supply circuit block for cellular phones
- Power supply circuit block for health care products
- Power supply circuit block for various mobile devices

S-1702 series

PIN CONFIGURATION

S-1702 series

SOT-23-6

Top view

1 2 3 4 5 6

1 VIN VIN VIN
2 ON/OFF ON/OFF ON/OFF
3 RESX CD SENSE
4 VSS VSS VSS
5 VDOUT VDOUT VDOUT
6 VOUT VOUT VOUT

APPLICATIONS

- Power supply for battery-powered devices
- Power supply for communication devices
- Power supply for home electric/electronic appliances
- Power supply for mobile phones

S-1711 series

PIN CONFIGURATION

S-1711 series

SOT-23-6

Top view

1 2 3 4 5 6

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

APPLICATIONS

- Power supply for battery-powered devices
- Power supply for communication devices
- Power supply for home electric/electronic appliances
- Power supply for mobile phones
SUPER-SMALL PACKAGE 2-CIRCUIT BUILT-IN DELAY FUNCTION
HIGH RIPPLE REJECTION LOW DROPOUT CMOS VOLTAGE REGULATOR

**S-13D1 series**

**FEATURES**

- **Low current consumption (Per circuit)**
  - 39μA typ., 58μA max. (during operation)
  - 0.1μA typ., 1μA max. (during power-off)
- **Output voltage:** 1.0 to 3.6V (selectable in 0.05V step)
- **Input voltage:** 1.5 to 5.5V
- **High output voltage accuracy:** ±1.0% (1.0 to 1.45V output product: ±15mV)
- **Output current:** 150mA capable (product with 3.0V output, when VIN=4V)*1
- **Dropout voltage:** 80mV typ. (product with 2.8V output, when IOUT=100mA)
- **Ripple rejection rate:** 70dB typ. (f=1kHz, VOUT=3.6V)
- **Built-in power-off circuit:** Ensures long battery life.
- **Discharge shunt circuit can be selected.**
- **Built-in overcurrent protection circuit**
- **Constant current source pull-down is selectable.**
- **Built-in thermal shutdown circuit**
- **Delay function is selectable.**
- **Input/output capacitor:** Use of a ceramic capacitor of 0.22μF or more is possible.

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

**PIN CONFIGURATIONS**

**APPLICATIONS**

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

---

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

**S-1721 series**

**FEATURES**

- **Low current consumption (Per circuit)**
  - 25μA typ., 45μA max. (during operation, 3.0V output)
  - 0.1μA typ., 1μA max. (during power-off)
- **Output voltage:** 1.2 to 5.0V (selectable in 0.05V step)
- **High output voltage accuracy:** ±1.0%
- **Output current:** 150mA capable (product with 3.0V output, when VIN=4V)*1
- **Dropout voltage:** 130mV typ. (product with 3.0V output, when IOUT=100mA)
- **Ripple rejection rate:** 80dB typ. (f=1kHz, VOUT=less than 1.8V output product)
- **Built-in power-off circuit:** Active high or low in the regulator is selectable.
- **Built-in overcurrent protection circuit**
- **Input/output capacitor:** Use of a ceramic capacitor of 1.0μF or more is possible.

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

**PIN CONFIGURATIONS**

**APPLICATIONS**

- **Power supply for battery-powered devices**
- **Power supply for communication devices**
- **Power supply for home electric/electronic appliances**
- **Power supply for mobile phones**
200mA OUTPUT CURRENT HIGH-WITHSTAND VOLTAGE (50V) 
LOW CURRENT CONSUMPTION LOW DROPOUT CMOS VOLTAGE REGULATOR

S-1142 series

FEATURES
- Output voltage : 2.0 to 15.0V, selectable in 0.1V step
- Low equivalent series resistance capacitor:
  Ceramic capacitor of 0.1μF or more can be used as the I/O capacitor.
- Input voltage : 3.0 to 50V
- High-accuracy output voltage :
  ±1.0% (at Tj=25°C), ±3.0% (Tj=−40 to +105°C)
- Low current consumption :
  During operation: 4.0μA typ., 9.0μA max. (Tj=−40 to +85°C)
  During power-off: 0.1μA typ., 1.0μA max. (Tj=−40 to +85°C)
- Output current : 200mA
  (product with 3.0V output, when VIN=5V)※1
- Built-in overcurrent protection circuit
  limits overcurrent of output transistor
- Built-in thermal shutdown circuit:
  prevents damage caused by heat
- Built-in power on/off circuit : longer battery life
  ※1. Attention should be paid to the power dissipation of the package when the load is large.

APPLICATIONS
- Constant-voltage power supplies for home electric appliances

250mA OUTPUT CURRENT HIGH-WITHSTAND VOLTAGE (36V) 
LOW CURRENT CONSUMPTION LOW DROPOUT CMOS VOLTAGE REGULATOR

S-1212B/D series

FEATURES
- Output voltage : 2.5 to 16.0V, selectable in 0.1V step
- Low equivalent series resistance capacitor:
  Input capacitor: A ceramic capacitor can be used.
  (1.0 to 100μF)
  Output capacitor: A ceramic capacitor can be used.
  (0.1μF or more)
- Input voltage : 3.0 to 36V
- High-accuracy output voltage :
  ±2.0% (Ta=25°C)
- Low current consumption :
  During operation: 6.5μA typ. (Ta=25°C)
  During power-off: 0.1μA typ. (Ta=25°C)
- Output current : 250mA (at Vn=Vout(B)+2.0V)※1
- Built-in overcurrent protector :
  limits overcurrent of output transistor
- Built-in thermal shutdown circuit :
  Detection temperature 165°C typ.
- Built-in power on/off circuit : longer battery life
- Built-in discharge shunt circuit:
  Discharges the electric charge of the output capacitor during power-off. (Rlow=70kΩ typ.)
  ※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 supplies for home electric appliances
Voltage Detector Lineup

We SII Semiconductor Corporation offer high-accuracy voltage detectors which are developed based on CMOS technology. The detection voltage is fixed internally with an accuracy of ±0.5% to ±2.0%. Two output forms Nch open-drain output and CMOS (push-pull) output are selectable.

### Product Lineup

<table>
<thead>
<tr>
<th>Description</th>
<th>Product name</th>
<th>Detection voltage</th>
<th>Operating voltage</th>
<th>Current consumption (typ.)</th>
<th>Output type</th>
<th>Package</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>350nA super-low current consumption</td>
<td>S-1000 series</td>
<td>1.5 to 4.6V</td>
<td>±1.0%</td>
<td>0.95 to 5.0V</td>
<td>350mA (Vcc=detection voltage+1.5V)</td>
<td>Nch open-drain / CMOS (push-pull) output</td>
<td>S-82AB</td>
</tr>
<tr>
<td>Standard</td>
<td>S-808xxC series</td>
<td>0.8 to 6.0V</td>
<td>±2.0%</td>
<td>0.65 to 5.0V (detection voltage 1.4V typ. or less models)</td>
<td>1.3μA (detection voltage 1.4V typ. or less, Vcc=1.5V)</td>
<td>Nch open-drain / CMOS (push-pull) output</td>
<td>S-82AB</td>
</tr>
<tr>
<td>270mA super-low current consumption</td>
<td>S-1009 series</td>
<td>0.8 to 4.6V</td>
<td>±0.5%</td>
<td>0.6 to 10V (CMOS output product)</td>
<td>270mA (1.2×Vcc=2.3V)</td>
<td>Nch open-drain / CMOS (push-pull) output</td>
<td>S-82AB</td>
</tr>
<tr>
<td>Built-in delay circuit (external delay time setting)</td>
<td>S-809xxC series</td>
<td>1.3 to 6.0V</td>
<td>±2.0%</td>
<td>0.7 to 10V</td>
<td>1.1μA (detection voltage 1.5V typ. or more, Vcc=3.5V)</td>
<td>Nch open-drain / CMOS (push-pull) output</td>
<td>S-82AB</td>
</tr>
<tr>
<td>Built-in delay circuit (internal delay time setting)</td>
<td>S-801 series</td>
<td>2.2 to 6.0V</td>
<td>±2.0%</td>
<td>0.95 to 10V</td>
<td>1.3μA (Vcc=3.5V)</td>
<td>Nch open-drain / CMOS (push-pull) output</td>
<td>S-82AB</td>
</tr>
<tr>
<td>Manual reset</td>
<td>S-1003 series</td>
<td>1.2 to 5.0V</td>
<td>±1.0%</td>
<td>0.95 to 10V</td>
<td>500mA</td>
<td>Nch open-drain / CMOS (push-pull) output</td>
<td>S-82AB</td>
</tr>
<tr>
<td>SENSE detection</td>
<td>S-1002 series</td>
<td>1.0 to 5.0V</td>
<td>±1.0%</td>
<td>0.95 to 10V</td>
<td>500mA</td>
<td>Nch open-drain / CMOS (push-pull) output</td>
<td>S-82AB</td>
</tr>
<tr>
<td>SENSE detection</td>
<td>S-1004 series</td>
<td>1.0 to 5.0V</td>
<td>±1.0%</td>
<td>0.95 to 10V</td>
<td>500mA</td>
<td>Nch open-drain / CMOS (push-pull) output</td>
<td>S-82AB</td>
</tr>
<tr>
<td>High-withstand voltage</td>
<td>S-1011 series</td>
<td>3.0 to 10V (SENSE detection)</td>
<td>±1.5% (A/CE/G Type)</td>
<td>1.8 to 36V</td>
<td>600mA</td>
<td>Nch open-drain</td>
<td>S-82AB</td>
</tr>
</tbody>
</table>
POWER SUPPLY ICs
Voltage Detectors

SUPER-SMALL PACKAGE HIGH-ACCURACY VOLTAGE DETECTOR
S-1000 series

FEATURES

• Low current consumption: 350mA (0.35uA) typ.
  (VDD=detection voltage +1.5V)
• Detection voltage accuracy: ±1.0%
• Operating voltage range: 0.95 to 5.5V
• Hysteresis: 5% typ.
• Detection voltage: 1.5 to 4.6V (0.1V step)
• Output type: Active low Open-drain (Nch open-drain) output
  Active low Push-pull (CMOS output)

APPLICATIONS

• Monitor for power supply of microcomputers and reset for
  CPUs.
• Monitor for power supply of portable equipment such as mobile
  phones, digital still cameras and PDAs.
• Monitor for constant voltage power supply of cameras, video
  equipment and communication devices.

PIN CONFIGURATIONS

SUPER-SMALL PACKAGE HIGH-ACCURACY VOLTAGE DETECTOR
S-808xxC series

FEATURES

• Super-low current consumption: 1.3uA typ.
  (Product with detection voltage 1.4V typ. or less, VDD=1.5V)
  0.8uA typ.
  (Product with detection voltage 1.5V typ. or more, VDD=3.5V)
• Detection voltage accuracy: ±2.0%
• Operating voltage range:
  0.65 to 5.0V (Product with detection voltage 1.4V typ. or less)
  0.95 to 10.0V (Product with detection voltage 1.5V typ. or more)
• Hysteresis: 5% typ.
• Detection voltage: 0.8 to 6.0V (0.1V step)
• Output type: Active low Open-drain (Nch open-drain) output
  Active low Push-pull (CMOS output)

APPLICATIONS

• Battery checker
• Power failure detector
• Monitor for power supply of portable equipment such as pagers,
  pocket calculators, electronic organizers, remote controllers
• Monitor for constant voltage power supply of cameras, video
  equipment, communication devices
• Monitor for power supply of microcomputers and reset for CPUs

PIN CONFIGURATIONS
SUPERLOW CURRENT CONSUMPTION SUPER HIGH-ACCURACY VOLTAGE DETECTOR WITH DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING)  
S-1009 series

FEATURES
- Super-low current consumption: 270nA (0.27μA) typ. 
  (1.2V−V<sub>DET</sub><sub>><</sub>2.3V)
- Super high-accuracy detection voltage: ±0.5% (2.4V<sub>−</sub>V<sub>DET</sub><sub>−</sub>4.6V)
- Operating voltage range: 0.6 to 10.0V 
  (CMOS output products)
- Hysteresis characteristics: 5%±1%
- Delay time accuracy: ±15% (C<sub>F</sub>=4.7nF)
- Detection voltage: 0.8V to 4.6V (0.1V step)
- Output form: Nch open drain output (Active "L") 
  CMOS output (Active "L")

APPLICATIONS
- Power monitor and reset for CPUs and microcomputers
- Power supply monitor for portable devices such as notebook PCs, digital still cameras and mobile phones
- Constant voltage power monitor for TVs, DVD recorders and home appliances

PIN CONFIGURATIONS

SUPER-SMALL PACKAGE HIGH-ACCURACY VOLTAGE DETECTOR 
WITH DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING)  
S-809xxC series

FEATURES
- Super-low current consumption: 1.0μA typ. 
  (Product with detection voltage 1.4V typ. or less, V<sub>DD</sub><sub>=</sub>2.0V)
- Operating voltage range: 0.7 to 10.0V
- Hysteresis: 5% typ.
- Detection voltage: 1.3 to 6.0V (0.1V step)
- Output type: Active low Push-pull (OCN open-drain) output

APPLICATIONS
- Monitor for power supply of portable applications such as notebook PCs, digital still cameras, PDAs, and cellular phones
- Monitor for constant voltage power supply of cameras, video equipment, communication devices
- Monitor for power supply of microcomputers and reset for CPUs

PIN CONFIGURATIONS
SUPER-SMALL PACKAGE HIGH-ACCURACY VOLTAGE DETECTOR WITH DELAY CIRCUIT (INTERNAL DELAY TIME SETTING)  

S-801 series

**FEATURES**
- Super-low current consumption: 1.3μA typ. (VDD=3.5V)
- Detection voltage accuracy: ±2.0%
- Hysteresis: 60mV typ.
- Three delay times: 50ms typ. (A series)
  - 100ms typ. (B series)
  - 200ms typ. (C series)
- Delay time ON/OFF switch available (DS pin).
- Operating voltage range: 0.95 to 10.0V
- Detection voltage: 2.2 to 6.0V (0.1V step)
- Output type: Active low Open-drain (Nch open-drain) output
  - Active low Push-pull (CMOS output)

**APPLICATIONS**
- Monitor for power supply of portable equipment such as notebook PCs, digital still cameras, PDAs, and cellular phones
- Monitor for constant voltage power supply of cameras, video equipment and communication devices
- Monitor for power supply of microcomputers and reset for CPUs

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

S-1003 series

**FEATURES**
- Super-low current consumption: 500nA (0.5μA) typ.
- High-accuracy detection voltage: ±1.0% (2.2V< VDET<5.0V)
  - ±22mV (1.2V< VDET<2.2V)
- Operating voltage range: 0.95 to 10.0V
- Hysteresis characteristics: 5%±2%
- Delay time accuracy: ±15% (C<4.7nF)
- Detection voltage: 1.2 to 5.0V (0.1V step)
- Output form: Nch open drain output (Active “L”)
  - CMOS output (Active “L”)
- Manual reset function: MR pin logic Active “L”, Active “H”

**APPLICATIONS**
- Power monitor and reset for CPUs and microcomputers
- Power supply monitor for portable devices such as notebook PCs, digital still cameras and mobile phones
- Constant voltage power monitor for TVs, Blu-ray recorders and home appliances
VOLTAGE DETECTOR WITH SENSE PIN  
S-1002 series

**FEATURES**
- Super-low current consumption: 500nA typ.
- High-accuracy detection voltage: \[ \pm 1.0\% \] (2.2V≤VDET≤5.0V)  
  \[ \pm 0.2\% \] (1.0V≤VDET≤2.2V)
- Operating voltage range: 0.95 to 10.0V
- Hysteresis characteristics: 5\%±2\%
- Detection voltage: 1.0 to 5.0V (0.1V step)
- Output form: Nch open drain output (Active “L”)  
  CMOS output (Active “L”)

**APPLICATIONS**
- Power supply monitor for microcomputers and reset for CPUs
- Constant voltage power supply monitor for TVs, Blu-ray recorders and home appliances
- Power supply monitor for portable devices such as notebook PCs, digital still cameras and mobile phones

**PIN CONFIGURATIONS**

VOLTAGE DETECTOR WITH BUILT-IN DELAY CIRCUIT  
(EXTERNAL DELAY TIME SETTING) AND SENSE PIN  
S-1004 series

**FEATURES**
- Super-low current consumption: 500nA typ.
- High-accuracy detection voltage: \[ \pm 1.0\% \] (2.2V≤VDET≤5.0V)  
  \[ \pm 0.2\% \] (1.0V≤VDET≤2.2V)
- Operating voltage range: 0.95 to 10.0V
- Hysteresis characteristics: 5\%±2\%
- Delay time accuracy: \[ \pm 15\% \] (C=4.7nF)
- Detection voltage: 1.0 to 5.0V (0.1V step)
- Output form: Nch open drain output (Active “L”)  
  CMOS output (Active “L”)

**APPLICATIONS**
- Power supply monitor for microcomputers and reset for CPUs
- Constant voltage power supply monitor for TVs, Blu-ray recorders and home appliances
- Power supply monitor for portable devices such as notebook PCs, digital still cameras and mobile phones

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

S-1011 series

**FEATURES**

- **Super-low current consumption:** 600nA typ.
- **High-accuracy detection voltage:** ±1.5% (A/C/E/G type)
- **Operating voltage range:** 1.8 to 36.0V
- **Hysteresis characteristics:** “Available” (5.0% typ.)/ “unavailable” is selectable. ±20% (C=3.3nF)
- **Detection delay time accuracy:** ±20% (C=3.3nF)
- **Release delay time accuracy:** ±20% (C=3.3nF)
- **Detection voltage:**
  - 3.0 to 10.0V (0.05V step) (SENSE detection product)
  - 3.6 to 10.0V (0.05V step) (VDD detection product)
- **Output form:** Nch open drain output

**APPLICATIONS**

- Power supply monitor for microcomputers and reset for CPUs
- Constant voltage power supply monitor for TVs and home appliances etc.
- Power supply monitor for Blu-ray recorders, notebook PCs and digital still cameras
- Industrial equipment, housing equipment

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LOW CURRENT CONSUMPTION WATCHDOG TIMER WITH RESET FUNCTION

S-1410/1411 series

**FEATURES**

- **Detection voltage:** 2.0 to 5.0V (0.1V step)
- **Detection voltage accuracy:** ±1.5%
- **Input voltage:** V<sub>CC</sub>=0.9 to 6.0V
- **Hysteresis width:** 5% typ.
- **Current consumption:** 3.8μA typ.
- **Reset time-out period:** 14.5ms typ. (C<sub>POR</sub>=2200pF)
- **Watchdog operation is switchable:** Enable, Disable
- **Watchdog operation voltage range:** 2.5 to 6.0V
- **Watchdog mode switching function**: 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 W/T pin (Output: WDO pin))
  - S-1411 Series
  - (Product without W/T pin (Output: RST pin, WDO pin))
- **Operation temperature range:** Ta=-40 to +105°C

*Remark* Please contact our sales office for the specification of this product.

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**APPLICATIONS**

- Power supply monitoring of microcontroller mounted apparatuses and system monitoring
### Product Lineup

SII Semiconductor Corporation's Switching Regulator Controllers with the high efficiency, convert the input voltage to the fixed output voltage as intended. We SII Semiconductor Corporation offer two types of switching regulator controllers: step-up (boost), step-down (buck) switching regulator controllers.

The PWM control types are highly efficient to output low ripple and low noise. The PFM control types are efficiently even during light loads. The PWM/PFM switchover control types use PFM for light loads, and automatically switch to PWM control for heavy loads.

<table>
<thead>
<tr>
<th>Type</th>
<th>FET</th>
<th>Product name</th>
<th>Control method</th>
<th>Operation start voltage</th>
<th>Output voltage</th>
<th>Output accuracy</th>
<th>Switching frequency</th>
<th>IC's current consumption (operating)</th>
<th>IC's current consumption (power-off)</th>
<th>Package</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Built-in</td>
<td>S-8351 series</td>
<td>PFM</td>
<td>0.9V</td>
<td>2.0 to 6.5V (A,B,C) 1.5 to 6.5V(D)</td>
<td>±2.4%</td>
<td>1000kHz</td>
<td>23.2μA (3.3V)</td>
<td>0.5μA max.</td>
<td>SOT-23-5</td>
<td>SOT-23-5</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>S-8353/8354 series</td>
<td>PWM, PFM/PMF switchover</td>
<td>0.9V</td>
<td>1.5 to 6.5V (Vos/Vout separate type) 2.0 to 6.5V (other than Vos/Vout separate type)</td>
<td>±2.4%</td>
<td>30, 50, 250kHz</td>
<td>18.7μA (3.3V, 50kHz)</td>
<td>0.5μA max.</td>
<td>SOT-23-5</td>
<td>SOT-23-5</td>
<td>43</td>
</tr>
<tr>
<td>Step-up</td>
<td>S-8363 series</td>
<td>PWM/PFM switchover</td>
<td>0.9V</td>
<td>1.8 to 5.0V</td>
<td>–</td>
<td>1.2MHz</td>
<td>450μA</td>
<td>3.0μA max.</td>
<td>SOT-6A</td>
<td>SOT-23-5</td>
<td>44</td>
</tr>
<tr>
<td>External</td>
<td>S-8352 series</td>
<td>PFM</td>
<td>0.9V</td>
<td>2.0 to 6.5V (A,B,C) 1.5 to 6.5V(D)</td>
<td>±2.4%</td>
<td>1000kHz</td>
<td>23.2μA (3.3V)</td>
<td>0.5μA max.</td>
<td>SOT-23-5</td>
<td>SOT-23-5</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>S-8355/56/57/58 series</td>
<td>PWM, PFM/PMF switchover</td>
<td>0.9V</td>
<td>1.5 to 6.5V (Vos/Vout separate type) 2.0 to 6.5V (other than Vos/Vout separate type)</td>
<td>±2.4%</td>
<td>100, 250, 300, 600kHz</td>
<td>25.9μA (3.3V, 100kHz)</td>
<td>0.5μA max.</td>
<td>SOT-23-5</td>
<td>SOT-23-3</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>S-8365/8366 series</td>
<td>PWM, PFM/PMF switchover</td>
<td>1.1V (Input 1.8 to 3.5V)</td>
<td>Arbitrary via external resistor</td>
<td>–</td>
<td>1.2MHz, 600kHz</td>
<td>300μA (3.3V, 600kHz)</td>
<td>1.0μA max.</td>
<td>SOT-6A</td>
<td>SOT-23-5</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>S-8340/8341 series</td>
<td>PWM, PFM/PMF switchover</td>
<td>0.9V</td>
<td>2.5 to 6.0V</td>
<td>±2.0%</td>
<td>300, 600kHz</td>
<td>350μA (3.3V, 600kHz)</td>
<td>3.0μA max.</td>
<td>8-Pin TSSOP</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S-8337/8338 series</td>
<td>PWM</td>
<td>Input (1.8 to 6.0V)</td>
<td>Arbitrary via external resistor</td>
<td>–</td>
<td>2.0 to 1.13MHz via external resistor</td>
<td>400μA (700kHz, Vos=0.95V)</td>
<td>1μA max.</td>
<td>8-Pin TSSOP</td>
<td>8-Pin TSSOP</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>S-8333 series</td>
<td>1 channel for LCD</td>
<td>Input (1.8 to 6.0V)</td>
<td>Arbitrary via external resistor</td>
<td>–</td>
<td>2.0 to 1.13MHz via external resistor</td>
<td>400μA (650kHz, Vos=0.95V)</td>
<td>–</td>
<td>8-Pin TSSOP</td>
<td>8-Pin TSSOP</td>
<td>46</td>
</tr>
<tr>
<td>Built-in</td>
<td>S-8550 series</td>
<td>PWM</td>
<td>Input (2.0 to 5.5V)</td>
<td>1.1 to 4.0V</td>
<td>–</td>
<td>1.2MHz</td>
<td>200μA</td>
<td>1μA max.</td>
<td>SOT-23-5</td>
<td>SOT-8A</td>
<td>47</td>
</tr>
<tr>
<td>Step-down</td>
<td>S-8520/8521 series</td>
<td>PWM, PFM/PMF switchover</td>
<td>Input (2.5 to 10V)</td>
<td>1.5 to 6.0V</td>
<td>±2.4%</td>
<td>60, 180, 300kHz</td>
<td>60μA (180kHz) 2μA (60kHz) 10μA (300kHz)</td>
<td>0.5μA max.</td>
<td>SOT-23-5</td>
<td>SOT-23-5</td>
<td>47</td>
</tr>
<tr>
<td>External</td>
<td>S-8540/8541 series</td>
<td>PWM, PFM/PMF switchover</td>
<td>Input (2.5 to 10V)</td>
<td>1.5 to 6.0V</td>
<td>±2.0%</td>
<td>300, 600kHz</td>
<td>180μA (600kHz) 140μA (300kHz)</td>
<td>1μA max.</td>
<td>8-Pin MSOP</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S-8533 series</td>
<td>PWM synchronous rectification</td>
<td>Input (2.7 to 16V)</td>
<td>1.25, 1.3 to 6.0V</td>
<td>±2.0%</td>
<td>300kHz</td>
<td>30μA</td>
<td>1μA max.</td>
<td>8-Pin TSSOP</td>
<td>48</td>
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</tbody>
</table>
**POWER SUPPLY ICs**

**Switching Regulators (DC-DC Converters)**

---

### CONTENTS

- Voltage Regulators
- Voltage Detectors
- Lithium-ion Rechargeable Battery Protection ICs
- Switching Regulators (DC-DC Converters)
- Memory ICs
- Sensors
- PROGRAMMABLE PORT CONTROLLER, POWER SEQUENCER

---

#### FEATURES

**STEP-UP, BUILT-IN EXTERNAL FET PFM CONTROL SWITCHING REGULATOR/ SWITCHING REGULATOR CONTROLLER**

**S-8351/8352 series**

- **Low voltage operation:** Startup at 0.9V min. (I\text{OUT}=1mA) guaranteed
- **Low current consumption:**
  - 23.2μA typ. (V\text{OUT}=3.3V, during maximum operation)
  - 0.5μA max. (during power-off)
- **Duty ratio:** 50/75%, built-in auto-switching-type PFM controller (product types A, B, D)
- **External parts:** Coil, capacitor, diode
- **Output voltage:** 2.0 to 6.5V (product types A, B, C) or 1.5 to 6.5V (product type D) (selectable in 0.1V step)
- **Output voltage accuracy:** ±2.4%
- **Power-off function (product type A)**
- **V\text{CC}/V\text{OUT} separate type (product type D)**
- **External transistor type is available (S-8352 series)**

**APPLICATIONS**

- **Power supply for portable equipment such as digital cameras, electronic organizers, and PDAs**
- **Power supply for audio equipment such as portable CD/MD players**
- **Constant voltage power supply for cameras, video equipment, and communication equipment**
- **Power supply for microcomputers**

---

#### FEATURES

**STEP-UP, BUILT-IN FET PWM CONTROL, PWM/PFM SWITCHABLE SWITCHING REGULATOR**

**S-8353/8354 series**

- **Low voltage operation:** Start-up is guaranteed from 0.9V (I\text{OUT}=1mA)
- **Low current consumption:**
  - 18.7μA typ. (50kHz product, 3.3V, during operation)
  - 0.5μA max. (during power-off)
- **Duty ratio:**
  - Built-in PWM/PFM switching control circuit (S-8354 series)
  - 15 to 83% (30kHz and 50kHz models),
  - 15 to 78% (250kHz models)
- **External parts:** Coil, capacitor, and diode
- **Output voltage:** 1.5 to 6.5V (for V\text{DD}/V\text{OUT} separate types) or 2.0 to 6.5V (for other than V\text{CC}/V\text{OUT} separate types) (Selectable in 0.1V step)
- **Output voltage accuracy:** ±2.4%
- **Oscillation frequency:** 30, 50, and 250kHz
- **Soft-start function:** 6ms typ. (50kHz models)

**APPLICATIONS**

- **Power supplies for portable equipment such as digital cameras, electronic organizers, and PDAs**
- **Power supplies for audio equipment such as portable CD/MD players**
- **Constant voltage power supplies for cameras, video equipment, and communication equipment**
- **Power supplies for microcomputers**

---

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POWER SUPPLY ICs
Switching Regulators (DC-DC Converters)

STEP-UP, SUPER-SMALL PACKAGE, 1.2MHz, PWM/PFM SWITCHABLE SWITCHING REGULATOR

S-8363 series

FEATURES
- Low operation voltage: Start at 0.9V (Iout = 1mA) guaranteed
- Input voltage range: 0.9 to 4.5V
- Oscillation frequency: 1.2MHz
- Output current: 300mA (Vin = 1.8V, Vout = 3.3V)
- Reference voltage: 0.6V±2.5%
- Efficiency: 85%
- Soft start function: 1.2ms typ.
- Low current consumption: During switching-off, 95μA typ.
- Duty ratio:
  - PWM / PFM switching control
  - max 88%
- Power-off function:
  - Current consumption during power-off 3.0μA max.
  - Current limit circuit: limits the peak value of inductor current
  - Nch power MOS FET ON resistance: 0.25Ω typ.
- Start-up function: Operation with fixed duty pulse under the Vout voltage of 1.4V or less

PIN CONFIGURATIONS

APPLICATIONS
- MP3 players, digital audio players
- Digital cameras, GPS, wireless transceiver
- Portable devices

STEP-UP, SUPER-SMALL PACKAGE, 600kHz, PWM CONTROL OR PWM/PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER

S-8355/56/57/58 series

FEATURES
- Low voltage operation: Start-up is guaranteed from 0.9V (Iout=1mA)
- Low current consumption:
  - 25μA typ. (100kHz product, 3.3V, during operation)
  - 0.5μA max. (during power-off)
- Duty ratio:
  - Built-in PWM/PFM switching control circuit (S-8356/58)
  - 15 to 83% (100kHz models), 15 to 78% (250kHz, 300kHz, and 600kHz models)
- External parts: Coil, diode, capacitor, and transistor
- Output voltage:
  - 1.5 to 6.5V (for VDD/VOUT separate types) or
  - 2.0 to 6.5V (for other than VDD/VOUT separate types)
  - (Selectable in 0.1V step)
- Output voltage accuracy: ±2.4%
- Soft-start function: 6ms typ. (100kHz models)
- Power-off function

APPLICATIONS
- Power supplies for portable devices, such as digital cameras, electronic organizers, and PDAs
- Power supplies for audio equipment, such as portable CD/MD players
- Constant voltage power supply of cameras, video equipment, and communication devices
- Power supply for microcomputers
**FEATURES**

- Low operation voltage: Start at 1.1V (1mA) guaranteed (in the product without UVLO function)
- Input voltage range: 1.8 to 5.5V
- Oscillation frequency: 1.2MHz, 600kHz
- Reference voltage: 0.6V±2.0%
- Soft start function: 7ms typ.
- Low current consumption: 70μA typ. at switching off
- Duty ratio: Built-in PWM / PFM switching control circuit (S-8365 series) 28 to 85% (1.2MHz product) 28 to 90% (600kHz product)
- Power-off function: Current consumption 1.0μA max. at power-off
- External parts: Inductor, diode, capacitor, transistor
- Timer latch short-circuit protection circuit:
  Selectable with / without short-circuit protection circuit for each product
  Settable delay time by external capacitor
  (in the product with short-circuit protection)
- UVLO (under-voltage lockout) function: Selectable with / without UVLO for each product

**APPLICATIONS**

- MP3 players, digital audio players
- Digital cameras, GPS, wireless transceiver
- Portable devices

**POWER SUPPLY ICs**

**Switching Regulators (DC-DC Converters)**

**STEP-UP, SUPER-SMALL PACKAGE, 1.2MHz, PWM CONTROL OR PWM/PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER**

**S-8365/8366 series**

**FEATURES**

- Oscillation frequency: 600kHz (A, B type), 300kHz (C, D type)
- Output voltage range: 2.5 to 6.0V (selectable in 0.1V step, output voltage fixed type)
- Output voltage accuracy: ±2.0%
- An output voltage external setting (FB) type is also available. (Vref=1.0V)
- External components: Transistor, coil, diode, three capacitors, and resistor only
- Duty ratio: 0% to 82% PWM control (S-8340 series)
  27% to 82% PWM/PFM switcher control (S-8341 series A/B type)
  21% to 82% PWM/PFM switcher control (S-8341 series C/D type)
- Oscillation is guaranteed at a low 0.9V operation
- Current limit circuit: Set by an external resistor RSENSE
- Soft-start function: Set by an external capacitor CSS
- Power-off function

**APPLICATIONS**

- Power supply for portable devices such as PDAs, electronic organizers and mobile phones
- Power supply for audio devices such as portable CD players and headphone stereos
- Main and sub power supply for notebook computers and peripheral equipment
- Constant voltage power supply for cameras, video equipment and communication devices

---

**STEP-UP, 600kHz, PWM CONTROL OR PWM/PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER**

**S-8340/8341 series**

**FEATURES**

- Oscillation frequency: 600kHz (A, B type), 300kHz (C, D type)
- Output voltage range: 2.5 to 6.0V (selectable in 0.1V step, output voltage fixed type)
- Output voltage accuracy: ±2.0%
- An output voltage external setting (FB) type is also available. (Vref=1.0V)
- External components: Transistor, coil, diode, three capacitors, and resistor only
- Duty ratio: 0% to 82% PWM control (S-8340 series)
  27% to 82% PWM/PFM switcher control (S-8341 series A/B type)
  21% to 82% PWM/PFM switcher control (S-8341 series C/D type)
- Oscillation is guaranteed at a low 0.9V operation
- Current limit circuit: Set by an external resistor RSENSE
- Soft-start function: Set by an external capacitor CSS
- Power-off function

**APPLICATIONS**

- Power supply for portable devices such as PDAs, electronic organizers and mobile phones
- Power supply for audio devices such as portable CD players and headphone stereos
- Main and sub power supply for notebook computers and peripheral equipment
- Constant voltage power supply for cameras, video equipment and communication devices
**FEATURES**

- Low voltage operation: 1.8 to 6.0V
- Oscillation frequency: Settable in range of 280kHz to 1.08MHz via external resistor
- Maximum duty: Settable up to 88.5% via external resistor
  - 47 to 88.5% (oscillation frequency: 500kHz or more)
  - 47 to 80% (oscillation frequency: less than 500kHz)
- Reference voltage: 1.0V ±1.5%
- UVLO function: Detection voltage selectable from 1.5 to 2.3V in 0.1V step
  - Hysteresis width selectable from 0.1 to 0.3V in 0.1V step
- Timer-latch-type short-circuit protection circuit:
  - Settable delay time via external capacitor
- Soft-start function: Soft-start time adjustable in three steps: 10ms, 15ms, and 20ms
- Phase compensation external setting: Adjustable by connecting resistor and capacitor to GND in series
- Power-off function: Current consumption during power-off 1.0μA max. (S-8338 series)

**APPLICATIONS**

- Power supply for LCD bias
- Power supply for portable devices
STEP-DOWN, BUILT-IN FET, SYNCHRONOUS RECTIFICATION, 1.2MHz PWM CONTROL SWITCHING REGULATORS

**S-8550 series**

**FEATURES**
- Oscillation frequency: 1.2MHz
- Input voltage range: 2.0 to 5.5V
- Output voltage range: Arbitrarily settable by external output voltage setting resistor
- Output current: 600mA typ.
- Reference voltage: 0.6V ±2.0%
- Efficiency: 92%
- Soft-start function: 1ms typ.
- Power-off function: Current consumption at power-off: 1.0μA max.
- Built-in current limit circuit
- Pch power MOS FET on-resistance: 0.4Ω typ.
- Nch power MOS FET on-resistance: 0.3Ω typ.
- Constant continuous mode operation (no light load mode)

**APPLICATION**
- Mobile devices, such as mobile phones, Bluetooth devices, wireless devices, digital audio players, digital still cameras, portable DVD players, and portable CD players

**PIN CONFIGURATIONS**

**APPLICATIONS**
- On-board power supply of battery devices for portable telephones, electronic organizers, PDAs
- Power supply for audio devices such as portable CD players and headphone stereo
- Constant voltage power supply for cameras, video equipment and communications equipment
- Power supply for microcomputers
- Voltage conversion from 4-NH or NiCd, or 2-Lithium ion batteries to 3.3V/3V
- Voltage conversion from AC adapter to 5V/3V

STEP-DOWN, PWM CONTROL, PWM/PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER

**S-8520/8521 series**

**FEATURES**
- Low current consumption:
  - 60μA max. (A, B series, during operation)
  - 21μA max. (C, D series, during operation)
  - 100μA max. (E, F series, during operation)
  - 0.5μA max. (during power-off)
- Input voltage: 2.5 to 16V (B, D, F series)
  - 2.5 to 10V (A, C, E series)
- Output voltage: 1.5 to 6.0V (selectable in 0.1V step)
- Duty ratio: 0 to 100% PWM control (S-8520)
  - 25 to 100% PWM/PFM switchover control (S-8521)
- External components: Pch power MOS FET or PNP transistor, coil, diode and capacitors. (If a PNP transistor is used, a base resistor and a capacitor are required.)
- Oscillation frequency: 180kHz typ. (A, B series), 60kHz typ. (C, D series), or 300kHz typ. (E, F series)
- Soft-start function: 8ms typ. (A, B series), 12ms typ. (C, D series), or 4.5ms typ. (E, F series)
- Power-off function
- Overload protection circuit: Overload detection time
  - 4ms typ. (A series),
  - 14ms typ. (C series),
  - 2.6ms typ. (E series)

**APPLICATIONS**
- On-board power supply of battery devices for portable telephones, electronic organizers, PDAs
- Power supply for audio devices such as portable CD players and headphone stereo
- Constant voltage power supply for cameras, video equipment and communications equipment
- Power supply for microcomputers
- Voltage conversion from 4-NH or NiCd, or 2-Lithium ion batteries to 3.3V/3V
- Voltage conversion from AC adapter to 5V/3V

**PIN CONFIGURATION**
**POWER SUPPLY ICs**

**Switching Regulators (DC-DC Converters)**

**FEATURES**

- Oscillation frequency: 600kHz (A, B type) 300kHz (C, D type)
- Output voltage: 1.5 to 6.0V (selectable in 0.1V step)
- Output voltage accuracy: ±2.0%
- An output voltage external setting (FB) type is also provided: Vin=1.0V
- Duty ratio: 0 to 100% PWM control (S-8540) 29 to 100% PWM/PFM switchover control (S-8541)
- External components: Transistor, coil, diode, capacitors.
- Built-in current limiter can be set by external resistor RSENSE.
- Soft-start function can be set by external resistor RSS and external capacitor CSS.
- Power-off function

**APPLICATIONS**

- Power supplies for portable devices such as PDAs, electronic organizers, and cellular phones
- Power supplies for audio equipment such as portable CD players and headphone stereos
- Main or sub power supplies for notebook computers and peripheral equipment

---

**STEP-DOWN, 600kHz, PWM CONTROL, PWM/PFM SWITCHABLE SWITCHING REGULATOR CONTROLLER**

**S-8540/8541 series**

**PIN CONFIGURATION**

- 8-Pin MSOP
- Top view

**APPLICATIONS**

- Constant voltage power supply for hard disk and DVD drivers
- Power supply for portable devices, such as digital cameras, PDAs, electronic organizers, and cellular phones
- Main or sub power supply of notebook computers and peripheral equipment
- Constant voltage power supply of cameras, video equipment, and communications devices

---

**STEP-DOWN, SYNCHRONOUS PWM CONTROL SWITCHING REGULATOR CONTROLLER**

**S-8533 series**

**FEATURES**

- Synchronous rectification system realizing high efficiency (typ. 94%)
- External components: With maximum duty=100%, using a battery up to maximum life is possible by using Pch and Nch MOS transistors on the MOS.
- Oscillation frequency: 300kHz
- Input voltage: 2.7 to 16.0V
- Output voltage: 1.25, 1.3 to 6.0V (selectable in 0.1V step)
- Output voltage accuracy: ±2.0%
- Soft-start function: Can be set by external capacitor CSS.
- Power-off function

**PIN CONFIGURATION**

- 8-Pin TSSOP
- Top view

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Charge Pump Lineup

Product Lineup
SII Semiconductor Corporation’s charge pumps utilize multiple external capacitors to provide various power supplies such as constant current and step-up voltage. Compared to DC-DC converters that use choke coils, smaller boards can be used for these ICs.

The S-8821 series steps up the voltage double.

<table>
<thead>
<tr>
<th>Type</th>
<th>Product name</th>
<th>Efficiency</th>
<th>Operating voltage</th>
<th>Output</th>
<th>Output accuracy</th>
<th>Switching frequency</th>
<th>Package</th>
<th>Page</th>
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</thead>
<tbody>
<tr>
<td>Voltage regulation step-up</td>
<td>S-8821 series</td>
<td>90%</td>
<td>1.6 to 5.0V</td>
<td>2.5 to 5.5V, in 0.1V step</td>
<td>-2% max.</td>
<td>1.0MHz</td>
<td>SOT-23-6W</td>
<td>SNT-8A</td>
</tr>
</tbody>
</table>
FEATURES

- Step-up CMOS charge pump
- Power supply voltage: 1.6 to 5.0V
- Output voltage: 2.5 to 5.5V (selectable in 0.1V step)
- Output voltage accuracy: ±2%
- Output current: 25mA (\(V_{IN} = (V_{OUT} \times 0.8)\)\)
- Oscillation frequency: 1.0MHz
- ON/OFF function

PIN CONFIGURATIONS

APPLICATIONS

- Applications with lithium ion battery
- Local power supply
- Power supply for white LED display backlights
Product Lineup

We SII Semiconductor Corporation offer a composite ICs with low current consumption which have a high-accuracy voltage detector and a voltage regulator in a single chip.

- **Battery backup switching IC**

<table>
<thead>
<tr>
<th>Product name</th>
<th>Composition</th>
<th>Output voltage</th>
<th>Detection voltage</th>
<th>Accuracy</th>
<th>Current consumption</th>
<th>Package</th>
<th>Page</th>
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</thead>
<tbody>
<tr>
<td>S-8424A series</td>
<td>2 voltage regulators +3 voltage detectors + switch</td>
<td>2.3 to 5.4V (0.1V step)</td>
<td>2.4 to 5.3V (CS), 1.7 to 3.4V (PREEND, RESET) (0.1V step)</td>
<td>±2%</td>
<td>15μA max. (Operating) 2.1μA max. (Back up)</td>
<td>8-Pin TSSOP 8-Pin SON(B)</td>
<td>52</td>
</tr>
<tr>
<td>S-8425 series</td>
<td>3 voltage regulators +2 voltage detectors + switch</td>
<td>2.3 to 5.4V (0.1V step)</td>
<td>2.4 to 5.3V (CS), 1.7 to 3.4V (RESET) (0.1V step)</td>
<td>±2%</td>
<td>15μA max. (Operating) 2.1μA max. (Back up)</td>
<td>8-Pin TSSOP 8-Pin SON(B)</td>
<td>52</td>
</tr>
<tr>
<td>S-8426A series</td>
<td>2 voltage regulators +3 voltage detectors + switch</td>
<td>2.3 to 5.4V (0.1V step)</td>
<td>2.4 to 5.3V (CS), 1.7 to 3.4V (PREEND, RESET) (0.1V step)</td>
<td>±2%</td>
<td>15μA max. (Operating) 4.5μA max. (Back up)</td>
<td>8-Pin TSSOP 8-Pin SOP</td>
<td>53</td>
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</table>
BATTERY BACKUP SWITCHING IC

FEATURES

- Low current consumption
  - 15μA max. (V_{IN}=6V, during normal operation)
  - 2.1μA max. (during backup)
- Voltage regulator
  - Output voltage accuracy: ±2%
  - Output voltage: 2.3 to 5.4V (selectable in 0.1V step independently)
- Three built-in voltage detectors (CS, PREEND, RESET)
  - Detection voltage accuracy: ±2%
  - Detection voltage: 2.4 to 5.3V (selectable in 0.1V step)
    (CS voltage detector)
  - Detection voltage: 1.7 to 3.4V (selectable in 0.1V step)
    (PREEND, RESET voltage detector)
- Switching circuit for primary power supply and backup power supply configurable on one chip
- Efficient use of backup power supply
- 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.

APPLICATIONS

- Camcorders
- Digital cameras
- Memory cards
- Other SRAM backup equipment

PIN CONFIGURATIONS

8-Pin TSSOP
Top view
1. VSS
2. PREEND
3. VBAT
4. CS
5. RESET
6. VOUT
7. VIN
8. VRO

8-Pin SON(B)
Top view
1. VSS
2. PREEND
3. VBAT
4. CS
5. RESET
6. VOUT
7. VIN
8. VRO

BATTERY BACKUP SWITCHING IC

FEATURES

- Low current consumption
  - 15μA max. (V_{IN}=6V, during normal operation)
  - 2.1μA max. (during backup)
- Voltage regulator
  - Output voltage accuracy: ±2%
  - Output voltage: 2.3 to 5.4V (selectable in 0.1V step independently)
- Two built-in voltage detectors (CS, RESET)
  - Detection voltage accuracy: ±2%
  - Detection voltage: 2.4 to 5.3V (CS voltage detector)
  - Selectable in 0.1V step in the range of 2.4 to 5.3V
  - Selectable in 0.1V step in the range of 1.7 to 3.4V (RESET voltage detector)
- PREEND release delay: 300μs min.
- Switching circuit for primary power supply and backup power supply configurable on one chip
- Efficient use of backup power supply
- 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.

APPLICATIONS

- Camcorders
- Digital cameras
- Memory cards
- Other SRAM backup equipment

PIN CONFIGURATIONS

8-Pin TSSOP
Top view
1. VSS
2. VCH
3. VBAT
4. CS
5. RESET
6. VOUT
7. VIN
8. VRO

8-Pin SON(B)
Top view
1. VSS
2. VCH
3. VBAT
4. CS
5. RESET
6. VOUT
7. VIN
8. VRO
**FEATURES**

- **Low current consumption**
  - 15μA max. (Ve=6V, during normal operation)
  - 4.5μA max. (during backup)
- **Voltage regulator**
  - Output voltage accuracy: ±2%
  - Output voltage: 2.3 to 5.4V (selectable in 0.1V step independently)
- **Three built-in voltage detectors (CS, PREEND, RESET)**
  - Detection voltage accuracy: ±2%
  - Detection voltage: Selectable in 0.1V step in the range of 2.4 to 5.3V (CS voltage detector)
  - Selectable in 0.1V step in the range of 1.7 to 3.4V (PREEND, RESET voltage detector)
- **Switching circuit for primary power supply and backup power supply configurable on one chip**
- **Efficient use of backup power supply**
- **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.

**APPLICATIONS**

- Camcorders
- Digital cameras
- Memory cards
- Other SRAM backup equipment

**PIN CONFIGURATIONS**

- **8-Pin TSSOP**
  - Top view
  - 1. VSS
  - 2. PREEND
  - 3. VBAT
  - 4. CS
  - 5. RESET
  - 6. VOUT
  - 7. VIN
  - 8. VRO
- **8-Pin SOP**
  - Top view
  - 1. VSS
  - 2. PREEND
  - 3. VBAT
  - 4. CS
  - 5. RESET
  - 6. VOUT
  - 7. VIN
  - 8. VRO
Lithium-ion Rechargeable Battery Protection IC Lineup

- Lithium-ion Rechargeable Battery Protection ICs

  - Battery protection IC
    - 1-Cell
      - S-8211C/D series
      - S-8211E series
    - 2-Cell
      - S-8240B series
      - S-8241 series
    - 3-Cell
      - S-8240A series
      - S-8243 series
    - 3-/4-Cell switching
      - S-8244 series
      - S-8213 series
    - 4-Cell
      - S-8204A/B series
      - S-8205B series
    - 5-Cell
      - S-8250A series
      - S-8253C series

  - Secondary protection
    - 1- to 4-Cell
      - S-8203A series
    - 2-/3-Cell
      - S-8211A/D series
    - 2- to 4-Cell
      - S-8211C/D series
    - 3- to 5-Cell
      - S-8211C/D series

  - Voltage monitoring
    - 3- to 5-Cell battery monitoring (3ch VD)
      - S-8239A/B series

  - Overcurrent monitoring
    - With cell balancing function
      - S-8229 series

  - Overcharge protection
    - With cell balancing function
      - S-8249 series

- New product

- Package

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</table>
### Product Lineup

SII Semiconductor Corporation’s lithium-ion rechargeable battery protection ICs protect the lithium-ion battery packs from overcharge, overdischarge and overcurrent. High-accuracy voltage detectors and delay circuits are included.

<table>
<thead>
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<th>Description</th>
<th>Features</th>
<th>Product name</th>
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<th>Overdischarge Detection Voltage (Accuracy)</th>
<th>Overcurrent Detection Voltage (Accuracy)</th>
<th>Overcharge Detection Delay</th>
<th>Package</th>
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</thead>
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<td>Built-in delay timer</td>
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<td>For 1-cell</td>
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<td>S-8281A series</td>
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<td>Built-in delay timer</td>
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<td>S-8240A series</td>
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<td>Built-in delay timer</td>
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<td>S-8211C series</td>
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<td>S-8211D series</td>
<td>3.5 to 4.5 V (+20mV) 2.0 to 3.0 V (±50mV) 0.05 to 0.3 V (+15mV)</td>
<td>Built-in delay timer</td>
<td>SOT-23-5</td>
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<td>S-8261 series</td>
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<td>Built-in delay timer</td>
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<td>S-8230A/B series</td>
<td>3.5 to 4.5 V (+20mV) 2.0 to 3.4 V (±5mV) 0.05 to 0.3 V (+10mV)</td>
<td>Built-in delay timer</td>
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<td>S-8250A/B series</td>
<td>4.1 to 4.6 V (+20mV) 2.0 to 2.8 V (±50mV) 0.05 to 0.15 V (+10mV)</td>
<td>Built-in delay timer</td>
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<td>S-8230B series</td>
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<td>Built-in delay timer</td>
<td>SOT-23-6</td>
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<td>S-82302 series</td>
<td>3.5 to 4.6 V (+20mV) 2.0 to 3.0 V (±50mV) 0.05 to 0.4 V (+10mV)</td>
<td>Built-in delay timer</td>
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<td>S-8262A series</td>
<td>3.9 to 4.5 V (+20mV) 2.0 to 3.0 V (±80mV) 0.05 to 0.2 V (+10mV)</td>
<td>Built-in delay timer</td>
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<td>S-82303CD series</td>
<td>3.5 to 4.5 V (+20mV) 2.0 to 3.2 V (±80mV) 0.05 to 0.3 V (+15mV)</td>
<td>External delay capacitor</td>
<td>16-Pin TSSOP</td>
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<td>For 2-cell</td>
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<td>S-8243A/B series</td>
<td>3.9 to 4.4 V (+25mV) 2.0 to 3.0 V (±80mV) 0.05 to 0.3 V (+25mV)</td>
<td>External delay capacitor</td>
<td>16-Pin TSSOP</td>
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<td>S-8245A series</td>
<td>3.9 to 4.4 V (+25mV) 2.0 to 3.0 V (±80mV) 0.05 to 0.3 V (+25mV)</td>
<td>External delay capacitor</td>
<td>16-Pin TSSOP</td>
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<td>S-8204A series</td>
<td>3.8 to 4.6 V (+25mV) 2.0 to 3.0 V (±80mV) 0.05 to 0.3 V (+15mV)</td>
<td>External delay capacitor</td>
<td>16-Pin TSSOP</td>
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<td>S-8204B series</td>
<td>3.8 to 4.6 V (+25mV) 2.0 to 3.0 V (±80mV) 0.05 to 0.3 V (+15mV)</td>
<td>External delay capacitor</td>
<td>16-Pin TSSOP</td>
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<td>S-8205A/B series</td>
<td>3.5 to 4.6 V (+25mV) 2.0 to 3.0 V (±80mV) 0.05 to 0.3 V (+15mV)</td>
<td>External delay capacitor</td>
<td>16-Pin TSSOP</td>
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<td>For 3- to-5-cell</td>
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<td>S-8206A series</td>
<td>3.5 to 5.0 V (+20mV) - - - - Built-in delay timer</td>
<td>SNT-6A</td>
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<td>S-8244 series</td>
<td>3.7 to 4.55 V (+25mV) - - - - Built-in delay timer</td>
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<td>S-8213 series</td>
<td>4.1 to 4.5 V (+25mV) - - - - Built-in delay timer</td>
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<td>S-8264A/B/C series</td>
<td>4.2 to 4.8 V (+25mV) - - - - Built-in delay timer</td>
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<td>3.5 to 4.7 V (+25mV) - - - - Built-in delay timer</td>
<td>SNT-8A</td>
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<td><strong>Secondary protection</strong></td>
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<td>S-8259A series</td>
<td>3.5 to 4.6 V (+25mV) 2.0 to 3.4 V (±50mV) - - - - Built-in delay timer</td>
<td>SOT-23-6</td>
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<tr>
<td>For 1-cell</td>
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<td>S-8211E series</td>
<td>3.6 to 4.5 V (+25mV) 2.0 to 3.0 V (±50mV) - - - - Built-in delay timer</td>
<td>SOT-23-5</td>
<td>SNT-6A</td>
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<tr>
<td>With cell balancing function</td>
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<td>S-82009A/B series</td>
<td>3.5 to 4.4 V (+25mV) 2.0 to 3.0 V (±50mV) - - - - Built-in delay timer</td>
<td>SNT-8A</td>
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<td>S-8225A series</td>
<td>3.5 to 4.5 V (+20mV) 2.0 to 3.2 V (±50mV) - - - - Built-in delay timer</td>
<td>16-Pin TSSOP</td>
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<td>S-8225B series</td>
<td>3.5 to 4.4 V (+20mV) 2.2 to 3.2 V (±80mV) - - - - Built-in delay timer</td>
<td>16-Pin TSSOP</td>
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<td>For 3- to 5-cell battery monitoring (3st VO)</td>
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<td>S-8229 series</td>
<td>- - - - - - - - - - Built-in delay timer</td>
<td>SOT-23-6</td>
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<td>Overcurrent monitoring For multi-serial-cell pack</td>
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<td>S-8239AB series</td>
<td>- - - - - 0.04 to 0.3 V (+15mV) - Built-in delay timer</td>
<td>SOT-23-6</td>
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<tr>
<td>Overcharge protection With cell balancing function</td>
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<td>S-8249 series</td>
<td>2.0 to 4.8 V (+0.5%) - - - - - - - - - - Built-in delay timer</td>
<td>SOT-23-6</td>
<td>SNT-6A</td>
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</tbody>
</table>

**NEW**: New product

**Note**: Overcharge protection

**Overview**: The table lists various lithium-ion rechargeable battery protection ICs with different features and specifications, including overcharge, overdischarge, and overcurrent detection capabilities. The table also includes details on package types and page numbers for further reference.
### FEATURES

- High-accuracy voltage detection circuit
  - Overcharge detection voltage: 3.5 to 4.6V (5mV step) Accuracy ±20mV
  - Overcharge release voltage: 3.1 to 4.6V² Accuracy ±50mV
  - Overdischarge detection voltage: 2.0 to 3.0V (10mV step) Accuracy ±50mV
  - Overdischarge release voltage: 2.0 to 3.4V² Accuracy ±100mV
- Discharge overcurrent detection voltage: 1.01 to 0.10V (1mV step) Accuracy ±3mV
- Discharge overcurrent detection voltage: 0.03 to 0.20V (1mV step) Accuracy ±5mV
- Load short-circuiting detection voltage: 0.05 to 0.50V (5mV step) Accuracy ±20mV
- Charge overcurrent detection voltage: –0.10 to –0.01V (1mV step) Accuracy ±3mV
- Detection delay times are generated by an internal circuit (external capacitors are unnecessary).
- Release condition of discharge overcurrent status is selectable:
  - Load disconnection, charger connection
- Release voltage of discharge overcurrent status is selectable:
  - Discharge overcurrent detection voltage 1 (Vocov1), Discharge overcurrent release voltage (Vmv)=Vocovx0.8 (typ.)
- High-withstand voltage device is used for charger connection pins (VM pin and CO pin : Absolute maximum rating=28V)
- 0V battery charge function "Available"/"Unavailable" is selectable.
- Power-down function "Available"/"Unavailable" is selectable.
- Wide operating temperature range: –40 to +85°C
- Low current consumption:
  - During operation: 2µA typ., 4.0µA max. (+25°C)
  - During power-down: 50nA max. (+25°C)
  - During overdischarge: 500nA max. (+25°C)

### APPLICATIONS

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

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Specs described herein are subject to change without notice. For information about new products, refer to our SII Semiconductor Corporation website.

www.sii-ic.com  SII Semiconductor Corporation Web site
BATTERY PROTECTION IC
WITH CHARGE-DISCHARGE CONTROL FUNCTION FOR 1-CELL PACK

FEATURES

- High-accuracy voltage detection circuit
  - Overcharge detection voltage
    - 3.5 to 4.6V (5mV step)  Accuracy ±20mV
  - Overcharge release voltage
    - 3.1 to 4.6V  Accuracy ±50mV
  - Overdischarge detection voltage
    - 2.0 to 3.0V (10mV step)  Accuracy ±50mV
  - Overdischarge release voltage
    - 2.0 to 3.4V  Accuracy ±100mV
  - Discharge overcurrent detection voltage
    - 0.01 to 0.10V (1mV step)  Accuracy ±3mV
  - Discharge overcurrent detection voltage
    - 0.03 to 0.20V (1mV step)  Accuracy ±5mV
  - Load short-circuiting detection voltage
    - 0.05 to 0.50V (5mV step)  Accuracy ±20mV
  - Charge overcurrent detection voltage
    - −0.10 to −0.01V (1mV step)  Accuracy ±3mV

- Detection delay times are generated by an internal circuit (external capacitors are unnecessary).
- Discharge control function
  - CTL pin control logic is selectable: Active “H”, active “L”
  - CTL pin internal resistance connection is selectable: Pull-up, pull-down
  - CTL pin internal resistance value is selectable: 1.0Ω, 2.0Ω, 3.0Ω, 4.0Ω, 5.0Ω
- Release condition of discharge overcurrent status is selectable:
  - Load disconnection, charger connection

- Release voltage of discharge overcurrent status is selectable:
  - Discharge overcurrent detection voltage 1 (Vbdwn),
  - Discharge overcurrent release voltage (Vprox)/Vbdwn×0.8 (typ.)
- High-withstand voltage device is used for charger connection pins (VM pin and CO pin: Absolute maximum rating=28V)
- 0V battery charge function “Available”/“Unavailable” is selectable.
- Power-down function “Available”/“Unavailable” is selectable.
- Wide operating temperature range  −40 to +85°C
- Low current consumption
  - During operation 2.0μA typ., 4.0μA max. (+25°C)
  - During power-down 50nA max. (+25°C)
  - During overdischarge 500nA max. (+25°C)

APPLICATIONS

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

SPECIFICATIONS

- OVERVOLTAGE PROTECTION FUNCTION
  - Overcharge protection
    - Operation: 4.5V to 5.0V
    - Speed: <1us
  - Overdischarge protection
    - Operation: 2.0V to 2.5V
    - Speed: <1us

- OVERCURRENT PROTECTION FUNCTION
  - Overcurrent protection
    - Operation: >5A
    - Speed: <1us

- BATTERY PROTECTION IC
  - With charge-discharge control function for 1-cell pack

- NEW S-82B1A series

BATTERY PROTECTION IC WITH CHARGE-DISCHARGE CONTROL FUNCTION FOR 1-CELL PACK

PIN CONFIGURATION

SNT-6A
Top view

1 VM
2 CO
3 DO
4 VSS
5 VDD
6 CTL

www.sii-ic.com    SII Semiconductor Corporation Web site
**POWER SUPPLY ICs**

**Lithium-ion Rechargeable Battery Protection ICs**

**BATTERY PROTECTION IC FOR 1-CELL PACK**

**S-8240A series**

**FEATURES**

- High-accuracy voltage detection circuit
  - Overcharge detection voltage 3.5 to 4.6V (5mV step) Accuracy ±20mV
  - Overcharge release voltage 3.1 to 4.6V Accuracy ±50mV
  - Overdischarge detection voltage 2.0 to 3.4V (10mV step) Accuracy ±50mV
  - Overdischarge release voltage 2.0 to 3.4V Accuracy ±100mV
  - Discharge overcurrent detection voltage 0.015 to 0.200V (5mV step) Accuracy ±5mV
  - Load short-circuiting detection voltage 0.065 to 0.500V (25mV step) Accuracy ±40mV
  - Charge overcurrent detection voltage 0.200 to ~0.015V (5mV step) Accuracy ±5mV
  - Detection delay times are generated by an internal circuit (external capacitors are unnecessary).
  - High-withstand voltage device is used for charger connection pins (VM pin and CO pin : Absolute maximum rating=28V)
  - 0V battery charge function “Available”/”Unavailable” is selectable.
  - Power-down function “Available”/”Unavailable” is selectable.
  - Release condition of discharge overcurrent status is selectable:
    - Load disconnection, charger disconnection
  - Release voltage of discharge overcurrent status is selectable: $V_{FROCV}, V_{OCCV}$
  - Wide operating temperature range -40 to +85°C
  - Low current consumption
    - During operation 1.5μA typ., 3.0μA max. (+25°C)
    - During power-down 50μA max. (+25°C)
    - During overdischarge 500μA max. (+25°C)

**APPLICATIONS**

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

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**NEW S-8240B series**

**FEATURES**

- High-accuracy voltage detection circuit
  - Overcharge detection voltage 3.5 to 4.6V (5mV step) Accuracy ±20mV
  - Overcharge release voltage 3.1 to 4.6V Accuracy ±50mV
  - Overdischarge detection voltage 2.0 to 3.4V (10mV step) Accuracy ±50mV
  - Overdischarge release voltage 2.0 to 3.4V Accuracy ±100mV
  - Discharge overcurrent detection voltage 0.015 to 0.100V (1mV step) Accuracy ±3mV
  - Load short-circuiting detection voltage 0.065 to 0.500V (25mV step) Accuracy ±40mV
  - Charge overcurrent detection voltage 0.100 to ~0.015V (1mV step) Accuracy ±3mV
  - Detection delay times are generated by an internal circuit (external capacitors are unnecessary).
  - High-withstand voltage device is used for charger connection pins (VM pin and CO pin : Absolute maximum rating=28V)
  - 0V battery charge function “Available”/”Unavailable” is selectable.
  - Power-down function “Available”/”Unavailable” is selectable.
  - Release condition of discharge overcurrent status is selectable:
    - Load disconnection, charger disconnection
  - Release voltage of discharge overcurrent status is selectable:
    - $V_{FROCV}, V_{OCCV}$
    - Wide operating temperature range -40 to +85°C
    - Low current consumption
    - During operation 1.5μA typ., 3.0μA max. (+25°C)
    - During power-down 50μA max. (+25°C)
    - During overdischarge 500μA max. (+25°C)

**APPLICATIONS**

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

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*1. Overcharge release voltage*

Overcharge detection voltage – Overcharge hysteresis voltage
(Overcharge hysteresis voltage can be selected from a range of 0V to 0.4V in 50mV step.)

*2. Overdischarge release voltage*

Overdischarge detection voltage + Overdischarge hysteresis voltage
(Overdischarge hysteresis voltage can be selected from a range of 0V to 0.7V in 100mV step.)

*3. Load short-circuiting detection voltage*

Discharge overcurrent detection voltage + 0.025 x n
(n can be selected from any integer value greater or equal to 2)
**FEATURES**

- High-accuracy voltage detection circuit
  - Overcharge detection voltage
    - 3.5 to 4.5V (5mV step)
    - Accuracy ±20mV (+25°C)
  - Overcharge release voltage
    - 3.1 to 4.5V (10mV step)
    - Accuracy ±30mV
  - Overdischarge detection voltage
    - 2.0 to 3.4V (10mV step)
    - Accuracy ±35mV
  - Overdischarge release voltage
    - 2.0 to 3.4V (10mV step)
    - Accuracy ±50mV
  - Discharge overcurrent detection voltage
    - 0.05 to 0.20V (10mV step)
    - Accuracy ±10mV
  - Detection delay times are generated by an internal circuit (external capacitors are unnecessary).

**APPLICATIONS**

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

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**FEATURES**

- High-accuracy voltage detection circuit
  - Overcharge detection voltage
    - 3.9 to 4.5V (C series) 3.6 to 4.5V (D series) (5mV step)
    - Accuracy ±25mV (+25°C)
  - Overcharge release voltage
    - 3.8 to 4.43V (C series) 3.5 to 4.4V (D series)
    - Accuracy ±30mV
  - Overdischarge detection voltage
    - 2.0 to 3.0V (10mV step)
    - Accuracy ±50mV
  - Overdischarge release voltage
    - 2.0 to 3.4V
    - Accuracy ±100mV
  - Discharge overcurrent detection voltage
    - 0.05 to 0.30V (10mV step)
    - Accuracy ±15mV
  - Load short-circuiting detection voltage
    - 0.5V (fixed)
    - Accuracy ±200mV
  - Charge overcurrent detection voltage
    - ±0.1V (fixed)
    - Accuracy ±30mV (C series)
  - Detection delay times are generated by an internal circuit (external capacitors are unnecessary).

**APPLICATIONS**

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs
**FEATURES**

- **Internal high accuracy voltage detection circuit**
  - Overcharge detection voltage
    - 3.9 to 4.5V (applicable in 5mV step)
    - **Accuracy:** ±25mV (+25°C)
    - ±30mV (−5 to +55°C)
  - Overcharge hysteresis voltage
    - 0.1 to 0.4V
    - **Accuracy:** ±25mV
    - The overcharge hysteresis voltage can be selected in the range of 0.1 to 0.4V in 50mV step.
  - Overdischarge detection voltage
    - 2.0 to 3.0V (applicable in 10mV step)
    - **Accuracy:** ±50mV
    - Overdischarge hysteresis voltage
      - 0.0V to 0.7V
      - **Accuracy:** ±50mV
      - The overdischarge hysteresis voltage can be selected in the range of 0.0 to 0.7V in 100mV step.
  - Overcurrent 1 detection voltage
    - 0.05 to 0.3V (applicable in 10mV step)
    - **Accuracy:** ±15mV
  - Overcurrent 2 detection voltage
    - 0.5V (fixed)
    - **Accuracy:** ±100mV
  - High-withstand voltage device is used for charger connection pins (VM and CO pins: absolute maximum rating=28V).
  - Delay time (overcharge: tC, overdischarge: tD, overcurrent 1: tC1, overcurrent 2: tC2) is settable by an internal circuit. No external capacitor is necessary.
    - **Accuracy:** ±20%
  - Three-step overcurrent detection circuit is included (overcurrent 1, overcurrent 2 and load short-circuiting).
  - 0V battery charge function “Available”/“Unavailable” is selectable.
  - Power-down function “Available”/“Unavailable” is selectable.
  - Charger detection function and abnormal charge current detection function
    - The overcharge hysteresis is released by detecting negative voltage at the VM pin (−0.7V typ.) (Charger detection function).
    - When the output voltage of the DO pin is high and the voltage at the VM pin is equal to or lower than the charger detection voltage (−0.7V typ.), the output voltage of the CO pin goes low (Abnormal charge current detection function).
  - Low current consumption
    - During operation: 3.5μA typ., 7.0μA max.
    - During power-down: 0.1μA max.
  - Wide operating temperature range: −40 to +85°C

**APPLICATIONS**

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

**PIN CONFIGURATION**

**APPLICATIONS**

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

*1. Overcharge release voltage =
  Overcharge detection voltage − Overcharge hysteresis voltage
  (Overcharge release voltage < 3.8V is unavailable.)

*2. Overdischarge release voltage =
  Overdischarge detection voltage + Overdischarge hysteresis voltage
  (Overdischarge release voltage > 3.4V is unavailable.)
BATTERY PROTECTION IC WITH DISCHARGE CONTROL FUNCTION FOR 1-CELL PACK

S-8230A/B series

FEATURES

- High-accuracy voltage detection circuit
  - Overcharge detection voltage
    3.5 to 4.5V (5mV step)  
    Accuracy ±20mV (+25°C)
  - Overcharge release voltage
    3.1 to 4.5V
    Accuracy ±25mV (–10 to +60°C)
  - Overdischarge detection voltage
    2.0 to 3.4V (10mV step)
    Accuracy ±30mV
  - Overdischarge release voltage
    2.0 to 3.4V
    Accuracy ±50mV
  - Discharge overcurrent detection voltage
    0.05 to 0.20V (10mV step)
    Accuracy ±10mV
  - Load short-circuiting detection voltage
    0.5V (fixed)
    Accuracy ±100mV
  - Charge overcurrent detection voltage
    –0.20 to –0.05V (25mV step)
    –0.16 to –0.08V (40mV step)
    Accuracy ±15mV
  - Detection delay times are generated by an internal circuit (external capacitors are unnecessary).
    Accuracy ±20%

- Discharge control function
  - CTL pin control logic is selectable: Active “H”, active “L”
  - CTL pin internal resistance connection is selectable: Pull-up, pull-down
  - CTL pin internal resistance value is selectable: 1.0MΩ, 2.5MΩ, 5.0MΩ
  - Discharge inhibition status latch function is selectable:
    Available, unavailable

- Release condition of discharge overcurrent status is selectable:
  Load disconnection, charger connection

- High-withstand voltage device is used for charger connection pins (VM pin and CO pin : Absolute maximum rating=28V)
- 0V battery charge function “Available”/“Unavailable” is selectable.
- Power-down function “Available”/“Unavailable” is selectable.
- Wide operating temperature range –40 to +85°C
- Low current consumption
  - During operation 2.8μA typ., 5.5μA max. (+25°C)
  - During power-down 0.1μA max. (+25°C)

APPLICATIONS

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

PIN CONFIGURATIONS

SNT-6A
Top view

1  CTL
2  CO
3  DO
4  VSS
5  VDD
6  VM

*1. Overcharge release voltage=
Overcharge detection voltage – Overcharge hysteresis voltage
(Overcharge hysteresis voltage can be selected as 0V or from a range of 0.1 to 0.4V in 50mV step.)

*2. Overdischarge release voltage=
Overdischarge detection voltage + Overdischarge hysteresis voltage
(Overdischarge hysteresis voltage can be selected as 0V or from a range of 0.1 to 0.7V in 100mV step.)
FEATURES

- Discharge overcurrent detection voltage (Power supply voltage dependency can be set in accordance with ON resistance of the charge-discharge control FET.)
  0.05 to 0.15V (1mV step)
  Accuracy ±10mV (+25°C)
- High-accuracy voltage detection circuit
  - Overcharge detection voltage
    4.1 to 4.6V (5mV step)
    Accuracy ±20mV (+25°C)
    Accuracy ±25mV (~10 to +60°C)
  - Overcharge release voltage
    3.7 to 4.6V⁹
    Accuracy ±30mV
  - Overdischarge detection voltage
    2.0 to 2.8V (10mV step)
    Accuracy ±50mV
  - Overdischarge release voltage
    2.0 to 3.0V⁶
    Accuracy ±100mV
  - Load short-circuiting detection voltage
    0.25 to 0.50V (50mV step)
    Accuracy ±50mV
  - Charge overcurrent detection voltage
    ~0.20 to ~0.05V (25mV step) Accuracy ±15mV
- Detection delay times are generated by an internal circuit (external capacitors are unnecessary).
- Discharge control function (A series)
  - CTL pin control logic is selectable: Active “H”, active “L”
  - CTL pin internal resistance connection is selectable: Pull-up, pull-down
  - CTL pin internal resistance value is selectable:
    1.0MΩ, 2.0MΩ, 3.0MΩ, 4.0MΩ, 5.0MΩ
  - Discharge inhibition status latch function is selectable:
    Available, unavailable
- Release condition of discharge overcurrent status is selectable:
  Load disconnection, charger connection
- High-withstand voltage device is used for charger connection pins (VM pin and CO pin : Absolute maximum rating=28V)
- 0V battery charge function “Available”/“Unavailable” is selectable.
- Power-down function “Available”/“Unavailable” is selectable.
- Wide operating temperature range 
  -40 to +85°C
- Low current consumption
  - During operation 2.0μA typ., 4.0μA max. (+25°C)
  - During power-down 50nA max. (+25°C)

APPLICATIONS

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

PIN CONFIGURATIONS

<table>
<thead>
<tr>
<th>PIN</th>
<th>A series</th>
<th>B series</th>
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<tbody>
<tr>
<td>1</td>
<td>CTL</td>
<td>NC</td>
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<tr>
<td>2</td>
<td>CO</td>
<td>CO</td>
</tr>
<tr>
<td>3</td>
<td>DO</td>
<td>DO</td>
</tr>
<tr>
<td>4</td>
<td>VSS</td>
<td>VSS</td>
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<tr>
<td>5</td>
<td>VDD</td>
<td>VDD</td>
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<tr>
<td>6</td>
<td>VM</td>
<td>VM</td>
</tr>
</tbody>
</table>

S-8250A/B series

BATTERY PROTECTION IC
WITH DISCHARGE CONTROL FUNCTION FOR 1-CELL PACK

SNT-6A
Top view

*1. Overcharge release voltage=
   Overcharge detection voltage – Overcharge hysteresis voltage
   (Overcharge hysteresis voltage can be selected as 0 to 0.4V in 50mV step.)

*2. Overdischarge release voltage=
   Overdischarge detection voltage + Overdischarge hysteresis voltage
   (Overdischarge hysteresis voltage can be selected as 0 to 0.7V in 100mV step.)
BATTERY PROTECTION IC FOR 2-SERIAL-CELL PACK

S-8252 series

**FEATURES**
- High-accuracy voltage detection circuit
  - Overcharge detection voltage $n (n=1, 2)\$
    - 3.55 to 4.60V (5mV step) Accuracy $\pm 20mV (+25°C)$
  - Overcharge release voltage $n (n=1, 2)\$
    - 3.15 to 4.60V$^+$ Accuracy $\pm 25mV$ ($-10$ to $+60°C$)
  - Overdischarge detection voltage $n (n=1, 2)\$
    - 2.0 to 3.0V (10mV step) Accuracy $\pm 50mV$ (Ambient temperature $+25°C$)
  - Overdischarge release voltage $n (n=1, 2)\$
    - 2.0 to 3.40V$^+$ Accuracy $\pm 100mV$
  - Discharge overcurrent detection voltage
    - 0.05 to 0.40V (10mV step) Accuracy $\pm 10mV$
  - Load short-circuiting detection voltage
    - 0.7V (fixed)
  - Charge overcurrent detection voltage
    - $-0.40$ to $-0.05V$ (25mV step) Accuracy $\pm 20mV$
  - Detection delay times are generated only by an internal circuit (external capacitors are unnecessary).
    - Accuracy $\pm 20%$
  - High-withstand voltage device is used for charger connection pins (VM pin and CO pin: Absolute maximum rating=28V)
  - 0V battery charge function “Available”/“Unavailable” is selectable.
  - Power-down function “Available”/“Unavailable” is selectable.
  - Wide operating temperature range $-40$ to $+85°C$
  - Low current consumption
    - During operation 4.0μA typ., 8.0μA max. $+25°C$
    - During power-down 0.1μA max. $+25°C$

**APPLICATIONS**
- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

S-8262A series

**FEATURES**
- High-accuracy voltage detection for each cell
  - Overcharge detection voltage $n (n=1, 2)\$
    - 3.9 to 4.5V (5mV step) Accuracy $\pm 20mV (+25°C)$
  - Overcharge release voltage $n (n=1, 2)\$
    - 3.8 to 4.5V$^+$ Accuracy $\pm 30mV$
  - Overdischarge detection voltage $n (n=1, 2)\$
    - 2.0 to 3.0V (10mV step) Accuracy $\pm 50mV$ (Ambient temperature $+25°C$)
  - Overdischarge release voltage $n (n=1, 2)\$
    - 2.0 to 3.40V$^+$ Accuracy $\pm 100mV$
  - Discharge overcurrent 1 detection voltage
    - 0.05 to 0.20V (10mV step) Accuracy $\pm 10mV$
  - Discharge overcurrent 2 detection voltage
    - 0.2 to 0.4V (20mV step) Accuracy $\pm 20mV$
  - Load short-circuiting detection voltage
    - 0.7V (fixed)
  - Charge overcurrent detection voltage
    - $-0.40$ to $-0.05V$ (25mV step) Accuracy $\pm 20mV$
  - Detection delay times are generated only by an internal circuit (external capacitors are unnecessary).
    - Accuracy $\pm 20%$
  - High-withstanding-voltage device is used for charger connection pins (VM pin and CO pin: Absolute maximum rating=28V)
  - 0V battery charge function “Available”/“Unavailable” is selectable.
  - Wide operating temperature range $-40$ to $+85°C$
  - Low current consumption
    - During operation 8.0μA max. $+25°C$
    - During power-down 0.1μA max. $+25°C$

**APPLICATIONS**
- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

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SII Semiconductor Corporation www.sii-ic.com

CMOS IC 2016-2017
**FEATURES**

- High-accuracy voltage detection for each cell
  - Overcharge detection voltage n (n=1 to 3) 3.9 to 4.4V (50mV step) Accuracy: ±25mV
  - Overcharge release voltage n (n=1 to 3) 3.8 to 4.4V Accuracy: ±50mV
  - Overdischarge detection voltage n (n=1 to 3) 2.0 to 3.0V (100mV step) Accuracy: ±80mV
  - Overdischarge release voltage n (n=1 to 3) 2.0 to 3.4V Accuracy: ±100mV
- Three-level overcurrent detection (Including load short circuiting detection)
  - Overcurrent detection voltage 1 0.05 to 0.30V (50mV step) Accuracy: ±25mV
  - Overcurrent detection voltage 2 0.5V (Fixed)
  - Overcurrent detection voltage 3 1.2V (Fixed)
- Delay time (Overcharge, Overdischarge, Overcurrent) is settable by an internal circuit. (External capacitors are unnecessary).
- Charge/discharge operation can be inhibited via the control pin.
- 0V battery charge function available/unavailable are selectable.
- High-withstand voltage devices: Absolute maximum rating 28V
- Wide operating voltage range: 2 to 24V
- Wide operating temperature range: -40 to +85°C
- Low current consumption
  - During operation: 28mA max. (+25°C)
  - During power-down: 0.1μA max. (+25°C)

**APPLICATIONS**

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

**FEATURES**

- High-accuracy voltage detection for each cell
  - Overcharge detection voltage n (n=1 to 3) 3.55 to 4.50V (50mV step) Accuracy: ±25mV
  - Overcharge release voltage n (n=1 to 3) 3.30 to 4.50V Accuracy: ±50mV
  - Overdischarge detection voltage n (n=1 to 3) 2.0 to 3.2V (100mV step) Accuracy: ±80mV
  - Overdischarge release voltage n (n=1 to 3) 2.0 to 3.4V Accuracy: ±100mV
- Discharge overcurrent detection in 2-step
  - Discharge overcurrent detection voltage 0.05 to 0.30V (50mV step) Accuracy: ±15mV
  - Short-circuiting detection voltage 0.50 to 1.0V (100mV step) Accuracy: ±100mV
- Charge overcurrent detection function
  - Charge overcurrent detection voltage -0.30 to -0.05V (50mV step) Accuracy: ±30mV
- Settable by external capacitor; overcharge detection delay time, overdischarge detection delay time, charge overcurrent detection delay time, charge overcurrent detection delay time (Load short-circuiting detection delay time is internally fixed.)
- Independent charge and discharge control by the control pins
- Power-down function is selectable: Available, unavailable
- High-withstand voltage: Absolute maximum rating 28V
- Wide operating voltage range: 2 to 24V
- Wide operating temperature range: -40 to +85°C
- Low current consumption
  - During operation: 40μA max. (+25°C)
  - During power-down: 0.1μA max. (+25°C)
# BATTERY PROTECTION IC FOR 3-SERIAL OR 4-SERIAL CELL PACK  
**S-8243A/B series**

## FEATURES

- High-accuracy voltage detection for each cell
  - Overcharge detection voltage n (n = 1 to 4)
  - Hysteresis voltage n (n = 1 to 4) of overcharge detection
  - Overdischarge detection voltage n (n = 1 to 4)
- Three-level overcurrent protection including protection for short-circuiting
  - Overcurrent detection voltage
  - Overcurrent detection voltage 2
  - Overcurrent detection voltage 3
  - Voltage regulator
  - High-withstand voltage device: Absolute maximum rating 26V
  - Wide operating voltage range:
  - Wide operating temperature range: 
  - Low current consumption
  - Delay time for overcharge detection, overdischarge detection and overcurrent detection
  - Charge/discharge operation can be controlled by the control pins.
- High-accuracy battery monitor amp

## PIN CONFIGURATION

### 16-Pin TSSOP Top view

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
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</thead>
<tbody>
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<td>COP</td>
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<td>16</td>
<td>VREG</td>
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</tbody>
</table>

## APPLICATIONS

- Lithium-ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

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# BATTERY PROTECTION IC FOR 3-SERIAL OR 4-SERIAL CELL PACK  
**S-8254A series**

## FEATURES

- High-accuracy voltage detection for each cell
  - Overcharge detection voltage n (n = 1 to 4)
  - Hysteresis voltage n (n = 1 to 4) of overcharge detection
  - Overdischarge detection voltage n (n = 1 to 4)
  - Overdischarge detection voltage n (n = 1 to 4)
- Three-level overcurrent protection
  - Overcurrent detection voltage
  - Overcurrent detection voltage 2
  - Overcurrent detection voltage 3
  - Voltage regulator
  - High-withstand voltage device: Absolute maximum rating 26V
  - Wide operating voltage range:
  - Wide operating temperature range: 
  - Low current consumption
  - Delay time for overcharge detection, overdischarge detection and overcurrent detection
  - Charge/discharge operation can be controlled by the control pins.
- Switchable between a 3-cell serial and 4-cell serial cell using the SEL pin

## PIN CONFIGURATION

### 16-Pin TSSOP Top view

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>COP</td>
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<td>VMP</td>
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<td>16</td>
<td>VDD</td>
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</tbody>
</table>

## APPLICATIONS

- Lithium-ion rechargeable battery packs
- Lithium polymer rechargeable battery packs
BATTERY PROTECTION IC FOR 3-SERIAL OR 4-SERIAL CELL PACK

**FEATURES**

- High-accuracy voltage detection for each cell
  - Overcharge detection voltage n (n=1 to 4)
    3.6 to 4.6V (50mV step) (A series)
    3.65 to 4.65V (50mV step) (B series)
  - Overcharge release voltage n (n=1 to 4)
    3.6 to 4.6V (A series)
    3.6 to 4.6V (B series)
  - Overdischarge detection voltage n (n=1 to 4)
    2.0 to 3.0V (100mV step)
  - Overdischarge release voltage n (n=1 to 4)
    2.0 to 3.4V (A series)
  - Discharge overcurrent detection in 3-step
    - Discharge overcurrent detection voltage 1
      0.05 to 0.3V (50mV step)
      0.5V (fixed)
    - Short circuit detection voltage
      1.0V (fixed)
  - Charge overcurrent detection (A series)
    - Charge overcurrent detection voltage
      \(-0.25\) to \(-0.05V\) (50mV step)
  - Settable by external capacitor; Overcharge detection delay time,
    Overdischarge detection delay time, Discharge overcurrent detection
    delay time, Charge overcurrent detection delay time (A series)
  - Switchable between 3-series and 4-series cell by using the SEL pin
  - Independent charging and discharge control by the control pins
  - High-withstand voltage element
    Absolute maximum rating: 24V
  - Wide range of operation voltage
    2 to 22V
  - Wide range of operation temperature
    \(-40\) to \(+85^\circ\)C
  - Low current consumption
    - During operation
      33\(\mu\)A max. \(+25^\circ\)C
    - During power-down
      0.1\(\mu\)A max. \(+25^\circ\)C

**APPLICATIONS**

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

**PIN CONFIGURATION**

16-Pin TSSOP

**APPLICATION**

- Rechargeable lithium-ion battery packs

*1. Overcharge hysteresis voltage n (n=1 to 4) is selectable in 0V, or in 0.1V to 0.4V in 50mV step.
(Overcharge hysteresis voltage)

*2. Overdischarge hysteresis voltage n (n=1 to 4) is selectable in 0V, or in 0.2V to 0.7V in 100mV step.
(Overdischarge hysteresis voltage)

*3. Overdischarge hysteresis voltage n (n=1 to 5) is selectable in 0V, or in 0.2 to 0.7V in 100mV step.
(Overdischarge hysteresis voltage)

*4. The discharge overcurrent detection voltage and load short circuit detection voltage are not selectable if the voltage difference between them is 0.3V or less.

BATTERY PROTECTION IC FOR 4-SERIAL OR 5-SERIAL CELL PACK

**FEATURES**

- High-accuracy voltage detection for each cell
  - Overcharge detection voltage n (n=1 to 5)
    3.55 to 4.50V (50mV step)
    3.30 to 4.50V (50mV step)
  - Overcharge release voltage n (n=1 to 5)
  - Overdischarge detection voltage n (n=1 to 5)
  - Overdischarge release voltage n (n=1 to 5)
  - Discharge overcurrent detection in 2-step
    - Discharge overcurrent detection voltage
      0.05 to 0.30V (50mV step)
    - Short circuit detection voltage
      0.50 to 1.0V (100mV step)
  - Charge overcurrent detection
    - Charge overcurrent detection voltage
      \(-0.30\) to \(-0.05V\) (50mV step)
  - Settable by external capacitor; Overcharge detection delay time,
    Overdischarge detection delay time, Discharge overcurrent detection
    delay time, Charge overcurrent detection delay time (A series)
  - Independent charging and discharge control by the control pins
  - High-withstand voltage element
    Absolute maximum rating: 28V
  - Wide range of operation voltage
    2 to 24V
  - Wide range of operation temperature
    \(-40\) to \(+85^\circ\)C
  - Low current consumption
    - During operation
      40\(\mu\)A max. \(+25^\circ\)C
    - During power-down
      0.1\(\mu\)A max. \(+25^\circ\)C

**APPLICATION**

- Rechargeable lithium-ion battery packs

*1. The overcharge detection voltage n (n=1 to 5) and overdischarge detection voltage (n=1 to 5) are not selectable if the voltage difference between them is 0.6V or less.

*2. Overcharge hysteresis voltage n (n=1 to 5) is selectable in 0V, or in 0.1 to 0.4V in 50mV step.
(Overcharge hysteresis voltage)

*3. Overdischarge hysteresis voltage n (n=1 to 5) is selectable in 0V, or in 0.2 to 0.7V in 100mV step.
(Overdischarge hysteresis voltage)

*4. The discharge overcurrent detection voltage and load short circuit detection voltage are not selectable if the voltage difference between them is 0.3V or less.
**POWER SUPPLY ICs**

**Lithium-ion Rechargeable Battery Protection ICs**

### BATTERY PROTECTION IC FOR 1-CELL PACK (SECONDARY PROTECTION)

**S-8206A series**

**FEATURES**

- High-accuracy voltage detection circuit
  - Overcharge detection voltage
    - 3.5 to 5.0V (5mV step)  Accuracy ±20mV
  - Overcharge release voltage
    - 3.1 to 4.95V  Accuracy ±50mV

- Detection delay time is generated only by an internal circuit (external capacitors are unnecessary).
- Output logic is selectable: Active “H”, active “L”
- Wide operating temperature range  -40 to +85°C
- Low current consumption
  - During operation 1.5μA typ., 3.0μA max. (+25°C)

**APPLICATIONS**

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

### BATTERY PROTECTION IC FOR 2-SERIAL / 3-SERIAL CELL PACK (SECONDARY PROTECTION)

**S-8213 series**

**FEATURES**

- High-accuracy voltage detection circuit for each cell
  - Overcharge detection voltage n (n=1 to 3)
    - 4.10 to 4.50V (in 50mV steps)  Accuracy ±25mV (+25°C)
  - Overcharge hysteresis voltage n (n=1 to 3)
    - 0.0V±25mV, -0.05V±25mV, -0.4V±80mV

- Delay times for overcharge detection can be set by an internal circuit only (external capacitors are unnecessary)
- Output logic is selectable: Active high, Active low
- High-withstand voltage devices  Absolute maximum rating: 26V
- Wide operating voltage range  3.6 to 24V
- Wide operating temperature range  -40 to +85°C
- Low current consumption
  - At VClk: 1.0V for each cell  2.0μA max. (+25°C)
  - At 2.0V for each cell  0.3μA max. (+25°C)

**APPLICATION**

- Lithium-ion rechargeable battery packs (for secondary protection)
## FEATURES

**BATTERY PROTECTION IC FOR 2 TO 4-SERIAL CELL PACK (SECONDARY PROTECTION)**

### S-8264A/B/C series

- High-accuracy voltage detection circuit for each cell
  - Overcharge detection voltage \( n = 1 \) to 4
    - 4.20 to 4.80V (in 50mV step)  
    - Accuracy \( \pm 25 \)mV (+25°C)
  - Overcharge hysteresis voltage \( n = 1 \) to 4
    - \(-0.52 \leq 0.21\)V, \(-0.39 \leq 0.16\)V, \(-0.26 \leq 0.11\)V, \(-0.13 \leq 0.06\)V, None
- Delay time for overcharge detection can be set by an internal circuit exclusively (external capacitors are unnecessary)
- Output control function via CTL pin (CTL pin is pulled down internally) (S-8264A series)
- Output control function via CTL pin (CTL pin is pulled up internally) (S-8264C series)
- Output latch function after overcharge detection (S-8246B series)
- Output form and logic CMOS output active high
- High-withstand voltage devices
  - Absolute maximum rating 26V
- Wide operating voltage range: 3.6 to 24V
- Wide operating temperature range: \(-40\) to \(+85\)°C
- Low current consumption
  - At 3.5V for each cell: \(5.9\)μA max. (+25°C)
  - At 2.3V for each cell: \(4.0\)μA max. (+25°C)

### PIN CONFIGURATIONS

![Pin configurations](image)

### APPLICATION

- Lithium ion rechargeable battery packs (for secondary protection)

## FEATURES

**BATTERY PROTECTION IC FOR 1 TO 4-SERIAL CELL PACK (SECONDARY PROTECTION)**

### S-8244 series

- Internal high-accuracy voltage detector circuit
  - Overcharge detection voltage range:
    - 3.700 to 4.550V : Accuracy of \(+25\)mV (at \(+25\)°C)
    - (in 5mV/step) Accuracy of \(50\)mV (at \(-40\) to \(+85\)°C)
  - Hysteresis : 5 optional models available and selectable:
    - \(0.36\leq0.1\), \(0.25\leq0.07\), \(0.15\leq0.04\), \(0.045\leq0.02\), None
- High-withstand voltage device : Absolute maximum rating : 26V
- Wide operating voltage range: 3.6 to 24V (the range in which the delay circuit can operate normally after overvoltage is detected)
- Delay time during detection : Can be set by an external capacitor.
- Low current consumption:
  - At 3.5V for each cell: \(3.0\)μA max. (+25°C)
  - At 2.3V for each cell: \(2.4\)μA max. (+25°C)
- Output logic and form : 5 types
  - CMOS output active high
  - CMOS output active low
  - Pch open drain output active low
  - Nch open drain output active high
  - Nch open drain output active low
  (However, CMOS or Nch open drain output is available for hysteresis 0.045V products.)

### PIN CONFIGURATIONS

![Pin configurations](image)

### APPLICATION

- Lithium ion rechargeable battery packs (for secondary protection)

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**POWER SUPPLY ICs**

Lithium-ion Rechargeable Battery Protection ICs

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SII Semiconductor Corporation

CMOS IC 2016-2017
BATTERY PROTECTION IC FOR 3 TO 5-SERIAL CELL PACK
(SECONDARY PROTECTION)
S-8215A series

FEATURES
• High-accuracy voltage detection circuit for each cell
  - Overcharge detection voltage n (n=1 to 5)
    3.60 to 4.70V (in 50mV steps)  Accuracy ±25mV (+25°C)
  - Overcharge hysteresis voltage n (n=1 to 5)
    0.0 to -550mV (in 50mV steps)
    -300 to -550mV  Accuracy ±20%
    -100 to -250mV  Accuracy ±50mV
    0.0 to -50mV    Accuracy ±25mV
• Delay times for overcharge detection can be set by an internal circuit only (external capacitors are unnecessary)
• Output form is selectable:
  CMOS output, Nch open-drain output, Pch open-drain output
• Output logic is selectable:
  Active high, Active low
• High-withstand voltage devices
  Absolute maximum rating: 28V
• Wide operating voltage range
  3.6 to 26V
• Wide operating temperature range
  -40 to +85°C
• Low current consumption
  At Vcomp - 1.0V for each cell 3.0μA max. (+25°C)
  At 2.3V for each cell 1.7μA max. (+25°C)

APPLICATION
• Lithium-ion rechargeable battery packs (for secondary protection)

BATTERY MONITORING IC FOR 1-CELL PACK
S-8259A series

FEATURES
• High-accuracy voltage detection circuit
  - Overcharge detection voltage
    3.5 to 4.6V (5mV step)  Accuracy ±20mV
  - Overcharge release voltage
    3.1 to 4.6V  Accuracy ±50mV
  - Overdischarge detection voltage
    2.0 to 3.4V (10mV step)  Accuracy ±50mV
  - Overdischarge release voltage
    2.0 to 3.4V  Accuracy ±100mV
• Detection delay times are generated by an internal circuit (external capacitors are unnecessary).
• Wide operating temperature range
  -40 to +85°C
• Low current consumption
  - During operation
    1.5μA typ., 3.0μA max. (+25°C)
  - During overdischarge
    2.0μA max. (+25°C)

APPLICATIONS
• Lithium ion rechargeable battery packs
• Lithium polymer rechargeable battery packs

*1. Overcharge release voltage=
Overcharge detection voltage – Overcharge hysteresis voltage
(Overcharge hysteresis voltage can be selected from a range of 0V to 0.4V in 50mV step.)

*2. Overdischarge release voltage=
Overdischarge detection voltage + Overdischarge hysteresis voltage
(Overdischarge hysteresis voltage can be selected from a range of 0.1V to 0.7V in 100mV step.)
**BATTERY PROTECTION IC FOR 1-CELL PACK**

**S-8211E series**

**FEATURES**

- High-accuracy voltage detection circuit
  - Overcharge detection voltage: 3.6 to 4.5V (5mV step) 
    Accuracy ±25mV (+25°C)
  - Overcharge release voltage: 3.5 to 4.4V
    Accuracy ±50mV
  - Overdischarge detection voltage: 2.0 to 3.0V (10mV step)
    Accuracy ±50mV
  - Overdischarge release voltage: 2.0 to 3.4V
    Accuracy ±100mV
- Detection delay times are generated by an internal circuit (external capacitors are unnecessary).
  Accuracy ±20% 
- Wide operating temperature range: -40 to +85°C
- Low current consumption
  - During operation: 3.0μA typ., 5.5μA max. (+25°C)
  - During overdischarge: 2.0μA typ., 3.5μA max. (+25°C)
- Output logic of CO pin is selectable: active high or low

*1. Overcharge release voltage=
Overcharge detection voltage – Overcharge hysteresis voltage
(Overcharge hysteresis voltage can be selected as 0V or from a range of 0.1 to 0.4V in 50mV step.)

*2. Overdischarge release voltage=
Overdischarge detection voltage + Overdischarge hysteresis voltage
(Overdischarge hysteresis voltage can be selected as 0V or from a range of 0.1 to 0.7V in 100mV step.)

**APPLICATIONS**

- Lithium-ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

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**BATTERY PROTECTION IC WITH CELL-BALANCING**

**S-8209A/B series**

**FEATURES**

- High-accuracy voltage detection circuit
  - Overcharge detection voltage: 3.55 to 4.4V (5mV step) 
    Accuracy ±25mV
  - Overcharge release voltage: 3.5 to 4.45V
    Accuracy ±50mV
  - Cell-balance detection voltage: 3.55 to 4.4V (5mV step)
    Accuracy ±25mV
  - Cell-balance release voltage: 3.5 to 4.4V
    Accuracy ±50mV
  - Overdischarge detection voltage: 2.0 to 3.0V (10mV step)
    Accuracy ±50mV
  - Overdischarge release voltage: 2.0 to 3.4V
    Accuracy ±100mV
- Settable delay time by external capacitor for output pin
- Control charging, discharging, cell-balance by CTLC, CTLD pins
- Two types of cell-balancing: charge/discharge
- Wide range of operation temperature: -40 to +85°C
- Low current consumption: 7.0μA max.

*1. Overcharge release voltage=
Overcharge detection voltage – Overcharge hysteresis voltage
(Overcharge hysteresis voltage is selectable in 0 to 0.4V in 50mV step.)

*2. Overcharge detection voltage > Cell-balance detection voltage
(Overcharge detection voltage is always set higher than Cell-balance detection voltage)

*3. Cell-balance release voltage=
Cell-balance detection voltage – Cell-balance hysteresis voltage
(Cell-balance hysteresis voltage is selectable in 0 to 0.4V in 50mV step.)

*4. Overdischarge release voltage=
Overdischarge detection voltage + Overdischarge hysteresis voltage
(Overdischarge hysteresis voltage is selectable in 0 to 0.7V in 100mV step.)

*5. Also available the product without discharge cell-balancing

**APPLICATIONS**

- Lithium-ion rechargeable battery packs
- Lithium polymer rechargeable battery packs
BATTERY MONITORING IC FOR 3-SERIAL TO 5-SERIAL CELL PACK

**S-8225A/B series**

**FEATURES**

- High-accuracy voltage detection for each cell
  - Overcharge detection voltage (n=1 to 5)
    - 3.5 to 4.4V (50mV step) Accuracy ±20mV (±25°C), ±30mV (0 to +60°C)
  - Overcharge release voltage (n=1 to 5)
    - 3.3 to 4.4V Accuracy ±50mV
  - Overdischarge detection voltage (n=1 to 5)
    - 2.0 to 3.2V (100mV step) (S-8225A Series)
    - 2.2 to 3.2V (100mV step) (S-8225B Series)
    - Accuracy ±80mV
  - Overdischarge release voltage (n=1 to 5)
    - 2.1 to 3.4V² (S-8225A Series)
    - 2.2 to 3.4V² (S-8225B Series) Accuracy ±100mV
- Overcharge detection delay time and overdischarge detection delay time can be set by external capacitor.
- Switchable between 3-serial to 5-serial cell by using the SEL1 pin and the SEL2 pin.
- Cascade connection is available. (S-8225A Series)
- The CO pin and the DO pin are controlled by the CTCL pin and the CTLD pin, respectively.
- Output voltage of the CO pin and the DO pin is limited to 12V max.
- Output logic is selectable. (S-8225B Series)
- Active high, active low
- High-withstand voltage element Absolute maximum rating: 28V
- Wide operation voltage range 4 to 26V
- Wide operation temperature range -40 to +85°C
- Low current consumption
  - During operation (V1+V2+V3+V4+V5=3.4V)
    - 22µA max. (±25°C) (S-8225A Series)
    - 20µA max. (±25°C) (S-8225B Series)
  - During power-down (V1+V2+V3+V4+V5=1.6V)
    - 4.5µA max. (±25°C) (S-8225A Series)
    - 3.0µA max. (±25°C) (S-8225B Series)

**APPLICATIONS**

- Lithium ion rechargeable battery packs

*1. Overcharge hysteresis voltage n (n=1 to 5) is selectable in 0V, or in 0.1V to 0.4V in 50mV step.

*2. Overdischarge hysteresis voltage n (n=1 to 5) is selectable in 0V to 0.7V in 100mV step.

*3. Overcharge hysteresis voltage n (n=1 to 5) is selectable in 0V, or in 0.2V to 0.7V in 100mV step.

**BATTERY MONITORING IC**

**S-8229 series**

**FEATURES**

- Detection voltage accuracy: ±1.0%
- Hysteresis characteristics: \( V_{\text{HYS1}} \) to \( V_{\text{HYS2}} \) = 0mV, 50mV, 300mV, 400mV, 500V
- Current consumption:
  - During operation: \( I_{\text{DD1}} = 9\mu A \) max. \( (V_{\text{DET1}} \geq 42V) \)
  - During power-off: \( I_{\text{DD1}} = 11\mu A \) max.
  - Operation voltage range: \( V_{\text{DD}} = 3.6 \) to 24V
  - Detection voltage:
    - \( V_{\text{DET1}} \) to \( V_{\text{DET2}} = 10.5 \) to 21.5V
    - (0.1V step)
  - Output form: Nch open-drain output
  - Output logic:
    - Full charge all on, full charge all off
  - Operation temperature range: -40 to +85°C

*1. \( V_{\text{DET1}} \) Total detection voltage
  - \( V_{\text{DET1}} = V_{\text{DET1(O)}} + V_{\text{DET1(D)}} + V_{\text{DET1(S)}} \)

*2. Full charge all on: When the input voltage is equal to or higher than each of the three detection voltage values, \( V_{\text{OUT1}} = V_{\text{OUT2}} = V_{\text{OUT3}} = \text{VSS} \).

Full charge all off: When the input voltage is equal to or higher than each of the three detection voltage values, \( V_{\text{OUT1}} = V_{\text{OUT2}} = V_{\text{OUT3}} = \text{High-Z} \).

**APPLICATION**

- Lithium ion rechargeable battery packs
OVERCURRENT MONITORING IC FOR MULTI-SERIAL-CELL PACK

S-8239A/B series

FEATURES

- Built-in high-accuracy voltage detection circuit
  - Overcurrent 1 detection voltage*1
  0.04 to 0.30V (10mV step) Accuracy: ±15mV
  - Overcurrent 2 detection voltage
  0.1 to 0.7V (100mV step) Accuracy: ±100mV
  - Overcurrent 3 detection voltage
  1.2V (Fixed) Accuracy: ±300mV

- Built-in three-step overcurrent detection circuit (Overcurrent 1, overcurrent 2, overcurrent 3)
- Overcurrent 3 detection function is selectable: Available, unavailable
- Built-in UVLO (under voltage lock out) function
  - UVLO detection voltage
  2.0V (Fixed) Accuracy: ±100mV
- High-withstand voltage device is used (VM pin and DO pin: Absolute maximum rating=28V)
- Delay times are generated only by an internal circuit (External capacitors are unnecessary).
- Low current consumption
  - During normal operation 7.0µA max.
  - During UVLO operation 6.0µA max. (A series)
  - During power-down 0.1µA max. (B series)
- Output logic
  Active high,
  Active low (A series)
  Active low (B series)
- Wide operating temperature range
  -40 to +85°C

*1. Overcurrent 1 detection voltage ≤ 0.06V should be satisfied in the case of overcurrent 2 detection voltage = 0.1V.
Overcurrent 1 detection voltage ≤ 0.85 x overcurrent 2 detection voltage – 0.05V should be satisfied in the case of overcurrent 2 detection voltage ≥ 0.2V.

APPLICATIONS

- Lithium ion rechargeable battery packs
- Lithium polymer rechargeable battery packs

BATTERY PROTECTION IC WITH CELL-BALANCING

NEW S-8249 series

FEATURES

- High-accuracy voltage detection circuit
  - Cell-balance detection voltage
  2.0 to 4.6V (5mV step) Accuracy: ±12mV (2.0VsV5v0.24V)
  Accuracy: ±0.5% (2.4V5v4.6V)
  - Cell-balance release voltage
  2.0 to 4.6V Accuracy: ±24mV (2.0VsV5v0.24V)
  Accuracy: ±1.0% (2.4V5v4.6V)
  - Overcharge detection voltage
  2.0 to 4.6V (5mV step) Accuracy: ±12mV (2.0VsV5v0.24V)
  Accuracy: ±0.5% (2.4V5v4.6V)
  - Overcharge release voltage
  2.0 to 4.6V Accuracy: ±24mV (2.0VsV5v0.24V)
  Accuracy: ±1.0% (2.4V5v4.6V)

- Built-in Nch transistor with ON resistance of 5Ω typ. between the CB pin and the VSS pin.
- Current consumption 2.0µA max. (+25°C)
- Detection delay times are generated by an internal circuit (external capacitors are unnecessary).
- Output form and logic of CO pin are selectable:
  - CMOS output
  Active “H”, active “L”
  - Nch open-drain output
  Active “H”, active “L”
  - Switchable to power-saving mode by using the CE pin
- Range of operation temperature
  -40 to +85°C

*1. Cell-balance release voltage=
  Cell-balance detection voltage – Cell-balance hysteresis voltage
  (Cell-balance hysteresis voltage can be selected as 0V or from a range of 0.1 to 0.7V in 50mV step.)

*2. Overcharge release voltage=
  Overcharge detection voltage – Overcharge hysteresis voltage
  (Overcharge hysteresis voltage can be selected as 0V or from a range of 0.1 to 0.7V in 50mV step.)

APPLICATIONS

- Rechargeable battery module
- Capacitor module

Specs described herein are subject to change without notice. For information about new products, refer to our SII Semiconductor Corporation website.

www.sii-ic.com  SII Semiconductor Corporation Web site
## Memory IC Lineup

### E²PROMs (General applications)

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### 3-wire serial High reliability General use

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### Low voltage operation High reliability General use

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### 2-wire serial High reliability General use

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### SPI-BUS High reliability General use

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: New product
E²PROMs

3-wire serial

105°C operation guaranteed
- S-93C46B H 1K bit
- S-93C56B H 2K bit
- S-93C86B H 4K bit
- S-93C76A H 8K bit
- S-93C86B H 16K bit
- S-93C48C H 1K bit
- S-93C68C H 2K bit
- S-93C88C H 4K bit
- S-93C78C H 8K bit
- S-93C88C H 16K bit
- S-93A86A 1K bit
- S-93A56A 2K bit
- S-93A66A 4K bit
- S-93A86A 16K bit
- S-93A46B 1K bit
- S-93A56B 2K bit
- S-93A66B 4K bit
- S-93A86B 16K bit
- S-93S46A 1K bit
- S-93S56A 2K bit
- S-93S66A 4K bit
- S-24C510A H 1K bit
- S-24C512A H 2K bit
- S-24C516A H 4K bit
- S-24C564A 64K bit
- S-24C5128C H 128K bit

125°C operation guaranteed
- S-93C56B H 2K bit
- S-93C86B H 4K bit
- S-93C76A H 8K bit
- S-93C86B H 16K bit
- S-93C48C H 1K bit
- S-93C68C H 2K bit
- S-93C88C H 4K bit
- S-93C78C H 8K bit
- S-93C88C H 16K bit
- S-93A46B 1K bit
- S-93A56B 2K bit
- S-93A66B 4K bit
- S-93A86B 16K bit
- S-93S46A 1K bit
- S-93S56A 2K bit
- S-93S66A 4K bit
- S-24C510A H 1K bit
- S-24C512A H 2K bit
- S-24C516A H 4K bit
- S-24C564A 64K bit
- S-24C5128C H 128K bit

2-wire serial

105°C operation guaranteed
- S-24C510A H 1K bit
- S-24C512A H 2K bit
- S-24C516A H 4K bit
- S-24C564A 64K bit
- S-24C5128C H 128K bit

150°C operation guaranteed
- S-93A46B 1K bit
- S-93A56B 2K bit
- S-93A66B 4K bit
- S-93A86B 16K bit
- S-93A46B 1K bit
- S-93A56B 2K bit
- S-93A66B 4K bit
- S-93A86B 16K bit
- S-93S46A 1K bit
- S-93S56A 2K bit
- S-93S66A 4K bit
- S-24C510A H 1K bit
- S-24C512A H 2K bit
- S-24C516A H 4K bit
- S-24C564A 64K bit
- S-24C5128C H 128K bit

SPI-BUS

105°C operation guaranteed
- S-25C10A0H 1K bit
- S-25C20A0H 2K bit
- S-25C40A0H 4K bit
- S-25C80A0H 8K bit
- S-25C160A0H 16K bit
- S-25C320A0H 32K bit
- S-25C640A0H 64K bit
- S-25C128A0H 128K bit
- S-25A010A 1K bit
- S-25A020A 2K bit
- S-25A040A 4K bit
- S-25A080A 8K bit
- S-25A160A 16K bit
- S-25A320A 32K bit
- S-25A640A 64K bit
- S-25A128A 128K bit

125°C operation guaranteed
- S-25C10A0H 1K bit
- S-25C20A0H 2K bit
- S-25C40A0H 4K bit
- S-25C80A0H 8K bit
- S-25C160A0H 16K bit
- S-25C320A0H 32K bit
- S-25C640A0H 64K bit
- S-25C128A0H 128K bit
- S-25A010A 1K bit
- S-25A020A 2K bit
- S-25A040A 4K bit
- S-25A080A 8K bit
- S-25A160A 16K bit
- S-25A320A 32K bit
- S-25A640A 64K bit
- S-25A128A 128K bit

Remark: See pages 157 through 166 for details of automotive E²PROMs.
MEMORY ICs

HIGH-RELIABILITY, GENERAL USE
2-WIRE SERIAL EEPROM

FEATURES

- Memory capacity
  S-24C02D: 2K bit (256 words x 8 bit)
  S-24C04D: 4K bit (512 words x 8 bit)
  S-24C08D: 8K bit (1024 words x 8 bit)
  S-24C16D: 16K bit (2048 words x 8 bit)
- Operating voltage range
  Read: 1.7 to 5.5V
  Write: 1.7 to 5.5V
- Operating frequency: 1MHz max.
- Write time: 5.0ms max.
- Page write
- Sequential read
- Write protect function
- Protect area: 100%
- CMOS switch input (SCL, SDA)
- Endurance: 1 million cycles (25°C)
- Data retention: 100 years (25°C)

PACKAGE

- 8-Pin SOP (4000/reel)
  (5.02x6.0x1.75 max.)
- 8-Pin TSSOP (4000/reel)
  (3.0x6.4x1.1 max.)
- TSSOP-8 (4000/reel)
  (2.9x4.0x0.8 max.)
- SOT-23-5 (3000/reel)
  (1.97x2.46x0.5 max.)
- DFN-8(2030)(5000/reel)
  (2.0x3.0x0.5 max.)
- SOT-23-5 (3000/reel)
  (2.9x2.8x1.3 max.)

CONTENT
## FEATURES

- **Memory capacity**
  - S-24C08C: 8K bit (1024 words x 8 bit)
  - S-24C16C: 16K bit (2048 words x 8 bit)
  - S-24C32C: 32K bit (4096 words x 8 bit)
  - S-24C64C: 64K bit (8192 words x 8 bit)
  - S-24C128C: 128K bit (16384 words x 8 bit)
  - S-24C256C: 256K bit (32768 words x 8 bit)
  - S-24C512C: 512K bit (65536 words x 8 bit)
  - S-24CM01C: 1M bit (131072 words x 8 bit)

- **Operating voltage range**
  - Read: 1.6 to 5.5V
  - Write: 1.7 to 5.5V

- **Operating frequency**
  - 400kHz max.
  - 1MHz max.

- **Write time**: 5.0ms max.
- **Page write**: 1.0ms max.
- **Sequential read**: 400μs max.
- **Write protect function**: 100%
- **Protect area**: 100%
- **CMOS schmitt input (SCL, SDA)**
- **Write protect function under low power supply voltage**:
- **Endurance**: 1 million cycles (25°C)
- **Data retention**: 100 years (25°C)

## PACKAGE

### 8-Pin SOP (4000/reel)

- (5.02×6.0×1.75 max.)
- S-24C32C/64C/128C/256C/512C
- S-24CM01C

### 8-Pin TSSOP (4000/reel)

- (3.0×6.4×1.1 max.)
- S-24C32C/64C/128C/256C/512C

### TMSOP-8 (4000/reel)

- (2.9×4.0×0.8 max.)
- S-24C32C/64C

### S-24C08C/16C/32C/64C/128C/256C/512C/M01C

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<thead>
<tr>
<th>S-24C808CI-H6T3S3</th>
<th>S-24C16C1-H6T3S3</th>
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<tr>
<td>A1 SDA</td>
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<td>A1 SDA</td>
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<td>B2 WP</td>
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<tr>
<td>C1 A2</td>
<td>C2 VCC</td>
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</table>

### WLP

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<tr>
<th>S-24C08CI-H6T3S3</th>
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<tbody>
<tr>
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<td>B2 WP</td>
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<tr>
<td>C1 A2</td>
<td>C2 VCC</td>
</tr>
</tbody>
</table>

**Remark** Please contact our sales office regarding WLP package products.
MEMORY ICs  E2PROMs

**FEATURES**

- **Memory capacity**
  - S-25C010A: 1K bit (128 words x 8 bit)
  - S-25C020A: 2K bit (256 words x 8 bit)
  - S-25C040A: 4K bit (512 words x 8 bit)
  - S-25C080A: 8K bit (1024 words x 8 bit)
  - S-25C160A: 16K bit (2048 words x 8 bit)
  - S-25C320A: 32K bit (4096 words x 8 bit)
  - S-25C640A: 64K bit (8192 words x 8 bit)
  - S-25C128A: 128K bit (16384 words x 8 bit)
  - S-25C256A: 256K bit (32768 words x 8 bit)
  - S-25C512A: 512K bit (65536 words x 8 bit)
  - S-25CM01A: 1M bit (131072 words x 8 bit)

- **Operating voltage range**
  - Read: 1.6 to 5.5V
  - Write: 1.7 to 5.5V

- **Operating frequency**
  - 5.0MHz max. (S-25C010A/020A/040A/080A/160A/320A/640A/128A/256A/512A/M01A)
  - 10.0MHz max. (S-25C256A/512A/M01A)

- Write time: 4.0μs max. (S-25C010A/020A/040A/080A/160A/320A/640A/128A/256A/512A/M01A)

- SPI mode (0, 0) and (1, 1)

- Page write

- Sequential read

- Monitors write to the memory by a status register

- Write protect function: Software, Hardware

- Protect area: 0%, 25%, 50%, 100%

- CMOS schmitt input (CS, SCK, SI, WP, HOLD)

- Write protect function under low power supply voltage

- Protect function against write due to erroneous instruction recognition

- Endurance: 1 million cycles (25°C)

- Data retention: 100 years (25°C)

**PACKAGE**

- **8-Pin SOP (4000/reel)**
  - (5.02 x 6.0 x 1.75 max.)

- **8-Pin TSSOP (4000/reel)**
  - (3.0 x 6.4 x 1.1 max.)

**Remark** Please contact our sales office regarding WLP package products.
MEMORY ICs

HIGH-RELIABILITY, GENERAL USE
3-WIRE SERIAL E²PROM

S-93C46B/56B/66B/76A/86B

FEATURES
• Memory capacity S-93C46B:  1K bit (64 words x 16 bit)
  S-93C56B:  2K bit (128 words x 16 bit)
  S-93C66B:  4K bit (256 words x 16 bit)
  S-93C76A:  8K bit (512 words x 16 bit)
  S-93C86B:  16K bit (1024 words x 16 bit)
• Operating voltage range  Read:  2.7 to 5.5V
  Write:  2.0MHz max.
• Operating frequency  2.0MHz max.
• Write time:  8.0ms max. (S-93C46B/56B/66B)
  10.0ms max. (S-93C76A)
  4.0ms max. (S-93C86B)
• Sequential read
• Write protect function under low power supply voltage
• Protect function against write due to erroneous instruction recognition (S-93C46B/56B/66B/86B)
• Endurance:  1 million cycles (85°C)
• Data retention:  100 years (25°C)
  20 years (85°C)

PACKAGE

<table>
<thead>
<tr>
<th>8-Pin SOP (4000/reel) (5.02×6.0×1.75 max.)</th>
<th>8-Pin TSSOP (4000/reel) (3.0×6.4×1.1 max.)</th>
<th>TMSOP-8 (4000/reel) (2.9×4.0×0.8 max.)</th>
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<tbody>
<tr>
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<td>S-93C46BD0I-T8T1U</td>
<td>S-93C46BD0I-K8T3U</td>
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<tr>
<td>S-93C56BBD0I-J8T1U</td>
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<td>S-93C56BD0I-KBT3U</td>
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<td>S-93C66BD0I-T8T1U</td>
<td>S-93C66BD0I-KBT3U</td>
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<td>S-93C56BR0I-J8T1U</td>
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<td>S-93C66BD0I-I8T1U</td>
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</table>


LOW VOLTAGE OPERATION, 3-WIRE SERIAL \textsuperscript{2}E\textsuperscript{2}PROM\textsuperscript{3} S-93L46A/56A/66A/76A

FEATURES

- Memory capacity S-93L46A: 1K bit (64 words x 16 bit)
  S-93L56A: 2K bit (128 words x 16 bit)
  S-93L66A: 4K bit (256 words x 16 bit)
  S-93L76A: 8K bit (512 words x 16 bit)
- Operating voltage range
  Read: 1.6 to 5.5V
  Write: 1.8 to 5.5V (WRITE, ERASE)
  2.7 to 5.5V (WRAL, ERAL)
- Operating frequency: 2.0MHz max.
- Write time: 8.0ms max. (S-93L46A/56A/66A)
  10.0ms max. (S-93L76A)
- Sequential read
- Write protect function under low power supply voltage
- Protect function against write due to erroneous instruction recognition (S-93L46A/56A/66A)
- Endurance: 1 million cycles (85°C)
- Data retention: 100 years (25°C)
  20 years (85°C)

PACKAGE

8-Pin SOP (4000/reel) (5.02×6.0×1.75 max.)

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8-Pin TSSOP (4000/reel) (3.0×6.4x1.1 max.)

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TMSOP-8 (4000/reel) (2.9 x 4.0 x 0.8 max.)

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SNT-8A (5000/reel) (1.97 x 2.46 x 0.5 max.)

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8-Pin SOP (4000/reel) (rotated) (5.02×6.0×1.75 max.)

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</table>

1 CS
2 SK
3 DI
4 DO
5 GND
6 TEST
7 NC
8 VCC
FEATURES

- Memory capacity S-93C46C: 1K bit (64 words x 16 bit)
  S-93C56C: 2K bit (128 words x 16 bit)
  S-93C66C: 4K bit (256 words x 16 bit)
  S-93C76C: 8K bit (512 words x 16 bit)
  S-93C86C: 16K bit (1024 words x 16 bit)
- Operating voltage range
  Read: 1.6 to 5.5V
  Write: 1.8 to 5.5V
- Operating frequency: 2.0MHz max.
- Write time: 4.0ms max.
- Sequential read
- Write protect function under low power supply voltage
- Protect function against write due to erroneous instruction recognition
- Endurance: 1 million cycles (85°C)
- Data retention: 100 years (25°C)
  50 years (85°C)

PACKAGE

8-Pin SOP (4000/reel) (5.02x6.0x1.75 max.)

8-Pin TSSOP (4000/reel) (3.0x6.4x1.1 max.)

S-93C46CD0I-J8T1U3
S-93C56CD0I-J8T1U3
S-93C66CD0I-J8T1U3
S-93C76CD0I-J8T1U3
S-93C86CD0I-J8T1U3

8-Pin SOP (4000/reel) (rotated) (5.02x6.0x1.75 max.)

TMSOP-8 (4000/reel) (2.9x4.0x0.8 max.)

S-93C46CD0I-I8T1U3
S-93C56CD0I-I8T1U3
S-93C66CD0I-I8T1U3
S-93C76CD0I-I8T1U3
S-93C86CD0I-I8T1U3

S-93C46CD0I-K8T3U3
S-93C56CD0I-K8T3U3
S-93C66CD0I-K8T3U3
S-93C76CD0I-K8T3U3
S-93C86CD0I-K8T3U3
FEATURES

- **Memory capacity**: S-34C02B: 2K bit (256 words x 8 bit)
- **Operating voltage range**
  - Read: 1.7 to 5.5V
  - Write: 1.7 to 5.5V
- **Operating frequency**: 400kHz max.
- **Write time**: 5.0ms max.
- **Page write**: 16 bytes/page
- **Sequential read**
- **Write protect function**: Software, Hardware
- **Protect area**: Hardware: 100%
  - Software: the lower address of 50%
- **CMOS Schmitt input (SCL, SDA)**
- **Write protect function under low power supply voltage**
- **Endurance**: 1 million cycles (25°C)
- **Data retention**: 100 years (25°C)

### PACKAGE

**DFN (5000/reel)**

1. A0
2. A1
3. A2
4. GND
5. SDA
6. SCL
7. WP
8. VCC

---

### S-34C04A

**FEATURES**

- **Memory capacity**: S-34C04A: 4K bit (256 words x 8 bit)
- **Operating voltage range**
  - Read: 1.7 to 3.6V
  - Write: 1.7 to 3.6V
- **Operating frequency**: 1MHz max.
- **Write time**: 5.0ms max.
- **Page write**: 16 bytes/page
- **Sequential read**
- **Write protect function**: Software
- **Protect area**: Set per 25%
- **CMOS Schmitt input (SCL, SDA)**
- **Write protect function under low power supply voltage**
- **Endurance**: 1 million cycles (25°C)
- **Data retention**: 100 years (25°C)

### PACKAGE

**DFN (5000/reel)**

1. SA0
2. SA1
3. SA2
4. VSS
5. SDA
6. SCL
7. NC
8. VDD
## Temperature Sensor Lineup

### Temperature sensor IC

<table>
<thead>
<tr>
<th>Analog output</th>
<th>Sensitivity: -8.2 mV/°C</th>
<th>S-8110C series</th>
<th>High-accuracy</th>
<th>S-8120C series</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>temperature sensor IC</td>
<td>Super-small SNT package</td>
<td></td>
<td></td>
<td></td>
<td>83</td>
</tr>
<tr>
<td>Temperature switch IC (Thermostat IC)</td>
<td></td>
<td>With latch function</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-wire serial</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital Output</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PWM Output</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Remark

These ICs are suitable for a wide range of applications such as temperature control and detection.

### Product Lineup

SII Semiconductor Corporation offers a variety of temperature sensor ICs, including analog output temperature sensor ICs that provide the linear output voltage, digital temperature sensor ICs, PWM output temperature sensor ICs, and temperature switch ICs (thermostat ICs) that invert the output according to the detected temperature. These ICs are suitable for a wide range of applications such as temperature control and detection.

#### Analog output temperature sensor IC

<table>
<thead>
<tr>
<th>Product name</th>
<th>Temperature sensitivity</th>
<th>Operating ambient temperature</th>
<th>Supply voltage range</th>
<th>Temperature accuracy</th>
<th>Current consumption (+25°C)</th>
<th>Package</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-8110C/8120C series</td>
<td>-8.20mV/°C</td>
<td>-40 to +100°C</td>
<td>2.4 to 10V</td>
<td>±0.5°C (S-8110C) ±2.5°C (S-8120C)</td>
<td>4.5µA</td>
<td>SOT-23-5</td>
<td>83</td>
</tr>
<tr>
<td>S-5813A/5814A series</td>
<td>-11.04mV/°C</td>
<td>-40 to +100°C</td>
<td>2.4 to 10V</td>
<td>±0.5°C (S-5813A) ±2.5°C (S-5814A)</td>
<td>4.0µA</td>
<td>SOT-23-5</td>
<td>83</td>
</tr>
<tr>
<td>S-58LM20A series</td>
<td>-11.77mV/°C</td>
<td>-55 to +130°C</td>
<td>2.4 to 5.5V</td>
<td>±2.5°C</td>
<td>4.5µA</td>
<td>SOT-23-5</td>
<td>84</td>
</tr>
</tbody>
</table>

#### Temperature switch IC (Thermostat IC)

<table>
<thead>
<tr>
<th>Product name</th>
<th>Type</th>
<th>Operating ambient temperature</th>
<th>Detection temperature range</th>
<th>Supply voltage range</th>
<th>Temperature accuracy</th>
<th>Current consumption (+25°C)</th>
<th>Package</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-5840B series</td>
<td>Latch</td>
<td>-40 to +100°C</td>
<td>+55 to +65°C</td>
<td>1.0 to 10V</td>
<td>±2.5°C</td>
<td>12µA</td>
<td>SOT-23-5</td>
<td>84</td>
</tr>
<tr>
<td>S-5841 series</td>
<td>Hysteresis</td>
<td>-40 to +125°C</td>
<td>+40 to +100°C</td>
<td>2.2 to 10V</td>
<td>±2.5°C</td>
<td>10µA</td>
<td>SOT-23-5</td>
<td>85</td>
</tr>
<tr>
<td>S-5843A series</td>
<td>Hysteresis</td>
<td>-40 to +125°C</td>
<td>+40 to +120°C</td>
<td>1.65 to 5.5V</td>
<td>±2.5°C</td>
<td>4.5µA</td>
<td>SOT-23-5</td>
<td>85</td>
</tr>
<tr>
<td>S-5844A series</td>
<td>Hysteresis</td>
<td>-40 to +125°C</td>
<td>+50 to +100°C</td>
<td>1.65 to 5.5V</td>
<td>±2.5°C</td>
<td>0.18µA</td>
<td>HSNT-4(1010) SOT-23-5</td>
<td>86</td>
</tr>
<tr>
<td>S-5842A series</td>
<td>Dual trip</td>
<td>-40 to +125°C</td>
<td>≤10 to +110°C</td>
<td>2.5 to 5.5V</td>
<td>±2.5°C</td>
<td>10µA</td>
<td>SOT-23-6</td>
<td>86</td>
</tr>
</tbody>
</table>

#### Digital output temperature sensor IC

<table>
<thead>
<tr>
<th>Product name</th>
<th>Temperature resolution</th>
<th>Operating ambient temperature</th>
<th>Supply voltage range</th>
<th>Temperature accuracy</th>
<th>Current consumption (+25°C)</th>
<th>Package</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-5851A series</td>
<td>0.0625°C</td>
<td>-40 to +125°C</td>
<td>2.7 to 5.5V</td>
<td>±2°C (±25 to ±65°C) ±3°C (±40 to ±125°C)</td>
<td>45µA (Operating) 1.0µA (Shutdown)</td>
<td>SOT-23-6</td>
<td>87</td>
</tr>
<tr>
<td>S-5852A series</td>
<td>0.5°C, 0.25°C, 0.125°C, 0.0625°C</td>
<td>-40 to +125°C</td>
<td>1.7 to 3.6V</td>
<td>±1°C (±25 to ±65°C) ±2°C (±75 to ±95°C) ±3°C (±100 to ±125°C)</td>
<td>40µA (Operating) 0.3µA (Shutdown)</td>
<td>HSNT-8(2030)</td>
<td>87</td>
</tr>
</tbody>
</table>

*1. The option of the high-accuracy temperature range can be selected.

#### PWM output temperature sensor IC

<table>
<thead>
<tr>
<th>Product name</th>
<th>Temperature resolution</th>
<th>Operating ambient temperature</th>
<th>Supply voltage range</th>
<th>Temperature accuracy</th>
<th>Current consumption (+25°C)</th>
<th>Package</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-5855A series</td>
<td>-1 to +41°C</td>
<td>-40 to +125°C</td>
<td>1.65 to 5.5V</td>
<td>±3°C</td>
<td>50µA</td>
<td>SOT-23-5</td>
<td>88</td>
</tr>
</tbody>
</table>

Remark: Please contact our sales office regarding WLP package products.
ANALOG OUTPUT TEMPERATURE SENSOR IC
(SENSITIVITY –11.04mV/°C)

**FEATURES**
- Temperature accuracy
  - S-5813A series: ±5.0°C (–30 to +100°C)
  - S-5814A series: ±2.5°C (–30 to +100°C)
- Linear output voltage
  - –11.04mV/°C typ.
  - Ta=–30°C: 2.582V typ.
  - Ta=+30°C: 1.940V typ.
  - Ta=+100°C: 1.145V typ.
- Nonlinearity ±0.5% typ. (–20 to +80°C)
- Power supply voltage
  - Vcc=2.4 to 10.0V (Ta=+25°C)
- Current consumption
  - 4.0µA typ. (Ta=+25°C)
- Built-in operational amplifier
- Output voltage referred to Vss

**APPLICATIONS**
- Compensation of high-frequency circuits such as mobile phones and radio equipment
- Compensation of oscillation frequency in crystal oscillator
- LCD contrast compensation
- Compensation of amplifier gain
- Compensation of auto focus circuits
- Temperature detection in battery management
- Overheating prevention for charged batteries or halogen lights

**S-5813A/5814A series**

**PIN CONFIGURATION**

```
 SNT-4A
 Top view

 1 VSS
 2 VDD
 3 VOUT
 4 NC
```

**ANALOG OUTPUT TEMPERATURE SENSOR IC
(SENSITIVITY –8.2mV/°C)

**FEATURES**
- Temperature accuracy:
  - S-8110C series: ±5.0°C (–30 to +100°C)
  - S-8120C series: ±2.5°C (–30 to +100°C)
- Linear output voltage
  - –8.20mV/°C typ.
  - Ta=–30°C: 1.951V typ.
  - Ta=+30°C: 1.474V typ.
  - Ta=+100°C: 0.882V typ.
- Nonlinearity ±0.5% typ. (–20 to +80°C)
- Power supply voltage range
  - Vcc=2.4 to 10.0V (Ta=+25°C)
- Current consumption
  - 4.5µA typ. (Ta=+25°C)
- Built-in operational amplifier
- Output voltage referred to Vss

**APPLICATIONS**
- Compensation of high-frequency circuits such as mobile phones and radio equipment
- Compensation of oscillation frequency in crystal oscillator
- LCD contrast compensation
- Temperature detection in battery management
- Compensation of amplifier gain
- Overheating prevention for charged batteries or halogen lights
- Compensation of auto focus circuits

**S-8110C/8120C series**

**PIN CONFIGURATIONS**

```
 SC-82AB
 Top view

 1 VDD
 2 VSS
 3 NC
 4 VOUT

 SNT-4A
 Top view

 1 VSS
 2 VDD
 3 VOUT
 4 NC
```
ANALOG OUTPUT TEMPERATURE SENSOR IC (SENSITIVITY -11.77mV/°C)

S-58LM20A series

FEATURES

- Temperature accuracy: ±2.5°C (-55 to +130°C)
- Linear output voltage
  - -11.77mV/°C typ.
    - $T_a=-30°C$: 2.205V typ.
    - $T_a=+30°C$: 1.515V typ.
    - $T_a=+130°C$: 0.303V typ.
- Nonlinearity: ±0.4% typ. (-20 to +80°C)
- Power supply voltage range
  - $V_{cc}=2.4$ to 5.5V (-30 to +130°C)
  - $V_{cc}=2.7$ to 5.5V (-55 to +130°C)
- Current consumption
  - 4.5μA typ. ($T_a=+25°C$)
  - 6.0μA max. (-55 to +130°C)
- Built-in operational amplifier
- Output voltage referred to Vss

APPLICATIONS

- Compensation of high-frequency circuits such as mobile phones and radio equipment
- Compensation of oscillation frequency in crystal oscillator
- LCD contrast compensation
- Compensation of amplifier gain
- Compensation of auto focus circuits
- Temperature detection in battery management
- Overheating prevention for charged batteries or halogen lights

TEMPERATURE SWITCH IC (THERMOSTAT IC)

S-5840B series

FEATURES

- Detection temperature: +55 to +95°C, 1°C step
- Detection temperature accuracy: ±2.5°C
- Power supply voltage range: $V_{cc}=1.0$ to 10.0V
- Release voltage: 2.2 to 3.4V, 0.1V step
- Current consumption: 12μA typ. ($T_a=+25°C$)
- Built-in error prevention circuit for temperature detection
- Output logic level is fixed by the latch after temperature detection
- Selectable output logic active high or low
- Selectable output form CMOS or Nch open drain

PIN CONFIGURATION

- SOT-23-5 Top view

1. Set the RT pin open in use.
**TEMPERATURE SWITCH IC (THERMOSTAT IC) S-5841 series**

**FEATURES**
- Detection temperature: +40 to +100°C, 1°C step
- Detection temperature accuracy: ±2.5°C
- Power supply voltage range: $V_{CC}$=2.2 to 10.0V (when detection temperature=+55 to +100°C, $T_a$=40 to +100°C)
- Current consumption: 10μA typ. ($T_a$=+25°C)
- Hysteresis temperature can be switched in 0°C, 2°C, 4°C and 10°C
- Selectable output logic active high or low
- Selectable output from CMOS or Nch open drain

**PIN CONFIGURATIONS**

```
SOT-23-5  Top view
1 1 3 4 5 6
2 2 5 4 3 6
1  HYS1
2  VSS
3  RT
4  DET
5  HYS2
6  VDD

SNT-6A  Top view
1 1 3 4 5 6
2 2 5 4 3 6
1  RT
2  VSS
3  HYS1
4  DET
5  HYS2
6  VDD
```

*1. Set the RT pin open in use.

*2. Set the HYS1 pin and the HYS2 pin as VDD or VSS in use.

**TEMPERATURE SWITCH IC (THERMOSTAT IC) S-5843A series**

**FEATURES**
- Detection temperature: +40 to +120°C, +1°C step
- Detection accuracy: ±2.5°C
- Power supply voltage range: $V_{CC}$=1.65 to 5.5V
- Current consumption: 4.5μA typ. ($T_a$=+25°C)
- Hysteresis temperature: selectable in 2°C, 4°C, 10°C or 20°C
- Selectable output logic active high or low
- Selectable output from CMOS or Nch open drain
- Prevent functions for false detection operation and false release operation

**PIN CONFIGURATIONS**

```
SOT-23-5  Top view
1 1 3 4 5 6
2 2 5 4 3 6
1  HYS1
2  VSS
3  RT
4  DET
5  VDD

SNT-6A  Top view
1 1 3 4 5 6
2 2 5 4 3 6
1  RT
2  VSS
3  NC
4  DET
5  NC
6  VDD
```

*1. Set the RT pin open in use.
**FEATURES**

- Detection temperature: +50 to +100°C, +5°C step
- Detection accuracy: ±2.5°C
- Power supply voltage range: \( V_{DD} = 1.65 \text{ to } 5.5V \)
- Current consumption: 0.18μA typ. (\( T_a = +25°C \))
- Hysteresis temperature: selectable in 5°C, 10°C, 15°C or 20°C
- Selectable output logic active high or low
- Selectable output form CMOS or Nch open drain

**PIN CONFIGURATIONS**

<table>
<thead>
<tr>
<th>SNT-4A</th>
<th>SNT-4(1010)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Top view" /></td>
<td><img src="image" alt="Top view" /></td>
</tr>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>DET</td>
<td>VSS</td>
</tr>
<tr>
<td>1 DET</td>
<td>2 VSS</td>
</tr>
</tbody>
</table>

*1. Connect the TEST pin to VSS or leave it open.

---

**FEATURES**

- Detection temperature: −10 to +110°C, 1°C step
- Detection temperature accuracy: ±2.5°C (is set for either detection temperature only)
- Power supply voltage range:
  - \( V_{DD} = 2.5 \text{ to } 5.5V \) (Detection temperature=+20 to +110°C)
  - \( V_{DD} = 2.7 \text{ to } 5.5V \) (Detection temperature=0 to +110°C)
  - \( V_{DD} = 2.8 \text{ to } 5.5V \) (Detection temperature=-10 to +110°C)
- Current consumption: 10μA typ. (\( T_a = +25°C \))
- The range of operation temperature: −40 to +125°C
- Selectable output logic high or low
- Selectable output form CMOS or Nch open drain
- Selectable product type
  - Separate type:
    - the DETH pin's output inverts during detection of higher temperature
    - the DETL pin's output inverts during detection of lower temperature
  - Integrated type:
    - the DETH pin's output inverts during detection of higher temperature
    - the DETL pin's output inverts during detection of higher and lower temperature

**PIN CONFIGURATIONS**

<table>
<thead>
<tr>
<th>SNT-6A</th>
<th>SOT-23-6</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Top view" /></td>
<td><img src="image" alt="Top view" /></td>
</tr>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>DETH</td>
<td>VSS</td>
</tr>
<tr>
<td>1 DETH</td>
<td>2 VSS</td>
</tr>
</tbody>
</table>

*1. Set the RTH pin open in use.
*2. Set the RTL pin open in use.
### DIGITAL OUTPUT TEMPERATURE SENSOR IC

#### FEATURES
- **Power supply voltage range:** $V_{CC}=2.7$ to 5.5V
- **Current consumption:** 45μA typ. (+25°C)
- **High accuracy:**
  - ±2.0°C (max.) for −25 to +85°C
  - ±3.0°C (max.) for −40 to +125°C
- **Temperature resolution:** 0.0625°C
- **Digital output:** 2-wire serial interface (I2C-bus)
- **Maximum operating frequency:** 400kHz
- **Built-in low power supply voltage detection circuit**

#### PIN CONFIGURATIONS

![PIN CONFIGURATIONS](image)

### DIGITAL OUTPUT TEMPERATURE SENSOR IC (WITH THERMOSTAT FUNCTION)

#### FEATURES
- **Power supply voltage range:** $V_{CC}=1.7$ to 3.6V
- **Current consumption:** 40μA typ. (+25°C)
- **High accuracy:**
  - ±0.5°C typ. / ±1.0°C max. (Ta=0 to +65°C)
  - ±0.5°C typ. / ±1.0°C max. (Ta=+75 to +95°C)
  - ±3.0°C max. (Ta=−40 to +125°C)
- **Temperature resolution:** 0.5°C, 0.25°C, 0.125°C, 0.0625°C
- **Digital output:** 2-wire serial interface (I2C-bus)
- **Operating frequency:** 1.0MHz max. ($V_{CC}=2.2$ to 3.6V)
  - 400kHz max. ($V_{CC}=1.7$ to 2.2V)
- **Temperature sample rate:** 7 samples/s min.
- **Hysteresis width:** No hysteresis, 1.5°C, 3.0°C, 6.0°C
- **Thermostat function:** Dual trip mode, single trip mode
- **Noise suppression:** Schmitt trigger and noise filter on input pins (SCL, SDA)

1. The option of the high-accuracy temperature range can be selected.

#### PIN CONFIGURATIONS

![PIN CONFIGURATIONS](image)

### APPLICATIONS
- **Power supply temperature monitoring**
- **Battery temperature monitoring**
- **Air conditioning system**
- **Electronic devices**
- **Solid state drive**
- **Hard disk drive**
- **Notebook PC, tablet PC**
- **Refrigerator**
- **Air conditioning system**

Specs described herein are subject to change without notice. For information about new products, refer to our SII Semiconductor Corporation website.

www.sii-ic.com  SII Semiconductor Corporation Web site
PWM OUTPUT TEMPERATURE SENSOR IC

S-5855A series

FEATURES

- Power supply voltage range: $V_	ext{DD}=1.65$ to 5.5V
- Current consumption: $50\mu\text{A}$ (typ.), $Ta=+25^\circ\text{C}$
- Temperature accuracy: $\pm3.0^\circ\text{C}$
- Duty change-start temperature
  Selectable from $+40$ to $+80^\circ\text{C}$ in 10°C step
- Duty temperature sensitivity
  Selectable from $-1\%$ to $-4\%$/°C in 1%/°C step

APPLICATIONS

- Temperature compensation for LED instruments
Magnetic Sensor Lineup

Magnetic sensor IC

- Hall effect IC
  - Small, Low current consumption type
  - Omnipolar/unipolar detection type Hall effect switch IC
    - Operation voltage range
      - 1.6 to 3.5V
      - 1.6 to 3.6V
      - 2.7 to 5.5V
    - Operation temperature (max.)
      - 85°C
      - 85°C
      - 85°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
  - Bipolar Hall effect latch IC
    - Operation voltage range
      - 1.6 to 3.5V
      - 2.7 to 5.5V
    - Operation temperature (max.)
      - 85°C
      - 85°C
      - 85°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
  - Unipolar detection type Hall effect switch IC
    - Operation voltage range
      - 3.5 to 26.0V
    - Operation temperature (max.)
      - 85°C
      - 85°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
  - Bipolar Hall effect latch IC
    - Operation voltage range
      - 3.5 to 26.0V
      - 2.7 to 26.0V
    - Operation temperature (max.)
      - 85°C
      - 85°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C
      - 125°C

Package
- SOT-23-3
- SOT-23-5
- SOT-23-6
- TO-92

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NEW : New product

: New product
Product Lineup
SII Semiconductor Corporation offers a diverse range of Hall effect ICs, developed by using CMOS technology, that operate with high sensitivity, low current consumption, high speeds, and high temperatures. These Hall effect ICs can be used to detect the open/close state and rotation of various devices by using a magnet with them.

● Small, Low current consumption type

<table>
<thead>
<tr>
<th>Product name</th>
<th>Pole detection</th>
<th>Operating cycle (typ.)</th>
<th>Current consumption (typ.)</th>
<th>Supply voltage range</th>
<th>Magnetic sensitivity (Bcr typ.)</th>
<th>Operation temperature range</th>
<th>Package</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-5712 series</td>
<td>Omnipolar detection</td>
<td>5.70ms</td>
<td>12.5μA</td>
<td>1.6 to 3.5V</td>
<td>±1.8mT, ±3.0mT, ±4.5mT</td>
<td>-40 to +85°C</td>
<td>SNT-4A SOT-23-3</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>Omnipolar detection</td>
<td>204.10ms</td>
<td>1.5μA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unipolar detection</td>
<td>6.05ms</td>
<td>6.5μA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unipolar detection</td>
<td>50.85ms</td>
<td>1.4μA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-5717 series</td>
<td>Omnipolar detection</td>
<td>50.50ms</td>
<td>2.0μA</td>
<td>1.6 to 3.6V</td>
<td>±3.3mT</td>
<td>-60 to +85°C</td>
<td>SNT-4A</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>Unipolar detection</td>
<td>50.85ms</td>
<td>1.4μA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-5715 series</td>
<td>Omnipolar detection</td>
<td>0.10ms</td>
<td>1400.5μA</td>
<td>2.7 to 5.5V</td>
<td>±1.8mT, ±3.0mT, ±4.5mT, ±7.0mT</td>
<td>-40 to +85°C</td>
<td>SNT-4A SOT-23-3</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>Unipolar detection</td>
<td>0.05ms</td>
<td>1400.5μA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unipolar detection</td>
<td>1.25ms</td>
<td>60.0μA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unipolar detection</td>
<td>6.05ms</td>
<td>13.0μA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>S-5716 series</td>
<td>Omnipolar detection</td>
<td>50.50ms</td>
<td>4.0μA</td>
<td>2.7 to 5.5V</td>
<td>±1.8mT, ±3.0mT, ±4.5mT, ±7.0mT</td>
<td>-40 to +85°C</td>
<td>SNT-4A SOT-23-3</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>Unipolar detection</td>
<td>50.85ms</td>
<td>2.6μA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-5718 series</td>
<td>Unipolar detection</td>
<td>0.05ms</td>
<td>1400.0μA</td>
<td>2.7 to 5.5V</td>
<td>±1.8mT, ±3.0mT, ±4.5mT, ±7.0mT</td>
<td>-40 to +125°C</td>
<td>SOT-23-3</td>
<td>93</td>
</tr>
<tr>
<td>S-5724 series</td>
<td>Bipolar latch</td>
<td>0.05ms</td>
<td>640.0μA</td>
<td>1.6 to 3.5V</td>
<td>±1.8mT, ±4.5mT, ±7.0mT</td>
<td>-40 to +85°C</td>
<td>SNT-4A SOT-23-3</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>Bipolar latch</td>
<td>1.25ms</td>
<td>26.0μA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bipolar latch</td>
<td>6.05ms</td>
<td>6.0μA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-5725 series</td>
<td>Bipolar latch</td>
<td>0.05ms</td>
<td>1400.0μA</td>
<td>2.7 to 5.5V</td>
<td>±1.8mT, ±3.0mT, ±4.5mT, ±7.0mT</td>
<td>-40 to +85°C</td>
<td>SNT-4A SOT-23-3</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td>Bipolar latch</td>
<td>1.25ms</td>
<td>60.0μA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bipolar latch</td>
<td>6.05ms</td>
<td>13.0μA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-5741 A series</td>
<td>Bipolar latch</td>
<td>0.05ms</td>
<td>1400.0μA</td>
<td>2.7 to 5.5V</td>
<td>±1.8mT, ±3.0mT, ±4.5mT, ±7.0mT</td>
<td>-40 to +125°C</td>
<td>SOT-23-3S</td>
<td>98</td>
</tr>
</tbody>
</table>

● High-speed, High-withstand voltage type

<table>
<thead>
<tr>
<th>Product name</th>
<th>Pole detection</th>
<th>Chopping frequency (typ.)</th>
<th>Output delay time (typ.)</th>
<th>Supply voltage range</th>
<th>Magnetic sensitivity (Bcr typ.)</th>
<th>Operation temperature range</th>
<th>Package</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-5731 series</td>
<td>Unipolar detection</td>
<td>250kHz</td>
<td>16.0μs</td>
<td>3.5 to 26.0V</td>
<td>±3.0mT, ±6.0mT</td>
<td>-40 to +85°C</td>
<td>SOT-23-3</td>
<td>95</td>
</tr>
<tr>
<td>S-5732 B series</td>
<td>Unipolar detection</td>
<td>250kHz</td>
<td>16.0μs</td>
<td>3.5 to 26.0V</td>
<td>±3.0mT, ±6.0mT</td>
<td>-40 to +85°C</td>
<td>TO-92S</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>Unipolar detection</td>
<td>250kHz</td>
<td>16.0μs</td>
<td>3.5 to 26.0V</td>
<td>±3.0mT, ±6.0mT</td>
<td>-40 to +125°C</td>
<td>TO-92S</td>
<td>96</td>
</tr>
<tr>
<td>S-5744 B series</td>
<td>Bipolar latch</td>
<td>500kHz</td>
<td>8.0μs</td>
<td>3.5 to 26.0V</td>
<td>±1.8mT, ±3.0mT, ±6.0mT</td>
<td>-40 to +85°C</td>
<td>TO-92S</td>
<td>97</td>
</tr>
<tr>
<td>S-5743 A series</td>
<td>Bipolar latch</td>
<td>500kHz</td>
<td>8.0μs</td>
<td>3.5 to 26.0V</td>
<td>±1.5mT, ±2.2mT, ±3.0mT</td>
<td>-40 to +125°C</td>
<td>SOT-23-3S</td>
<td>98</td>
</tr>
</tbody>
</table>
LOW VOLTAGE OPERATION
OMNIPOLAR / UNIPOLAR DETECTION TYPE HALL EFFECT SWITCH IC
S-5712 series

FEATURES
- Pole detection: Detection of omnipolar, S pole or N pole
- Output logic: Active low, Active high
- Output form: Nch open drain output, CMOS output
- Magnetic sensitivity: $B_{cr}=1.8\,\text{mT\,typ.},\,3.0\,\text{mT\,typ.},\,4.5\,\text{mT\,typ.}$
- Operating cycle (current consumption):
  Product with omnipolar detection
  - $5.70\,\text{ms\,(12.0\,\mu A\,typ.}}$
  - $50.50\,\text{ms\,(2.0\,\mu A\,typ.)}$
  - $204.10\,\text{ms\,(1.0\,\mu A\,typ.)}$
  Product with S pole or N pole detection
  - $6.85\,\text{ms\,(6.0\,\mu A\,typ.)}$
  - $50.85\,\text{ms\,(1.4\,\mu A\,typ.)}$
- Power supply voltage range: 1.6 to 3.5V
- Operation temperature range: $-40$ to $+85\,\text{°C}$

PIN CONFIGURATIONS

S-5717 series

FEATURES
- Pole detection: Detection of omnipolar, S pole or N pole
- Output logic: Active low, Active high
- Output form: Nch open drain output, CMOS output
- Magnetic sensitivity: $B_{cr}=3.3\,\text{mT\,typ.}$
- Operating cycle (current consumption):
  Product with omnipolar detection
  - $50.50\,\text{ms\,(2.0\,\mu A\,typ.)}$
  Product with S pole or N pole detection
  - $50.85\,\text{ms\,(1.4\,\mu A\,typ.)}$
- Power supply voltage range: 1.6 to 3.6V
- Operation temperature range: $-40$ to $+85\,\text{°C}$

PIN CONFIGURATION
**FEATURES**

- **Pole detection:** Detection of omnipolar, S pole or N pole
- **Output logic:** Active low, Active high
- **Output form:** Nch open drain output, CMOS output
- **Magnetic sensitivity:** \( B_0 = 3.0 \text{mT} \) typ.
- **Operating cycle (current consumption):**
  - Product with omnipolar detection
    - 0.10 ms (1400.0 \mu A) typ.
    - 0.90 ms (155.0 \mu A) typ.
    - 5.70 ms (26.0 \mu A) typ.
  - Product with S pole or N pole detection
    - 0.05 ms (1400.0 \mu A) typ.
    - 1.25 ms (60.0 \mu A) typ.
    - 6.05 ms (13.0 \mu A) typ.
- **Power supply voltage range:** 2.7 to 5.5 V
- **Operation temperature range:** -40 to +85°C

**PIN CONFIGURATIONS**

![PIN CONFIGURATIONS](image)
125°C OPERATION HIGH-SPEED UNIPOLAR DETECTION TYPE HALL EFFECT SWITCH IC  
**S-57B1 series**

**FEATURES**
- Pole detection: Detection of S pole
- Output logic: Active low, Active high
- Output form: Nch open drain output, CMOS output
- Magnetic sensitivity: \( B_{0}=3.0 \text{mT typ.}, \ 4.5 \text{mT typ.}, \ 7.0 \text{mT typ.} \)
- Operating cycle (current consumption): 0.05ms (1400.0μA) typ.
- Power supply voltage range: 2.7 to 5.5V
- Operation temperature range: -40 to +125°C

**PIN CONFIGURATION**

---

LOW VOLTAGE OPERATION HIGH-SPEED BIPOLAR HALL EFFECT LATCH IC  
**S-5724 series**

**FEATURES**
- Pole detection: Bipolar latch
- Output logic: \( V_{\text{OUT}}=\text{"L" at S pole detection} \) \( V_{\text{OUT}}=\text{"H" at S pole detection} \)
- Output form: Nch open drain output, CMOS output
- Magnetic sensitivity: \( B_{0}=3.0 \text{mT typ.}, \ 4.5 \text{mT typ.}, \ 7.0 \text{mT typ.} \)
- Operating cycle (current consumption): 50μs (640.0μA) typ. 1.25ms (26.0μA) typ. 6.05ms (6.0μA) typ.
- Power supply voltage range: 1.6 to 3.5V
- Operating temperature range: -40 to +85°C
- Built-in power-down circuit (only SNT-4A)

**PIN CONFIGURATIONS**

---
HIGH SPEED BIPOLAR HALL EFFECT LATCH IC

**FEATURES**
- Pole detection: Bipolar latch
- Output logic: 
  - \( V_{OUT}="L" \) at S pole detection
  - \( V_{OUT}="H" \) at S pole detection
- Output form: Nch open drain output, CMOS output
- Magnetic sensitivity: \( B_0=0.8\text{mT typ.}, 1.8\text{mT typ.}, 3.0\text{mT typ.}, 7.0\text{mT typ.} \)
- Operating cycle: 
  - 50\( \mu \text{s} \) (1400.0\( \mu \text{A} \) typ.)
  - 1.25ms (60.0\( \mu \text{A} \) typ.)
  - 6.05ms (13.0\( \mu \text{A} \) typ.)
- Power supply voltage range: 2.7 to 5.5V
- Operating temperature range: \(-40 \text{ to } +85^\circ\text{C} \)
- Built-in power-down circuit (only SNT-4A)

**PIN CONFIGURATIONS**

---

125°C OPERATION HIGH-SPEED BIPOLAR HALL EFFECT LATCH IC

**FEATURES**
- Pole detection: Bipolar latch
- Output logic: 
  - \( V_{OUT}="L" \) at S pole detection
  - \( V_{OUT}="H" \) at S pole detection
- Output form: Nch open drain output, CMOS output
- Magnetic sensitivity: \( B_0=3.0\text{mT typ.} \)
- Operating cycle (current consumption): 0.05ms (1400.0\( \mu \text{A} \) typ.)
- Power supply voltage range: 2.7 to 5.5V
- Operating temperature range: \(-40 \text{ to } +125^\circ\text{C} \)
HIGH-WITHSTAND VOLTAGE
HIGH-SPEED UNIPOLAR DETECTION TYPE HALL EFFECT SWITCH IC

S-5731 series

FEATURES

- Pole detection:
  Detection of S pole
  or N pole

- Output logic:
  Active low, Active high

- Output form:
  Nch open drain output,
  Nch driver + built-in pull-up resistor

- Magnetic sensitivity:
  $B_{0\text{r}}=3.0\text{mT}$ typ., $6.0\text{mT}$ typ.

- Chopping frequency:
  $250\text{kHz}$ typ.

- Output delay time:
  $16.0\mu\text{s}$ typ.

- Power supply voltage range:
  $3.5$ to $26.0\text{V}$

- Built-in regulator

- Built-in output current limit circuit

- Operation temperature range:
  $-40$ to $+85^\circ\text{C}$

PIN CONFIGURATION

SOT-03-3
Top view

1  VSS
2  VDD
3  OUT

Specifications:

- Output logic: Active low, Active high
- Magnetic sensitivity: $B_{0\text{r}}=3.0\text{mT}$ typ., $6.0\text{mT}$ typ.
- Chopping frequency: $250\text{kHz}$ typ.
- Output delay time: $16.0\mu\text{s}$ typ.
- Power supply voltage range: $3.5$ to $26.0\text{V}$
- Built-in regulator
- Bottom view
- Bottom view
- Top view
- Side view

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125°C OPERATION HIGH-WITHSTAND VOLTAGE HIGH-SPEED UNIPOLAR DETECTION TYPE HALL EFFECT SWITCH IC

NEW S-5732 B series

FEATURES
- Pole detection: Detection of S pole or N pole
- Output logic: Active low, Active high
- Output form: Nch open drain output, Nch driver + built-in pull-up resistor
- Magnetic sensitivity: Bn=3.0mT typ., Bp=6.0mT typ.
- Chopping frequency: fc=250kHz typ.
- Output delay time: toc=16.0µs typ.
- Power supply voltage range: VDD=3.5 to 26.0V
- Built-in regulator
- Built-in output current limit circuit
- Operating temperature range: −40 to +125°C

PIN CONFIGURATION

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HIGH-WITHSTAND VOLTAGE HIGH-SPEED BIPOLAR HALL EFFECT LATCH IC

NEW S-5742 I series

FEATURES
- Pole detection: Bipolar latch
- Output logic: VOUT="L" at S pole detection
- Output form: Nch open drain output, Nch driver + built-in pull-up resistor
- Magnetic sensitivity: Bn=1.8mT typ., Bp=3.0mT typ., Bp=6.0mT typ.
- Chopping frequency: fc=500kHz typ.
- Output delay time: to=8.0µs typ.
- Power supply voltage range: VDD=3.5 to 26.0V
- Built-in regulator
- Built-in output current limit circuit
- Operating temperature range: −40 to +85°C

PIN CONFIGURATION

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**125°C OPERATION HIGH-WITHSTAND VOLTAGE HIGH-SPEED BIPOLAR HALL EFFECT LATCH IC**

**FEATURES**
- Pole detection: Bipolar latch
- Output logic: $V_{\text{OUT}}=\text{L}$ at S pole detection
- Output logic: $V_{\text{OUT}}=\text{H}$ at S pole detection
- Output form: Nch open drain output, Nch driver + built-in pull-up resistor
- Magnetic sensitivity: $B_{\text{OP}}=1.8\text{mT typ.}$, $3.0\text{mT typ.}$, $6.0\text{mT typ.}$
- Chopping frequency: 500kHz
- Output delay time: 8.0μs
- Power supply voltage range: 3.5 to 26.0V
- Built-in regulator
- Built-in output current limit circuit
- Operating temperature range: $-40$ to $+125^\circ\text{C}$

**PIN CONFIGURATION**

---

**125°C OPERATION HIGH-WITHSTAND VOLTAGE HIGH-SPEED BIPOLAR HALL EFFECT LATCH IC**

**FEATURES**
- Pole detection: Bipolar latch
- Output logic: $V_{\text{OUT}}=\text{L}$ at S pole detection
- Output logic: $V_{\text{OUT}}=\text{H}$ at S pole detection
- Output form: Nch open drain output, Nch driver + built-in pull-up resistor
- Magnetic sensitivity: $B_{\text{OP}}=1.8\text{mT typ.}$, $3.0\text{mT typ.}$, $6.0\text{mT typ.}$
- Chopping frequency: $f_c=500\text{kHz typ.}$
- Output delay time: $t_o=8.0\mu\text{s typ.}$
- Power supply voltage range: $V_{\text{DD}}=3.5$ to 26.0V
- Built-in regulator
- Built-in output current limit circuit
- Operating temperature range: $-40$ to $+125^\circ\text{C}$

**PIN CONFIGURATION**

---

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125°C OPERATION HIGH-WITHSTAND VOLTAGE HIGH-SPEED BIPOLAR HALL EFFECT LATCH IC

FEATURES

- Pole detection: Bipolar latch
- Output logic: 
  \( V_{OUT}=L \) at S pole detection
  \( V_{OUT}=H \) at S pole detection
- Output form: Nch open drain output
- Magnetic sensitivity: 
  \( B_{S}=0.5\text{mT typ.,} \)
  \( B_{S}=1.5\text{mT typ.,} \)
  \( B_{S}=2.2\text{mT typ.,} \)
  \( B_{S}=3.0\text{mT typ.} \)
- Chopping frequency: 500kHz
- Output delay time: 8.0\( \mu \text{s} \)
- Power supply voltage range: 2.7 to 26.0V
- Built-in regulator
- Built-in output current limit circuit
- Operating temperature range: −40 to +125°C

PIN CONFIGURATION

SOT-23-3S
Top view

1 VSS
2 VDD
3 OUT

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Faint Signal Detection ICs Lineup

Product Lineup
Due to its ultra-low current consumption and low-voltage operation, faint signal detection IC is suitable for battery-operated small mobile device applications.

<table>
<thead>
<tr>
<th>Product name</th>
<th>Type</th>
<th>Features</th>
<th>Current consumption</th>
<th>Supply voltage</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-5470 series</td>
<td>Faint signal detection</td>
<td>0.7mA faint current detection</td>
<td>0.1nA or less</td>
<td>0.9 to 5.5V</td>
<td>SOT-23-5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Package</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOT-23-5</td>
<td>100</td>
</tr>
</tbody>
</table>
ULTRA-LOW CURRENT CONSUMPTION
NORMALLY-OFF FAINT SIGNAL DETECTION IC
S-5470 series

FEATURES

- Ultra-low current consumption: $I_{\text{os}}=0.1\text{nA typ.}$
- Faint current detection: $I_{\text{DET}}=0.7\text{nA typ.}$
- Wide operation voltage range: $V_{\text{DD}}=0.9$ to 5.5V
- Detection of faint signal:
  - Detects faint signals of approximately 0.7nW (1.0V, 0.7nA typ.)
- Detection of signal strength difference:
  - Detects difference between strengths of two signals input at the same time

APPLICATIONS

- Detects output signals of electric generating devices or sensor devices with high internal resistance
- Advanced sensing using two electric generating devices or sensor devices
- Miniaturization and low power consumption for various sensors of portable and wireless devices

PIN CONFIGURATION

SOT-23-5 Top view

1 VDD
2 VSS
3 INM
4 INP
5 OUT

1 4
3 5
2
Amplifiers Lineup

Operational Amplifier Product Lineup
SIL Semiconductor Corporation CMOS operational amplifiers are the ICs in which a general-purpose analog circuit is embedded in a small package. Low voltage driving and low current consumption make them optimum for small mobile devices driven by batteries.

<table>
<thead>
<tr>
<th>Product name</th>
<th>Input Rail-to-Rail</th>
<th>Operating power supply voltage range</th>
<th>Current consumption (Per circuit)</th>
<th>Input offset voltage</th>
<th>Gain bandwidth product</th>
<th>Slow rate</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-89430 series</td>
<td>Yes</td>
<td>0.9 to 5.5V</td>
<td>0.5μA</td>
<td>5.0μV</td>
<td>4.8kHz</td>
<td>5.0V/1μs</td>
<td>SOT-23-5</td>
</tr>
<tr>
<td>S-89431 series</td>
<td>Yes</td>
<td>0.9 to 5.5V</td>
<td>0.5μA</td>
<td>3.0μV</td>
<td>4.8kHz</td>
<td>5.0V/1μs</td>
<td>SOT-23-5</td>
</tr>
<tr>
<td>S-89110 series</td>
<td>–</td>
<td>1.8 to 5.5V</td>
<td>0.1μA</td>
<td>4.0μV</td>
<td>17kHz</td>
<td>0.07V/μs</td>
<td>SOT-23-5</td>
</tr>
<tr>
<td>S-89120 series</td>
<td>–</td>
<td>1.8 to 5.5V</td>
<td>10μA</td>
<td>3.0μV</td>
<td>35kHz</td>
<td>0.015V/μs</td>
<td>SOT-23-5</td>
</tr>
<tr>
<td>S-89130 series</td>
<td>–</td>
<td>2.7 to 5.5V</td>
<td>10μA</td>
<td>3.0μV</td>
<td>3.0kHz</td>
<td>2.0V/5μs</td>
<td>SOT-23-5</td>
</tr>
<tr>
<td>S-89140 series</td>
<td>–</td>
<td>2.7 to 5.5V</td>
<td>0.27μA</td>
<td>7.0μV</td>
<td>1.0kHz</td>
<td>0.5V/5μs</td>
<td>SOT-23-5</td>
</tr>
<tr>
<td>S-89713 series</td>
<td>Yes</td>
<td>2.6 to 5.5V</td>
<td>165μA</td>
<td>10.0μV</td>
<td>24kHz</td>
<td>0.16V/μs</td>
<td>SOT-23-5</td>
</tr>
</tbody>
</table>

Comparator Product Lineup
SIL Semiconductor Corporation CMOS comparators are the ICs in which a general-purpose analog circuit is embedded in a small package. The low voltage driving and low current consumption make them optimum for small mobile devices that use battery.

<table>
<thead>
<tr>
<th>Product name</th>
<th>Input Rail-to-Rail</th>
<th>Operating power supply voltage range</th>
<th>Current consumption (Per circuit)</th>
<th>Input offset voltage</th>
<th>Rise propagation delay time (During ηVcc=3.0V)</th>
<th>Fall propagation delay time (During ηVcc=3.0V)</th>
<th>Output rise time (During ηVcc=3.0V)</th>
<th>Output fall time (During ηVcc=3.0V)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-89530 series</td>
<td>Yes</td>
<td>0.9 to 5.5V</td>
<td>0.7μA</td>
<td>5.0μV</td>
<td>110μs</td>
<td>280μs</td>
<td>10μs</td>
<td>30μs</td>
<td>S-894A</td>
</tr>
<tr>
<td>S-89531 series</td>
<td>Yes</td>
<td>0.9 to 5.5V</td>
<td>1.4μA</td>
<td>5.0μV</td>
<td>110μs</td>
<td>280μs</td>
<td>10μs</td>
<td>30μs</td>
<td>S-894A</td>
</tr>
<tr>
<td>S-89210 series</td>
<td>–</td>
<td>1.8 to 5.5V</td>
<td>50μA</td>
<td>3.0μV</td>
<td>150μs</td>
<td>30μs</td>
<td>10μs</td>
<td>10μs</td>
<td>S-894A</td>
</tr>
<tr>
<td>S-89220 series</td>
<td>–</td>
<td>1.8 to 5.5V</td>
<td>30μA</td>
<td>4.0μV</td>
<td>26μs</td>
<td>4μs</td>
<td>2μs</td>
<td>2μs</td>
<td>S-894A</td>
</tr>
<tr>
<td>S-89230 series</td>
<td>–</td>
<td>1.8 to 5.5V</td>
<td>20μA</td>
<td>4.0μV</td>
<td>10μs</td>
<td>10μs</td>
<td>10μs</td>
<td>TMSOP-8 S-89BA</td>
<td></td>
</tr>
<tr>
<td>S-89240 series</td>
<td>–</td>
<td>1.8 to 5.5V</td>
<td>5μA</td>
<td>4.0μV</td>
<td>100μs</td>
<td>18μs</td>
<td>10μs</td>
<td>TMSOP-8 S-89BA</td>
<td></td>
</tr>
</tbody>
</table>

CMOS IC 2016-2017
SIL Semiconductor Corporation www.sil-ic.com

101
0.5μA RAIL-TO-RAIL CMOS OPERATIONAL AMPLIFIER 

S-89430/89431 series

**FEATURES**
- Operating power supply voltage range: 0.9 to 5.5V
- Current consumption (per circuit): 0.5μA typ.
- I/O voltage range (Rail-to-Rail): \( V_{\text{CM}} = V_{\text{SS}} \) to \( V_{\text{DD}} \)
- Input offset voltage: 10.0mV Max. (S-89430 series)
  5.0mV Max. (S-89431 series)
- Operating temperature range: -40 to +85°C
- No external capacitors required for internal phase compensation

**APPLICATIONS**
- Mobile phones, Digital cameras, Notebook PCs, Digital video cameras

**PIN CONFIGURATIONS**

CMOS OPERATIONAL AMPLIFIER 

S-89110/89120 series

**FEATURES**
- Operating power supply voltage range: 1.8 to 5.5 V
- Current consumption (per circuit):
  50μA typ. (S-89110 series)
  10μA typ. (S-89120 series)
- Input offset voltage: 4.0mV max.
- Operating temperature range: -40 to +85°C
- No external capacitors required for internal phase compensation
- Output full swing

**APPLICATIONS**
- Mobile phones, Digital cameras, Notebook PCs, Digital video cameras

**PIN CONFIGURATIONS**
**CMOS OPERATIONAL AMPLIFIER**

**S-89130/89140 series**

**FEATURES**
- Operating power supply voltage range: 2.7 to 5.5V
- Current consumption (per circuit):
  - 1.00mA typ. (S-89130 series)
  - 0.27mA typ. (S-89140 series)
- Input offset voltage: 6.0mV max. (S-89130 series)
  - 7.0mV max. (S-89140 series)
- Operational temperature range: -40 to +125°C
- No external capacitors required for internal phase compensation

**APPLICATIONS**
- Current sensing
- Signal amplification
- Buffer
- Active filter
- Electronics devices

**PIN CONFIGURATIONS**

![PIN CONFIGURATIONS](image_url)

**LOW INPUT OFFSET VOLTAGE CMOS OPERATIONAL AMPLIFIER**

**S-89713 series**

**FEATURES**
- Operating power supply voltage range: 2.65 to 5.5V
- Low current consumption (for 1 circuit): 165μA typ.
- Input offset voltage: 10μV Max.
- Operating temperature range: -40 to +85°C
- No external capacitors required for internal phase compensation
- Rail-to-Rail I/O

**APPLICATIONS**
- Various sensor interface, High-accuracy current detection, Strain gauge amplifiers, Game, Various electric devices

**PIN CONFIGURATIONS**

![PIN CONFIGURATIONS](image_url)
0.7μA RAIL-TO-RAIL CMOS COMPARATOR

**FEATURES**
- Operating power supply voltage range: 0.9 to 5.5V
- Current consumption: 0.7μA typ.
- I/O voltage range (Rail-to-Rail): \( V_{CMN} = V_{SS} \) to \( V_{DD} \)
- Input offset voltage: 10.0mV Max. (S-89530 series)
- 5.0mV Max. (S-89531 series)
- Operating temperature range: −40 to +85°C

**APPLICATIONS**
- Mobile phones, Digital cameras, Notebook PCs, Digital video cameras

**PIN CONFIGURATION**

CMOS COMPARATOR

**FEATURES**
- Operating power supply voltage range: 1.8 to 5.5V
- Current consumption: 50μA typ. (S-89210 series)
- 10μA typ. (S-89220 series)
- Input offset voltage: 4.0mV max.
- Operating temperature range: −40 to +85°C

**APPLICATIONS**
- Mobile phones, Digital cameras, Notebook PCs, Digital video cameras

**PIN CONFIGURATION**
CMOS COMPARATOR

FEATURES

- Operating power supply voltage range: 1.8 to 5.5V
- Current consumption (per circuit):
  - 23μA typ. (S-9230 series)
  - 5μA typ. (S-9240 series)
- Input offset voltage: 4.0mV Max.
- Operating temperature range: -40 to +85°C
- Output full swing

APPLICATIONS

- Mobile phones, Digital cameras, Notebook PCs, Digital video cameras

PIN CONFIGURATIONS

S-89230/89240 series

CMOS IC 2016-2017
SII Semiconductor Corporation www.sii-ic.com

105
Real-time Clock Lineup

Product Lineup
Real-time clock ICs send and set the data of time/calendar when they receive a code from CPU. These ICs feature low current consumption and low voltage operation.

<table>
<thead>
<tr>
<th>Type</th>
<th>Product name</th>
<th>Features</th>
<th>Operating voltage</th>
<th>Current consumption</th>
<th>Package</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-wire (I2C-bus)</td>
<td>S-35390A/35391A</td>
<td>Super-low 0.25µA current consumption</td>
<td>1.1 to 5.5V</td>
<td>0.25µA (3.0V)</td>
<td>SNT-8A</td>
<td>108</td>
</tr>
<tr>
<td></td>
<td>S-35392A</td>
<td>Constant 32kHz output</td>
<td>1.1 to 5.5V</td>
<td>0.45µA (3.0V)</td>
<td>SNT-8A</td>
<td>109</td>
</tr>
<tr>
<td></td>
<td>S-35399A03</td>
<td>Alarm settable to day/month/year</td>
<td>1.1 to 5.5V</td>
<td>0.34µA (3.0V)</td>
<td>SNT-8A</td>
<td>109</td>
</tr>
<tr>
<td>3-wire (MICROWIRE)</td>
<td>S-35190A</td>
<td>Super-low 0.25µA current consumption</td>
<td>1.1 to 5.5V</td>
<td>0.25µA (3.0V)</td>
<td>SNT-8A</td>
<td>108</td>
</tr>
<tr>
<td></td>
<td>S-35192A</td>
<td>Constant 32kHz output</td>
<td>1.1 to 5.5V</td>
<td>0.45µA (3.0V)</td>
<td>SNT-8A</td>
<td>109</td>
</tr>
<tr>
<td></td>
<td>S-78190A series</td>
<td>Switch Input Detection Function</td>
<td>1.1 to 5.5V</td>
<td>0.35µA (3.0V)</td>
<td>16-Pin TSSOP</td>
<td>110</td>
</tr>
</tbody>
</table>

*1. S-35390A only
REAL-TIME CLOCK ICs

- SII CRYSTAL OSCILLATORS (32.768kHz) -

Using SII crystal oscillators achieve high accuracy clock operation when combined with an SII Semiconductor Corporation real-time clock IC.

CRYSTAL OSCILLATOR PRODUCTS

<table>
<thead>
<tr>
<th>Product name</th>
<th>Appearance</th>
<th>Frequency deviation</th>
<th>Load capacitance</th>
<th>Maximum excitation level</th>
<th>Recommended excitation level</th>
<th>Dimensions (mm) (max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VT-200-F</td>
<td>Cylinder</td>
<td>±50ppm, ±10ppm, ±20ppm</td>
<td>6.0pF</td>
<td>1μW</td>
<td>0.1μW</td>
<td>2.0 – – 6.0</td>
</tr>
<tr>
<td>VT-200-FL</td>
<td>Cylinder</td>
<td>±20ppm</td>
<td>6.0pF</td>
<td>1μW</td>
<td>0.01μW</td>
<td>2.0 – – 6.0</td>
</tr>
<tr>
<td>SSP-T7-F</td>
<td>SMD</td>
<td>±20ppm, ±50ppm</td>
<td>7.0pF</td>
<td>1μW</td>
<td>0.1μW</td>
<td>– 7.0 1.5 1.4</td>
</tr>
<tr>
<td>SSP-T7-FL</td>
<td>SMD</td>
<td>±20ppm</td>
<td>6.0pF</td>
<td>1μW</td>
<td>0.01μW</td>
<td>– 7.0 1.5 1.4</td>
</tr>
<tr>
<td>SC-32S</td>
<td>SMD</td>
<td>±20ppm</td>
<td>7.0pF</td>
<td>0.5μW</td>
<td>0.1μW</td>
<td>– 3.3 1.6 0.85</td>
</tr>
<tr>
<td>SC-20S</td>
<td>SMD</td>
<td>±20ppm</td>
<td>7.0pF</td>
<td>0.5μW</td>
<td>0.1μW</td>
<td>– 2.15 1.3 0.6</td>
</tr>
</tbody>
</table>

Refer to the following URL for details of SII crystal oscillators.

www.sii-crystal.com

MATCHING REPORT

The SII Semiconductor Corporation web pages provide detailed matching reports including the evaluation results of matching between SII Semiconductor Corporation real-time clocks and SII crystal oscillators.

[Example of a matching report]

Refer to the following URL for the matching report.

www.sii-ic.com/en/semicon/rtc/m/
REAL-TIME CLOCK ICs

REAL-TIME CLOCK

S-35190A/35390A/35391A

FEATURES

- Low current consumption: 0.25μA typ. (VDD=3.0V, Ta=25°C)
- Wide range of operating voltage: 1.3 to 5.5V
- Built-in clock correction function
- Built-in free user register
- 3-wire (MICROWIRE) CPU interface (S-35190A)
- 2-wire (I²C-bus) CPU interface (S-35390A/35391A)
- Built-in alarm interrupter
- Built-in flag generator during detection of low power voltage or at power-on
- Auto calendar up to the year 2099, automatic leap year calculation function
- Built-in constant voltage circuit
- Built-in 32.768kHz crystal oscillator (Cv built in, Cg external)

APPLICATIONS

- Mobile AV devices
- Digital still cameras
- Digital video cameras
- Electronic power meters
- DVD recorders
- TVs, VCRs
- Mobile phones, PHS
- Car navigation

PIN CONFIGURATIONS

1. S-35190A

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
<th>S-35190A-J8T1U</th>
<th>S-35190A-I8T1U</th>
<th>S-35190A-T8T1U</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>INT</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>XOUT</td>
<td>8</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>XIN</td>
<td>7</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>VSS</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>VDD</td>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>SCK</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>SIO</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>CS</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

2. S-35390A/35391A

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
<th>S-35390A-J8T1U</th>
<th>S-35391A-J8T1U</th>
<th>S-35390A-I8T1U</th>
<th>S-35391A-I8T1U</th>
<th>S-35390A-T8T1U</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>INT</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>XOUT</td>
<td>8</td>
<td>2</td>
<td>8</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>XIN</td>
<td>7</td>
<td>4</td>
<td>7</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>VSS</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>VDD</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>SCL</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>SDA</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>INT2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

*S-35390A only*
REAL-TIME CLOCK ICs

REAL-TIME CLOCK (32kHz CONTINUOUS OUTPUT) S-35192A/35392A

FEATURES
- Low current consumption: 0.45µA typ. (Vcc=3.0V, Ta=25°C)
- Constant output of 32.768kHz clock pulse (Nch open-drain output)
- Wide range of operating voltage: 1.3 to 5.5V
- Built-in clock correction function
- Built-in free user register
- 3-wire (MICROWIRE) CPU interface (S-35192A)
- 2-wire (PC-bus) CPU interface (S-35392A)
- Built-in alarm function (S-35192A)
- Built-in alarm interrupt function (S-35392A)
- Built-in flag generator during detection of low power voltage or at power-on
- Auto calendar up to the year 2099, automatic leap year calculation function
- Built-in constant voltage circuit
- Built-in 32.768kHz crystal oscillator (Ct built in, Cc external)

APPLICATIONS
- Mobile AV devices
- Digital still cameras
- Digital video cameras
- Electronic power meters
- DVD recorders
- TVs, VCRs
- Mobile phones, PHS
- Car navigation

PIN CONFIGURATIONS

1. S-35192A

2. S-35392A

REAL-TIME CLOCK (ALARM SETTABLE TO DAY/MONTH/YEAR, 24-bit COUNTER) S-35399A03

FEATURES
- Low current consumption: 0.34µA typ. (Vcc=3.0V, Ta=25°C)
- Wide range of operating voltage: 1.3 to 5.5V
- Built-in clock correction function
- Built-in 24-bit binary up counter
- Built-in free user register
- 2-wire (PC-Bus) CPU interface
- Built-in alarm interrupter
- Built-in flag generator during detection of low power voltagte or at power-on
- Auto calendar up to the year 2099, automatic leap year calculation function
- Built-in constant voltage circuit
- Built-in 32.768kHz crystal oscillator (Ct built in, Cc external)

APPLICATIONS
- Mobile AV devices
- Digital still cameras
- Digital video cameras
- Electronic power meters
- DVD recorders
- TVs, VCRs
- Mobile phones, PHS
- Car navigation

PIN CONFIGURATION
REAL-TIME CLOCK ICs

REAL-TIME CLOCK (WITH SWITCH INPUT DETECTION FUNCTION) S-78190A series

**FEATURES**

- Low current consumption: 0.35μA Typ. ($V_{DD}=3.0V$, $Ta=25^\circ C$, $TRIP$=“L”)
- Wide operating voltage range: 1.3 to 5.5V
- Minimum time keeping operation voltage: 1.1V
- 3-wire (MICROWIRE) CPU interface
- Built-in input detection circuit
- Built-in remote control pre-decode circuit (by option)
- Report signal output function by trigger input detection
- Built-in user free register
- Built-in clock correction function
- Built-in alarm interrupt function
- Built-in constant-voltage circuit
- Built-in flag generator at low voltage detection and power on.
- Auto calendar up to the year 2099, automatic leap year calculation function
- Built-in 32.768kHz crystal oscillator circuit ($C_0$ built in, $C_9$ external)

**APPLICATIONS**

- Digital video cameras
- Digital still cameras
- DVD recorders
- Thin-screen televisions
- Portable navigation systems
- Digital photo frames

**PACKAGE**

![16-Pin TSSOP Top View](image)

**Remarks** Please contact our sales office for the specification of this product.
Programmable Port Controller Lineup

Programmable Port Controller

<table>
<thead>
<tr>
<th>Product name</th>
<th>Digital output</th>
<th>Operating voltage</th>
<th>Operating frequency</th>
<th>Current consumption during standby max.</th>
<th>E2PROM endurance</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-7760A</td>
<td>8ch</td>
<td>2.3 to 4.5V</td>
<td>400kHz</td>
<td>3.0A (VCCH=4.5V CMOS input type)</td>
<td>105 cycles (at –40 to +85C)</td>
<td>16-Pin TSSOP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10.0A (VCCH=4.5V Low voltage input type)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1. Under development

Product Lineup

Initial value, and inverted delay time can be set respectively for each port. This is effective for controlling turning on or off the voltage regulator in mobile phones. The built-in E2PROM retains the initial value of each control setting when power is off.

Power Sequencer Lineup

Power Sequencer

Product Lineup

These ICs control the power up and down timing of power supply sequence operation. The enable output signal is activated every delay time by inputting an external signal. The delay time can be set by an external capacitor.

<table>
<thead>
<tr>
<th>Product name</th>
<th>Enable output</th>
<th>Disable trigger input pin</th>
<th>Operating temperature</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-77100 series</td>
<td>4 channels</td>
<td>No</td>
<td>–40 to +85C</td>
<td>8-Pin TSSOP</td>
</tr>
<tr>
<td>S-77101 series</td>
<td>3 channels</td>
<td>Yes</td>
<td>–40 to +85C</td>
<td>8-Pin TSSOP</td>
</tr>
</tbody>
</table>

S-77100/77101 series

Page 113
PROGRAMMABLE PORT CONTROLLER
(PORT EXPANDER WITH BUILT-IN E²PROM CIRCUIT)

FEATURES

- Operating voltage range: 2.3 to 4.5V
- 8-channel digital output
- Operating frequency: 400kHz
- Malfunction prevention function at low supply voltage
- Low current consumption During standby: 3.0μA max. (VCC=4.5V CMOS input type)
- 10.0μA max. (VCC=4.5V Low voltage input type)
- Built-in E²PROM circuit
- E²PROM endurance: 10^6 cycles (at –40 to +85°C)
- E²PROM data retention: 10 years (after 100,000 rewrites)
- E²PROM write protect function

APPLICATIONS

- Mobile phones
- Portable communication device
- Digital still cameras
- Digital video cameras

PIN CONFIGURATIONS

16-Pin TSSOP*1
Top View

*1. Under development

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SCL</td>
<td>Serial clock input</td>
</tr>
<tr>
<td>2</td>
<td>VSS</td>
<td>Ground</td>
</tr>
<tr>
<td>3*1</td>
<td>CLK</td>
<td>External clock input</td>
</tr>
<tr>
<td>4</td>
<td>DO7</td>
<td>Output port 7</td>
</tr>
<tr>
<td>5</td>
<td>DO6</td>
<td>Output port 6</td>
</tr>
<tr>
<td>6</td>
<td>DO5</td>
<td>Output port 5</td>
</tr>
<tr>
<td>7</td>
<td>DO4</td>
<td>Output port 4</td>
</tr>
<tr>
<td>8*2</td>
<td>TIMEN</td>
<td>Timer enable input</td>
</tr>
<tr>
<td>9</td>
<td>VCC/CL</td>
<td>Power supply for output port</td>
</tr>
<tr>
<td>10</td>
<td>DO3</td>
<td>Output port 3</td>
</tr>
<tr>
<td>11</td>
<td>DO2</td>
<td>Output port 2</td>
</tr>
<tr>
<td>12</td>
<td>DO1</td>
<td>Output port 1</td>
</tr>
<tr>
<td>13</td>
<td>DO0</td>
<td>Output port 0</td>
</tr>
<tr>
<td>14</td>
<td>VCC/H</td>
<td>Power supply</td>
</tr>
<tr>
<td>15</td>
<td>WP</td>
<td>Write protect input</td>
</tr>
<tr>
<td>16</td>
<td>SDA</td>
<td>Serial data I/O</td>
</tr>
</tbody>
</table>

*1. Whether to use A1 as CLK or BPDX is selected by the option.
*2. Whether to use C2 as TIMEN or RESX is selected by the option.
POWER SEQUENCER

S-77100/77101 series

FEATURES

• Easy support for sequencing of multiple power supplies
• Delay time can be set by the external capacitor
• Sequence operations of 4 channels can be controlled by 1 input signal (S-77100 Series)
• On-sequence operation and off-sequence operation can be controlled by the separate input signal (S-77101 Series)
• Enable output can be increased by cascade connection
• Low current consumption: 3.0µA typ. (Off period, power-good period, VDD=3.3V, Ta=+25°C)
• Wide range of operation voltage: 2.2 to 5.5V
• Operation temperature range: Ta=−40 to +85°C
• Output form is selectable: CMOS output, Nch open-drain output
• Output logic is selectable: Active “H”, active “L”

APPLICATIONS

• Power sequencing for multiple devices
• Sequencing for microprocessors and microcontrollers
• Power sequencing for FPGAs
• Power sequencing for TVs, cameras, printers etc.

PIN CONFIGURATIONS

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ENBL_A</td>
<td>Enable signal output pin</td>
</tr>
<tr>
<td>2</td>
<td>ENBL_B</td>
<td>Enable signal output pin</td>
</tr>
<tr>
<td>3</td>
<td>CDLY</td>
<td>External capacitor (C DLY) connection pin</td>
</tr>
<tr>
<td>4</td>
<td>VSS</td>
<td>GND pin</td>
</tr>
<tr>
<td>5</td>
<td>ON</td>
<td>Enable trigger input pin</td>
</tr>
<tr>
<td>6</td>
<td>ENBL_D</td>
<td>Enable signal output pin</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
<td>Disable trigger input pin</td>
</tr>
<tr>
<td>7</td>
<td>ENBL_C</td>
<td>Enable signal output pin</td>
</tr>
<tr>
<td>8</td>
<td>VDD</td>
<td>Positive power supply pin</td>
</tr>
</tbody>
</table>

*1. The S-77100 Series only  
*2. The S-77101 Series only

Remarks  Please contact our sales office for the specification of this product.
AUTOMOTIVE APPLICATIONS

Introduces SII’s high-reliability semiconductor products corresponding to automotive specifications.

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For detailed information about products, refer to SII Semiconductor Corporation products website.
www.sii-ic.com
# Product Lineup

## CMOS IC for Automotive Use

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<th>Operation</th>
<th>Voltage</th>
<th>Temperature</th>
<th>Series</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>50V</td>
<td>200mA output</td>
<td>105°C</td>
<td>S-1142xxxH Series</td>
<td>119</td>
</tr>
<tr>
<td></td>
<td></td>
<td>125°C</td>
<td>S-1142xxxA Series</td>
<td>129</td>
</tr>
<tr>
<td></td>
<td></td>
<td>105°C</td>
<td>S-19200A/BxxH Series</td>
<td>120</td>
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<tr>
<td></td>
<td></td>
<td>125°C</td>
<td>S-19200A/BxxA Series</td>
<td>130</td>
</tr>
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<td>36V</td>
<td>250mA output</td>
<td>105°C</td>
<td>S-19212B/DxxH Series</td>
<td>121</td>
</tr>
<tr>
<td></td>
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<td>S-19212B/DxxA Series</td>
<td>131</td>
</tr>
<tr>
<td>10V</td>
<td>500mA output</td>
<td>105°C</td>
<td>S-19243xxxH Series</td>
<td>123</td>
</tr>
<tr>
<td></td>
<td></td>
<td>125°C</td>
<td>S-19243xxxA Series</td>
<td>133</td>
</tr>
<tr>
<td></td>
<td>1000mA output</td>
<td>105°C</td>
<td>S-19244xxxH Series</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td></td>
<td>125°C</td>
<td>S-19244xxxA Series</td>
<td>135</td>
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<tr>
<td>6.5V</td>
<td>500mA output</td>
<td>105°C</td>
<td>S-19253xxxH Series</td>
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<tr>
<td></td>
<td></td>
<td>105°C</td>
<td>S-19254xxxH Series</td>
<td>128</td>
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</table>

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<table>
<thead>
<tr>
<th>Operation</th>
<th>Voltage</th>
<th>Temperature</th>
<th>Series</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>36V</td>
<td>200mA output</td>
<td>105°C</td>
<td>S-19110AxxH to S-19110HxxH Series</td>
<td>137</td>
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<td>125°C</td>
<td>S-19110AxxA to S-19110HxxA Series</td>
<td>148</td>
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<tr>
<td></td>
<td>Detection voltage 5.0 V to 10.0 V</td>
<td>105°C</td>
<td>S-19110xxH to S-19110xxA Series</td>
<td>147</td>
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<tr>
<td></td>
<td>Detection voltage 3.0 V to 4.95 V</td>
<td>105°C</td>
<td>S-19110JxxH to S-19110RxxH Series</td>
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<td>10V</td>
<td>VDD detection</td>
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<td></td>
<td>With hysteresis width</td>
<td>105°C</td>
<td>S-19100xxxA Series</td>
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</tr>
<tr>
<td></td>
<td>Without hysteresis width</td>
<td>105°C</td>
<td>S-19101xxxH Series</td>
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</tr>
<tr>
<td></td>
<td>Without hysteresis width</td>
<td>125°C</td>
<td>S-19101xxxA Series</td>
<td>141</td>
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<td></td>
<td>SENSE detection, No delay circuit</td>
<td>105°C</td>
<td>S-19102/19108 Series</td>
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<td></td>
<td>With hysteresis width</td>
<td>105°C</td>
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<tr>
<td></td>
<td>Without hysteresis width</td>
<td>105°C</td>
<td>S-19104/19106 Series</td>
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<tr>
<td></td>
<td>With hysteresis width</td>
<td>105°C</td>
<td>S-19105/19107 Series</td>
<td>145</td>
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<tr>
<td></td>
<td>Without hysteresis width</td>
<td>125°C</td>
<td>S-19500/19501 Series</td>
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</table>

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<table>
<thead>
<tr>
<th>Operation</th>
<th>Voltage</th>
<th>Temperature</th>
<th>Series</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>36V</td>
<td>200mA LDO + Time-out mode</td>
<td>105°C</td>
<td>S-19700 Series</td>
<td>152</td>
</tr>
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<td>6V</td>
<td>Window mode</td>
<td>125°C</td>
<td>S-19400/19401 Series</td>
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</table>

### Antenna diagnosis ICs

<table>
<thead>
<tr>
<th>Operation</th>
<th>Voltage</th>
<th>Temperature</th>
<th>Series</th>
<th>Page</th>
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</thead>
<tbody>
<tr>
<td>36V</td>
<td>400mA LDO + Antenna diagnosis</td>
<td>125°C</td>
<td>S-19680 Series</td>
<td>153</td>
</tr>
<tr>
<td>10V</td>
<td>High side switch + Antenna diagnosis</td>
<td>105°C</td>
<td>S-8412A Series</td>
<td>154</td>
</tr>
</tbody>
</table>

### Composite ICs

<table>
<thead>
<tr>
<th>Operation</th>
<th>Voltage</th>
<th>Temperature</th>
<th>Series</th>
<th>Page</th>
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</thead>
<tbody>
<tr>
<td>VCOM buffer amplifier</td>
<td>105°C</td>
<td>S-8235A Series</td>
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</tr>
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### Battery Protection ICs

<table>
<thead>
<tr>
<th>Operation</th>
<th>Voltage</th>
<th>Temperature</th>
<th>Series</th>
<th>Page</th>
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</thead>
<tbody>
<tr>
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<td>S-19190 Series</td>
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: New product : Under development
### Memory ICs

<table>
<thead>
<tr>
<th>Type</th>
<th>Operation temperature range</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>E²PROM</td>
<td>1 K to 16 K bit</td>
<td>105°C</td>
</tr>
<tr>
<td></td>
<td>1 K to 16 K bit</td>
<td>105°C</td>
</tr>
<tr>
<td></td>
<td>1 K to 16 K bit</td>
<td>125°C</td>
</tr>
<tr>
<td></td>
<td>1 K to 16 K bit</td>
<td>125°C</td>
</tr>
<tr>
<td></td>
<td>1 K to 4 K bit</td>
<td>150°C</td>
</tr>
<tr>
<td>3-wire</td>
<td>8 K to 256 K bit</td>
<td>125°C</td>
</tr>
<tr>
<td>2-wire</td>
<td>8 K to 128 K bit</td>
<td>105°C</td>
</tr>
<tr>
<td></td>
<td>1 K to 128 K bit</td>
<td>105°C</td>
</tr>
<tr>
<td>SPI-bus</td>
<td>1 K to 64 K bit</td>
<td>125°C</td>
</tr>
</tbody>
</table>

### Sensors

<table>
<thead>
<tr>
<th>Type</th>
<th>Operation temperature range</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetic Sensor ICs</td>
<td>Bipolar Hall effect latch</td>
<td>125°C</td>
</tr>
<tr>
<td></td>
<td>Unipolar detection switch</td>
<td>125°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>150°C</td>
</tr>
<tr>
<td>Sensors</td>
<td></td>
<td>125°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>105°C</td>
</tr>
</tbody>
</table>

### Amplifiers

<table>
<thead>
<tr>
<th>Type</th>
<th>Operation temperature range</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational Amplifier</td>
<td>Zero-drift operational amplifier</td>
<td>105°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>105°C</td>
</tr>
</tbody>
</table>

### Timer ICs

<table>
<thead>
<tr>
<th>Type</th>
<th>Operation temperature range</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real-Time Clock</td>
<td>2-wire</td>
<td>125°C</td>
</tr>
<tr>
<td></td>
<td>3-wire</td>
<td>125°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>125°C</td>
</tr>
<tr>
<td></td>
<td>2-wire (I²C-bus) interval timer</td>
<td>125°C</td>
</tr>
<tr>
<td></td>
<td>Interval timer with fixed-cycle interrupt signal setting pin</td>
<td>125°C</td>
</tr>
<tr>
<td></td>
<td>Interval timer with built-in timer of fixed interrupt time</td>
<td>125°C</td>
</tr>
<tr>
<td></td>
<td>Counter</td>
<td>125°C</td>
</tr>
<tr>
<td>Convenience Timer</td>
<td>With interrupt time setting pin</td>
<td>125°C</td>
</tr>
<tr>
<td></td>
<td>Clock pulse output</td>
<td>125°C</td>
</tr>
</tbody>
</table>

*: New product   : Under development
AEC-Q100 PRODUCTS

Some of the products in this catalogue comply with AEC-Q100 qualification.
SII is able to report the reliability test results for AEC-Q100 qualification.
Please contact our sales office for more information.

AVAILABLE APPLICATIONS

Available applications are set according to each product and each operation temperature range in SII’s automotive ICs.
Please check the following symbols mentioned in the introduction page of each product for the available applications.
For more information, or if there are any further questions, please contact our sales office.

Safety critical components typified by engine, transmission, suspension and ABS, and EV/HEV/PHEV related equipment, etc.

Meter, body, headlamp, ITS, etc.

Accessory, car navigation, car audio system, etc.

RELATED SOURCE

Please refer to the datasheet of each product for detailed specifications.
Regarding the newest version, contact our sales office.
Select product category and product name on our SII Semiconductor Corporation website, download the PDF file.

www.sii-ic.com   SII Semiconductor Corporation Web site
S-1142xxxH Series

HIGH-WITHSTAND VOLTAGE LOW CURRENT CONSUMPTION LOW DROPOUT 105°C OPERATION CMOS VOLTAGE REGULATOR

FEATURES

- High-withstand voltage  50 V operation, 60 V rating
- Low current consumption  4.0 μA typ.
- Wide output voltage range  2.0 V to 15.0 V

SPECIFICATIONS

- 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 +105°C)
  During power-off:  0.1 μA typ., 2.5 μA max. (Ta = −40°C to +105°C)
- Output current: Possible to output 200 mA (Vin ≥ Vout(S) + 2.0 V)
- 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 +105°C

PIN CONFIGURATIONS

HSOP-6 Top view

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

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
Voltage Regulators

S-19200A/BxxH Series

HIGH-WITHSTAND VOLTAGE LOW CURRENT CONSUMPTION
LOW DROPOUT 105°C OPERATION CMOS VOLTAGE REGULATOR

FEATURES

- High-withstand voltage  50 V operation, 60 V rating
- Low current consumption  4.0 μA typ.
- Improved characteristics of load transient response in comparison with SII Semiconductor Corporation similar products

SPECIFICATIONS

- 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 +105°C)
  During power-off:  0.1 μA typ., 2.5 μA max. (Ta = -40°C to +105°C)
- Output current:  Possible to output 200 mA (V_IN ≥ V_OUT + 2.0 V)
- 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 +105°C
- AEC-Q100 qualified

PIN CONFIGURATIONS

TO-252-5S(A)

Top view

<table>
<thead>
<tr>
<th>1</th>
<th>VOUT</th>
</tr>
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<tbody>
<tr>
<td>2</td>
<td>ON / OFF</td>
</tr>
<tr>
<td>3</td>
<td>VSS</td>
</tr>
<tr>
<td>4</td>
<td>NC</td>
</tr>
<tr>
<td>5</td>
<td>VIN</td>
</tr>
</tbody>
</table>

HSOP-6

Top view

<table>
<thead>
<tr>
<th>1</th>
<th>VOUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>VSS</td>
</tr>
<tr>
<td>3</td>
<td>ON / OFF</td>
</tr>
<tr>
<td>4</td>
<td>NC</td>
</tr>
<tr>
<td>5</td>
<td>VSS</td>
</tr>
<tr>
<td>6</td>
<td>VIN</td>
</tr>
</tbody>
</table>

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
S-19212B/DxxH Series

105°C OPERATION HIGH-WITHSTAND VOLTAGE LOW DROPOUT CMOS VOLTAGE REGULATOR

FEATURES

- High-withstand voltage  36 V operation, 45 V rating
- Low current consumption  8.5 μA max. (Tj = −40°C to +105°C)
- High-accuracy output voltage  ±2.0% (Tj = −40°C to +105°C)

SPECIFICATIONS

- 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% (Tj = −40°C to +105°C)
- Current consumption:  During operation:  6.5 μA typ., 8.5 μA max. (Tj = −40°C to +105°C)
  During power-off:  0.1 μA typ., 3.5 μA max. (Tj = −40°C to +105°C)
- Output current:  Possible to output 250 mA (VIN ≥ VOUT[S] + 2.0 V)
- 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.
- Built-in discharge shunt circuit:  Discharges the electric charge of the output capacitor during power-off.
  (RLOW = 70 kΩ typ.)
- Operation temperature range:  Ta = −40°C to +105°C
- Withstand 45 V load dump
- AEC-Q100 qualified*:  HSOP-8A, HSOP-6, SOT-89-5, SOT-23-5, TO-252-5S(A) package products

*1. HTMSOP-8 package product is in the process of AEC-Q100.

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
FEATURES

- High output current: 500 mA
- Built-in soft-start function
- 10 V operation

SPECIFICATIONS

- Output voltage (externally set): 1.0 V to 9.0 V, settable via external resistor
  (HSOP-8A, HSOP-6 and HSNT-8(2030) only)
- Output voltage (internally set): 1.0 V to 6.0 V, selectable in 0.05 V step
- Input voltage: 2.5 V to 10.0 V
- Output voltage accuracy: ±2.3% (Tj = -40°C to +105°C)
- Dropout voltage: 0.09 V typ. (2.6 V output product, at IOUT = 200 mA)
- Current consumption:
  - During operation: 120 µA typ., 150 µA max. (Tj = -40°C to +150°C)
  - During power-off: 0.1 µA typ., 4.5 µA max. (Tj = -40°C to +105°C)
- Output current: Possible to output 500 mA (at V IN ≥ VOUT(S) + 1.0 V)
- Ripple rejection: 60 dB typ. (at f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in soft-start circuit: Adjusts output voltage rising time at power-on or at the time when ON / OFF pin is set to ON.
  - Adjustable type: E / F / G / H type, tSS = 6.0 ms typ. (CSS = 10 nF)
  - Soft-start time can be changed by the capacitor (CSS).
    - Fixed type: A / B / C / D type: Fixed to tSS = 1.0 ms typ.
- Built-in ON / OFF circuit: Ensures long battery life.
- Built-in discharge shunt circuit: Discharges the electric charge of the output capacitor during power-off.
- Operation temperature range: Ta = -40°C to +105°C
- AEC-Q100 qualified*: HSOP-8A package product

PIN CONFIGURATIONS

<table>
<thead>
<tr>
<th>HSOP-8A</th>
<th>Types in which Output Voltage is Externally Set (E / F / G / H type)</th>
<th>Types in which Output Voltage is Internally Set (A / B / C / D type)</th>
<th>Types in which Output Voltage is Internally Set (E / F / G / H type)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top view</td>
<td>1 VOUT</td>
<td>1 VOUT</td>
<td>1 VOUT</td>
</tr>
<tr>
<td></td>
<td>2 VDAJ</td>
<td>VOUT</td>
<td>VOUT</td>
</tr>
<tr>
<td></td>
<td>3 VSS</td>
<td>VSS</td>
<td>VSS</td>
</tr>
<tr>
<td></td>
<td>4 ON / OFF</td>
<td>NC</td>
<td>ON / OFF</td>
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<td>5 SSC</td>
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<td>NC</td>
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<tr>
<td></td>
<td>8 VIN</td>
<td>VIN</td>
<td>VIN</td>
</tr>
</tbody>
</table>

Bottom view

*1. HSOP-6, SOT-89-5, TO-252-5S(A), HSNT-8(2030) package products are in the process of AEC-Q100.

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
### Voltage Regulators

<table>
<thead>
<tr>
<th>Type</th>
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<tbody>
<tr>
<td>HSOP-6</td>
</tr>
<tr>
<td>SOT-89-5</td>
</tr>
<tr>
<td>TO-252-5S(A)</td>
</tr>
<tr>
<td>HSNT-8(2030)</td>
</tr>
</tbody>
</table>

#### Top view

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VOUT</td>
</tr>
<tr>
<td>2</td>
<td>VSS</td>
</tr>
<tr>
<td>3</td>
<td>VADJ ON / OFF</td>
</tr>
<tr>
<td>4</td>
<td>VSS</td>
</tr>
<tr>
<td>5</td>
<td>VIN</td>
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</table>

#### Bottom view

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>8</td>
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<td>7</td>
<td>NC</td>
</tr>
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<td>6</td>
<td>VIN</td>
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</tbody>
</table>

#### Details

- **Types in which Output Voltage is Externally Set (A / B / C / D type)**
- **Types in which Output Voltage is Internally Set (E / F / G / H type)**

1. **VOUT**
2. **VSS**
3. **VADJ ON / OFF**
4. **ON / OFF**
5. **SSC**
6. **VIN**
7. **NC**
8. **VOUT**

---

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
NEW

S-19244xxxH Series

105°C OPERATION LOW DROPOUT HIGH OUTPUT CURRENT (1000 mA)
CMOS VOLTAGE REGULATOR WITH SOFT-START FUNCTION

/ FEATURES

- High output current 1000 mA
- Built-in soft-start function
- 10 V operation

/ SPECIFICATIONS

- Output voltage (externally set): 1.0 V to 9.0 V, settable via external resistor
  (HSOP-8A, HSOP-6 and HSNT-8(2030) only)
- Output voltage (internally set): 1.0 V to 6.0 V, selectable in 0.05 V step
- Input voltage: 2.5 V to 10.0 V
- Output voltage accuracy: ±2.3% (Tj = -40°C to +105°C)
- Dropout voltage: 0.38 V typ. (2.6 V output product, at IOUT = 1000 mA)
- Current consumption:
  During operation: 120 μA typ., 150 μA max. (Tj = -40°C to +150°C)
  During power-off: 0.1 μA typ., 4.5 μA max. (Tj = -40°C to +105°C)
- Output current: Possible to output 1000 mA (at VIN ≥ VOUT(S) + 1.0 V)
- Ripple rejection: 60 dB typ. (at f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in soft-start circuit: Adjusts output voltage rising time at power-on or at the time when ON / OFF pin is set to ON.
  Adjustable type: E / F / G / H type, tSS = 6.0 ms typ. (CSS = 10 nF)
  Soft-start time can be changed by the capacitor (CSS).
  Fixed type: A / B / C / D type: Fixed to tSS = 1.0 ms typ.
- Built-in ON / OFF circuit: Ensures long battery life.
- Built-in discharge shunt circuit: Discharges the electric charge of the output capacitor during power-off.
- Operation temperature range: Ta = -40°C to +105°C
- AEC-Q100 qualified*1: HSOP-8A package product

*1. HSOP-6, TO-252-5S(A), HSNT-8(2030) package products are in the process of AEC-Q100.

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
## PIN CONFIGURATIONS

### HSOP-8A

**Top view**

1. **VOUT**
2. **VDAJ**
3. **VSS**
4. **ON / OFF**
5. **SSC**
6. **NC**
7. **NC**
8. **VIN**

**Bottom view**

1. **VOUT**
2. **VDAJ**
3. **VSS**
4. **ON / OFF**
5. **SSC**
6. **NC**
7. **NC**
8. **VIN**

### HSOP-6

**Top view**

1. **VOUT**
2. **VSS**
3. **VADJ**
4. **ON / OFF**
5. **VSS**
6. **VIN**

### TO-252-5S(A)

**Top view**

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

### HSNT-8(2030)

**Top view**

1. **VOUT**
2. **VDAJ**
3. **VSS**
4. **ON / OFF**
5. **SSC**
6. **NC**
7. **NC**
8. **VIN**

**Bottom view**

1. **VOUT**
2. **VDAJ**
3. **VSS**
4. **ON / OFF**
5. **SSC**
6. **NC**
7. **NC**
8. **VIN**

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This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
NEW
S-19253xxxH Series

105°C OPERATION LOW DROPOUT HIGH OUTPUT CURRENT (500 mA)
CMOS VOLTAGE REGULATOR WITH SOFT-START FUNCTION

FEATURES

• High output current  500 mA
• Built-in soft-start function
• 6.5 V operation

SPECIFICATIONS

- Output voltage: 1.0 V to 5.5 V, selectable in 0.05 V step
- Input voltage: 2.5 V to 6.5 V
- Output voltage accuracy: ±3.0% (Tj = −40°C to +105°C)
- Dropout voltage: 0.09 V typ. (2.6 V output product, at IOUT = 200 mA)
- Current consumption: During operation: 120 μA typ., 150 μA max. (Tj = −40°C to +105°C)
  During power-off: 0.1 μA typ., 4.5 μA max. (Tj = −40°C to +105°C)
- Output current: Possible to output 500 mA (at VIN ≥ VOUT(S) + 1.0 V)
- Ripple rejection: 60 dB typ. (at f = 1.0 kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in soft-start circuit: Adjusts output voltage rising time at power-on or at the time when ON / OFF pin is set to ON.
  Adjustable type: tSS = 6.0 ms typ. (CSS = 10 nF)
  Soft-start time can be changed by the capacitor (CSS).
- Built-in ON / OFF circuit: Ensures long battery life.
- Built-in discharge shunt circuit: Discharges the electric charge of the output capacitor during power-off.
- Operation temperature range: Ta = −40°C to +105°C
- AEC-Q100 in process

PIN CONFIGURATIONS

SOT-89-5
Top view

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

**NEW**

S-19254xxxH Series

105°C OPERATION LOW DROPOUT HIGH OUTPUT CURRENT (1000 mA)
CMOS VOLTAGE REGULATOR WITH SOFT-START FUNCTION

### FEATURES

- High output current: 1000 mA
- Built-in soft-start function
- 6.5 V operation

### SPECIFICATIONS

- **Output voltage:** 1.0 V to 5.5 V, selectable in 0.05 V step
- **Input voltage:** 2.5 V to 6.5 V
- **Output voltage accuracy:** ±3.0% (Tj = –40°C to +105°C)
- **Dropout voltage:** 0.38 V typ. (2.6 V output product, at IOUT = 1000 mA)
- **Current consumption:**
  - During operation: 120 μA typ., 150 μA max. (Tj = –40°C to +105°C)
  - During power-off: 0.1 μA typ., 4.5 μA max. (Tj = –40°C to +105°C)
- **Output current:** Possible to output 1000 mA (at V IN ≥ V OUT(S) + 1.0 V)
- **Ripple rejection:** 60 dB typ. (at f = 1.0 kHz)
- **Built-in overcurrent protection circuit:** Limits overcurrent of output transistor.
- **Built-in thermal shutdown circuit:** Detection temperature 170°C typ.
- **Built-in soft-start circuit:** Adjusts output voltage rising time at power-on or at the time when ON/OFF pin is set to ON.
  
  - Adjustable type: \( t_{SS} = 6.0 \text{ ms typ.} \) (\( C_{SS} = 10 \text{ nF} \))
  - Soft-start time can be changed by the capacitor (\( C_{SS} \)).
- **Built-in ON/OFF circuit:** Ensures long battery life.
- **Built-in discharge shunt circuit:** Discharges the electric charge of the output capacitor during power-off.
- **Operation temperature range:** Ta = –40°C to +105°C
- **AEC-Q100 qualified**

### PIN CONFIGURATIONS

<table>
<thead>
<tr>
<th>HSOP-8A</th>
<th>1</th>
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<tr>
<td>Top view</td>
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<tr>
<td></td>
<td>3</td>
<td>VSS</td>
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<td>4</td>
<td>ON / OFF</td>
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<tr>
<td></td>
<td>8</td>
<td>VIN</td>
</tr>
</tbody>
</table>
NEW

S-1142xxxxA Series

HIGH-WITHSTAND VOLTAGE LOW CURRENT CONSUMPTION
LOW DROPOUT 125°C OPERATION CMOS VOLTAGE REGULATOR

FEATURES

• High-withstand voltage  50 V operation, 60 V rating
• Low current consumption  4.0 μA typ.
• Wide output voltage range  2.0 V to 12.0 V

SPECIFICATIONS

• Output voltage: 2.0 V to 12.0 V, selectable in 0.1 V step
• Input voltage:  3.0 V to 50 V
• Output voltage accuracy:
  ±1.0% (Tj = +25°C)
  ±4.0% (Tj = -40°C to +125°C)
• Current consumption:
  During operation: 4.0 μA typ., 15.0 μA max. (Ta = -40°C to +135°C)
  During power-off: 0.1 μA typ., 3.5 μA max. (Ta = -40°C to +135°C)
• Output current:
  Possible to output 200 mA (VIN ≥ VOUT(B) + 2.0 V)
• 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 +125°C

PIN CONFIGURATIONS

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
S-19200A/BxxA Series

High-withstand Voltage Low Current Consumption
Low Dropout 125°C Operation CMOS Voltage Regulator

**FEATURES**

- High-withstand voltage  50 V operation, 60 V rating
- Low current consumption  4.0 μA typ.
- Improved characteristics of load transient response in comparison with SII Semiconductor Corporation similar products

**SPECIFICATIONS**

- 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)
- Current consumption: During operation: 4.0 μA typ., 15.0 μA max. (Tj = -40°C to +135°C)
- During power-off: 0.1 μA typ., 3.5 μA max. (Tj = -40°C to +135°C)
- Output current: Possible to output 200 mA (VIN ≥ VOUT(S) + 2.0 V)
- 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 +125°C
- AEC-Q100 qualified

**PIN CONFIGURATIONS**

TO-252-5S(A)

Top view

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

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
S-19212B/DxxA Series

125°C OPERATION HIGH-WITHSTAND VOLTAGE LOW DROPOUT CMOS VOLTAGE REGULATOR

FEATURES

- High-withstand voltage  36 V operation, 45 V rating
- Low current consumption  8.5 µA max. (Tj = -40°C to +125°C)
- High-accuracy output voltage  ±2.0% (Tj = -40°C to +125°C)

SPECIFICATIONS

- 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% (Tj = -40°C to +125°C)
- Current consumption:  
  - During operation:  6.5 µA typ., 8.5 µA max. (Tj = -40°C to +125°C)
  - During power-off:  0.1 µA typ., 3.5 µA max. (Tj = -40°C to +125°C)
- Output current:  Possible to output 250 mA (V_IN ≥ V_OUT(S) + 2.0 V)
- 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.
- Built-in discharge shunt circuit:  Discharges the electric charge of the output capacitor during power-off.
  (R_LOW = 70 kΩ typ.)
- Operation temperature range:  Ta = -40°C to +125°C
- Withstand 45 V load dump
- AEC-Q100 qualified*:  HSOP-8A, HSOP-6, SOT-89-5, SOT-23-5, TO-252-5S(A) package products

*1. HTMSOP-8 package product is in the process of AEC-Q100.

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
PIN CONFIGURATIONS

TO-252-5S(A)
Top view
1 VOUT
2 ON / OFF
3 VSS
4 NC
5 VIN

-bottom view-
1 2 3 4 5

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

-bottom view-
1 2 3 4

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

-bottom view-
1 2 3

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

-bottom view-
1 2 3 4

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
FEATURES

- High output current  500 mA
- Built-in soft-start function
- 10 V operation

SPECIFICATIONS

- Output voltage (internally set):  1.0 V to 9.0 V, settable via external resistor
  (HSOP-8A, HSOP-6 and HSNT-8(2030) only)
- Output voltage (externally set):  1.0 V to 6.0 V, selectable in 0.05 V step
- Input voltage:  2.5 V to 10.0 V
- Output voltage accuracy:  ±2.3% (Tj = -40°C to +125°C)
- Dropout voltage:  0.09 V typ. (2.6 V output product, at IOUT = 200 mA)
- Current consumption:  
  During operation:  120 μA typ., 150 μA max. (Tj = -40°C to +150°C)
  During power-off:  0.1 μA typ., 10.5 μA max. (Tj = -40°C to +125°C)
- Output current:  Possible to output 500 mA (at VIN ≥ VOUT(S) + 1.0 V)
- Ripple rejection:  60 dB typ. (at f = 1.0 kHz)
- Built-in overcurrent protection circuit:  Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit:  Detection temperature 170°C typ.
- Built-in soft-start circuit:  Adjusts output voltage rising time at power-on or at the time when
  ON / OFF pin is set to ON.
  Adjustable type: E / F / G / H type, tSS = 6.0 ms typ. (CSS = 10 nF)
  Soft-start time can be changed by the capacitor (CSS).
  Fixed type: A / B / C / D type: Fixed to tSS = 1.0 ms typ.
- Built-in ON / OFF circuit:  Ensures long battery life.
- Built-in discharge shunt circuit:  Discharges the electric charge of the output capacitor during power-off.
- Operation temperature range:  Ta = -40°C to +125°C
- AEC-Q100 qualified*:  HSOP-8A package product

PIN CONFIGURATIONS

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
Voltage Regulators

- **HSOP-6**
  - Top view
  - Types in which Output Voltage is Externally Set (A / B / C / D type)
    - 1: VOUT
    - 2: VSS
    - 3: VADJ
    - 4: ON / OFF
    - 5: VSS
    - 6: VIN
  - Types in which Output Voltage is Internally Set (A / B / C / D type)
    - 1: VOUT
    - 2: VSS
    - 3: ON / OFF
    - 4: NC
    - 5: VSS
    - 6: VIN
  - Types in which Output Voltage is Internally Set (E / F / G / H type)
    - 1: VOUT
    - 2: VSS
    - 3: ON / OFF
    - 4: SSC
    - 5: VSS
    - 6: VIN

- **SOT-89-5**
  - Top view
  - Types in which Output Voltage is Internally Set (A / B / C / D type)
    - 1: ON / OFF
    - 2: VSS
    - 3: NC
    - 4: VIN
    - 5: VOUT
  - Types in which Output Voltage is Externally Set (E / F / G / H type)
    - 1: ON / OFF
    - 2: VSS
    - 3: SSC
    - 4: VIN
    - 5: VOUT

- **TO-252-5S(A)**
  - Top view
  - Types in which Output Voltage is Internally Set (E / F / G / H type)
    - 1: VOUT
    - 2: ON / OFF
    - 3: VSS
    - 4: SSC
    - 5: VIN
  - Types in which Output Voltage is Externally Set (A / B / C / D type)
    - 1: VOUT
    - 2: VOUT
    - 3: VSS
    - 4: ON / OFF
    - 5: SSC
    - 6: NC
    - 7: NC
    - 8: VIN

- **HSNT-8(2030)**
  - Top view
  - Types in which Output Voltage is Internally Set (E / F / G / H type)
    - 1: VOUT
    - 2: ON / OFF
    - 3: VSS
    - 4: SSC
    - 5: VIN
  - Types in which Output Voltage is Externally Set (A / B / C / D type)
    - 1: VOUT
    - 2: VOUT
    - 3: VSS
    - 4: ON / OFF
    - 5: SSC
    - 6: NC
    - 7: NC
    - 8: VIN
  - Types in which Output Voltage is Internally Set (E / F / G / H type)
    - 1: VOUT
    - 2: VOUT
    - 3: VSS
    - 4: ON / OFF
    - 5: SSC
    - 6: NC
    - 7: NC
    - 8: VIN

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This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
NEW

S-19244xxxxA Series

125°C OPERATION LOW DROPOUT HIGH OUTPUT CURRENT (1000 mA)
CMOS VOLTAGE REGULATOR WITH SOFT-START FUNCTION

FEATURES

• High output current 1000 mA
• Built-in soft-start function
• 10 V operation

SPECIFICATIONS

• Output voltage (internally set): 1.0 V to 9.0 V, settable via external resistor
  (HSOP-8A, HSOP-6 and HSNT-8(2030) only)
• Output voltage (externally set): 1.0 V to 6.0 V, selectable in 0.05 V step
• Input voltage: 2.5 V to 10.0 V
• Output voltage accuracy: ±2.3% (Tj = -40°C to +125°C)
• Dropout voltage: 0.38 V typ. (2.6 V output product, at IOUT = 1000 mA)
• Current consumption:
  During operation: 120 μA typ., 150 μA max. (Tj = -40°C to +150°C)
  During power-off: 0.1 μA typ., 10.5 μA max. (Tj = -40°C to +125°C)
• Output current: Possible to output 1000 mA (at VIN ≥ VOUT(S) + 1.0 V)
• Ripple rejection: 60 dB typ. (at f = 1.0 kHz)
• Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
• Built-in thermal shutdown circuit: Detection temperature 170°C typ.
• Built-in soft-start circuit:
  Adjustable type: E / F / G / H type, tSS = 6.0 ms typ. (CSS = 10 nF)
  Soft-start time can be changed by the capacitor (CSS)
  Fixed type: A / B / C / D type: Fixed to tSS = 1.0 ms typ
• Built-in ON / OFF circuit: Ensures long battery life.
• Built-in discharge shunt circuit: Discharges the electric charge of the output capacitor during power-off.
• Operation temperature range: Ta = -40°C to +125°C
• AEC-Q100 qualified*: HSOP-8A package product

*1. HSOP-6, TO-252-5S(A), HSNT-8(2030) package products are in the process of AEC-Q100.
## PIN CONFIGURATIONS

### HSOP-8A

<table>
<thead>
<tr>
<th>Bottom view</th>
<th>Types in which Output Voltage is Externally Set (E / F / G / H type)</th>
<th>Types in which Output Voltage is Internally Set (A / B / C / D type)</th>
<th>Types in which Output Voltage is Internally Set (E / F / G / H type)</th>
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<tbody>
<tr>
<td>1</td>
<td>VOUT</td>
<td>VOUT</td>
<td>VOUT</td>
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<tr>
<td>2</td>
<td>VDAJ</td>
<td>VOUT</td>
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### HSOP-6

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<th>Types in which Output Voltage is Externally Set (A / B / C / D type)</th>
<th>Types in which Output Voltage is Internally Set (A / B / C / D type)</th>
<th>Types in which Output Voltage is Internally Set (E / F / G / H type)</th>
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<td>2</td>
<td>VDAJ</td>
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### TO-252-5S(A)

<table>
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<tr>
<th>Top view</th>
<th>Types in which Output Voltage is Internally Set (E / F / G / H type)</th>
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### HSNT-8(2030)

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<th>Bottom view</th>
<th>Types in which Output Voltage is Externally Set (E / F / G / H type)</th>
<th>Types in which Output Voltage is Internally Set (A / B / C / D type)</th>
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<td>4</td>
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<tr>
<td>8</td>
<td>VIN</td>
<td>VIN</td>
<td>VIN</td>
</tr>
</tbody>
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This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
Voltage Regulators

S-19311 Series

125°C OPERATION HIGH-WITHSTAND VOLTAGE
CMOS VOLTAGE REGULATOR WITH RESET FUNCTION

FEATURES

- High-withstand voltage  36 V operation, 45 V rating
- With reset function
- High output voltage accuracy  ±2.0% (Tj = -40°C to +150°C)

SPECIFICATIONS

Regulator block
- Output voltage: 3.0 V to 5.3 V, selectable in 0.1 V step
- Input voltage: 4.0 V to 36.0 V
- Output voltage accuracy: ±2.0% (Tj = -40°C to +150°C)
- Dropout voltage: 120 mV typ. (5.0 V output product, IOUT = 100 mA)
- Output current: Possible to output 200 mA (VIN ≥ VOUT(IS) + 1.0 V)
- Input and output capacitors: A ceramic capacitor of 2.2 μF or more can be used.
- Ripple rejection: 70 dB typ. (f = 100 Hz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.

Detector block
- Detection voltage: 2.6 V to 5.0 V, selectable in 0.1 V step
- Detection voltage accuracy: 100 mV (Tj = -40°C to +150°C)
- Hysteresis width: 0.12 V min.
- Release delay time: 18 ms typ. (C DLY = 47 nF)
- Output form: Nch open-drain output (Built-in pull-up resistor)

Overall
- Current consumption: During operation: 60 μA typ., 95 μA max. (Tj = -40°C to +150°C)
- Operation temperature range: Ta = -40°C to +125°C
- Withstand 45 V load dump
- AEC-Q100 in process

PIN CONFIGURATIONS

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
Voltage Detectors

S-19100xxxH Series

105°C OPERATION VOLTAGE DETECTOR
BUILT-IN DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING)

FEATURES

- Super-low current consumption  270 nA typ.
- Low operation voltage  0.6 V (CMOS output product)
- Hysteresis width  5% typ.

SPECIFICATIONS

- Detection voltage:  1.2 V to 4.6 V (0.1 V step)
- Detection voltage accuracy:  ±2.5% (2.4 V ≤ VDET ≤ 4.6 V, Ta = -40°C to +105°C)
- Current consumption:  270 nA typ. (1.2 V ≤ VDET < 2.3 V)
- Operation voltage range:  0.6 V to 10.0 V (CMOS output product)
- Hysteresis width:  5% ±2% (Ta = -40°C to +105°C)
- Delay time accuracy:  ±15% (CD = 4.7 nF, Ta = +25°C)
- Output form:  Nch open-drain output (Active "L")
- Operation temperature range:  Ta = -40°C to +105°C
- AEC-Q100 qualified

PIN CONFIGURATIONS

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
S-19101xxxH Series

105°C OPERATION VOLTAGE DETECTOR
BUILT-IN DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING)

FEATURES

- Super-low current consumption  270 nA typ.
- Low operation voltage  0.6 V (CMOS output product)
- No hysteresis width

SPECIFICATIONS

- Detection voltage:  1.2 V to 4.6 V (0.1 V step)
- Detection voltage accuracy:  \(\pm 2.5\% \ (2.4 \text{ V} \leq V_{DET} \leq 4.6 \text{ V}, \ T_a = -40^\circ\text{C} \text{ to } +105^\circ\text{C})\)
  \(\pm (2.0% + 12 \text{ mV}) \ (1.2 \text{ V} \leq -V_{DET} < 2.4 \text{ V}, \ T_a = -40^\circ\text{C} \text{ to } +105^\circ\text{C})\)
- Current consumption:  270 nA typ. (1.2 V \leq -V_{DET} < 2.3 V)
- Operation voltage range:  0.6 V to 10.0 V (CMOS output product)
- 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")
- Operation temperature range:  \(T_a = -40^\circ\text{C} \text{ to } +105^\circ\text{C}\)
- AEC-Q100 qualified

PIN CONFIGURATIONS

<table>
<thead>
<tr>
<th>SOT-23-5</th>
<th>SC-82AB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top view</td>
<td>Top view</td>
</tr>
<tr>
<td>5 4 3 2 1</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>OUT</td>
<td>VSS</td>
</tr>
<tr>
<td>VDD</td>
<td>VDD</td>
</tr>
<tr>
<td>VSS</td>
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<tr>
<td>NC</td>
<td>OUT</td>
</tr>
<tr>
<td>CD</td>
<td></td>
</tr>
</tbody>
</table>

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
FEATURES

- Super-low current consumption  270 nA typ.
- Low operation voltage  0.6 V (CMOS output product)
- Hysteresis width  5% typ.

SPECIFICATIONS

- Detection voltage:  1.2 V to 4.6 V (0.1 V step)
- Detection voltage accuracy:  ±3.0% (2.4 V ≤ $V_{\text{DET}}$ ≤ 4.6 V, $T_a$ = −40°C to +125°C)
  ±(2.5% + 12 mV) (1.2 V ≤ $V_{\text{DET}}$ < 2.4 V, $T_a$ = −40°C to +125°C)
- Current consumption:  270 nA typ. (1.2 V ≤ $V_{\text{DET}}$ < 2.3 V)
- Operation voltage range:  0.6 V to 10.0 V (CMOS output product)
- Hysteresis width:  5% ±2% ($T_a$ = −40°C to +125°C)
- Delay time accuracy:  ±15% ($C_D$ = 4.7 nF, $T_a$ = +25°C)
- Output form:  Nch open-drain output (Active "L")
  CMOS output (Active "L")
- Operation temperature range: $T_a$ = −40°C to +125°C
- AEC-Q100 qualified

PIN CONFIGURATIONS

SOT-23-5
Top view

1 OUT
2 VDD
3 VSS
4 NC
5 CD

SC-82AB
Top view

1 VSS
2 VDD
3 CD
4 OUT

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
S-19101xxxA Series

125°C OPERATION VOLTAGE DETECTOR
BUILT-IN DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING)

FEATURES

- Super-low current consumption 270 nA typ.
- Low operation voltage 0.6 V (CMOS output product)
- No hysteresis width

SPECIFICATIONS

- Detection voltage: 1.2 V to 4.6 V (0.1 V step)
- Detection voltage accuracy: ±3.0% (2.4 V ≤ VDET ≤ 4.6 V, Ta = -40°C to +125°C)
- ±(2.5% + 12 mV) (1.2 V ≤ VDET < 2.4 V, Ta = -40°C to +125°C)
- Current consumption: 270 nA typ. (1.2 V ≤ VDET < 2.3 V)
- Operation voltage range: 0.6 V to 10.0 V (CMOS output product)
- Delay time accuracy: ±15% (CD = 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 +125°C
- AEC-Q100 qualified

PIN CONFIGURATIONS

<table>
<thead>
<tr>
<th>SOT-23-5</th>
<th>SC-82AB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top view</td>
<td>Top view</td>
</tr>
<tr>
<td>1</td>
<td>OUT</td>
</tr>
<tr>
<td>2</td>
<td>VDD</td>
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<tr>
<td>3</td>
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<tr>
<td>4</td>
<td>NC</td>
</tr>
<tr>
<td>5</td>
<td>CD</td>
</tr>
</tbody>
</table>

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.

CMOS IC 2016-2017
SII Semiconductor Corporation
Voltage Detectors

S-19102/19108 Series

105°C OPERATION
VOLTAGE DETECTOR WITH SENSE PIN

FEATURES
- Low current consumption  500 nA typ.
- Hysteresis width  5% typ.
- 2 types of pin configuration

SPECIFICATIONS
- Detection voltage:  1.0 V to 5.0 V (0.1 V step)
- Detection voltage accuracy:  ±3.5% (2.2 V ≤ −V_{DET(S)} ≤ 5.0 V, Ta = −40°C to +105°C)
  ±(2.5% + 22 mV) (1.0 V ≤ −V_{DET(S)} < 2.2 V, Ta = −40°C to +105°C)
- Current consumption:  500 nA typ.
- Operation voltage range:  0.95 V to 10.0 V
- Hysteresis width:  5% ± 2% (Ta = −40°C to +105°C)
- Output form:  Nch open-drain output (Active “L”)
  CMOS output (Active “L”)
- Operation temperature range:  Ta = −40°C to +105°C
- AEC-Q100 qualified

PIN CONFIGURATIONS

<table>
<thead>
<tr>
<th>SOT-23-5</th>
<th>S-19102 Series</th>
<th>S-19108 Series</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1  OUT</td>
<td>OUT</td>
</tr>
<tr>
<td></td>
<td>2  VDD</td>
<td>VSS</td>
</tr>
<tr>
<td></td>
<td>3  VSS</td>
<td>VDD</td>
</tr>
<tr>
<td></td>
<td>4  NC</td>
<td>SENSE</td>
</tr>
<tr>
<td></td>
<td>5  SENSE</td>
<td>NC</td>
</tr>
</tbody>
</table>
105°C OPERATION
VOLTAGE DETECTOR WITH SENSE PIN

FEATURES

- Low current consumption  500 nA typ.
- No hysteresis width
- 2 types of pin configurations

SPECIFICATIONS

- Detection voltage:  1.0 V to 5.0 V (0.1 V step)
- Detection voltage accuracy:
  \[ \pm 3.5\% \quad (2.2 \text{ V} \leq -V_{\text{DET(S)}} \leq 5.0 \text{ V}, \quad \text{Ta} = -40^\circ \text{C} \text{ to } +105^\circ \text{C}) \]
  \[ \pm (2.5\% + 22 \text{ mV}) \quad (1.0 \text{ V} \leq -V_{\text{DET(S)}} < 2.2 \text{ V}, \quad \text{Ta} = -40^\circ \text{C} \text{ to } +105^\circ \text{C}) \]
- Current consumption:  500 nA typ.
- Operation voltage range:  0.95 V to 10.0 V
- Output form:
  - Nch open-drain output (Active "L")
  - CMOS output (Active "L")
- Operation temperature range:  Ta = -40°C to +105°C
- AEC-Q100 qualified

PIN CONFIGURATIONS

<table>
<thead>
<tr>
<th>SOT-23-5</th>
<th>S-19103 Series</th>
<th>S-19109 Series</th>
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<tbody>
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</tr>
<tr>
<td></td>
<td>2 VDD</td>
<td>VSS</td>
</tr>
<tr>
<td>5 4</td>
<td>3 VSS</td>
<td>VDD</td>
</tr>
<tr>
<td></td>
<td>4 NC</td>
<td>SENSE</td>
</tr>
<tr>
<td>1 2 3</td>
<td>5 SENSE</td>
<td>NC</td>
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</tbody>
</table>

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
**Voltage Detectors**

**S-19104/19106 Series**

105°C OPERATION BUILT-IN DELAY CIRCUIT (EXTERNAL DELAY TIME SETTING) VOLTAGE DETECTOR WITH SENSE PIN

---

### FEATURES

- **Low current consumption**: 500 nA typ.
- **Hysteresis width**: 5% typ.
- **2 types of pin configurations**

### SPECIFICATIONS

- **Detection voltage**: 1.0 V to 5.0 V (0.1 V step)
- **Detection voltage accuracy**:
  - ±3.5% (2.2 V ≤ \( V_{DET(S)} \) ≤ 5.0 V, \( Ta = -40°C \) to +105°C)
  - ±(2.5% + 22 mV) (1.0 V ≤ \( V_{DET(S)} \) < 2.2 V, \( Ta = -40°C \) to +105°C)
- **Current consumption**: 500 nA typ.
- **Operation voltage range**: 0.95 V to 10.0 V
- **Hysteresis width**: 5% ± 2% (\( Ta = -40°C \) to +105°C)
- **Release delay time accuracy**: ±34% (\( CD = 4.7 \text{ nF} \), \( Ta = -40°C \) to +105°C)
- **Output form**: Nch open-drain output (Active "L")
  - CMOS output (Active "L")
- **Operation temperature range**: \( Ta = -40°C \) to +105°C
- **AEC-Q100 qualified**

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### PIN CONFIGURATIONS

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<thead>
<tr>
<th>SOT-23-5 Top view</th>
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<th>S-19106 Series</th>
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<td>VSS</td>
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<td>3</td>
<td>VSS</td>
<td>VDD</td>
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<tr>
<td>4</td>
<td>CD</td>
<td>SENSE</td>
</tr>
<tr>
<td>5</td>
<td>SENSE</td>
<td>CD</td>
</tr>
</tbody>
</table>


**FEATURES**

- Low current consumption  500 nA typ.
- No hysteresis width
- 2 types of pin configurations

**SPECIFICATIONS**

- Detection voltage:  1.0 V to 5.0 V (0.1 V step)
- Detection voltage accuracy:  
  ±3.5% (2.2 V ≤ V_DET(S) ≤ 5.0 V, Ta = -40°C to +105°C)  
  ±(2.5% + 22 mV) (1.0 V ≤ V_DET(S) < 2.2 V, Ta = -40°C to +105°C)
- Current consumption:  500 nA typ.
- Operation voltage range:  0.95 V to 10.0 V
- Release delay time accuracy:  ±34% (C_D = 4.7 nF, Ta = -40°C to +105°C)
- Output form:  Nch open-drain output (Active "L")  
  CMOS output (Active "L")
- Operation temperature range:  Ta = -40°C to +105°C
- AEC-Q100 qualified

**PIN CONFIGURATIONS**

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<tr>
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<th>S-19107 Series</th>
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<tr>
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<td>2 VDD</td>
<td>VSS</td>
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</tr>
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<td>3 VSS</td>
<td>VDD</td>
<td></td>
</tr>
<tr>
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<td>4 CD</td>
<td>SENSE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 SENSE</td>
<td>CD</td>
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</table>

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
Voltage Detectors

S-19110AxxH to S-19110HxxH Series

105°C OPERATION HIGH-WITHSTAND VOLTAGE BUILT-IN DELAY CIRCUIT
(EXTERNAL DELAY TIME SETTING) VOLTAGE DETECTOR

FEATURES

- High-withstand voltage: 36 V operation, 45 V rating
- VDD detection / SENSE detection is selectable
- Detection voltage (−V_{DET(S)} ≥ 5.0 V) and release voltage can be set separately

SPECIFICATIONS

- Detection voltage: 5.0 V to 10.0 V (0.05 V step)
- Detection voltage accuracy: ±1.5% (Ta = −40°C to +105°C)
- Detection delay time accuracy: ±20% (C_N = 3.3 nF, Ta = −40°C to +105°C)
- Release voltage: 5.25 V to 13.0 V (0.05 V step)
- Release voltage accuracy: ±1.5% (Ta = −40°C to +105°C, 5.0% ≤ V_{HY} ≤ 20.0%)
  ±2.0% (Ta = −40°C to +105°C, 20.0% < V_{HY} ≤ 30.0%)
- Release delay time accuracy: ±20% (C_P = 3.3 nF, Ta = −40°C to +105°C)
- Current consumption: 600 nA typ.
- Operation voltage range: 1.8 V to 36.0 V
- Hysteresis width: "Available" / "unavailable" is selectable.
  5.0% to 30.0% (Ta = −40°C to +105°C)
- Output form: Nch open-drain output
- Operation temperature range: Ta = −40°C to +105°C
- AEC-Q100 qualified

PIN CONFIGURATIONS

<table>
<thead>
<tr>
<th>SOT-23-6</th>
<th>A / B / C / D type (VDD検品出)</th>
<th>E / F / G / H type (SENSE検品出)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top view</td>
<td>1 VDD</td>
<td>VDD</td>
</tr>
<tr>
<td></td>
<td>2 NC</td>
<td>SENSE</td>
</tr>
<tr>
<td></td>
<td>3 OUT</td>
<td>OUT</td>
</tr>
<tr>
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<td>4 CP</td>
<td>CP</td>
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<td>VSS</td>
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<tr>
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<td>6 CN</td>
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</tbody>
</table>

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
Voltage Detectors

S-19110JxxH to S-19110RxxH Series

105°C OPERATION HIGH-WITHSTAND VOLTAGE BUILT-IN DELAY CIRCUIT
(EXTERNAL DELAY TIME SETTING) VOLTAGE DETECTOR

/ FEATURES

- High-withstand voltage: 36 V operation, 45 V rating
- VDD detection / SENSE detection is selectable
- Detection voltage (\(-V_{DET(S)}\) < 5.0 V) and release voltage can be set separately

/ SPECIFICATIONS

- Detection voltage:
  - J / K / L / M type (VDD detection product): 3.6 V to 4.95 V (0.05 V step)
  - N / P / O / R type (SENSE detection product): 3.0 V to 4.95 V (0.05 V step)
- Detection voltage accuracy:
  - \(\pm 3.0\%\) (~\(V_{DET(S)}\) = 3.0 V to 4.15 V, \(Ta = -40°C to +105°C\))
  - \(\pm 2.5\%\) (~\(V_{DET(S)}\) = 4.2 V to 4.95 V, \(Ta = -40°C to +105°C\))
- Detection delay time accuracy:
  - \(\pm 20\%\) (\(CN = 3.3\) nF, \(Ta = -40°C to +105°C\))
- Release voltage:
  - J / K / L / M type (VDD detection product): 3.8 V to 6.4 V (0.05 V step)
  - N / P / O / R type (SENSE detection product): 3.15 V to 6.4 V (0.05 V step)
- Release voltage accuracy:
  - \(\pm 3.0\%\) (~\(V_{DET(S)}\) = 3.0 V to 4.15 V, \(Ta = -40°C to +105°C, 5.0\% \leq V_{HYS} \leq 20.0\%\))
  - \(\pm 3.5\%\) (~\(V_{DET(S)}\) = 3.0 V to 4.15 V, \(Ta = -40°C to +105°C, 20.0\% < V_{HYS} \leq 30.0\%\))
  - \(\pm 2.5\%\) (~\(V_{DET(S)}\) = 4.2 V to 4.95 V, \(Ta = -40°C to +105°C, 5.0\% \leq V_{HYS} \leq 20.0\%\))
  - \(\pm 3.0\%\) (~\(V_{DET(S)}\) = 4.2 V to 4.95 V, \(Ta = -40°C to +105°C, 20.0\% < V_{HYS} \leq 30.0\%\))
- Release delay time accuracy:
  - \(\pm 20\%\) (\(CP = 3.3\) nF, \(Ta = -40°C to +105°C\))
- Current consumption: 600 nA typ.
- Operation voltage range: 1.8 V to 36.0 V
- Hysteresis width:
  - "Available" / "unavailable" is selectable.
  - 5.0% to 30.0% (\(Ta = -40°C to +105°C\))
- Output form: Nch open-drain output
- Operation temperature range: \(Ta = -40°C to +105°C\)
- AEC-Q100 qualified

/ PIN CONFIGURATIONS

<table>
<thead>
<tr>
<th>SOT-23-6</th>
<th>J / K / L / M type (VDD detection product)</th>
<th>N / P / O / R type (SENSE detection product)</th>
</tr>
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<tbody>
<tr>
<td>Top view</td>
<td>1 VDD</td>
<td>2 VDD</td>
</tr>
<tr>
<td></td>
<td>2 NC</td>
<td>3 SENSE</td>
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<td>6 CN</td>
<td>1 CN</td>
</tr>
</tbody>
</table>

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
Voltage Detectors

S-19110AxxA to S-19110HxxA Series

125°C OPERATION HIGH-WITHSTAND VOLTAGE BUILT-IN DELAY CIRCUIT
(EXTERNAL DELAY TIME SETTING) VOLTAGE DETECTOR

FEATURES

- High-withstand voltage: 36 V operation, 45 V rating
- VDD detection / SENSE detection is selectable
- Detection voltage ($-V_{DET(S)} \geq 5.0 \text{ V}$) and release voltage can be set separately

SPECIFICATIONS

- Detection voltage: 5.0 V to 10.0 V (0.05 V step)
- Detection voltage accuracy: $\pm 2.0\%$ ($Ta = -40^\circ\text{C} \text{ to } +125^\circ\text{C}$)
- Detection delay time accuracy: $\pm 20\%$ ($CN = 3.3 \text{ nF}, Ta = -40^\circ\text{C} \text{ to } +125^\circ\text{C}$)
- Release voltage: 5.25 V to 13.0 V (0.05 V step)
- Release voltage accuracy: $\pm 2.0\%$ ($Ta = -40^\circ\text{C} \text{ to } +125^\circ\text{C}$, $5.0\% \leq V_{HYS} \leq 20.0\%$)
- Release delay time accuracy: $\pm 20\%$ ($CP = 3.3 \text{ nF}, Ta = -40^\circ\text{C} \text{ to } +125^\circ\text{C}$)
- Current consumption: 600 nA typ.
- Operation voltage range: 1.8 V to 36.0 V
- Hysteresis width: *Available* / *unavailable* is selectable. $5.0\% \text{ to } 30.0\%$ ($Ta = -40^\circ\text{C} \text{ to } +125^\circ\text{C}$)
- Output form: Nch open-drain output
- Operation temperature range: $Ta = -40^\circ\text{C} \text{ to } +125^\circ\text{C}$
- AEC-Q100 qualified

PIN CONFIGURATIONS

<table>
<thead>
<tr>
<th>SOT-23-6</th>
<th>A / B / C / D type (VDD detection product)</th>
<th>E / F / G / H type (SENSE detection product)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top view</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 5 4 1</td>
<td>VDD</td>
<td>VDD</td>
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<tr>
<td>2</td>
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<td>SENSE</td>
</tr>
<tr>
<td>3</td>
<td>OUT</td>
<td>OUT</td>
</tr>
<tr>
<td>4</td>
<td>CP</td>
<td>CP</td>
</tr>
<tr>
<td>5</td>
<td>VSS</td>
<td>VSS</td>
</tr>
<tr>
<td>6</td>
<td>CN</td>
<td>CN</td>
</tr>
</tbody>
</table>

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
S-19110JxxA to S-19110RxxA Series

125°C OPERATION HIGH-WITHSTAND VOLTAGE BUILT-IN DELAY CIRCUIT
(EXTERNAL DELAY TIME SETTING) VOLTAGE DETECTOR

FEATURES

- High-withstand voltage  36 V operation, 45 V rating
- VDD detection / SENSE detection is selectable
- Detection voltage ($-V_{DET(S)} < 5.0 \text{ V}$) and release voltage can be set separately

SPECIFICATIONS

- Detection voltage:  
  J / K / L / M type (VDD detection product): 3.6 V to 4.95 V (0.05 V step)
  N / P / Q / R type (SENSE detection product): 3.0 V to 4.95 V (0.05 V step)
- Detection voltage accuracy:  
  $\pm 3.0\% \quad (-V_{DET(S)} = 3.0 \text{ V to 4.15 V, Ta = -40°C to +125°C})$
  $\pm 2.5\% \quad (-V_{DET(S)} = 4.2 \text{ V to 4.95 V, Ta = -40°C to +125°C})$
- Detection delay time accuracy:  
  $\pm 20\% \quad (C_N = 3.3 \text{ nF, Ta = -40°C to +125°C})$
- Release voltage:  
  J / K / L / M type (VDD detection product): 3.8 V to 6.4 V (0.05 V step)
  N / P / Q / R type (SENSE detection product): 3.15 V to 6.4 V (0.05 V step)
- Release voltage accuracy:  
  $\pm 3.0\% \quad (-V_{DET(S)} = 3.0 \text{ V to 4.15 V, Ta = -40°C to +125°C, 5.0\% \leq V_{HYS} \leq 20.0\%})$
  $\pm 3.5\% \quad (-V_{DET(S)} = 3.0 \text{ V to 4.15 V, Ta = -40°C to +125°C, 20.0\% < V_{HYS} \leq 30.0\%})$
  $\pm 2.5\% \quad (-V_{DET(S)} = 4.2 \text{ V to 4.95 V, Ta = -40°C to +125°C, 5.0\% \leq V_{HYS} \leq 20.0\%})$
  $\pm 3.0\% \quad (-V_{DET(S)} = 4.2 \text{ V to 4.95 V, Ta = -40°C to +125°C, 20.0\% < V_{HYS} \leq 30.0\%})$
- Release delay time accuracy:  
  $\pm 20\% \quad (C_P = 3.3 \text{ nF, Ta = -40°C to +125°C})$
- Current consumption:  
  600 nA typ.
- Operation voltage range:  
  1.8 V to 36.0 V
- Hysteresis width:  
  "Available" / "unavailable" is selectable.
  5.0\% to 30.0\% (Ta = -40°C to +125°C)
- Output form:  
  Nch open-drain output
- Operation temperature range:  
  Ta = -40°C to +125°C
- AEC-Q100 qualified

PIN CONFIGURATIONS

<table>
<thead>
<tr>
<th>SOT-23-6</th>
<th>J / K / L / M type</th>
<th>N / P / Q / R type</th>
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</thead>
<tbody>
<tr>
<td>Top view</td>
<td>(VDD detection product)</td>
<td>(SENSE detection product)</td>
</tr>
<tr>
<td>1 VDD</td>
<td>VDD</td>
<td></td>
</tr>
<tr>
<td>2 NC</td>
<td>SENSE</td>
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</tr>
<tr>
<td>3 OUT</td>
<td>OUT</td>
<td></td>
</tr>
<tr>
<td>4 CP</td>
<td>CP</td>
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</tr>
<tr>
<td>5 VSS</td>
<td>VSS</td>
<td></td>
</tr>
<tr>
<td>6 CN</td>
<td>CN</td>
<td></td>
</tr>
</tbody>
</table>
Watchdog Timers

**S-19500/19501 Series**

**125°C OPERATION HIGH-WITHSTAND VOLTAGE WATCHDOG TIMER WITH RESET FUNCTION CMOS VOLTAGE REGULATOR**

**FEATURES**

- LDO, reset IC and watchdog timer on a single chip
- Built-in autonomous watchdog operation function
- Possible to turn on / turn off the watchdog timer forcibly (S-19500 Series)

**SPECIFICATIONS**

**Regulator block**
- Output voltage: 3.0 V to 5.3 V, selectable in 0.1 V step
- Input voltage: 4.0 V to 36.0 V
- Output voltage accuracy: ±2.0% (Tj = −40°C to +150°C)
- Dropout voltage: 120 mV typ. (5.0 V output product, \(I_{OUT} = 100 \, \text{mA}\))
- Output current: Possible to output 200 mA (\(V_{IN} = V_{OUT(S)} + 1.0 \, \text{V}\))
- Input and output capacitors: A ceramic capacitor of 2.2 \(\mu\)F or more can be used.
- Ripple rejection: 70 dB typ. (f = 100 Hz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.

**Detector block**
- Detection voltage: 2.6 V to 5.0 V, selectable in 0.1 V step
- Detection voltage accuracy: ±100 mV (Tj = −40°C to +150°C)
- Hysteresis width: 0.12 V min.
- Release delay time: 18 ms typ. (C DLY = 47 nF)
- Output form: Nch open-drain output (Built-in pull-up resistor)

**Watchdog timer block**
- Autonomous watchdog operation function: The watchdog timer operates due to detection of load current.
- Watchdog activation current is adjustable: 1.5 mA typ. (WADJ pin is open)
- Product type is selectable:
  - S-19500 Series (Product with watchdog enable function (Output: WO / RO pin))
  - S-19501 Series (Product without watchdog enable function (Output: WO pin and RO pin))
- Watchdog trigger time is adjustable: 43 ms typ. (C DLY = 47 nF)
- Output form: Nch open-drain output (Built-in pull-up resistor)

Overall

- Current consumption: 60 \(\mu\)A typ. (\(I_{OUT} = 0 \, \text{mA}\), When the watchdog timer is deactivated.)
- Operation temperature range: 75 \(\mu\)A typ. (\(I_{OUT} \leq 5 \, \text{mA}\), When the watchdog timer is activated.)
- Withstand 45 V load dump
- AEC-Q100 qualified

**PIN CONFIGURATIONS**

<table>
<thead>
<tr>
<th>Top view</th>
<th>HSOP-8A</th>
<th>Bottom view</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
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<td>6</td>
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<td>4</td>
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<table>
<thead>
<tr>
<th>S-19500 Series</th>
<th>S-19501 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VOUT</td>
</tr>
<tr>
<td>2</td>
<td>WADJ</td>
</tr>
<tr>
<td>3</td>
<td>VSS</td>
</tr>
<tr>
<td>4</td>
<td>DLY</td>
</tr>
<tr>
<td>5</td>
<td>WO / RO</td>
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<td>7</td>
<td>WI</td>
</tr>
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<td>8</td>
<td>VIN</td>
</tr>
</tbody>
</table>

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
**Watchdog Timers**

**S-19400/19401 Series**

**125°C OPERATION LOW CURRENT CONSUMPTION WATCHDOG TIMER WITH RESET FUNCTION**

### FEATURES
- Reset IC and watchdog timer on a single chip
- The time-out mode and the window mode are selectable
- Super-low current consumption 3.8 μA typ.

### SPECIFICATIONS
- Detection voltage: 2.0 V to 5.0 V, selectable in 0.1 V step
- Detection voltage accuracy: ±2.0%
- Input voltage: \( V_{DD} = 0.9 \text{ V to 6.0 V} \)
- Hysteresis width: 5% typ.
- Current consumption: 3.8 μA typ.
- Reset time-out period: 14.5 ms typ. (\( C_{POR} = 2200 \text{ pF} \))
- Watchdog operation is switchable: Enable, Disable
- Watchdog operation voltage range: 2.5 V to 6.0 V
- Watchdog mode switching function: Time-out mode, window mode
- Watchdog input edge is selectable: Rising edge, falling edge, both rising and falling edges
- Product type is selectable: S-19400 Series (Product with W / T pin (Output: WDO pin))
  - S-19401 Series (Product without W / T pin (Output: RST pin, WDO pin))
- Operation temperature range: \( T_a = -40°C \text{ to } +125°C \)
- AEC-Q100 qualified

### PIN CONFIGURATIONS

#### TMSOP-8

**Top view**

<table>
<thead>
<tr>
<th>Pin</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>W / T</td>
<td>CPOR</td>
<td>CWDT</td>
<td>VSS</td>
<td>WEN</td>
<td>WDO</td>
<td>WDI</td>
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</tbody>
</table>

**S-19400 Series (Product with W / T pin)**

**S-19401 Series (Product without W / T pin)**

#### HSNT-8(2030)

**Top view**

<table>
<thead>
<tr>
<th>Pin</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>W / T</td>
<td>CPOR</td>
<td>CWDT</td>
<td>VSS</td>
<td>WEN</td>
<td>WDO</td>
<td>WDI</td>
<td>VDD</td>
</tr>
</tbody>
</table>

**S-19400 Series (Product with W / T pin)**

**S-19401 Series (Product without W / T pin)**

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This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
Antenna diagnosis ICs

S-19700 Series

125°C OPERATION CURRENT MONITORING
ADJUSTABLE CURRENT LIMIT CMOS VOLTAGE REGULATOR

/ FEATURES 

- LDO, antenna diagnosis circuit and protection circuit on a single chip
- High output current  400 mA
- Possible to monitor load current by monitoring the CSO pin voltage

/ SPECIFICATIONS 

- Output voltage (externally set): 3.3 V to 20.0 V, settable via an external resistor
- Output voltage (internally set): 3.3 V to 15.0 V, selectable in 0.1 V step
- Input voltage: 4.5 V to 36.0 V
- Output voltage accuracy: ±2.3% (1.0 mA ≤ IOUT ≤ 30 mA, TJ = -40°C to +150°C)
- Dropout voltage: 240 mV typ. (3.3 V output product, IOUT = 300 mA)
- Current consumption: During operation: 80 µA typ., 170 µA max. (TJ = -40°C to +150°C)
  During power-off: 1.0 µA typ., 5.0 µA max. (TJ = -40°C to +90°C)
- Output current: Possible to output 400 mA (VIN ≥ VOUT(S) + 2.0 V)
- Output capacitor: A ceramic capacitor of 4.7 µF or more can be used.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in overvoltage detection circuit: Detects an output short-circuit of the higher voltage.
- Built-in ON / OFF circuit: Ensures long battery life.
- Constant current source pull-down is selectable.
- Current monitoring function: Possible to monitor load current by monitoring the CSO pin voltage.
- Current limit function: Possible to adjust a current limit value via an external resistor.
- Reverse current protection function: IREV = 45 µA max.
- Operation temperature range: Ta = -40°C to +125°C
- AEC-Q100 qualified

/ PIN CONFIGURATIONS 

<table>
<thead>
<tr>
<th>Top view</th>
<th>Types in which Output Voltage is Externally Set</th>
<th>Types in which Output Voltage is Internally Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIN</td>
<td>VIN</td>
<td></td>
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<tr>
<td>SENSE</td>
<td>SENSE</td>
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</tr>
<tr>
<td>VDD</td>
<td>VDD</td>
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<tr>
<td>CSO</td>
<td>CSO</td>
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<tr>
<td>ON / OFF</td>
<td>ON / OFF</td>
<td></td>
</tr>
<tr>
<td>VSS</td>
<td>VSS</td>
<td></td>
</tr>
<tr>
<td>VADJ</td>
<td>INT</td>
<td></td>
</tr>
<tr>
<td>VOUT</td>
<td>VOUT</td>
<td></td>
</tr>
</tbody>
</table>

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
S-19680 Series

105°C OPERATION CURRENT MONITOR HIGH SIDE SWITCH

FEATURES

- Incorporates a high-side switch, antenna diagnosis circuit and protection circuit on 1 chip.
- Enables monitoring of the load current by attaching an external current monitoring resistor.
- The hysteresis type or latch type can be selected for the thermal shutdown circuit.

SPECIFICATIONS

- Power supply voltage: $V_{DD} = 2.7$ V to 10.0 V
- Current consumption during operation: $I_{SS1} = 12$ μA typ., $I_{SS1} = 24$ μA max. ($T_1 = -40°C$ to +105°C)
- ON resistance: $R_{ON} = 1.1$ Ω typ., $R_{ON} = 3.7$ Ω max. ($T_1 = -40°C$ to +105°C)
- Limit current: 40 mA to 100 mA, selectable in 10 mA step
- Load short-circuit detection current: $I_{LIM} \times 0.3$ to $I_{LIM} \times 1.0$ ($I_{SHORT} \geq 30$ mA), selectable in 0.1 step
- Load open detection current: 2.5 mA to 30 mA, selectable in 2.5 mA step
- Built-in thermal shutdown circuit: Detection temperature 165°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.
- Operation temperature range: $T_a = -40°C$ to +105°C
- AEC-Q100 qualified

PIN CONFIGURATIONS

TMSOP-8

1 VIN
2 SENSE
3 VDD
4 ON / OFF
5 OL
6 SC
7 VSS
8 OUT

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
S-8412A Series

105°C OPERATION VCOM BUFFER AMPLIFIER
WITH BUILT-IN CALIBRATION FUNCTION

FEATURES

- Multiple time programmable (MTP) memory allows VCOM voltage level to be rewritable for up to 48 times
- Recorded data is automatically loaded when the power is turned on
- Built-in I²C-bus interface

SPECIFICATIONS

- The VCOM voltage level can be adjusted in 256 steps.
- Supports a range of TFT liquid crystal source voltages
  Power supply voltage range (VDDH): 6 V to 13.5 V
  VCOM voltage setting range: 20% to 70% of VDDH
- Interfaces with the CPU via a 2-wire I²C-bus interface
- Supports a low operation voltage
  Power supply for interface: 2.1 V to 3.8 V
- Optimum VCOM level can be saved in the built-in MTP memory which is rewritable for up to 48 times
- Buffer characteristics
  Source current (I SOURCE): 35 mA
  Sink current (I SINK): 45 mA
- Operation temperature range:
  Ta = −40°C to +105°C

PIN CONFIGURATIONS

16-Pin TSSOP

<table>
<thead>
<tr>
<th>Top view</th>
<th>S-8412A Series A type</th>
<th>S-8412A Series B type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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</tr>
<tr>
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</tr>
<tr>
<td>3</td>
<td>VCOM</td>
<td>VCOM</td>
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<tr>
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<tr>
<td>5</td>
<td>VDDH</td>
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<tr>
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<tr>
<td>7</td>
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<td>16</td>
<td>SCL</td>
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</tbody>
</table>

Remark

Contact our sales office for the product name.

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
S-8235A Series

85°C OPERATION BATTERY PROTECTION IC FOR 3-SERIAL TO 5-SERIAL CELL PACK (SECONDARY PROTECTION)

/ FEATURES

- High-withstand voltage  24 V operation, 26 V rating
- By connecting in cascade, protection for 6-serial or more cells lithium-ion rechargeable battery pack is available
- Self-test operation to confirm overcharge detection is available

/ SPECIFICATIONS

- High-accuracy voltage detection circuit for each cell
  Overcharge detection voltage n (n = 1 to 5)
  3.60 V to 4.50 V (50 mV step)
  Accuracy ±20 mV (Ta = +25°C)
  Accuracy ±30 mV (Ta = -5°C to +55°C)
  Overcharge hysteresis voltage n (n = 1 to 5)
  0.0 mV to −550 mV (50 mV step)
  −300 mV to −550 mV Accuracy ±20%
  −100 mV to −250 mV Accuracy ±50 mV
  0.0 mV to −50 mV Accuracy ±25 mV
- Self-test operation to confirm overcharge detection is available.
- Cascade connection is available.
- Delay times for overcharge detection can be set by an internal circuit only (External capacitors are unnecessary).
- High-withstand voltage: Absolute maximum rating 26 V
- Wide operation voltage range: 6 V to 24 V
- Wide operation temperature range: Ta = -40°C to +85°C
- Low current consumption
  At VCELL = 1.0 V for each cell: 10 μA max. (Ta = +25°C)
  At 2.3 V for each cell: 8 μA max. (Ta = +25°C)
- AEC-Q100 qualified

/ PIN CONFIGURATIONS

16-Pin TSSOP

Top view

1  VDD
2  VC1
3  VC2
4  VC3
5  VC4
6  VC5
7  VSS
8  NPI
9  CO
10  CAO
11  CLKI
12  RSTI
13  RSTO
14  CLKO
15  CAI
16  CTL

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
Battery Protection ICs

NEW S-19190 Series

105°C OPERATION VOLTAGE MONITORING IC WITH CELL BALANCING FUNCTION

FEATURES

- Supports different numbers of cells due to protection in 1-cell units.
- Low current consumption 2.0 μA max.
- Includes a high-accuracy voltage detection circuit and a delay circuit.

SPECIFICATIONS

- High-accuracy voltage detection circuit
  - Cell balancing detection voltage: 2.0 V to 4.6 V (5 mV step) Accuracy ±12 mV (2.0 V ≤ VBU ≤ 2.4 V)
  - Cell balancing release voltage: 2.0 V to 4.6 V* Accuracy ±0.5% (2.4 V ≤ VBU ≤ 4.6 V)
  - Overcharge detection voltage: 2.0 V to 4.6 V (5 mV step) Accuracy ±12 mV (2.0 V ≤ VCU ≤ 2.4 V)
  - Overcharge release voltage: 2.0 V to 4.6 V* Accuracy ±24 mV (2.0 V ≤ VCL ≤ 4.6 V)

- Built-in Nch transistor with ON resistance of 5 Ω typ. between the CB pin and the VSS pin
- Current consumption: 2.0 μA max. (Ta = +25°C)
- Delay times are generated only by an internal circuit (External capacitors are unnecessary).
- CO pin output form and output logic are selectable: CMOS output Active “H”, active “L”
  - Nch open-drain output Active “H”, active “L”

- Switchable to power-saving mode by using the CE pin
- Operation temperature range: Ta = -40°C to +105°C
- AEC-Q100 qualified

*1. Cell balancing release voltage = Cell balancing detection voltage – Cell balancing hysteresis voltage
   (Cell balancing hysteresis voltage can be selected as 0 V or from a range of 0.1 V to 0.7 V in 50 mV step.)

*2. Overcharge release voltage = Overcharge detection voltage – Overcharge hysteresis voltage
   (Overcharge hysteresis voltage can be selected as 0 V or from a range of 0.1 V to 0.7 V in 50 mV step.)

PIN CONFIGURATIONS

SOT-23-6
Top view

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tr>
<td>CO</td>
<td>VSS</td>
<td>DP</td>
<td>CE</td>
<td>VDD</td>
<td>CB</td>
</tr>
</tbody>
</table>

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
150°C OPERATION
3-WIRE SERIAL E²PROM

/ FEATURES

- 150°C operation guaranteed
- Endurance 1 million cycles (85°C)
- Data retention 20 years (150°C)

/ SPECIFICATIONS

- Memory capacity
  - S-93S46A: 1 K bit (64 words × 16 bit)
  - S-93S56A: 2 K bit (128 words × 16 bit)
  - S-93S66A: 4 K bit (256 words × 16 bit)
- Operation voltage range
  - Read: 4.0 V to 5.5 V
  - Write: 4.0 V to 5.5 V
- Operating frequency: 1 MHz max.
- Write time: 10.0 ms max.
- Sequential read
- CMOS schmitt input (CS, SK)
- Write protect function under low power supply voltage
- Protect function against write due to erroneous instruction recognition
- Endurance: 1 million cycles (Ta = +85°C)
  - 800,000 cycles (Ta = +105°C)
  - 500,000 cycles (Ta = +125°C)
  - 200,000 cycles (Ta = +150°C)
- Data retention:
  - 100 years (Ta = +25°C)
  - 50 years (Ta = +125°C)
  - 20 years (Ta = +150°C)
- Wafer level burn-in (standard specifications)
- Operation temperature range: Ta = −40°C to +150°C
- AEC-Q100 qualified

/ PIN CONFIGURATIONS

8-Pin SOP (JEDEC)
Top view

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- 4 VCC
- 5 GND
- 6 TEST
- 7 NC
- 8 VCC
- 1 CS
- 2 SK
- 3 DI
- 4 DO

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
**E²PROM**

**S-93A46A/56A/66A/86A**

**125°C OPERATION**

**3-WIRE SERIAL E²PROM**

---

### FEATURES

- **125°C** operation guaranteed
- **Endurance** 1 million cycles (85°C)
- **Data retention** 50 years (125°C)

---

### SPECIFICATIONS

- **Memory capacity**
  - S-93A46A: 1 K bit (64 words × 16 bit)
  - S-93A56A: 2 K bit (128 words × 16 bit)
  - S-93A66A: 4 K bit (256 words × 16 bit)
  - S-93A86A: 16 K bit (1024 words × 16 bit)

- **Operation voltage range**
  - Read: 2.7 V to 5.5 V
  - Write: 2.7 V to 5.5 V

- **Operating frequency**
  - 1.0 MHz max. (S-93A46A/56A/66A)
  - 2.0 MHz max. (S-93A86A)

- **Write time**
  - 8.0 ms max. (S-93A46A/56A/66A)
  - 5.0 ms max. (S-93A86A)

- **Sequential read**
- CMOS schmitt input (CS, SK)
- Write protect function under low power supply voltage
- Protect function against write due to erroneous instruction recognition
- **Endurance:**
  - 1 million cycles (Ta = +85°C)
  - 800,000 cycles (Ta = +105°C)
  - 500,000 cycles (Ta = +125°C)

- **Data retention:**
  - 100 years (Ta = +25°C)
  - 50 years (Ta = +125°C)

- **Wafer level burn-in** (standard specifications)
- **Operation temperature range:** Ta = -40°C to +125°C
- **AEC-Q100 qualified**

---

### PIN CONFIGURATIONS

**8-Pin SOP (JEDEC)**

Top view

```
1  2  3  4  5  6  7  8
1  CS  SK  DI  DO  GND  TEST  NC  VCC
```

**8-Pin TSSOP**

Top view

```
1  2  3  4  5  6  7  8
1  CS  SK  DI  DO  GND  TEST  NC  VCC
```

---

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
125°C OPERATION
3-WIRE SERIAL E2PROM

FEATURES
- 125°C operation guaranteed
- Endurance: 1 million cycles (85°C)
- Data retention: 50 years (125°C)

SPECIFICATIONS
- Memory capacity:
  - S-93A46B: 1 K bit (64 words x 16 bit)
  - S-93A56B: 2 K bit (128 words x 16 bit)
  - S-93A66B: 4 K bit (256 words x 16 bit)
  - S-93A76B: 8 K bit (512 words x 16 bit)
  - S-93A86B: 16 K bit (1024 words x 16 bit)
- Operation voltage range:
  - Read: 2.5 V to 5.5 V
  - Write: 2.5 V to 5.5 V
- Operating frequency: 2.0 MHz max.
- Write time: 4.0 ms max.
- Sequential read
- CMOS schmitt input (CS, SK, DI)
- Write protect function under low power supply voltage
- Protect function against write due to erroneous instruction recognition
- Endurance:
  - 1 million cycles (Ta = +85°C)
  - 800,000 cycles (Ta = +105°C)
  - 500,000 cycles (Ta = +125°C)
- Data retention:
  - 100 years (Ta = +25°C)
  - 50 years (Ta = +125°C)
- Wafer level burn-in (standard specifications)
- Operation temperature range: Ta = -40°C to +125°C
- AEC-Q100 in process

PIN CONFIGURATIONS

8-Pin SOP (JEDEC)

<table>
<thead>
<tr>
<th>8-Pin TSSOP</th>
<th>8-Pin TSSOP</th>
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<tbody>
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<td>Top view</td>
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<td>1 CS</td>
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TMSOP-8

<table>
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<tr>
<th>HSNT-8(2030)</th>
<th>HSNT-8(2030)</th>
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<tbody>
<tr>
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</table>

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
S-93C46B/56B/66B/76A/86B H Series

105°C OPERATION
3-WIRE SERIAL E²PROM

FEATURES

- 105°C operation guaranteed
- Endurance: 1 million cycles (85°C)
- Data retention: 20 years (105°C)

SPECIFICATIONS

- Memory capacity:
  - S-93C46B: 1 K bit (64 words x 16 bit)
  - S-93C56B: 2 K bit (128 words x 16 bit)
  - S-93C66B: 4 K bit (256 words x 16 bit)
  - S-93C76A: 8 K bit (512 words x 16 bit)
  - S-93C86B: 16 K bit (1024 words x 16 bit)

- Operation voltage range:
  - Read: 2.7 V to 5.5 V
  - Write: 2.7 V to 5.5 V

- Operating frequency: 1.0 MHz max.

- Write time:
  - 8.0 ms max. (S-93C46B/56B/66B)
  - 10.0 ms max. (S-93C76A)
  - 4.0 ms max. (S-93C86B)

- Sequential read

- Write protect function under low power supply voltage

- Protect function against write due to erroneous instruction recognition (S-93C46B/56B/66B/86B)

- Endurance:
  - 1 million cycles (Ta = +85°C)
  - 500,000 cycles (Ta = +105°C)

- Data retention:
  - 100 years (Ta = +25°C)
  - 20 years (Ta = +105°C)

- Wafer level burn-in (by option)

- Operation temperature range: Ta = -40°C to +105°C

- Be sure to contact our sales office for AEC-Q100 qualification test result.

PIN CONFIGURATIONS

8-Pin SOP (JEDEC)

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<th>Top view</th>
<th>8-Pin TSSOP</th>
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This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
NEW

S-93C46C/56C/66C/76C/86C H Series

105°C OPERATION
3-WIRE SERIAL E²PROM

FEATURES

- 105°C operation guaranteed
- Endurance 1 million cycles (85°C)
- Data retention 50 years (105°C)

SPECIFICATIONS

- Memory capacity
  - S-93C46C: 1 K bit (64 words × 16 bit)
  - S-93C56C: 2 K bit (128 words × 16 bit)
  - S-93C66C: 4 K bit (256 words × 16 bit)
  - S-93C76C: 8 K bit (512 words × 16 bit)
  - S-93C86C: 16 K bit (1024 words × 16 bit)
- Operation voltage range
  - Read: 1.6 V to 5.5 V
  - Write: 1.8 V to 5.5 V
- Operating frequency: 2.0 MHz max.
- Write time: 4.0 ms max.
- Sequential read
- Write protect function under low power supply voltage
- Protect function against write due to erroneous instruction recognition
- Endurance:
  - 1 million cycles (Ta = +85°C)
  - 800,000 cycles (Ta = +105°C)
- Data retention:
  - 100 years (Ta = +25°C)
  - 50 years (Ta = +105°C)
- Wafer level burn-in (by option)
- Operation temperature range: Ta = –40°C to +105°C
- AEC-Q100 in process

PIN CONFIGURATIONS

8-Pin SOP (JEDEC) 8-Pin TSSOP

Top view

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TMSOP-8

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HSNT-8(2030)

Top view

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This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.

CMOS IC 2016-2017

SII Semiconductor Corporation
125°C OPERATION
SPI SERIAL E²PROM

FEATURES

- 125°C operation guaranteed
- Endurance 1 million cycles (85°C)
- Data retention 50 years (125°C)

SPECIFICATIONS

- Memory capacity
  - S-25A010A: 1 K bit (128 words x 8 bit)
  - S-25A020A: 2 K bit (256 words x 8 bit)
  - S-25A040A: 4 K bit (512 words x 8 bit)
  - S-25A080A: 8 K bit (1024 words x 8 bit)
  - S-25A160A: 16 K bit (2048 words x 8 bit)
  - S-25A320A: 32 K bit (4096 words x 8 bit)
  - S-25A640A: 64 K bit (8192 words x 8 bit)

- Operation voltage range
  - Read: 2.5 V to 5.5 V
  - Write: 2.5 V to 5.5 V

- Operating frequency:
  - 6.5 MHz max. (S-25A010A/020A/040A/080A/160A/320A)
  - 5.0 MHz max. (S-25A640A)

- Write time: 4.0 ms max.

- SPI mode (0,0) and (1,1)
- Page write
- Sequential read

- Monitors write to the memory by a status register
- Write protect function: Software, Hardware
  - Protect area: 0%, 25%, 50%, 100%
- CMOS schmitt input (CS, SCK, SI, WP, HOLD)
- Write protect function under low power supply voltage
- Protect function against write due to erroneous instruction recognition
- Endurance:
  - 1 million cycles (Ta = +85°C)
  - 800,000 cycles (Ta = +105°C)
  - 500,000 cycles (Ta = +125°C)
- Data retention:
  - 100 years (Ta = +25°C)
  - 50 years (Ta = +125°C)

- Wafer level burn-in (standard specifications)
- Operation temperature range: Ta = -40°C to +125°C
- AEC-Q100 qualified

PIN CONFIGURATIONS

8-Pin SOP (JEDEC)
Top view

1 2 3 4 5 6 7 8

CS SO WP GND SI SCK HOLD VCC

8-Pin TSSOP
Top view

1 2 3 4 5 6 7 8

CS SO WP GND SI SCK HOLD VCC

TMSOP-8
Top view

1 2 3 4

CS SO WP GND SI SCK HOLD VCC

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
S-25A080B/160B/320B/640B/128B/256B

125°C OPERATION
SPI SERIAL E²PROM

FEATURES

- 125°C operation guaranteed
- Endurance 300,000 cycles (125°C)
- Data retention 50 years (125°C)

SPECIFICATIONS

- Memory capacity
  - S-25A080B: 8 K bit (1024 words × 8 bit)
  - S-25A160B: 16 K bit (2048 words × 8 bit)
  - S-25A320B: 32 K bit (4096 words × 8 bit)
  - S-25A640B: 64 K bit (8192 words × 8 bit)
  - S-25A128B: 128 K bit (16384 words × 8 bit)
  - S-25A256B: 256 K bit (32768 words × 8 bit)

- Operation voltage range
  - Read: 2.5 V to 5.5 V
  - Write: 2.5 V to 5.5 V

- Operating frequency:
  - 6.5 MHz max. (S-25A080B/160B/320B/640B/128B)
  - 5.0 MHz max. (S-25A256B)

- Write time:
  - 5.0 ms max.

- SPI mode (0, 0) and (1, 1)
- Page write
- Sequential read
- Monitors write to the memory by a status register
- Write protect function: Software, Hardware
- Protect area: 0%, 25%, 50%, 100%
- CMOS schmitt input (CS, SCK, SI, WP, HOLD)
- Write protect function under low power supply voltage
- Protect function against write due to erroneous instruction recognition
- Endurance:
  - 1 million cycles (Ta = +25°C)
  - 700,000 cycles (Ta = +85°C)
  - 500,000 cycles (Ta = +105°C)
  - 300,000 cycles (Ta = +125°C)

- Data retention:
  - 100 years (Ta = +25°C)
  - 50 years (Ta = +125°C)

- Wafer level burn-in (standard specifications)
- Operation temperature range: Ta = -40°C to +125°C
- AEC-Q100 qualified

PIN CONFIGURATIONS

8-Pin SOP (JEDEC)

- Top view

8-Pin TSSOP

- Top view

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
**FEATURES**

- 105°C operation guaranteed
- Endurance 1 million cycles (85°C, S-25C010A/020A/040A/080A)
- Data retention 50 years (105°C, S-25C010A/020A/040A/080A)

**SPECIFICATIONS**

- Memory capacity
  - S-25C010A: 1 K bit (128 words × 8 bit)
  - S-25C020A: 2 K bit (256 words × 8 bit)
  - S-25C040A: 4 K bit (512 words × 8 bit)
  - S-25C080A: 8 K bit (1024 words × 8 bit)
  - S-25C160A: 16 K bit (2048 words × 8 bit)
  - S-25C320A: 32 K bit (4096 words × 8 bit)
  - S-25C640A: 64 K bit (8192 words × 8 bit)
  - S-25C128A: 128 K bit (16384 words × 8 bit)

- Operation voltage range
  - Read: 2.5 V to 5.5 V
  - Write: 2.5 V to 5.5 V

- Operating frequency:
  - 6.5 MHz max. (S-25C010A/020A/040A/080A)
  - 5.0 MHz max. (S-25C160A/320A/640A/128A)

- Write time:
  - 4.0 ms max. (S-25C010A/020A/040A/080A)
  - 5.0 ms max. (S-25C160A/320A/640A/128A)

- SPI mode (0, 0) and (1, 1)
- Page write
- Sequential read
- Monitors write to the memory by a status register
- Write protect function: Software, Hardware
- Protect area: 0%, 25%, 50%, 100%
- CMOS schmitt input (CS, SCK, SI, WP, HOLD)
- Write protect function under low power supply voltage
- Protect function against write due to erroneous instruction recognition
- Endurance:
  - 1 million cycles (Ta = +85°C) (S-25C010A/020A/040A/080A)
  - 800,000 cycles (Ta = +105°C) (S-25C160A/320A/640A/128A)
  - 1 million cycles (Ta = +25°C)
  - 300,000 cycles (Ta = +85°C) (S-25C010A/020A/040A/080A)
  - 200,000 cycles (Ta = +105°C) (S-25C160A/320A/640A/128A)
- Data retention:
  - 100 years (Ta = +25°C) (S-25C010A/020A/040A/080A)
  - 50 years (Ta = +105°C) (S-25C160A/320A/640A/128A)
  - 100 years (Ta = +25°C)
  - 30 years (Ta = +85°C) (S-25C160A/320A/640A/128A)
  - 25 years (Ta = +105°C)

- Wafer level burn-in (standard specifications)
- Operation temperature range: Ta = −40°C to +105°C
- AEC-Q100 qualified

**PIN CONFIGURATIONS**

8-Pin SOP (JEDEC)

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<td>7</td>
<td>HOLD</td>
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</tr>
<tr>
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<td>VCC</td>
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8-Pin TSSOP

<table>
<thead>
<tr>
<th>Top view</th>
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<tbody>
<tr>
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</tr>
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<td>8</td>
<td>VCC</td>
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</tr>
</tbody>
</table>

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
105°C OPERATION
2-WIRE SERIAL E²PROM

FEATURES

- 105°C operation guaranteed
- Endurance 1 million cycles (85°C)
- Data retention 20 years (105°C)

SPECIFICATIONS

- Memory capacity
  - S-24CS01A: 1 K bit (128 words × 8 bit)
  - S-24CS02A: 2 K bit (256 words × 8 bit)
  - S-24CS04A: 4 K bit (512 words × 8 bit)
- Operation voltage range
  - Read: 2.55 V to 5.5 V
  - Write: 2.55 V to 5.5 V
- Operating frequency: 350 kHz max.
- Write time: 10.0 ms max.
- Page write
- Sequential read
- Write protect function
  - Protect area: 100%
- CMOS Schmitt input (SCL, SDA)
- Write protect function under low power supply voltage
- Endurance:
  - 1 million cycles (Ta = +85°C)
  - 500,000 cycles (Ta = +105°C)
- Data retention:
  - 100 years (Ta = +25°C)
  - 20 years (Ta = +105°C)
- Wafer level burn-in (by option)
- Operation temperature range: Ta = –40°C to +105°C
- Be sure to contact our sales office for AEC-Q100 qualification test result.

PIN CONFIGURATIONS

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.

CMOS IC 2016-2017
SII Semiconductor Corporation
105°C OPERATION
2-WIRE SERIAL E²PROM

FEATURES

- 105°C operation guaranteed
- Endurance: 200,000 cycles (105°C)
- Data retention: 25 years (105°C)

SPECIFICATIONS

- Memory capacity:
  - S-24C08C: 8 K bit (1024 words × 8 bit)
  - S-24C16C: 16 K bit (2048 words × 8 bit)
  - S-24C32C: 32 K bit (4096 words × 8 bit)
  - S-24C64C: 64 K bit (8192 words × 8 bit)
  - S-24C128C: 128 K bit (16384 words × 8 bit)

- Operation voltage range:
  - Read: 2.5 V to 5.5 V
  - Write: 2.5 V to 5.5 V

- Operating frequency: 400 kHz max.

- Write time: 5.0 ms max.

- Page write

- Sequential read

- Write protect function
  - Protect area: 100%
  - CMOS schmitt input (SCL, SDA)
  - Write protect function under low power supply voltage

- Endurance:
  - 1 million cycles (Ta = +25°C)
  - 300,000 cycles (Ta = +85°C)
  - 200,000 cycles (Ta = +105°C)

- Data retention:
  - 100 years (Ta = +25°C)
  - 30 years (Ta = +85°C)
  - 25 years (Ta = +105°C)

- Wafer level burn-in (standard specifications)

- Operation temperature range: Ta = −40°C to +105°C

- AEC-Q100 qualified

PIN CONFIGURATIONS

8-Pin SOP (JEDEC)

<table>
<thead>
<tr>
<th></th>
<th>S-24C08C/16C</th>
<th>S-24C32C/64C/128C</th>
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8-Pin TSSOP

<table>
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<th>S-24C32C/64C/128C</th>
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<tr>
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<tr>
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<td>VCC</td>
<td>VCC</td>
</tr>
</tbody>
</table>

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
**S-57A1 A Series**

125°C OPERATION HIGH-WITHSTAND VOLTAGE HIGH-SPEED UNIPOLAR DETECTION TYPE HALL EFFECT SWITCH IC

### FEATURES
- High-withstand voltage 26 V
- High-speed operation
- High-accuracy magnetic sensitivity

### SPECIFICATIONS
- Pole detection: Detection of S pole, detection of N pole
- Output logic: Active "L", Active "H"
- Output form: Nch open-drain output, Nch driver + built-in pull-up resistor
- Magnetic sensitivity: $B_{OP} = 3.0 \text{ mT typ.}, B_{OP} = 6.0 \text{ mT typ.}$
- Operating cycle: $t_{CYCLE} = 16.0 \text{ µs typ.}$
- Power supply voltage range: $V_{DD} = 3.5 \text{ V to } 26.0 \text{ V}$
- Built-in regulator
- Built-in reverse voltage protection circuit
- Built-in output current limit circuit
- Operation temperature range: $Ta = -40°C \text{ to } +125°C$
- AEC-Q100 qualified

### PIN CONFIGURATIONS

<table>
<thead>
<tr>
<th>SOT-23-3</th>
<th>1</th>
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</tr>
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<tr>
<td>Top view</td>
<td>2</td>
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</tr>
<tr>
<td></td>
<td>3</td>
<td>OUT</td>
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</tbody>
</table>

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
Magnetic Sensor ICs

S-57K1 A Series

125°C OPERATION HIGH-WITHSTAND VOLTAGE
HIGH-SPEED BIPOLAR HALL EFFECT LATCH IC

FEATURES

- High-withstand voltage 26 V
- High-speed operation
- High-accuracy magnetic sensitivity

SPECIFICATIONS

- Pole detection: Bipolar latch
- Output logic: $V_{OUT} = \text{"L"} \text{ at } S \text{ pole detection}$
  $V_{OUT} = \text{"H"} \text{ at } S \text{ pole detection}$
- Output form: Nch open-drain output, Nch driver + built-in pull-up resistor
- Magnetic sensitivity: $B_{OP} = 3.0 \text{ mT typ.}, B_{OP} = 6.0 \text{ mT typ.}$
- Operating cycle: $t_{CYCLE} = 8.0 \mu s \text{ typ.}$
- Power supply voltage range: $V_{DD} = 3.5 \text{ V to 26.0 V}$
- Built-in regulator
- Built-in reverse voltage protection circuit
- Built-in output current limit circuit
- Operation temperature range: $Ta = -40°C \text{ to } +125°C$
- AEC-Q100 qualified

PIN CONFIGURATIONS

SOT-23-3
Top view

1  VSS
2  VDD
3  OUT

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
S-57P1 S Series

150°C OPERATION HIGH-WITHSTAND VOLTAGE
HIGH-SPEED BIPOLAR HALL EFFECT LATCH IC

FEATURES

- High-withstand voltage 26 V
- High-speed operation
- High-accuracy magnetic sensitivity

SPECIFICATIONS

- Pole detection: Bipolar latch
- Output logic: \( V_{OUT} = \text{"L"} \) at S pole detection
  \( V_{OUT} = \text{"H"} \) at S pole detection
- Output form: Nch open-drain output
- Magnetic sensitivity: \( B_{OP} = 0.5 \, \text{mT typ.} \)
  \( B_{OP} = 1.5 \, \text{mT typ.} \)
  \( B_{OP} = 2.2 \, \text{mT typ.} \)
  \( B_{OP} = 3.0 \, \text{mT typ.} \)
- Operating cycle: \( t_{CYCLE} = 8.0 \, \mu\text{s typ.} \)
- Power supply voltage range: \( V_{DD} = 2.7 \, \text{V to 26.0 V} \)
- Built-in regulator
- Built-in reverse voltage protection circuit
- Built-in output current limit circuit
- Operation temperature range: \( T_a = -40^\circ\text{C to +150^\circC} \)
- AEC-Q100 qualified

PIN CONFIGURATIONS

SOT-23-3S

<table>
<thead>
<tr>
<th>Top view</th>
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<th>2</th>
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<tbody>
<tr>
<td>VSS</td>
<td>VDD</td>
<td>OUT</td>
<td></td>
</tr>
</tbody>
</table>

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
125°C OPERATION
CMOS OPERATIONAL AMPLIFIER

FEATURES
- Gain-bandwidth product  3.0 MHz
- Input offset voltage  6.0 mV
- Low voltage operation  2.7 V

SPECIFICATIONS
- Dual operational amplifier (with 2 circuits)
- Gain-bandwidth product:  3.0 MHz typ.
- Input offset voltage:  $V_{IO} = 6.0$ mV max. ($T_a = -40^\circ$C to $+125^\circ$C)
- Operation power supply voltage range:  $V_{DD} = 2.7$ V to 5.5 V
- Current consumption (Per circuit):  $I_{DD} = 1.00$ mA typ.
- Operation temperature range:  $T_a = -40^\circ$C to $+125^\circ$C
- AEC-Q100 qualified

PIN CONFIGURATIONS

TMSOP-8
Top view

1  OUT1
2  IN1(−)
3  IN1(+)
4  VSS
5  IN2(+)
6  IN2(−)
7  OUT2
8  VDD

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
**FEATURES**

- Low input offset voltage 17 μV
- Auto-zero operation zero-drift operational amplifier
- Low current consumption 200 μA

**SPECIFICATIONS**

- Dual operational amplifier (with 2 circuits)
- Rail-to-Rail input and output
- Gain-bandwidth product: 320 kHz typ.
- Input offset voltage: $V_{IO} = 17 \, \mu V$ max. ($Ta = +25^\circ C$)
  $V_{IO} = 100 \, \mu V$ max. ($Ta = -40^\circ C$ to $+105^\circ C$)
- Operation power supply voltage range: $V_{DD} = 2.65 \, V$ to $5.5 \, V$
- Current consumption (Per circuit): $I_{DD} = 200 \, \mu A$ typ.
- Operation temperature range: $Ta = -40^\circ C$ to $+105^\circ C$
- AEC-Q100 qualified

**PIN CONFIGURATIONS**

```
TMSOP-8
Top view

1 8 OUT1
2 7 IN1(–)
3 6 IN1(+) VSS
4 5 IN2(+) IN2(–)
5 4 OUT2
6 3 IN1(–)
7 2 IN1(+) VSS
8 1 OUT1
```

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
Real-Time Clock ICs

S-35190A H Series

105°C OPERATION
3-WIRE REAL-TIME CLOCK

FEATURES
- Super-low current consumption  0.25 µA
- Built-in clock correction function to correct advance / delay of the clock data speed in the wide range
- The included free registers can be used as the function for user’s backup memory

SPECIFICATIONS
- Low current consumption: 0.25 µA typ. (VDD = 3.0 V, Ta = +25°C)
- Wide range of operation voltage: 1.3 V to 5.5 V
- Built-in clock correction function
- Built-in free user register
- 3-wire (MICROWIRE) CPU interface
- Built-in alarm interrupter
- Built-in flag generator during detection of low power voltage or at power-on
- Auto calendar up to the year 2099, automatic leap year calculation function
- Built-in constant-voltage circuit
- Built-in 32.768 kHz crystal oscillator (Cg built in, Cg external)
- Operation temperature range: Ta = −40°C to +105°C
- AEC-Q100 qualified

PIN CONFIGURATIONS

8-Pin SOP (JEDEC)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
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<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<tbody>
<tr>
<td>Top view</td>
<td>INT</td>
<td>XOUT</td>
<td>XIN</td>
<td>VSS</td>
<td>CS</td>
<td>SCK</td>
<td>SIO</td>
<td>VDD</td>
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8-Pin TSSOP

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<tr>
<td>Top view</td>
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<td>XOUT</td>
<td>XIN</td>
<td>VSS</td>
<td>CS</td>
<td>SCK</td>
<td>SIO</td>
<td>VDD</td>
</tr>
</tbody>
</table>

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
S-35390A H Series

105°C OPERATION
2-WIRE REAL-TIME CLOCK

FEATURES

- Super-low current consumption 0.25 μA
- Built-in clock correction function to correct advance / delay of the clock data speed in the wide range
- The included free registers can be used as the function for user’s backup memory

SPECIFICATIONS

- Low current consumption: 0.25 μA typ. (VDD = 3.0 V, Ta = +25°C)
- Wide range of operation voltage: 1.3 V to 5.5 V
- Built-in clock correction function
- Built-in free user register
- 2-wire (I2C-bus) CPU interface
- Built-in alarm interrupter
- Built-in flag generator during detection of low power voltage or at power-on
- Auto calendar up to the year 2099, automatic leap year calculation function
- Built-in constant-voltage circuit
- Built-in 32.768 kHz crystal oscillator (C0 built in, C0 external)
- Operation temperature range: Ta = -40°C to +105°C
- AEC-Q100 qualified

PIN CONFIGURATIONS

8-Pin SOP (JEDEC) 8-Pin TSSOP
Top view
1 INT1
2 XOUT
3 XIN
4 VSS
5 INT2
6 SCL
7 SDA
8 VDD

Top view
1 INT1
2 XOUT
3 XIN
4 VSS
5 INT2
6 SCL
7 SDA
8 VDD

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
Convenience Timers

S-35710 Series

125°C OPERATION 2-WIRE CONVENIENCE TIMER

FEATURES

- Low current consumption  0.2 μA typ.
- An interrupt signal is output when the timer value and the internal register value match each other
- The internal register data can be set via a 2-wire serial interface

OUTLINE

The convenience timer is a CMOS timer IC which operates with low current consumption, and is suitable for the time management of the relative time.
The S-35710 Series compares the timer value and the value written to the internal register, and outputs an interrupt signal when the values match each other.
The timer is a 24-bit binary-up counter.
The internal register data can be set freely by users via a 2-wire serial interface. Consequently, the time before the occurrence of an interrupt signal can be set freely.

SPECIFICATIONS

- Alarm interrupt function: Settable on the second time scale from 1 second to 194 days (Approximately half a year)
- Low current consumption: 0.2 μA typ. (Crystal oscillator: $C_L = 6.0$ pF, $V_{DD} = 3.0$ V, $Ta = +25°C$)
- Wide range of operation voltage: 1.8 V to 5.5 V
- 2-wire (I2C-bus) CPU interface
- Built-in 32.768 kHz crystal oscillation circuit
- Operation temperature range: $Ta = -40°C$ to $+125°C$
- AEC-Q100 qualified

PIN CONFIGURATIONS

| TMSOP-8 |     | 1 | RST |
|         | 2  | XOUT |
| 3       | 4  | VSS  |
| 5       | 6  | INT  |
| 7       | 8  | SDA  |
|         |    | SCL  |
|         |    | VDD  |

This product can be used in vehicle equipment and in-vehicle equipment.
Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
FEATURES

- Low current consumption  0.2 μA typ.
- An interrupt signal is output when the timer value and the value set to the SET0 pin and the SET1 pin match each other.
- 4 types of interrupt time can be selected.

OUTLINE

The convenience timer is a CMOS timer IC which operates with low current consumption, and is suitable for the time management of the relative time.

The S-35720 Series compares the timer value and the value set to the SET0 pin and the SET1 pin, and outputs an interrupt signal when the values match each other.

The timer is a 24-bit binary-up counter.

4 types of interrupt time can be selected depending on the SET0 pin and the SET1 pin settings.

SPECIFICATIONS

- Alarm interrupt function:  Settable interrupt time
  Selectable as the option on the second time scale from 1 second to 194 days
  (Approximately half a year)
- Low current consumption:  0.2 μA typ. (Crystal oscillator: C_L = 6.0 pF, V_DD = 3.0 V, Ta = +25°C)
- Wide range of operation voltage:  1.8 V to 5.5 V
- Built-in 32.768 kHz crystal oscillation circuit
- Operation temperature range:  Ta = −40°C to +125°C
- AEC-Q100 qualified

PIN CONFIGURATIONS

TMSOP-8
Top view

1  RST
2  XOUT
3  XIN
4  VSS
5  INT
6  SET0
7  SET1
8  VDD

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
Convenience Timers

S-35730 Series

125°C OPERATION CLOCK PULSE OUTPUT WITH FREQUENCY SETTING PIN CONVENIENCE TIMER

FEATURES

- Low current consumption
- The clock pulse is output
- 4 types of clock pulse frequency can be selected

OUTLINE

The convenience timer is a CMOS timer IC which operates with low current consumption, and is suitable for the time management of the relative time. The S-35730 Series outputs the clock pulse. 4 types of clock pulse frequency can be selected from 1 Hz to 32.768 kHz depending on the SET0 pin and the SET1 pin settings.

SPECIFICATIONS

- Clock pulse output function: Settable clock pulse frequency, with an output control pin
- Low current consumption: 0.7 μA typ. (Crystal oscillator: C_L = 6.0 pF, V_DD = 3.0 V, ENBL pin = "H", T_a = +25°C, FOUT pin = Nch open-drain output)
- Wide range of operation voltage: 1.8 V to 5.5 V
- Built-in 32.768 kHz crystal oscillation circuit
- Operation temperature range: T_a = -40°C to +125°C
- AEC-Q100 qualified

PIN CONFIGURATIONS

TMSOP-8

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
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<td>SET0</td>
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<td>7</td>
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</tr>
<tr>
<td>8</td>
<td>VDD</td>
</tr>
</tbody>
</table>

This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
**S-35740 Series**

**125°C OPERATION 2-WIRE INTERVAL TIMER**

**CONVENIENCE TIMER**

**FEATURES**

- Low current consumption
- The fixed-cycle interrupt signal is output
- The frequency and duty ratio can be set via a 2-wire serial interface

**OUTLINE**

The convenience timer is a CMOS timer IC which operates with low current consumption, and is suitable for the time management of the relative time.

The S-35740 Series outputs the fixed-cycle interrupt signal. The frequency and duty ratio of the fixed-cycle interrupt signal can be set freely by users via a 2-wire serial interface.

Moreover, the S-35740 Series has a built-in 24-bit timer. For example, users can obtain the cumulative energization time of the system since the timer performs a count-up action every second.

**SPECIFICATIONS**

- Fixed-cycle interrupt signal output function: Settable frequency and duty ratio, with an output control pin
- Low current consumption: 0.2 μA typ. (Crystal oscillator: \( C_L = 6.0 \text{ pF} \), \( V_{DD} = 3.0 \text{ V} \), ENBL pin = "H", \( T_a = 25^\circ\text{C} \))
- Wide range of operation voltage: 1.8 V to 5.5 V
- 2-wire (I^2C-bus) CPU interface
- Built-in 32.768 kHz crystal oscillation circuit
- Operation temperature range: \( T_a = -40^\circ\text{C} \) to +125°C
- AEC-Q100 qualified

**PIN CONFIGURATIONS**

```
<table>
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<tr>
<th>TMSOP-8</th>
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<td>VDD</td>
</tr>
</tbody>
</table>
```

This product can be used in vehicle equipment and in-vehicle equipment.

Before using the product in the purpose, contact to SII Semiconductor Corporation is indispensable.
Convenience Timers

Under Development

125°C OPERATION INTERVAL TIMER WITH FIXED-CYCLE INTERRUPT SIGNAL SETTING PIN CONVENIENCE TIMER

/ FEATURES

- Low current consumption
- The fixed-cycle interrupt signal is output
- 4 types of fixed-cycle interrupt signal can be selected

/ OUTLINE

The convenience timer is a CMOS timer IC which operates with low current consumption, and is suitable for the time management of the relative time.

The S-35750 Series outputs the fixed-cycle interrupt signal.

4 types of fixed-cycle interrupt signal can be selected depending on the SET0 pin and the SET1 pin settings.

/ SPECIFICATIONS

- Fixed-cycle interrupt signal output function: Settable frequency and duty ratio, with an output control pin
- Low current consumption: 0.2 μA typ.
  (Crystal oscillator: QL = 6.0 pF, VDD = 3.0 V, ENBL pin = "H", Ta = +25°C)
- Wide range of operation voltage: 1.8 V to 5.5 V
- Built-in 32.768 kHz crystal oscillation circuit
- Operation temperature range: Ta = -40°C to +125°C
- AEC-Q100 qualified

/ PIN CONFIGURATIONS

TMSOP-8
Top view

1 ENBL
2 XOUT
3 XIN
4 VSS
5 INT
6 SET0
7 SET1
8 VDD

Contact our sales office for details of the product.
Since the product is under development, the information described herein is subject to change without notice.
Moreover, commercialization of the product may be stopped.
S-35760 Series

125°C OPERATION 2-WIRE INTERVAL TIMER WITH BUILT-IN TIMER
OF FIXED INTERRUPT TIME CONVENIENCE TIMER

FEATURES

- Low current consumption
- Possible to output 2 interrupt signals
- The frequency and the duty ratio can be set via a 2-wire serial interface (INT1 pin only)

OUTLINE

The convenience timer is a CMOS timer IC which operates with low current consumption, and is suitable for the time management of the relative time.

The S-35760 Series outputs 2 interrupt signals. The INT1 pin outputs the fixed-cycle interrupt signal. Users can set the frequency and the duty ratio freely via a 2-wire serial interface. The INT2 pin outputs an interrupt signal which can be selected as the option on the second time scale from 1 second to 194 days.

SPECIFICATIONS

- Fixed-cycle interrupt signal output function: Settable frequency and duty ratio
- Alarm interrupt function: Selectable as the option on the second time scale from 1 second to 194 days (Approximately half a year)
- Low current consumption: 0.2 \( \mu \)A typ. (Crystal oscillator: \( C_L = 6.0 \) pF, \( V_{DD} = 3.0 \) V, \( T_a = +25°C \))
- Wide range of operation voltage: 1.8 V to 5.5 V
- 2-wire (I2C-bus) CPU interface
- Built-in 32.768 kHz crystal oscillation circuit
- Operation temperature range: \( T_a = -40°C \) to +125°C
- AEC-Q100 qualified

PIN CONFIGURATIONS

<table>
<thead>
<tr>
<th>TMSOP-8</th>
<th>1</th>
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<tr>
<td>Top view</td>
<td>INT2</td>
<td>XOUT</td>
<td>XIN</td>
<td>VSS</td>
<td>INT1</td>
<td>SDA</td>
<td>SCL</td>
<td>VDD</td>
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</tbody>
</table>

Contact our sales office for details of the product.
Since the product is under development, the information described herein is subject to change without notice.
Moreover, commercialization of the product may be stopped.
Convenience Timers

S-35770 Series

125°C OPERATION 2-WIRE COUNTER
CONVENIENCE TIMER

FEATURES

- Super-low current consumption 0.01 μA typ.
- The number of clocks input from an external device is counted
- The counter data can be read via a 2-wire serial interface

OUTLINE

The convenience timer is a CMOS timer IC which operates with low current consumption, and is suitable for the time management of the relative time.
The S-35770 Series counts the number of clocks input from an external device.
The counter is a 24-bit binary up counter.
The counter data can be read via a 2-wire serial interface.

SPECIFICATIONS

- External clock signal count function: Countable from 0 to 16,777,215 with output pin for counter loop flag
- Low current consumption: 0.01 μA typ. (VDD = 3.0 V, Ta = +25°C, out of communication (CLKIN pin = 0 V))
- Wide range of operation voltage: 1.5 V to 5.5 V
- 2-wire (I²C-bus) CPU interface
- Operation temperature range: Ta = -40°C to +125°C
- AEC-Q100 qualified

PIN CONFIGURATIONS

| TMSOP-8 | 1 | RST |
|         | 2 | NC  |
|         | 3 | CLKIN |
| Top view| 4 | VSS |
|         | 5 | LOOP |
|         | 6 | SDA |
|         | 7 | SCL |
|         | 8 | VDD |
RELATED INFORMATION

Provides information about discontinued products, package lists, and an index.

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www.sii-ic.com
SII Semiconductor Corporation classifies products into the following four statuses:

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<th>Status</th>
<th>Use</th>
<th>Production</th>
<th>Sales</th>
<th>Description</th>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Can be purchased.</td>
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<tr>
<td>Not recommended for new design</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Not recommended for new designs. Consider using a successor.</td>
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<tr>
<td>Limited availability</td>
<td>No</td>
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<td>Yes</td>
<td>No longer produced. May be able to be purchased, depending on stock availability.</td>
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<td>No longer available</td>
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### NOT RECOMMENDED FOR NEW DESIGN

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<th>Product Group</th>
<th>Product Type</th>
<th>Product Name</th>
<th>Successor</th>
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<td>Power-supply IC</td>
<td>Voltage regulator</td>
<td>S-1111/1121 series</td>
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<td>Lithium-ion rechargeable battery protection IC</td>
<td>S-8232 series</td>
<td>S-8252 series</td>
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<td></td>
<td>S-8233A/B/C series</td>
<td>S-8253C/D series</td>
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<td>S-8242B series</td>
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<td>S-8244AxPN-xxxTxx (S-8244 series 8-Pin MSOP products only)</td>
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<td>(S-8253A/B series</td>
<td>S-8253C/D series</td>
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<td>Memory IC</td>
<td>2-wire serial E/PROM</td>
<td>S-24C01C/02C/04C/08C/16C (General use 85°C operation guaranteed)</td>
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<td>ASSP</td>
<td>Mini Logic</td>
<td>S-75V/75L series</td>
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**Remark** Successors might not completely match the original products in terms of specifications, electrical characteristics, or pin configurations. Contact SII for more information about successors.

### LIMITED AVAILABILITY

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### NO LONGER AVAILABLE

(1/4)

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**Remark** The information shown here is current as of October, 2016.
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**Remark** Please contact our sales office regarding WLP package products.
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### CMOS IC PACKAGES

**CMOS IC PACKAGES**

- **21. 6-Pin HSON(A)**
- **22. HSOP-8A**

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- *The exposed thermal die pad has different electric potential depending on the product. Confirm specifications of each product. Do not use it as the function of electrode.*
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<td>2. Mask aperture ratio of the heat sink mounting part is 40%.</td>
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</tr>
<tr>
<td></td>
<td>3. Mask thickness: 0.10mm to 0.12mm</td>
<td></td>
</tr>
<tr>
<td>26. HSNT-4(1010)</td>
<td><img src="image4" alt="Diagram" /></td>
<td><img src="image5" alt="Diagram" /></td>
</tr>
<tr>
<td></td>
<td>Caution: It is recommended to solder the heat sink to a board in order to ensure the heat radiation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Metal Mask Pattern: <img src="image6" alt="Diagram" /></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Caution:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Mask aperture ratio of the lead mounting part is 100%.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Mask aperture ratio of the heat sink mounting part is 40%.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Mask thickness: 0.10mm to 0.12mm</td>
<td></td>
</tr>
</tbody>
</table>
### CMOS IC PACKAGES

#### Package Name | Dimensional Drawing | Recommended Land Pattern
---|---|---
27. HSNT-6(1212) | ![Dimensional Drawing](image1.png) | ![Recommended Land Pattern](image2.png)

- **Caution:** It is recommended to solder the heat sink to a board in order to ensure the heat radiation.

#### Mask openings
- **Aperture ratio**
- **Aperture ratio**

#### PM006-A

28. HSNT-6A | ![Dimensional Drawing](image3.png) | ![Recommended Land Pattern](image4.png)

- **Caution:** It is recommended to solder the heat sink to a board in order to ensure the heat radiation.

#### Mask openings
- **Aperture ratio**
- **Aperture ratio**

#### PJ006-A
<table>
<thead>
<tr>
<th>Package Name</th>
<th>Dimensional Drawing</th>
<th>Recommended Land Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>29. HSNT-8(2030)</strong></td>
<td><img src="image1" alt="Dimensional Drawing" /></td>
<td><img src="image2" alt="Recommended Land Pattern" /></td>
</tr>
<tr>
<td><strong>30. SNT-4A</strong></td>
<td><img src="image3" alt="Dimensional Drawing" /></td>
<td><img src="image4" alt="Recommended Land Pattern" /></td>
</tr>
<tr>
<td><strong>31. SNT-6A</strong></td>
<td><img src="image5" alt="Dimensional Drawing" /></td>
<td><img src="image6" alt="Recommended Land Pattern" /></td>
</tr>
</tbody>
</table>

- **Notes:**
  - The heat sink of back side has different electric potential depending on the product. Confirm specifications of each product.
  - Do not use it as the function of electrode.
### CMOS IC PACKAGES

(Unit : mm)

<table>
<thead>
<tr>
<th>Package Name</th>
<th>Dimensional Drawing</th>
<th>Recommended Land Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>32. SNT-8A</strong></td>
<td><img src="image1" alt="Dimensional Drawing" /></td>
<td><img src="image2" alt="Recommended Land Pattern" /></td>
</tr>
<tr>
<td><strong>33. DFN-8(2030)</strong></td>
<td><img src="image3" alt="Dimensional Drawing" /></td>
<td><img src="image4" alt="Recommended Land Pattern" /></td>
</tr>
<tr>
<td><strong>34. DFN-6(1414A)</strong></td>
<td><img src="image5" alt="Dimensional Drawing" /></td>
<td><img src="image6" alt="Recommended Land Pattern" /></td>
</tr>
</tbody>
</table>

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

- **1.** Pay attention to the land pattern width (0.25mm min./0.30mm typ.).
- **2.** Do not widen the land pattern to the center of the package (SNT-4A: 1.10mm to 1.20mm, SNT-6A: 1.30mm to 1.40mm, SNT-6A(H): 1.30mm to 1.40mm, SNT-8A: 1.96mm to 2.06mm).

**Caution**
- 1. Do not do silkscreen printing and solder printing under the mold resin of the package.
- 2. The thickness of the solder resist on the wire pattern under the package should be 0.03mm or less from the land pattern surface.
- 3. Match the mask aperture size and aperture position with the land pattern.
# Environmental Management Activities

## SII Group Environmental Policy: Environmental Concept

The SII Group, aiming to achieve a harmony between business operations and protection for the environment, positions the three "green" concepts of "green processes," "green products," and "green lifestyles" as the cornerstones of its environmental activities, which are undertaken to protect and improve the environment, and contribute to the establishment of a sustainable society that can coexist with all living things.

Based on the environmental policies of the SII Group, SII Semiconductor Corporation not only develops environmentally conscious products, but also makes every effort to implement energy-saving measures, reduce the amount of waste, and effectively utilize paper resources.

### Specific Actions

**1. Energy Saving**
- Producing energy-saving products
  - We promote the development of energy-efficient (low power consumption) products by utilizing the features of CMOS ICs.
- Creating more energy-efficient manufacturing processes
  - We are creating more energy-efficient manufacturing processes at our semiconductor manufacturing sites.

**2. Zero Emissions (Elimination of Waste Sent to Disposal Site)**

We are achieving a reduction in waste by actively promoting recycling of materials used in the semiconductor manufacturing process, such as etching solution, washing water, and packing materials.

Waste reductions are also being achieved in our office, where staff are encouraged to not only sort garbage for recycling, but also to actively recycle the paper they use in daily operations.

**3. Chemical Materials Management**
- Activities to reduce the impact of chemical substances
  - SII Semiconductor Division has been an industry leader to stop the use of ozone-layer depletion materials:
    - SII discontinued specific fluorine in August 1992;
    - SII discontinued Trichloroethane in November 1993;
    - SII discontinued organic chloride solvents in March 1999;
    - SII discontinued alternative fluorine HCFC-141b (a global warming factor gas) in March 2000.
  - Promoting the proper management of chemical emissions is not restricted to the materials mentioned above.

We continuously review our processes to reduce chemical materials which are harmful to our global environment.

- Pb-Free Soldering
  - The plating on the outer leads of our semiconductor devices has been Pb-free since December 2003.

- Compliance with REACH
  - We obtain and manage information about chemical substances included in the products, through supply chain management. As required, we provide such information in a proper manner.

**4. Design of Environmental Friendly Products**
- Implementation of environmental assessments
  - Products to be newly developed undergo stringent environmental assessments. These assessments involve checking whether the product contains any banned or regulated substances. An MSDS (Material Safety Data Sheet) is also obtained so that we can evaluate the environmental impact and safety of the product, and thereby reduce the impact of that product on the environment.

**5. Green Purchasing**

We observe the “Green Purchasing Guidelines” set by the SII Group to promote green purchasing in cooperation with our suppliers.
All Products are Lead-free and Compliant with the RoHS Directive

- We promote the development of lead-free Sn 100% plated semiconductor products in SII Semiconductor Corporation.
- SII Semiconductor Corporation products are compliant with the Europe RoHS Directive (2011/65/EU) regulation.


<table>
<thead>
<tr>
<th>Substance</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cadmium (Cd)</td>
<td>100ppm or less</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>1000ppm or less</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>1000ppm or less</td>
</tr>
<tr>
<td>Hexavalent chromium (Cr⁶⁺)</td>
<td>1000ppm or less</td>
</tr>
<tr>
<td>Polybrominated biphenyls (PBB)</td>
<td>1000ppm or less</td>
</tr>
<tr>
<td>Polybrominated diphenyl ethers (PBDE)</td>
<td>1000ppm or less</td>
</tr>
</tbody>
</table>

Actions for Developing Halogen-free Products

- We promote the development of halogen-free semiconductor products in SII Semiconductor Corporation.
- In SII Semiconductor Corporation, what fulfills the following conditions is defined as halogen-free.

<table>
<thead>
<tr>
<th>Substance</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine (Cl)</td>
<td>Less than 900ppm</td>
</tr>
<tr>
<td>Bromine (Br)</td>
<td>Less than 900ppm</td>
</tr>
<tr>
<td>Total content (Cl + Br)</td>
<td>Less than 1500ppm</td>
</tr>
</tbody>
</table>

Compliance with REACH Regulation*1

- As of June, 2016, We have confirmed that the 169 substances of very high concern (SVHC) are not included in SII Semiconductor Corporation products.
- We get information on included chemical substances regulated by REACH from the company which supplies us with article’s substance/preparation among our supply chains in order to answer our customers’ requirements for information.
- We would like to flexibly answer our customers’ requirements for information. However, the following ways promptly offer information.
  - JAMP AIS (Article Information Sheet)
  - JGPSSI Green Procurement Survey Tool
  - IMDS (International Material Data System)
  - JAMA/JAPIA Standard Material Datasheet
- Please confirm about the REACH Regulation and the latest information on SVHC in the following ECHA website. Please contact our sales office about the compliance with SII Semiconductor Corporation REACH Regulation.
  - ECHA website: http://echa.europa.eu

Environmental Friendly Products

- SII Semiconductor Corporation products can be identified by the "environmental code" at the end of the product name.
  - U: Lead-free (Sn 100%), halogen-free
  - S: Lead-free, halogen-free
  - G: Lead-free

- Some products have names that end with “UD”, “U2”, “U3”, “U4” and “U5”.
- WLP package products are lead-free and halogen-free.

- Please select products of “Environmental code = U” for Sn 100%, halogen-free products. The products of “Environmental code = U” are products with few environmental risks.

- SII Semiconductor Corporation products do not change their electrical characteristics, mechanical characteristics, physical form and temperature profile of mounting by the difference in an environmental code.

- Even if the products of "Environmental code = U" are published by this catalogue, the products of "Environmental code = S" and "Environmental code = G" may also be prepared.

- For products other than those published by this catalogue, please contact our sales office or refer to the data sheets in SII Semiconductor Corporation website.
The following products with **Environmental code = G or S** are no longer available. Only products with **Environmental code = U** are available for purchase.

<table>
<thead>
<tr>
<th>Product Group</th>
<th>Product Type</th>
<th>Product Name</th>
<th>Package</th>
</tr>
</thead>
<tbody>
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<td>Power-supply IC</td>
<td>Voltage regulator</td>
<td>S-1112 series</td>
<td>SNT-6A(H)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S-1132 series</td>
<td>SNT-6A(H)</td>
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<td></td>
<td>S-1133 series</td>
<td>SNT-8A</td>
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<td>S-1135 series</td>
<td>HSNT-6A</td>
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<td>S-1137 series</td>
<td>SNT-6A(H)</td>
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<td>S-1167 series</td>
<td>SNT-6A(H)</td>
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<td>S-11L10 series</td>
<td>SNT-6A(H)</td>
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<td>S-1200 series</td>
<td>SNT-6A(H), HSNT-6A</td>
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<td>S-1206 series</td>
<td>SNT-6A(H)</td>
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<td>S-1721 series</td>
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<td>S-812C series</td>
<td>TO-92, SNT-6A(H)</td>
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<td>S-817 series</td>
<td>TO-92, SNT-4A</td>
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<td>Voltage detector</td>
<td>S-1000 series</td>
<td>SNT-4A</td>
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<td>S-801 series</td>
<td>SNT-4A</td>
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<td></td>
<td>S-808xxG series</td>
<td>TO-92, SNT-4A</td>
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<td>S-809xxG series</td>
<td>SNT-4A</td>
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<td>Switching regulator</td>
<td>S-8333 series</td>
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<td>S-8365/8395 series</td>
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<td>S-8550 series</td>
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<td>Lithium-ion rechargeable battery protection IC</td>
<td>S-8204A series</td>
<td>16-Pin TSSOP</td>
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<td>S-8204B series</td>
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<td>S-824A/B/C series</td>
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<td>Memory IC</td>
<td>SPI serial E²PROM</td>
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<td>Sensor</td>
<td>Temperature sensor</td>
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<td>S-5851A series</td>
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<td>S-810C/8120C series</td>
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<td>Analog IC</td>
<td>Amplifier</td>
<td>SNT-8A</td>
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<td>S-89110/89120 series</td>
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<td>S-89430/89431 series</td>
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<td>S-89713 series</td>
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<td>Real-time clock</td>
<td>SNT-8A</td>
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</table>
Conflict Minerals Policy

SII recognizes conflict minerals as being a critical international issue that supports the financing of organizations engaged in human rights violations and/or injustices committed in the Democratic Republic of Congo and adjoining countries.

In March 2012, the "SII Group Conflict Minerals Policy" was established, and we ask our suppliers for their cooperation in prohibiting the use of any conflict minerals.

SII Group Conflict Minerals Policy

SII Group is committed to developing, carrying out and promoting a policy that prohibits the use of any minerals ("conflict minerals"), whose extraction, trade, handling and export contribute to conflicts in the Democratic Republic of Congo and adjoining countries, and/or lead to human rights violations.

- SII Group recognizes conflict minerals as a critical international issue that supports the financing of organizations engaging in human rights violations and/or injustices committed in the Democratic Republic of Congo and adjoining countries.
- In the SII Group Charter of Corporate Behavior, SII Group clarifies that “we respect the human rights and individuality of all stakeholders in our business activities.”
- SII Group has no intention of taking part in any actions that violate human rights. SII Group has thoroughly communicated and appropriately implemented this policy among SII Group’s affiliate companies, and cooperates with them to disseminate the policy widely.
- SII Group asks our suppliers for their cooperation in following the policy.

*1: Conflict minerals include cassiterite (tin), coltan (tantalum), wolframite (tungsten), and gold.

There is also a substance (cobalt) reported in regard to severe violation of human rights besides tin, tantalum, tungsten, and gold.

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• The products described herein are not designed to be radiation-proof.
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  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.
This catalogue and the Part Number List have a common layout. After selecting the product that matches your application from this catalogue, confirm the detailed specifications of each model in the Part Number List.

<table>
<thead>
<tr>
<th>Series Name</th>
<th>This Catalogue</th>
<th>Part Number List</th>
</tr>
</thead>
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</tr>
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<td>S-1000 series</td>
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<td>S-1002 series</td>
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<td>S-11L10 series</td>
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<td>S-1200 series</td>
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<td>S-1212B/D series</td>
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<td>63</td>
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<td>S-1313 series</td>
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### Asia

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<th>Phone</th>
<th>Fax</th>
<th>Email</th>
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<td>2701-2703, Shanghai Square, No. 138, Mid Huaihai Road, Shanghai 200021, China</td>
<td>+86-21-6375-6611</td>
<td>+86-21-6375-6727</td>
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<tr>
<td>Beijing Branch</td>
<td>Room 1002, 10th Floor, East Ocean Centre, 24 Jiangguomen Wai Ave., Chaoyang District, Beijing 100004, China</td>
<td>+86-10-6515-5634</td>
<td></td>
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<tr>
<td>Seiko Instruments Taiwan Inc.</td>
<td>1/F, No.101, Sec.2, Nanking E.Rd., Taipei 104, Taiwan</td>
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<td>+886-2-2563-5580</td>
<td><a href="mailto:public@siitai.com">public@siitai.com</a></td>
<td><a href="http://www.sii-ic.com/zh/">http://www.sii-ic.com/zh/</a></td>
</tr>
<tr>
<td>SII Semiconductor Korea Corporation</td>
<td>#507, Korea City Air Terminal Bldg., 22, 87Gii, Teheran-ro, Gangnam-gu, Seoul, 135-728 Korea</td>
<td>+82-2-555-6006</td>
<td>+82-2-555-6306</td>
<td></td>
<td><a href="http://www.sii-ic.com/ko/">http://www.sii-ic.com/ko/</a></td>
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### Europe

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<th>Phone</th>
<th>Fax</th>
<th>Email</th>
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<tbody>
<tr>
<td>Seiko Instruments GmbH</td>
<td>Siemensstrasse 9 D-63263 Neu Isenburg, Germany</td>
<td>+49-6102-297-0</td>
<td>+49-6102-297-50100</td>
<td><a href="mailto:info@seiko-instruments.de">info@seiko-instruments.de</a></td>
<td><a href="http://www.seiko-instruments.de">http://www.seiko-instruments.de</a></td>
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### North/Central/South America

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Contact us

(Specifications are subject to change without notice.)

Released in December 2016

Printed with soy ink.