



# CMOS IC

## Product Catalog

*Components Headquarters Product Catalog*

CMOS IC

Quartz Crystals

Micro Batteries

Fiber Optics

MATERIALS

Liquid Crystal Display

Custom LCD Module



Seiko Instruments Inc.

**Please visit our HomePage  
for more new information.**

---

[<http://www.sii.co.jp/compo>](http://www.sii.co.jp/compo)

**Welcome to the SII Components Global Web Network**

**Seiko Instruments  
GmbH (English)**

**Seiko Instruments Inc.  
(Japanese)**

**Seiko Instruments  
USA Inc. (English)**

**Seiko Instruments (H.K.) Ltd. (English)**

**Seiko Instruments Taiwan  
Inc. (English)**

**Seiko Instruments  
Singapore Pte. (English)**



# Contents

<b>POWER SUPPLY ICs</b>	<b>3</b>
<b>Voltage Detectors</b>	
HIGH-PRECISION VOLTAGE DETECTOR WITH DELAY CIRCUIT --- [S-801 SERIES] -----	3
HIGH-PRECISION VOLTAGE DETECTOR WITH DELAY CIRCUIT --- [S-809 SERIES] -----	4
SUPER-SMALL PACKAGE HIGH PRECISION VOLTAGE DETECTOR --- [S-808 SERIES] -----	5
HIGH-PRECISION VOLTAGE DETECTOR ----- [S-807 SERIES] -----	6
<b>Voltage Regulators</b>	
SUPER-SMALL PACKAGE VOLTAGE REGULATOR ----- [S-817 SERIES] -----	7
LOW DROPOUT CMOS VOLTAGE REGULATOR ----- [S-818 SERIES] -----	8
LOW DROPOUT CMOS VOLTAGE REGULATOR ----- [S-814 SERIES] -----	9
LOW DROPOUT DRIVER/CONTROLLER ----- [S-816 SERIES] -----	10
HIGH-PRECISION VOLTAGE REGULATOR ----- [S-812XXSG SERIES] -----	11
<b>Switching Regulators</b>	
SMALL-PACKAGE PWM CONTROL STEP-UP SWITCHING REGULATOR --- [S-8323/8327 SERIES] -----	12
SMALL-PACKAGE PWM/PFM CONTROL STEP-UP SWITCHING REGULATOR --- [S-8324/8328 SERIES] -----	14
SMALL PACKAGE STEP-UP SWITCHING REGULATOR ----- [S-8321/8322 SERIES] -----	16
HIGH FREQUENCY STEP-UP SWITCHING REGULATOR CONTROLLER --- [S-8340/8341 SERIES] -----	17
STEP-UP SWITCHING REGULATOR FOR LCD BIAS SUPPLY ----- [S-8330/8331 SERIES] -----	18
STEP-DOWN SWITCHING REGULATOR CONTROLLER ----- [S-8520/8521 SERIES] -----	19
HIGH FREQUENCY STEP-DOWN SWITCHING REGULATOR CONTROLLER ----- [S-8540/8541 SERIES] -----	20
SYNCHRONOUS RECTIFYING STEP-DOWN SWITCHING REGULATOR CONTROLLER ----- [S-8532 SERIES] -----	21
STEP-UP & DOWN VOLTAGE REGULATOR ----- [S-8430AF] -----	22
<b>Composite ICs</b>	
HIGH WITHSTAND-VOLTAGE VOLTAGE REGULATOR WITH RESET FUNCTION ---- [S-87X SERIES] -----	23
BATTERY BACKUP IC ----- [S-8423 SERIES] -----	24
<b>Lithium Ion Battery Protection IC</b>	
BATTERY PROTECTION IC FOR 3- OR 4-CELL SERIAL PACK----- [S-8243A/B SERIES] -----	25
BATTERY PROTECTION IC FOR 1 CELL ----- [S-8261 SERIES] -----	25
BATTERY PROTECTION IC FOR 1 CELL ----- [S-8241 SERIES] -----	26
LITHIUM ION BATTERY PROTECTION IC (FOR 1-CELL) ----- [S-8231A/B SERIES] -----	27
LITHIUM-ION BATTERY PROTECTION IC (FOR 2-CELL) ----- [S-8232 SERIES] -----	28
LITHIUM-ION BATTERY PROTECTION IC (FOR 3-CELL) ----- [S-8233A/B/C SERIES] -----	29
BATTERY PROTECTION IC FOR 1 TO 4 CELL (SECONDARY PROTECTION)-- [S-8244 SERIES] -----	30
<b>MEMORY</b>	<b>31</b>
<b>E<sup>2</sup>PROM</b>	
SERIAL E <sup>2</sup> PROM ----- [S-93C SERIES, S-29 SERIES] -----	32
LOW VOLTAGE OPERATION SERIAL E <sup>2</sup> PROM ----- [S-29L/U/Z SERIES] -----	34
2-WIRE SERIAL E <sup>2</sup> PROM ----- [S-24C SERIES] -----	35
2-WIRE SERIAL E <sup>2</sup> PROM ----- [S-24CV SERIES] -----	35
PARALLEL E <sup>2</sup> PROM ----- [S-28 SERIES] -----	36
<b>Others</b>	
NVRAM ----- [S-22H/22S SERIES, S-24H/24S SERIES] -----	36
<b>GENERAL PURPOSE ICs</b>	<b>37</b>
MINI ANALOG SERIES CMOS SINGLE OPERATIONAL AMPLIFIER [S-8944X SERIES] -----	37
MINI ANALOG SERIES CMOS SINGLE OPERATIONAL AMPLIFIER [S-8940X SERIES] -----	38
MINI ANALOG SERIES CMOS SINGLE OPERATIONAL AMPLIFIER [S-891XX SERIES] -----	38
MINI ANALOG SERIES CMOS SINGLE OPERATIONAL AMPLIFIER [S-8953X SERIES] -----	39
MINI ANALOG SERIES CMOS SINGLE COMPARATOR ----- [S-892XX SERIES] -----	39
MINI LOGIC SERIES ----- [S-75V/75L SERIES] -----	40
<b>ASSP</b>	<b>41</b>
<b>Communications</b>	
MICROCOMPUTER WITH BUILT-IN PAGING DECODER ----- [S-70L01AQS] -----	42
PAGING DECODER IC (POCSAG) ----- [S-7041BFT/70L41BFT] -----	42
PAGING DECODER IC (POCSAG) ----- [S-7040D] -----	43
4-BIT MICROCOMPUTER FOR TELEPHONE ----- [S-7292AF] -----	43
<b>Timer</b>	
REALTIME CLOCK (2-WIRE) ----- [S-3530A/3531A] -----	43
REALTIME CLOCK (2-WIRE) ----- [S-35L32A] -----	44
REALTIME CLOCK ----- [S-3511A] -----	44
REALTIME CLOCK ----- [S-3513B] -----	45
REALTIME CLOCK ----- [S-35L12A] -----	45
REALTIME CLOCK ----- [S-3510 SERIES] -----	46
<b>MICROCOMPUTER</b>	<b>47</b>
4-BIT SINGLE CHIP MICROCOMPUTER ----- [S-13XX SERIES] -----	47
4-BIT SINGLE CHIP MICROCOMPUTER ----- [S-14XX SERIES] -----	48
8-BIT SINGLE CHIP MICROCOMPUTER ----- [S-18XX SERIES] -----	48
<b>DRIVER</b>	<b>49</b>
THERMAL HEAD DRIVER ----- [S-46XXA] -----	49
GRAPHIC LCD CONTROLLER DRIVER ----- [S-452X/454X/455X] -----	50
CHARACTER TYPE LCD CONTROLLER DRIVER ----- [S-4561A/4562A] -----	50
<b>SENSOR</b>	<b>51</b>
TEMPERATURE SENSOR IC ----- [S-8110/8120 SERIES] -----	51
TEMPERATURE SWITCH IC ----- [S-8130 SERIES] -----	52
LINEAR IMAGE SENSOR IC FOR CONTACT IMAGE SENSOR ----- [S-86XX] -----	53

## Power Supply IC Line-up

		Package										Page				
		SC-82AB	5Pin SON	SOT-23-3	SOT-23-5	SOT-23-6	SOT-89-3	8Pin MSOP	8Pin TSSOP	8Pin SSOP	14Pin SOP	16Pin TSSOP	TO-92			
Voltage Detector	Delay time selectable	Internal clock												S-801 Series	3	
		External capacitor													S-809 Series	4
														S-808 Series	5	
														S-807 Series	6	
Voltage Regulator	Super-small High-Precision													S-817B Series	7	
		Short circuit Protection													S-817A Series	7
	Low dropout													S-818 Series	8	
		Short circuit Protection													S-814 Series	9
	Low dropout driver/controller													S-816 Series	10	
														S-812XXSG Series	11	
Switching Regulator	Step-up	Super-small	PWM control											S-8323/8327 Series	12	
			PWM/PFM switchover												S-8324/8328 Series	14
			PFM control												S-8321/22 Series	16
	High frequency	PWM control												S-8340 Series	17	
		PWM/PFM switchover												S-8341 Series	17	
		PFM control												S-8330/31 Series	18	
	Step-down	Super-small	PWM control												S-8520 Series	19
			PWM/PFM switchover												S-8521 Series	19
		High frequency	PWM control												S-8540 Series	20
			PWM/PFM switchover												S-8541 Series	20
Synchronous rectifying		PWM control												S-8532 Series	21	
Step-up & down													S-8430AF	22		
Multiple Power Supply ICs	Voltage Detector+Voltage Regulator (High-withstand)													S-87X Series	23	
	Battery Backup for 3V System													S-8423 Series	24	
Lithium-ion Rechargeable Battery Protection IC	1-Cell	Small												S-8261 Series	25	
														S-8241 Series	26	
															S-8231 Series	27
	2-Cell												S-8232 Series	28		
	3-Cell	Battery voltage monitor													S-8243A Series	25
															S-8233A Series	29
															S-8233B Series	29
	4-Cell	Battery voltage monitor													S-8233C Series	29
															S-8243B Series	25
	Secondary protection													S-8244 Series	30	

**New** : New product

**○** : Under Development

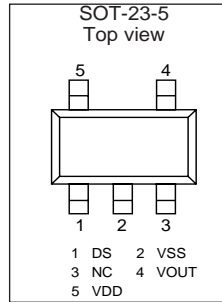
# HIGH-PRECISION VOLTAGE DETECTOR WITH DELAY CIRCUIT

▶ NEW

S-801 series

The S-801 series is a high-precision voltage detector with a fixed delay time generating circuit based on CMOS technology. Detection voltage is fixed internally with a precision of  $\pm 2.0\%$ . An integrated oscillator circuit and counter timer wake delay to the release signal without external components. One of the three delay times can be selected. Output types include Nch open-drain and CMOS output.

## ■ PIN CONFIGURATIONS



Pin No.	Pin Name	Functions
1	DS	Delay time switching pin
2	VSS	GND pin
3	NC	Not connected
4	VOUT	Voltage detection output pin
5	VDD	Voltage input pin

## ■ FEATURES

- Ultra-low current consumption : 1.3  $\mu$ A typ. ( $V_{DD} = 3.5$  V)
- Detection voltage tolerance :  $\pm 2.0\%$
- Hysteresis : 60 mV typ.
- Three delay times : A series 50 ms typ.  
: B series 100 ms typ.  
: C series 200 ms typ.
- Short delay times can be selected.
- Operating voltage range : 0.95 V to -10.0 V
- Detection voltage : 2.2 V to -6.0 V (0.1 V steps)
- Output type : Active low Nch open-drain output  
: Active low CMOS output
- Package : SOT-23-5

## ■ APPLICATIONS

- Power source monitoring for portable equipment such as Note PC digital still camera, PDA, cellular phone etc.
- Constant voltage power monitoring for cameras, video equipment and communication devices etc.
- Power source monitoring for microprocessors and CPU resetting.

Detection Voltage range	Delay time (typ.)	Nch open drain (Low)	CMOS output (Low)	Detection Voltage range	Delay time (typ.)	Nch open drain (Low)	CMOS output (Low)
2.2 V $\pm$ 2.0%	50 ms	S-80122ANMC-JCH-T2	S-80122ALMC-JAH-T2	4.2 V $\pm$ 2.0%	50 ms	S-80142ANMC-JC3-T2	S-80142ALMC-JA3-T2
	100 ms	S-80122BNMC-JGH-T2	S-80122BLMC-JEH-T2		100 ms	S-80142BNMC-JG3-T2	S-80142BLMC-JE3-T2
	200 ms	S-80122CNMC-JKH-T2	S-80122CLMC-JIH-T2		200 ms	S-80142CNMC-JK3-T2	S-80142CLMC-JI3-T2
2.3 V $\pm$ 2.0%	50 ms	S-80123ANMC-JCI-T2	S-80123ALMC-JAI-T2	4.3 V $\pm$ 2.0%	50 ms	S-80143ANMC-JC4-T2	S-80143ALMC-JA4-T2
	100 ms	S-80123BNMC-JGI-T2	S-80123BLMC-JEI-T2		100 ms	S-80143BNMC-JG4-T2	S-80143BLMC-JE4-T2
	200 ms	S-80123CNMC-JKI-T2	S-80123CLMC-JII-T2		200 ms	S-80143CNMC-JK4-T2	S-80143CLMC-JI4-T2
2.4 V $\pm$ 2.0%	50 ms	S-80124ANMC-JCJ-T2	S-80124ALMC-JAJ-T2	4.4 V $\pm$ 2.0%	50 ms	S-80144ANMC-JC5-T2	S-80144ALMC-JA5-T2
	100 ms	S-80124BNMC-JGJ-T2	S-80124BLMC-JEJ-T2		100 ms	S-80144BNMC-JG5-T2	S-80144BLMC-JE5-T2
	200 ms	S-80124CNMC-JKJ-T2	S-80124CLMC-JIJ-T2		200 ms	S-80144CNMC-JK5-T2	S-80144CLMC-JI5-T2
2.5 V $\pm$ 2.0%	50 ms	S-80125ANMC-JCK-T2	S-80125ALMC-JAK-T2	4.5 V $\pm$ 2.0%	50 ms	S-80145ANMC-JC6-T2	S-80145ALMC-JA6-T2
	100 ms	S-80125BNMC-JGK-T2	S-80125BLMC-JEK-T2		100 ms	S-80145BNMC-JG6-T2	S-80145BLMC-JE6-T2
	200 ms	S-80125CNMC-JKK-T2	S-80125CLMC-JIK-T2		200 ms	S-80145CNMC-JK6-T2	S-80145CLMC-JI6-T2
2.6 V $\pm$ 2.0%	50 ms	S-80126ANMC-JCL-T2	S-80126ALMC-JAL-T2	4.6 V $\pm$ 2.0%	50 ms	S-80146ANMC-JC7-T2	S-80146ALMC-JA7-T2
	100 ms	S-80126BNMC-JGL-T2	S-80126BLMC-JEL-T2		100 ms	S-80146BNMC-JG7-T2	S-80146BLMC-JE7-T2
	200 ms	S-80126CNMC-JKL-T2	S-80126CLMC-JIL-T2		200 ms	S-80146CNMC-JK7-T2	S-80146CLMC-JI7-T2
2.7 V $\pm$ 2.0%	50 ms	S-80127ANMC-JCM-T2	S-80127ALMC-JAM-T2	4.7 V $\pm$ 2.0%	50 ms	S-80147ANMC-JC8-T2	S-80147ALMC-JA8-T2
	100 ms	S-80127BNMC-JGM-T2	S-80127BLMC-JEM-T2		100 ms	S-80147BNMC-JG8-T2	S-80147BLMC-JE8-T2
	200 ms	S-80127CNMC-JKM-T2	S-80127CLMC-JIM-T2		200 ms	S-80147CNMC-JK8-T2	S-80147CLMC-JI8-T2
2.8 V $\pm$ 2.0%	50 ms	S-80128ANMC-JCN-T2	S-80128ALMC-JAN-T2	4.8 V $\pm$ 2.0%	50 ms	S-80148ANMC-JC9-T2	S-80148ALMC-JA9-T2
	100 ms	S-80128BNMC-JGN-T2	S-80128BLMC-JEN-T2		100 ms	S-80148BNMC-JG9-T2	S-80148BLMC-JE9-T2
	200 ms	S-80128CNMC-JKN-T2	S-80128CLMC-JIN-T2		200 ms	S-80148CNMC-JK9-T2	S-80148CLMC-JI9-T2
2.9 V $\pm$ 2.0%	50 ms	S-80129ANMC-JCO-T2	S-80129ALMC-JAO-T2	4.9 V $\pm$ 2.0%	50 ms	S-80149ANMC-JDA-T2	S-80149ALMC-JA0-T2
	100 ms	S-80129BNMC-JGO-T2	S-80129BLMC-JEO-T2		100 ms	S-80149BNMC-JGA-T2	S-80149BLMC-JE0-T2
	200 ms	S-80129CNMC-JKO-T2	S-80129CLMC-JIO-T2		200 ms	S-80149CNMC-JKA-T2	S-80149CLMC-JI0-T2
3.0 V $\pm$ 2.0%	50 ms	S-80130ANMC-JCP-T2	S-80130ALMC-JAP-T2	5.0 V $\pm$ 2.0%	50 ms	S-80150ANMC-JDB-T2	S-80150ALMC-JB0-T2
	100 ms	S-80130BNMC-JGP-T2	S-80130BLMC-JEP-T2		100 ms	S-80150BNMC-JGB-T2	S-80150BLMC-JE0-T2
	200 ms	S-80130CNMC-JKP-T2	S-80130CLMC-JIP-T2		200 ms	S-80150CNMC-JKB-T2	S-80150CLMC-JI0-T2
3.1 V $\pm$ 2.0%	50 ms	S-80131ANMC-JCQ-T2	S-80131ALMC-JAQ-T2	5.1 V $\pm$ 2.0%	50 ms	S-80151ANMC-JDC-T2	S-80151ALMC-JB1-T2
	100 ms	S-80131BNMC-JGQ-T2	S-80131BLMC-JEQ-T2		100 ms	S-80151BNMC-JGQ-T2	S-80151BLMC-JE1-T2
	200 ms	S-80131CNMC-JKQ-T2	S-80131CLMC-JIQ-T2		200 ms	S-80151CNMC-JKQ-T2	S-80151CLMC-JI1-T2
3.2 V $\pm$ 2.0%	50 ms	S-80132ANMC-JCR-T2	S-80132ALMC-JAR-T2	5.2 V $\pm$ 2.0%	50 ms	S-80152ANMC-JDD-T2	S-80152ALMC-JB2-T2
	100 ms	S-80132BNMC-JGR-T2	S-80132BLMC-JER-T2		100 ms	S-80152BNMC-JGD-T2	S-80152BLMC-JE2-T2
	200 ms	S-80132CNMC-JKR-T2	S-80132CLMC-JIR-T2		200 ms	S-80152CNMC-JKD-T2	S-80152CLMC-JI2-T2
3.3 V $\pm$ 2.0%	50 ms	S-80133ANMC-JCS-T2	S-80133ALMC-JAS-T2	5.3 V $\pm$ 2.0%	50 ms	S-80153ANMC-JDE-T2	S-80153ALMC-JB3-T2
	100 ms	S-80133BNMC-JGS-T2	S-80133BLMC-JES-T2		100 ms	S-80153BNMC-JGE-T2	S-80153BLMC-JE3-T2
	200 ms	S-80133CNMC-JKS-T2	S-80133CLMC-JIS-T2		200 ms	S-80153CNMC-JKE-T2	S-80153CLMC-JI3-T2
3.4 V $\pm$ 2.0%	50 ms	S-80134ANMC-JCT-T2	S-80134ALMC-JAT-T2	5.4 V $\pm$ 2.0%	50 ms	S-80154ANMC-JDF-T2	S-80154ALMC-JB4-T2
	100 ms	S-80134BNMC-JGT-T2	S-80134BLMC-JET-T2		100 ms	S-80154BNMC-JGF-T2	S-80154BLMC-JE4-T2
	200 ms	S-80134CNMC-JKT-T2	S-80134CLMC-JIT-T2		200 ms	S-80154CNMC-JKF-T2	S-80154CLMC-JI4-T2
3.5 V $\pm$ 2.0%	50 ms	S-80135ANMC-JCU-T2	S-80135ALMC-JAU-T2	5.5 V $\pm$ 2.0%	50 ms	S-80155ANMC-JDG-T2	S-80155ALMC-JB5-T2
	100 ms	S-80135BNMC-JGU-T2	S-80135BLMC-JEU-T2		100 ms	S-80155BNMC-JGF-T2	S-80155BLMC-JE5-T2
	200 ms	S-80135CNMC-JKU-T2	S-80135CLMC-JIU-T2		200 ms	S-80155CNMC-JKF-T2	S-80155CLMC-JI5-T2
3.6 V $\pm$ 2.0%	50 ms	S-80136ANMC-JCV-T2	S-80136ALMC-JAV-T2	5.6 V $\pm$ 2.0%	50 ms	S-80156ANMC-JDH-T2	S-80156ALMC-JB6-T2
	100 ms	S-80136BNMC-JGV-T2	S-80136BLMC-JEV-T2		100 ms	S-80156BNMC-JGH-T2	S-80156BLMC-JE6-T2
	200 ms	S-80136CNMC-JKV-T2	S-80136CLMC-JIV-T2		200 ms	S-80156CNMC-JKH-T2	S-80156CLMC-JI6-T2
3.7 V $\pm$ 2.0%	50 ms	S-80137ANMC-JCW-T2	S-80137ALMC-JAW-T2	5.7 V $\pm$ 2.0%	50 ms	S-80157ANMC-JDI-T2	S-80157ALMC-JB7-T2
	100 ms	S-80137BNMC-JGW-T2	S-80137BLMC-JEW-T2		100 ms	S-80157BNMC-JHI-T2	S-80157BLMC-JE7-T2
	200 ms	S-80137CNMC-JKW-T2	S-80137CLMC-JIW-T2		200 ms	S-80157CNMC-JKI-T2	S-80157CLMC-JI7-T2
3.8 V $\pm$ 2.0%	50 ms	S-80138ANMC-JCX-T2	S-80138ALMC-JAX-T2	5.8 V $\pm$ 2.0%	50 ms	S-80158ANMC-JDJ-T2	S-80158ALMC-JB8-T2
	100 ms	S-80138BNMC-JGX-T2	S-80138BLMC-JEX-T2		100 ms	S-80158BNMC-JHJ-T2	S-80158BLMC-JE8-T2
	200 ms	S-80138CNMC-JKX-T2	S-80138CLMC-JIX-T2		200 ms	S-80158CNMC-JKJ-T2	S-80158CLMC-JI8-T2
3.9 V $\pm$ 2.0%	50 ms	S-80139ANMC-JCY-T2	S-80139ALMC-JAY-T2	5.9 V $\pm$ 2.0%	50 ms	S-80159ANMC-JDK-T2	S-80159ALMC-JB9-T2
	100 ms	S-80139BNMC-JGY-T2	S-80139BLMC-JEY-T2		100 ms	S-80159BNMC-JHK-T2	S-80159BLMC-JE9-T2
	200 ms	S-80139CNMC-JKY-T2	S-80139CLMC-JIY-T2		200 ms	S-80159CNMC-JLK-T2	S-80159CLMC-JI9-T2
4.0 V $\pm$ 2.0%	50 ms	S-80140ANMC-JCZ-T2	S-80140ALMC-JAZ-T2	6.0 V $\pm$ 2.0%	50 ms	S-80160ANMC-JDL-T2	S-80160ALMC-JB0-T2
	100 ms	S-80140BNMC-JGZ-T2	S-80140BLMC-JEZ-T2		100 ms	S-80160BNMC-JHL-T2	S-80160BLMC-JE0-T2
	200 ms	S-80140CNMC-JKZ-T2	S-80140CLMC-JIZ-T2		200 ms	S-80160CNMC-JLL-T2	S-80160CLMC-JI0-T2
4.1 V $\pm$ 2.0%	50 ms	S-80141ANMC-JC2-T2	S-80141ALMC-JA2-T2				
	100 ms	S-80141BNMC-JG2-T2	S-80141BLMC-JE2-T2				
	200 ms	S-80141CNMC-JK2-T2	S-80141CLMC-JI2-T2				

\* parts are planned to line up. Contact our sales office for samples.

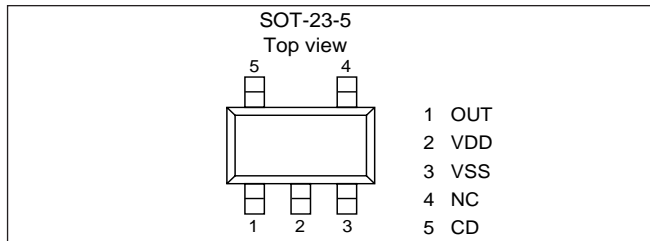
## HIGH-PRECISION VOLTAGE DETECTOR WITH DELAY CIRCUIT

S-809 series

The A-809 series is a family of voltage detectors with delay circuit, whose detection voltage is fixed internally. Release signal is delayed by an external capacitor.

N-channel open drain and CMOS output are available.

### PIN CONFIGURATIONS



### SPECIFICATIONS

Detection voltage range (V)	Hysteresis width $V_{\text{hys}}$ typ. (V)	Nch open drain (Low)	CMOS output (Low)	
			Delay time typ. (ms)	Delay time typ. (ms)
1.1 V $\pm$ 2.0%	0.055	S-80911ANMP-D71-T2	3.6 ( $V_{\text{DD}} = 2.0 \text{ V}$ ) ( $C_{\text{D}} = 4.7 \text{ nF}$ )	S-80911ALMP-D51-T2
1.2 V $\pm$ 2.0%	0.060	S-80912ANMP-D72-T2		S-80912ALMP-D52-T2
1.3 V $\pm$ 2.0%	0.065	S-80913ANMP-DDA-T2		S-80913ALMP-DAA-T2
1.4 V $\pm$ 2.0%	0.070	S-80914ANMP-DCB-T2		S-80914ALMP-DAB-T2
1.5 V $\pm$ 2.0%	0.075	S-80915ANMP-DDC-T2	27 ( $V_{\text{DD}} = 3.5 \text{ V}$ ) ( $C_{\text{D}} = 4.7 \text{ nF}$ )	S-80915ALMP-DAC-T2
1.6 V $\pm$ 2.0%	0.080	S-80916ANMP-DDD-T2		S-80916ALMP-DAD-T2
1.7 V $\pm$ 2.0%	0.085	S-80917ANMP-DDE-T2		S-80917ALMP-DAE-T2
1.8 V $\pm$ 2.0%	0.090	S-80918ANMP-DDF-T2		S-80918ALMP-DAF-T2
1.9 V $\pm$ 2.0%	0.095	S-80919ANMP-DDG-T2		S-80919ALMP-DAG-T2
2.0 V $\pm$ 2.0%	0.100	S-80920ANMP-DDH-T2		S-80920ALMP-DAH-T2
2.1 V $\pm$ 2.0%	0.105	S-80921ANMP-DDJ-T2		S-80921ALMP-DAJ-T2
2.2 V $\pm$ 2.0%	0.110	S-80922ANMP-DDK-T2		S-80922ALMP-DAK-T2
2.3 V $\pm$ 2.0%	0.115	S-80923ANMP-DDL-T2		S-80923ALMP-DAL-T2
2.4 V $\pm$ 2.0%	0.120	S-80924ANMP-DDM-T2		S-80924ALMP-DAM-T2
2.5 V $\pm$ 2.0%	0.125	S-80925ANMP-DDN-T2		S-80925ALMP-DAN-T2
2.6 V $\pm$ 2.0%	0.130	S-80926ANMP-DDP-T2		S-80926ALMP-DAP-T2
2.7 V $\pm$ 2.0%	0.135	S-80927ANMP-DDQ-T2	S-80927ALMP-DAQ-T2	
2.8 V $\pm$ 2.0%	0.140	S-80928ANMP-DDR-T2	S-80928ALMP-DAR-T2	
2.9 V $\pm$ 2.0%	0.145	S-80929ANMP-DDS-T2	S-80929ALMP-DAS-T2	
3.0 V $\pm$ 2.0%	0.150	S-80930ANMP-DDT-T2	S-80930ALMP-DAT-T2	
3.1 V $\pm$ 2.0%	0.155	S-80931ANMP-DDV-T2	S-80931ALMP-DAV-T2	
3.2 V $\pm$ 2.0%	0.160	S-80932ANMP-DDW-T2	S-80932ALMP-DAW-T2	
3.3 V $\pm$ 2.0%	0.165	S-80933ANMP-DDX-T2	S-80933ALMP-DAX-T2	
3.4 V $\pm$ 2.0%	0.170	S-80934ANMP-DDY-T2	S-80934ALMP-DAY-T2	
3.5 V $\pm$ 2.0%	0.175	S-80935ANMP-DDZ-T2	S-80935ALMP-DAZ-T2	
3.6 V $\pm$ 2.0%	0.180	S-80936ANMP-DD0-T2	S-80936ALMP-DA0-T2	
3.7 V $\pm$ 2.0%	0.185	S-80937ANMP-DD1-T2	S-80937ALMP-DA1-T2	
3.8 V $\pm$ 2.0%	0.190	S-80938ANMP-DD2-T2	S-80938ALMP-DA2-T2	
3.9 V $\pm$ 2.0%	0.195	S-80939ANMP-DD3-T2	S-80939ALMP-DA3-T2	
4.0 V $\pm$ 2.0%	0.200	S-80940ANMP-DD4-T2	S-80940ALMP-DA4-T2	
4.1 V $\pm$ 2.0%	0.205	S-80941ANMP-DD5-T2	S-80941ALMP-DA5-T2	
4.2 V $\pm$ 2.0%	0.210	S-80942ANMP-DD6-T2	S-80942ALMP-DA6-T2	
4.3 V $\pm$ 2.0%	0.215	S-80943ANMP-DD7-T2	S-80943ALMP-DA7-T2	
4.4 V $\pm$ 2.0%	0.220	S-80944ANMP-DD8-T2	S-80944ALMP-DA8-T2	
4.5 V $\pm$ 2.0%	0.225	S-80945ANMP-DD9-T2	S-80945ALMP-DA9-T2	
4.6 V $\pm$ 2.0%	0.230	S-80946ANMP-DJA-T2	S-80946ALMP-DEA-T2	
4.7 V $\pm$ 2.0%	0.235	S-80947ANMP-DJB-T2	S-80947ALMP-DEB-T2	
4.8 V $\pm$ 2.0%	0.240	S-80948ANMP-DJC-T2	S-80948ALMP-DEC-T2	
4.9 V $\pm$ 2.0%	0.245	S-80949ANMP-DJD-T2	S-80949ALMP-DED-T2	
5.0 V $\pm$ 2.0%	0.250	S-80950ANMP-DJE-T2	S-80950ALMP-DEE-T2	
5.1 V $\pm$ 2.0%	0.255	S-80951ANMP-DJF-T2	S-80951ALMP-DEF-T2	
5.2 V $\pm$ 2.0%	0.260	S-80952ANMP-DJG-T2	S-80952ALMP-DEG-T2	
5.3 V $\pm$ 2.0%	0.265	S-80953ANMP-DJH-T2	S-80953ALMP-DEH-T2	
5.4 V $\pm$ 2.0%	0.270	S-80954ANMP-DJJ-T2	S-80954ALMP-DEJ-T2	
5.5 V $\pm$ 2.0%	0.275	S-80955ANMP-DJK-T2	S-80955ALMP-DEK-T2	
5.6 V $\pm$ 2.0%	0.280	S-80956ANMP-DJL-T2	S-80956ALMP-DEL-T2	
5.7 V $\pm$ 2.0%	0.285	S-80957ANMP-DJM-T2	S-80957ALMP-DEM-T2	
5.8 V $\pm$ 2.0%	0.290	S-80958ANMP-DJN-T2	S-80958ALMP-DEN-T2	
5.9 V $\pm$ 2.0%	0.295	S-80959ANMP-DJP-T2	S-80959ALMP-DEP-T2	
6.0 V $\pm$ 2.0%	0.300	S-80960ANMP-DJQ-T2	S-80960ALMP-DEQ-T2	

\* Some products might need time to prepare. Please contact our sales office for samples.

### FEATURES

- Ultra-low current consumption : 1.2  $\mu\text{A}$  typ. ( $V_{\text{DD}} = 3.5 \text{ V}$ )
- Detection voltage tolerance :  $\pm 2.0\%$
- Operating voltage range : 0.8 V to 6.0 V  
(Detection voltage  $\leq 1.4 \text{ V}$  typ.)  
: 0.95 V to 10.0 V  
(Detection voltage  $\geq 1.5 \text{ V}$  typ.)
- Hysteresis width : 5% typ.
- Detection voltage : 1.1 V to 6.0 V (0.1 V step)
- Output forms : Active low Nch opendrain output  
: Active low CMOS output
- Small package : SOT-23-5

### APPLICATIONS

- Power monitor for note PC, digital still cameras, PDA, cellular phone.
- Constant voltage power monitor for cameras, video equipment, communication devices
- Power monitor for microcomputers and reset for CPUs



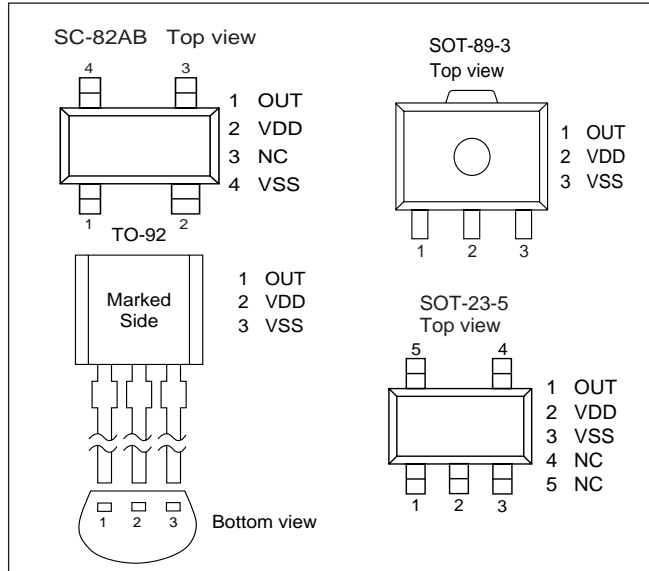
\* S-807 series will be summarized into S-808 series.

## SUPER-SMALL PACKAGE HIGH-PRECISION VOLTAGE DETECTOR

## S-808 series

The S-808 series is a family CMOS high-precision voltage detectors. Detection voltage is fixed and its accuracy is 2.0%. Nch open-drain output or CMOS output is available.

### PIN CONFIGURATIONS



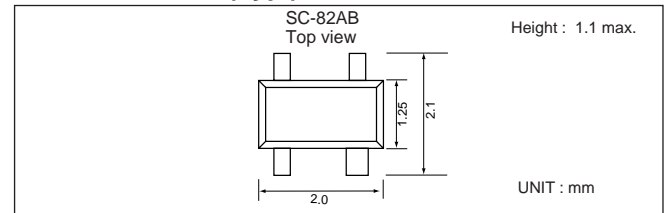
### FEATURES

- Ultra-low current consumption
  - 1.3  $\mu\text{A}$  typ. ( $V_{DD}=1.5\text{ V}$ ): Detection voltage  $\leq 1.4\text{ V}$  typ.
  - 0.8  $\mu\text{A}$  typ. ( $V_{DD}=3.5\text{ V}$ ): Detection voltage  $\geq 1.5\text{ V}$  typ.
- Detection voltage tolerance :  $\pm 2.0\%$
- Operating voltage range
  - 0.7 V to 5.0 V : Detection voltage  $\leq 1.4\text{ V}$  typ.
  - 0.95 V to 10.0 V : Detection voltage  $\geq 1.5\text{ V}$  typ.
- Hysteresis width : 5% typ.
- Detection voltage : 0.8 V to 6.0 V (0.1 V step)
- Output forms : Active Nch open drain output, Active low CMOS output

### APPLICATIONS

- Battery checker
- Power failure detector
- Power monitor for pagers, calculators, electronic organizers, remote controllers
- Constant voltage power monitor for cameras, video equipment, communication devices
- Power monitor for microcomputers and reset for CPUs

### DIMENSIONS (Typ.)



### SPECIFICATIONS

Detection voltage range (V)	Hysteresis width V <sub>hys</sub> typ. (V)	Nch open drain (Low)				CMOS output (Low)				Current consumption typ.
		SC-82AB	TO-92	SOT-89-3	SOT-23-5	SC-82AB	TO-92	SOT-89-3	SOT-23-5	
0.8 V $\pm$ 2.0%	0.034	S-80808ANNP-E7Y-T2	-	-	-	S-80808ALNP-E5Y-T2	-	-	-	1.3 $\mu\text{A}$
0.9 V $\pm$ 2.0%	0.044	S-80809ANNP-E7Z-T2	-	-	-	S-80809ALNP-E5Z-T2	-	-	-	(V <sub>cc</sub> =1.5 V)
1.0 V $\pm$ 2.0%	0.054	S-80810ANNP-E7O-T2	-	-	-	S-80810ALNP-E5O-T2	-	-	-	1.3 $\mu\text{A}$ (V <sub>cc</sub> =2.0 V)
1.1 V $\pm$ 2.0%	0.064	S-80811ANNP-E7I-T2	-	-	-	S-80811ALNP-E5I-T2	-	-	-	
1.2 V $\pm$ 2.0%	0.073	S-80812ANNP-E7J-T2	-	-	-	S-80812ALNP-E5J-T2	-	-	-	
1.3 V $\pm$ 2.0%	0.083	S-80813ANNP-E7A-T2	-	-	-	S-80813ALNP-E5A-T2	-	-	-	
1.4 V $\pm$ 2.0%	0.093	S-80814ANNP-E7B-T2	-	-	-	S-80814ALNP-E5B-T2	-	-	-	
1.5 V $\pm$ 2.0%	0.075	S-80815ANNP-EDC-T2	S-80815ANY	S-80815ANUP-EDC-T2	-	S-80815ALNP-EAC-T2	S-80815ALY	S-80815ALUP-EAC-T2	S-80815ALMP-EAC-T2	0.8 $\mu\text{A}$ (V <sub>cc</sub> =3.5 V)
1.6 V $\pm$ 2.0%	0.080	S-80816ANNP-EDD-T2	S-80816ANY	S-80816ANUP-EDD-T2	-	S-80816ALNP-EAD-T2	S-80816ALY	S-80816ALUP-EAD-T2	-	
1.7 V $\pm$ 2.0%	0.085	S-80817ANNP-EDE-T2	S-80817ANY	S-80817ANUP-EDE-T2	S-80817ANMP-EDE-T2	S-80817ALNP-EAE-T2	S-80817ALY	S-80817ALUP-EAE-T2	-	
1.8 V $\pm$ 2.0%	0.090	S-80818ANNP-EDF-T2	S-80818ANY	S-80818ANUP-EDF-T2	S-80818ANMP-EDF-T2	S-80818ALNP-EAF-T2	S-80818ALY	S-80818ALUP-EAF-T2	S-80818ALMP-EAF-T2	
1.9 V $\pm$ 2.0%	0.095	S-80819ANNP-EDG-T2	S-80819ANY	S-80819ANUP-EDG-T2	S-80819ANMP-EDG-T2	S-80819ALNP-EAG-T2	S-80819ALY	S-80819ALUP-EAG-T2	S-80819ALMP-EAG-T2	
2.0 V $\pm$ 2.0%	0.100	S-80820ANNP-EDH-T2	S-80820ANY	S-80820ANUP-EDH-T2	S-80820ANMP-EDH-T2	S-80820ALNP-EAH-T2	S-80820ALY	S-80820ALUP-EAH-T2	S-80820ALMP-EAH-T2	
2.1 V $\pm$ 2.0%	0.105	S-80821ANNP-EDJ-T2	S-80821ANY	S-80821ANUP-EDJ-T2	S-80821ANMP-EDJ-T2	S-80821ALNP-EAJ-T2	S-80821ALY	S-80821ALUP-EAJ-T2	S-80821ALMP-EAJ-T2	
2.2 V $\pm$ 2.0%	0.110	S-80822ANNP-EDK-T2	S-80822ANY	S-80822ANUP-EDK-T2	S-80822ANMP-EDK-T2	S-80822ALNP-EAK-T2	S-80822ALY	S-80822ALUP-EAK-T2	S-80822ALMP-EAK-T2	
2.3 V $\pm$ 2.0%	0.115	S-80823ANNP-EDL-T2	S-80823ANY	S-80823ANUP-EDL-T2	S-80823ANMP-EDL-T2	S-80823ALNP-EAL-T2	S-80823ALY	S-80823ALUP-EAL-T2	S-80823ALMP-EAL-T2	
2.4 V $\pm$ 2.0%	0.120	S-80824ANNP-EDM-T2	S-80824ANY	S-80824ANUP-EDM-T2	S-80824ANMP-EDM-T2	S-80824ALNP-EAM-T2	S-80824ALY	S-80824ALUP-EAM-T2	-	
2.5 V $\pm$ 2.0%	0.125	S-80825ANNP-EDN-T2	S-80825ANY	S-80825ANUP-EDN-T2	S-80825ANMP-EDN-T2	S-80825ALNP-EAN-T2	S-80825ALY	S-80825ALUP-EAN-T2	S-80825ALMP-EAN-T2	
2.6 V $\pm$ 2.0%	0.130	S-80826ANNP-EDP-T2	S-80826ANY	S-80826ANUP-EDP-T2	-	S-80826ALNP-EAP-T2	S-80826ALY	S-80826ALUP-EAP-T2	-	
2.7 V $\pm$ 2.0%	0.135	S-80827ANNP-EDQ-T2	S-80827ANY	S-80827ANUP-EDQ-T2	S-80827ANMP-EDQ-T2	S-80827ALNP-EAQ-T2	S-80827ALY	S-80827ALUP-EAQ-T2	S-80827ALMP-EAQ-T2	
2.8 V $\pm$ 2.0%	0.140	S-80828ANNP-EDR-T2	S-80828ANY	S-80828ANUP-EDR-T2	S-80828ANMP-EDR-T2	S-80828ALNP-EAR-T2	S-80828ALY	S-80828ALUP-EAR-T2	S-80828ALMP-EAR-T2	
2.9 V $\pm$ 2.0%	0.145	S-80829ANNP-EDS-T2	S-80829ANY	S-80829ANUP-EDS-T2	S-80829ANMP-EDS-T2	S-80829ALNP-EAS-T2	S-80829ALY	S-80829ALUP-EAS-T2	-	
3.0 V $\pm$ 2.0%	0.150	S-80830ANNP-EDT-T2	S-80830ANY	S-80830ANUP-EDT-T2	S-80830ANMP-EDT-T2	S-80830ALNP-EAT-T2	S-80830ALY	S-80830ALUP-EAT-T2	S-80830ALMP-EAT-T2	
3.1 V $\pm$ 2.0%	0.155	S-80831ANNP-EDV-T2	S-80831ANY	S-80831ANUP-EDV-T2	-	S-80831ALNP-EAV-T2	S-80831ALY	S-80831ALUP-EAV-T2	-	
3.2 V $\pm$ 2.0%	0.160	S-80832ANNP-EDW-T2	S-80832ANY	S-80832ANUP-EDW-T2	S-80832ANMP-EDW-T2	S-80832ALNP-EAW-T2	S-80832ALY	S-80832ALUP-EAW-T2	S-80832ALMP-EAW-T2	
3.3 V $\pm$ 2.0%	0.165	S-80833ANNP-EDX-T2	S-80833ANY	S-80833ANUP-EDX-T2	S-80833ANMP-EDX-T2	S-80833ALNP-EAX-T2	S-80833ALY	S-80833ALUP-EAX-T2	S-80833ALMP-EAX-T2	
3.4 V $\pm$ 2.0%	0.170	S-80834ANNP-EDY-T2	S-80834ANY	S-80834ANUP-EDY-T2	S-80834ANMP-EDY-T2	S-80834ALNP-EAY-T2	S-80834ALY	S-80834ALUP-EAY-T2	-	
3.5 V $\pm$ 2.0%	0.175	S-80835ANNP-EDZ-T2	S-80835ANY	S-80835ANUP-EDZ-T2	S-80835ANMP-EDZ-T2	S-80835ALNP-EAZ-T2	S-80835ALY	S-80835ALUP-EAZ-T2	S-80835ALMP-EAZ-T2	
3.6 V $\pm$ 2.0%	0.180	S-80836ANNP-ED0-T2	S-80836ANY	S-80836ANUP-ED0-T2	S-80836ANMP-ED0-T2	S-80836ALNP-EA0-T2	S-80836ALY	S-80836ALUP-EA0-T2	S-80836ALMP-EA0-T2	
3.7 V $\pm$ 2.0%	0.185	S-80837ANNP-ED1-T2	S-80837ANY	S-80837ANUP-ED1-T2	-	S-80837ALNP-EA1-T2	S-80837ALY	S-80837ALUP-EA1-T2	-	
3.8 V $\pm$ 2.0%	0.190	S-80838ANNP-ED2-T2	S-80838ANY	S-80838ANUP-ED2-T2	S-80838ANMP-ED2-T2	S-80838ALNP-EA2-T2	S-80838ALY	S-80838ALUP-EA2-T2	-	
3.9 V $\pm$ 2.0%	0.195	S-80839ANNP-ED3-T2	S-80839ANY	S-80839ANUP-ED3-T2	S-80839ANMP-ED3-T2	S-80839ALNP-EA3-T2	S-80839ALY	S-80839ALUP-EA3-T2	-	
4.0 V $\pm$ 2.0%	0.200	S-80840ANNP-ED4-T2	S-80840ANY	S-80840ANUP-ED4-T2	S-80840ANMP-ED4-T2	S-80840ALNP-EA4-T2	S-80840ALY	S-80840ALUP-EA4-T2	S-80840ALMP-EA4-T2	
4.1 V $\pm$ 2.0%	0.205	S-80841ANNP-ED5-T2	S-80841ANY	S-80841ANUP-ED5-T2	-	S-80841ALNP-EA5-T2	S-80841ALY	S-80841ALUP-EA5-T2	-	
4.2 V $\pm$ 2.0%	0.210	S-80842ANNP-ED6-T2	S-80842ANY	S-80842ANUP-ED6-T2	S-80842ANMP-ED6-T2	S-80842ALNP-EA6-T2	S-80842ALY	S-80842ALUP-EA6-T2	S-80842ALMP-EA6-T2	
4.3 V $\pm$ 2.0%	0.215	S-80843ANNP-ED7-T2	S-80843ANY	S-80843ANUP-ED7-T2	-	S-80843ALNP-EA7-T2	S-80843ALY	S-80843ALUP-EA7-T2	-	
4.4 V $\pm$ 2.0%	0.220	S-80844ANNP-ED8-T2	S-80844ANY	S-80844ANUP-ED8-T2	S-80844ANMP-ED8-T2	S-80844ALNP-EA8-T2	S-80844ALY	S-80844ALUP-EA8-T2	-	
4.5 V $\pm$ 2.0%	0.225	S-80845ANNP-ED9-T2	S-80845ANY	S-80845ANUP-ED9-T2	S-80845ANMP-ED9-T2	S-80845ALNP-EA9-T2	S-80845ALY	S-80845ALUP-EA9-T2	S-80845ALMP-EA9-T2	
4.6 V $\pm$ 2.0%	0.230	S-80846ANNP-EJA-T2	S-80846ANY	S-80846ANUP-EJA-T2	-	S-80846ALNP-EA2-T2	S-80846ALY	S-80846ALUP-EA2-T2	-	
4.7 V $\pm$ 2.0%	0.235	S-80847ANNP-EJB-T2	S-80847ANY	S-80847ANUP-EJB-T2	-	S-80847ALNP-EA2-T2	S-80847ALY	S-80847ALUP-EA2-T2	-	
4.8 V $\pm$ 2.0%	0.240	S-80848ANNP-EJC-T2	S-80848ANY	S-80848ANUP-EJC-T2	-	S-80848ALNP-EA2-T2	S-80848ALY	S-80848ALUP-EA2-T2	-	
4.9 V $\pm$ 2.0%	0.245	S-80849ANNP-EJD-T2	S-80849ANY	S-80849ANUP-EJD-T2	-	S-80849ALNP-EA2-T2	S-80849ALY	S-80849ALUP-EA2-T2	S-80849ALMP-EA2-T2	
5.0 V $\pm$ 2.0%	0.250	S-80850ANNP-EJE-T2	S-80850ANY	S-80850ANUP-EJE-T2	S-80850ANMP-EJE-T2	S-80850ALNP-EEE-T2	S-80850ALY	S-80850ALUP-EEE-T2	-	
5.1 V $\pm$ 2.0%	0.255	S-80851ANNP-EJF-T2	S-80851ANY	S-80851ANUP-EJF-T2	S-80851ANMP-EJF-T2	S-80851ALNP-EEF-T2	S-80851ALY	S-80851ALUP-EEF-T2	S-80851ALMP-EEF-T2	
5.2 V $\pm$ 2.0%	0.260	S-80852ANNP-EJG-T2	-	S-80852ANUP-EJG-T2	-	S-80852ALNP-EEG-T2	-	S-80852ALUP-EEG-T2	S-80852ALMP-EEG-T2	
5.3 V $\pm$ 2.0%	0.265	S-80853ANNP-EJH-T2	S-80853ANY	S-80853ANUP-EJH-T2	-	S-80853ALNP-EEH-T2	-	S-80853ALUP-EEH-T2	-	
5.4 V $\pm$ 2.0%	0.270	S-80854ANNP-EJJ-T2	-	S-80854ANUP-EJJ-T2	-	S-80854ALNP-EJJ-T2	-	S-80854ALUP-EJJ-T2	-	
5.5 V $\pm$ 2.0%	0.275	S-80855ANNP-EJK-T2	-	S-80855ANUP-EJK-T2	-	S-80855ALNP-EEK-T2	-	S-80855ALUP-EEK-T2	-	
5.6 V $\pm$ 2.0%	0.280	S-80856ANNP-EJL-T2	-	S-80856ANUP-EJL-T2	-	S-80856ALNP-EEL-T2	-	S-80856ALUP-EEL-T2	-	
5.7 V $\pm$ 2.0%	0.285	S-80857ANNP-EJM-T2	-	S-80857ANUP-EJM-T2	-	S-80857ALNP-EEM-T2	-	S-80857ALUP-EEM-T2	-	
5.8 V $\pm$ 2.0%	0.290	S-80858ANNP-EJN-T2	-	S-80858ANUP-EJN-T2	-	S-80858ALNP-EEN-T2	-	-	-	
5.9 V $\pm$ 2.0%	0.295	S-80859ANNP-EJP-T2	-	S-80859ANUP-EJP-T2	-	S-80859ALNP-EEP-T2	-	S-80859ALUP-EEP-T2	-	
6.0 V $\pm$ 2.0%	0.300	S-80860ANNP-EJQ-T2	-	S-80860ANUP-EJQ-T2	-	S-80860ALNP-EEQ-T2	-	S-80860ALUP-EEQ-T2	-	

\*\* Some products described here in are under development. Please contact us for Samples.

\* S-807 series will be summarized into S-808 series.

## HIGH-PRECISION VOLTAGE DETECTOR

## S-807 series

### FEATURES

- Ultra-low current consumption : 1.0  $\mu$ A typ. ( $V_{DD}=4.5$  V)
  - Detection voltage tolerance :  $\pm 2.4\%$
  - Wide operating voltage range : 1.0 to 15 V
  - Hysteresis width : 5% typ.
  - Wide operating temperature range : -30°C to +80°C
  - 3 output forms : Nch open-drain
  - : Active high CMOS output
  - : Active low CMOS output
- S-807XXSX has 2 output forms Nch open-drain and active low CMOS output.

### SPECIFICATIONS

Detection voltage	Hysteresis width Typ.	CMOS Output (Low)			CMOS Output (High)		Nch open-drain			Current consumption Typ.	Pin configurations
		TO-92	SOT-89-3*	SOT-23-5*	TO-92	SOT-89-3*	TO-92	SOT-89-3*	SOT-23-5*		
1.4 V $\pm$ 2.4%	0.07 V	-	S-80714AL-AB-X	-	-	-	-	-	1.4 $\mu$ A ( $V_{DD}=3.0$ V)		
1.5 V $\pm$ 2.4%	0.075 V	S-80715AL	S-80715AL-AC-X	S-80715SL-AC-X	-	-	S-80715AN	S-80715AN-DC-X	-		
1.6 V $\pm$ 2.4%	0.08 V	S-80716AL	S-80716AL-AD-X	-	-	-	S-80716AN	S-80716AN-DD-X	-		
1.7 V $\pm$ 2.4%	0.085 V	S-80717AL	S-80717AL-AE-X	-	-	-	-	-	S-80717SN-DE-X		
1.8 V $\pm$ 2.4%	0.09 V	S-80718AL	S-80718AL-AF-X	S-80718SL-AF-X	-	S-80718AH-BF-X	S-80718AN	S-80718AN-DF-X	S-80718SN-DF-X		
1.9 V $\pm$ 2.4%	0.095 V	S-80719AL	S-80719AL-AG-X	S-80719SL-AG-X	-	-	S-80719AN	S-80719AN-DG-X	S-80719SN-DG-X		
2.0 V $\pm$ 2.4%	0.1 V	S-80720AL	S-80720AL-AH-X	S-80720SL-AH-X	-	S-80720AH-BH-X	S-80720AN	S-80720AN-DH-X	S-80720SN-DH-X		
2.1 V $\pm$ 2.4%	0.105 V	S-80721AL	S-80721AL-AJ-X	S-80721SL-AJ-X	-	-	S-80721AN	S-80721AN-DJ-X	S-80721SN-DJ-X		
2.2 V $\pm$ 2.4%	0.11 V	S-80722AL	S-80722AL-AK-X	-	-	-	S-80722AN	S-80722AN-DK-X	S-80722SN-DK-X		
2.3 V $\pm$ 2.4%	0.115 V	S-80723AL	S-80723AL-AL-X	S-80723SL-AL-X	-	-	S-80723AN	S-80723AN-DL-X	S-80723SN-DL-X		
2.4 V $\pm$ 2.4%	0.12 V	S-80724AL	S-80724AL-AM-X	-	-	-	S-80724AN	S-80724AN-DM-X	S-80724SN-DM-X		
2.5 V $\pm$ 2.4%	0.125 V	S-80725AL	S-80725AL-AN-X	S-80725SL-AN-X	-	S-80725AH-BN-X	S-80725AN	S-80725AN-DN-X	S-80725SN-DN-X		
2.6 V $\pm$ 2.4%	0.13 V	S-80726AL	S-80726AL-AP-X	-	-	-	S-80726AN	S-80726AN-DP-X	-		
2.7 V $\pm$ 2.4%	0.135 V	S-80727AL	S-80727AL-AQ-X	S-80727SL-AQ-X	-	-	S-80727AN	S-80727AN-DQ-X	S-80727SN-DQ-X		
2.8 V $\pm$ 2.4%	0.14 V	S-80728AL	S-80728AL-AR-X	S-80728SL-AR-X	-	-	S-80728AN	S-80728AN-DR-X	S-80728SN-DR-X		
2.9 V $\pm$ 2.4%	0.145 V	S-80729AL	S-80729AL-AS-X	-	-	-	S-80729AN	S-80729AN-DS-X	-		
3.0 V $\pm$ 2.4%	0.15 V	S-80730AL	S-80730AL-AT-X	S-80730SL-AT-X	-	-	S-80730AN	S-80730AN-DT-X	S-80730SN-DT-X		
3.1 V $\pm$ 2.4%	0.155 V	S-80731AL	S-80731AL-AV-X	-	S-80731AH	S-80731AH-BV-X	S-80731AN	S-80731AN-DV-X	-		
3.2 V $\pm$ 2.4%	0.16 V	S-80732AL	S-80732AL-AW-X	S-80732SL-AW-X	-	-	S-80732AN	S-80732AN-DW-X	S-80732SN-DW-X		
3.3 V $\pm$ 2.4%	0.165 V	S-80733AL	S-80733AL-AX-X	S-80733SL-AX-X	S-80733AH	-	S-80733AN	S-80733AN-DX-X	S-80733SN-DX-X		
3.4 V $\pm$ 2.4%	0.17 V	S-80734AL	S-80734AL-AY-X	-	-	-	S-80734AN	S-80734AN-DY-X	S-80734SN-DY-X		
3.5 V $\pm$ 2.4%	0.175 V	S-80735AL	S-80735AL-AZ-X	S-80735SL-AZ-X	-	-	S-80735AN	S-80735AN-DZ-X	S-80735SN-DZ-X		
3.6 V $\pm$ 2.4%	0.18 V	S-80736AL	S-80736AL-A0-X	-	-	-	S-80736AN	S-80736AN-D0-X	S-80736SN-D0-X		
3.7 V $\pm$ 2.4%	0.185 V	S-80737AL	S-80737AL-A1-X	-	-	-	S-80737AN	S-80737AN-D1-X	-		
3.8 V $\pm$ 2.4%	0.19 V	S-80738AL	S-80738AL-A2-X	-	-	-	S-80738AN	S-80738AN-D2-X	-		
3.9 V $\pm$ 2.4%	0.195 V	S-80739AL	S-80739AL-A3-X	-	-	-	S-80739AN	S-80739AN-D3-X	S-80739SN-D3-X		
4.0 V $\pm$ 2.4%	0.2 V	S-80740AL	S-80740AL-A4-X	S-80740SL-A4-X	S-80740AH	S-80740AH-B4-X	S-80740AN	S-80740AN-D4-X	S-80740SN-D4-X		
4.1 V $\pm$ 2.4%	0.205 V	S-80741AL	S-80741AL-A5-X	-	-	-	S-80741AN	S-80741AN-D5-X	-		
4.2 V $\pm$ 2.4%	0.21 V	S-80742AL	S-80742AL-A6-X	S-80742SL-A6-X	-	-	S-80742AN	S-80742AN-D6-X	S-80742SN-D6-X		
4.3 V $\pm$ 2.4%	0.215 V	S-80743AL	S-80743AL-A7-X	-	-	-	S-80743AN	S-80743AN-D7-X	-		
4.4 V $\pm$ 2.4%	0.22 V	S-80744AL	S-80744AL-A8-X	-	-	-	S-80744AN	S-80744AN-D8-X	S-80744SN-D8-X		
4.295 to 4.605 V	Release voltage 4.70 V max.	S-80744HL	S-80744HL-U8-X	-	-	-	-	-	2.6 $\mu$ A ( $V_{DD}=6.0$ V)		
4.5 V $\pm$ 2.4%	0.225 V	S-80745AL	S-80745AL-A9-X	S-80745SL-A9-X	-	S-80745AH-B9-X	S-80745AN	S-80745AN-D9-X	S-80745SN-D9-X		
4.6 V $\pm$ 2.4%	0.23 V	S-80746AL	S-80746AL-EA-X	-	-	-	S-80746AN	S-80746AN-JA-X	-		
4.7 V $\pm$ 2.4%	0.235 V	S-80747AL	S-80747AL-EB-X	-	-	-	S-80747AN	S-80747AN-JB-X	-		
4.8 V $\pm$ 2.4%	0.24 V	S-80748AL	S-80748AL-EC-X	-	-	-	S-80748AN	S-80748AN-JC-X	-		
4.9 V $\pm$ 2.4%	0.245 V	S-80749AL	S-80749AL-ED-X	S-80749SL-ED-X	-	-	S-80749AN	S-80749AN-JD-X	-		
5.0 V $\pm$ 2.4%	0.25 V	S-80750AL	S-80750AL-EE-X	S-80750SL-EE-X	-	-	S-80750AN	S-80750AN-JE-X	S-80750SN-JE-X		
5.1 V $\pm$ 2.4%	0.255 V	S-80751AL	S-80751AL-EF-X	S-80751SL-EF-X	-	-	S-80751AN	S-80751AN-JF-X	S-80751SN-JF-X		
5.2 V $\pm$ 2.4%	0.26 V	-	S-80752AL-EG-X	S-80752SL-EG-X	-	-	-	S-80752AN-JG-X	-		
5.3 V $\pm$ 2.4%	0.265 V	-	-	-	-	-	S-80753AN	-	-		
5.5 V $\pm$ 2.4%	0.275 V	-	S-80755AL-EK-T1	-	-	-	-	-	-		
6.0 V $\pm$ 2.4%	0.3 V	-	-	-	-	-	-	S-80760AN-JQ-T1	-		
6.1 V $\pm$ 2.4%	0.305 V	-	-	S-80761SL-ER-T1	-	-	-	-	-		
6.3 V $\pm$ 2.4%	0.315 V	-	-	-	-	-	-	S-80763AN-JT-T1	-		
6.5 V $\pm$ 2.4%	0.325 V	-	-	-	-	-	-	S-80765AN-JW-T1	-		
6.6 V $\pm$ 2.4%	0.33 V	-	S-80766AL-EX-T1	-	-	S-80766AH-HX-T1	-	-	-		
6.9 V $\pm$ 2.4%	0.345 V	-	-	-	-	-	-	-	S-80769SN-J0-T1		
7.1 V $\pm$ 2.4%	0.355 V	-	S-80771AL-E2-T1	S-80771SL-E2-T1	-	-	-	-	-		
7.7 V $\pm$ 2.4%	0.385 V	-	-	-	-	-	-	S-80777AN-J8-T1	S-80777SN-J8-T1		
9.3 V $\pm$ 2.4%	0.465 V	-	-	-	-	-	-	-	2.5 $\mu$ A ( $V_{DD}=10.5$ V)		

\* The last letter "X" changes as follows depending upon the packing form for SOT-89-3

X=S : Stick, X=T1 or T2 : Tape (IC orientation is different for T1 and T2)

Only tape is available for SOT-23-5.



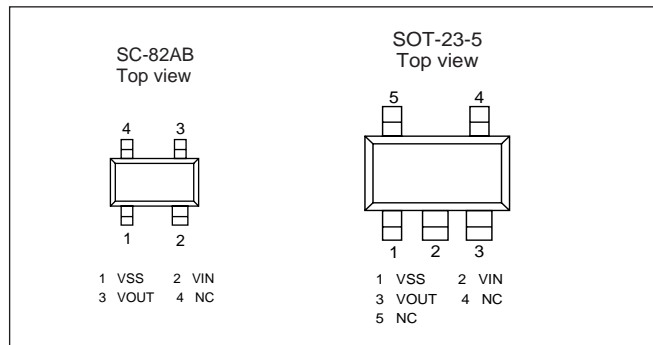
The S-817 series is a 3-terminal positive voltage regulator based on CMOS technology.

Package for the S-817A series is small compared to existing voltage regulators (SC-82AB: 2.0 x 2.1 mm) and is ideal for designing small portable devices. In addition a small ceramic capacitor can be used as output capacitor. The S-817B series does not have short circuit protection and is housed in SOT-23-5 package one rank bigger than SC-82AB. The products also provide stable operation even at low load (1  $\mu$ A).

FEATURES

- Low current consumption Operation: 1.2  $\mu$ A typ. 2.5  $\mu$ A max.
- Output voltage : 1.1 to 6.0 V (0.1 V step)
- Tolerance of output voltage :  $\pm 2.0\%$
- Output current : 50 mA capable  
(product with 3.0 V output, when  $V_{IN} = 5$  V)  
: 75 mA capable  
(product with 5.0 V output, when  $V_{IN} = 7$  V)
- Dropout voltage : 160 mV typ.  
( $V_{OUT} = 5.0$  V,  $I_{OUT} = 10$  mA)
- Low ESR capacitor : A ceramic capacitor of 0.1  $\mu$ F or higher.
- Short circuit protection : Only for A series
- Excellent line regulation : Stable even at low load (1  $\mu$ A)
- Small package : SC-82AB (A series)  
: SOT-23-5 (B series)

PIN CONFIGURATIONS



APPLICATIONS

- Constant voltage power supply for battery powered devices.
- Constant voltage power supply for communication devices.
- Constant voltage power supply for household appliances.

SELECTION GUIDE

Output voltage	SC-82AB	SOT-23-5	Output Current*1 Min.	Dropout Voltage ( $I_{OUT}=10mA$ )Typ.	Line regulation*2 Typ.	Load regulation*3 Typ.
1.1 V $\pm$ 2.0%	S-817A11ANB-CUA-T2	-	20 mA	0.92 V	5 mV	5 mV (1 $\mu$ A to 10 mA)
1.2 V $\pm$ 2.0%	S-817A12ANB-CUB-T2	-	20 mA	0.92 V	5 mV	5 mV (1 $\mu$ A to 10 mA)
1.4 V $\pm$ 2.0%	S-817A14ANB-CUD-T2	-	20 mA	0.92 V	5 mV	5 mV (1 $\mu$ A to 10 mA)
1.5 V $\pm$ 2.0%	S-817A15ANB-CUE-T2	S-817B15AMC-CWE-T2	20 mA	0.58 V	5 mV	5 mV (1 $\mu$ A to 10 mA)
1.8 V $\pm$ 2.0%	S-817A18ANB-CUH-T2	-	20 mA	0.58 V	5 mV	5 mV (1 $\mu$ A to 10 mA)
1.9 V $\pm$ 2.0%	S-817A19ANB-CUI-T2	-	20 mA	0.58 V	5 mV	5 mV (1 $\mu$ A to 10 mA)
2.0 V $\pm$ 2.0%	S-817A20ANB-CUJ-T2	S-817B20AMC-CWJ-T2	35 mA	0.40 V	5 mV	10 mV (1 $\mu$ A to 20 mA)
2.1 V $\pm$ 2.0%	S-817A21ANB-CUK-T2	-	35 mA	0.40 V	5 mV	10 mV (1 $\mu$ A to 20 mA)
2.2 V $\pm$ 2.0%	S-817A22ANB-CUL-T2	S-817B22AMC-CWL-T2	35 mA	0.40 V	5 mV	10 mV (1 $\mu$ A to 20 mA)
2.4 V $\pm$ 2.0%	S-817A24ANB-CUN-T2	-	35 mA	0.40 V	5 mV	10 mV (1 $\mu$ A to 20 mA)
2.5 V $\pm$ 2.0%	S-817A25ANB-CUO-T2	S-817B25AMC-CWO-T2	35 mA	0.31 V	5 mV	10 mV (1 $\mu$ A to 20 mA)
2.7 V $\pm$ 2.0%	S-817A27ANB-CUQ-T2	-	35 mA	0.31 V	5 mV	10 mV (1 $\mu$ A to 20 mA)
2.8 V $\pm$ 2.0%	S-817A28ANB-CUR-T2	S-817B28AMC-CWR-T2	35 mA	0.31 V	5 mV	10 mV (1 $\mu$ A to 20 mA)
3.0 V $\pm$ 2.0%	S-817A30ANB-CUT-T2	S-817B30AMC-CWT-T2	50 mA	0.25 V	5 mV	20 mV (1 $\mu$ A to 30 mA)
3.2 V $\pm$ 2.0%	S-817A32ANB-CUV-T2	-	50 mA	0.25 V	5 mV	20 mV (1 $\mu$ A to 30 mA)
3.3 V $\pm$ 2.0%	S-817A33ANB-CUW-T2	S-817B33AMC-CWW-T2	50 mA	0.25 V	5 mV	20 mV (1 $\mu$ A to 30 mA)
3.5 V $\pm$ 2.0%	S-817A35ANB-CUY-T2	S-817B35AMC-CWY-T2	50 mA	0.22 V	5 mV	20 mV (1 $\mu$ A to 30 mA)
3.6 V $\pm$ 2.0%	S-817A36ANB-CUZ-T2	-	50 mA	0.22 V	5 mV	20 mV (1 $\mu$ A to 30 mA)
4.0 V $\pm$ 2.0%	S-817A40ANB-CVD-T2	S-817B40AMC-CXD-T2	65 mA	0.19 V	5 mV	25 mV (1 $\mu$ A to 40 mA)
4.2 V $\pm$ 2.0%	S-817A42ANB-CVF-T2	S-817B42AMC-CXF-T2	65 mA	0.19 V	5 mV	25 mV (1 $\mu$ A to 40 mA)
4.3 V $\pm$ 2.0%	S-817A43ANB-CVG-T2	-	65 mA	0.19 V	5 mV	25 mV (1 $\mu$ A to 40 mA)
4.5 V $\pm$ 2.0%	S-817A45ANB-CVI-T2	-	65 mA	0.18 V	5 mV	25 mV (1 $\mu$ A to 40 mA)
4.8 V $\pm$ 2.0%	S-817A48ANB-CVL-T2	-	65 mA	0.18 V	5 mV	25 mV (1 $\mu$ A to 40 mA)
5.0 V $\pm$ 2.0%	S-817A50ANB-CVN-T2	S-817B50AMC-CXN-T2	75 mA	0.16 V	5 mV	35 mV (1 $\mu$ A to 50 mA)
5.6 V $\pm$ 2.0%	S-817A56ANB-CVT-T2	-	75 mA	0.15 V	5 mV	35 mV (1 $\mu$ A to 50 mA)

\*1  $V_{OUT}(S) + 2 V \leq V_{IN} \leq 10 V$

$V_{OUT}(S)$  : Set output voltage

\*2  $V_{OUT}(S) + 1 V \leq V_{IN} \leq 10 V$ ,  $I_{OUT} = 1 \mu A$ .

\*3  $V_{IN} = V_{OUT}(S) + 2 V$

Please contact our sales office when product with output voltage you need does not appear in this list.

The S-818 series is a positive voltage regulator featured by low dropout voltage, high output voltage accuracy and low current consumption, and has been developed utilizing CMOS technology.

Built-in low on-resistance translator provides low dropout voltage and large output current.

A power-off circuit ensures long battery life.

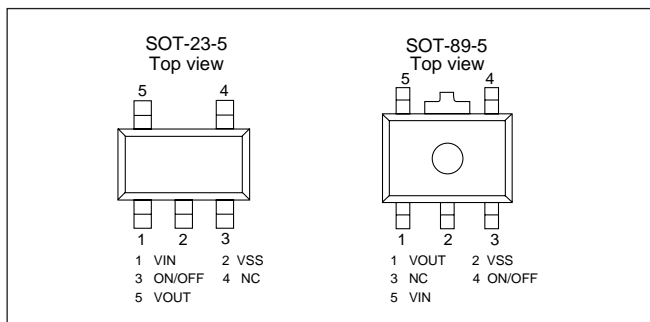
Various types of output capacitors including small ceramic capacitors can be used in the S-818 series compared with former CMOS voltage regulators.

The SOT-23-5 miniature package is recommended for configuring portable devices and the SOT-89-5 for large output current applications, respectively.

### FEATURES

- Low current consumption
    - Operation : 30  $\mu$ A typ., 40  $\mu$ A max.
    - Power off : 100 nA typ., 500 nA max.
  - Output voltage : 2.0 V to 6.0 V (0.1 V step)
  - Output voltage to tolerance :  $\pm 2.0\%$
  - Output current;
    - 200 mA capable (3.0 V output product,  $V_{IN}=4$  V)
    - 300 mA capable (5.0 V output product,  $V_{IN}=6$  V)
  - Low dropout voltage
    - 170 mV typ. (5.0 V output product,  $I_{OUT}=60$  mA)
  - Built-in power-off circuit
  - Low ESR capacitor: a ceramic capacitor of 2  $\mu$ F or more can be used as the output capacitor.
  - Compact package: SOT-23-5, SOT-89-5
- \* Pay attention to the power dissipation when the output current is large.

### PIN CONFIGURATIONS



### APPLICATIONS

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

### SPECIFICATIONS

Output voltage	SOT-23-5	SOT-89-5	Output Current*1 Min.	Dropout Voltage ( $I_{OUT}=60$ mA) Typ.	Line regulation*2 Typ.	Load regulation*3 Typ.
2.0 V $\pm$ 2.0%	S-818A20AMC-BGA-T2	S-818A20AUC-BGA-T2	100 mA	0.51 V	0.05% /V	30 mV
2.5 V $\pm$ 2.0%	S-818A25AMC-BGF-T2	S-818A25AUC-BGF-T2	150 mA	0.38 V	0.05% /V	30 mV
2.8 V $\pm$ 2.0%	S-818A28AMC-BGI-T2	S-818A28AUC-BGI-T2	150 mA	0.38 V	0.05% /V	30 mV
3.0 V $\pm$ 2.0%	S-818A30AMC-BGK-T2	S-818A30AUC-BGK-T2	200 mA	0.30 V	0.05% /V	30 mV
3.3 V $\pm$ 2.0%	S-818A33AMC-BGN-T2	S-818A33AUC-BGN-T2	200 mA	0.30 V	0.05% /V	30 mV
3.8 V $\pm$ 2.0%	S-818A38AMC-BGS-T2	S-818A38AUC-BGS-T2	200 mA	0.24 V	0.05% /V	30 mV
4.0 V $\pm$ 2.0%	S-818A40AMC-BGU-T2	S-818A40AUC-BGU-T2	250 mA	0.20 V	0.05% /V	30 mV
5.0 V $\pm$ 2.0%	S-818A50AMC-BHE-T2	S-818A50AUC-BHE-T2	300 mA	0.17 V	0.05% /V	30 mV

\*1  $V_{OUT}(S) + 1$  V  $\leq V_{IN} \leq 10$  V

$V_{OUT}(S)$  : Normal output voltage

\*2  $V_{OUT}(S) + 0.5$  V  $\leq V_{IN} \leq 10$  V,  $I_{OUT} = 10$   $\mu$ A, 30mA

\*3  $V_{IN} = V_{OUT}(S) + 1$  V,  $10$   $\mu$ A  $\leq I_{OUT} \leq 80$  mA

Please contact our sales office when a product with output voltage you need does not appear in this list or if you need a product with inverse logic for the ON/OFF terminal.

The S-814 series is a positive voltage regulator featured by low dropout voltage, high output voltage accuracy and low current consumption, and has been developed utilizing CMOS technology.

Built-in low on-resistance translators provide low dropout voltage and large output current.

A power-off circuit ensures long battery life.

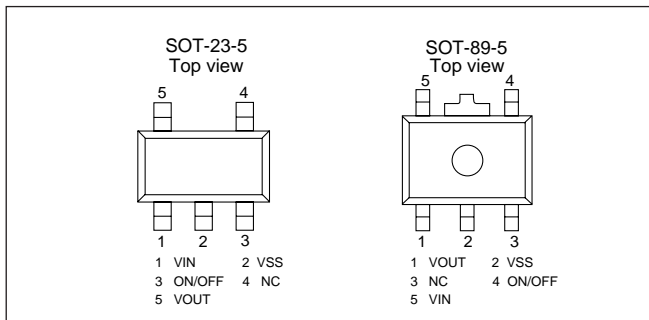
Various types of output capacitors including small ceramic capacitors can be used in the S-814 series compared with CMOS voltage regulators.

The SOT-23-5 miniature package is recommended for configuring portable devices and the SOT-89-5 for large output current applications, respectively.

■ FEATURES

- Low current consumption
    - During operation : 30  $\mu$ A typ., 40  $\mu$ A max.
    - During power off : 100 nA typ., 500 nA max.
  - Output voltage : 2.0 V to 6.0 V (0.1 V step)
  - Output voltage tolerance :  $\pm$ 2.0%
  - Output current;
    - 110 mA capable (3.0 V output product,  $V_{IN}$ =4 V)
    - 180 mA capable (5.0 V output product,  $V_{IN}$ =6 V)
  - Low dropout voltage
    - 170 mV typ. (5.0 V output product,  $I_{OUT}$ =60 mA)
  - Built-in power-off circuit
  - Built-in short circuit protection
  - Low ESR capacitor: A ceramic capacitor of 0.47  $\mu$ F or more can be used as the output capacitor.
  - Compact package: SOT-23-5, SOT-89-5
- \* Pay attention to the power dissipation when the output current is large.

■ PIN CONFIGURATIONS



■ APPLICATIONS

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

■ SPECIFICATIONS

Output voltage	SOT-23-5	SOT-89-5	Output Current*1 Min.	Dropout Voltage ( $I_{OUT}$ =60 mA) Typ.	Line regulation*2 Typ.	Load regulation*3 Typ.
2.0 V $\pm$ 2.0%	S-814A20AMC-BCK-T2	S-814A20AUC-BCK-T2	100 mA	0.51 V	1 mV	30 mV
2.2 V $\pm$ 2.0%	-	S-814A22AUC-BCM-T2	100 mA	0.51 V	1.1 mV	30 mV
2.4 V $\pm$ 2.0%	-	S-814A24AUC-BCO-T2	100 mA	0.51 V	1.2 mV	30 mV
2.5 V $\pm$ 2.0%	S-814A25AMC-BCP-T2	S-814A25AUC-BCP-T2	100 mA	0.38 V	1.25 mV	30 mV
2.6 V $\pm$ 2.0%	S-814A26AMC-BCQ-T2	S-814A26AUC-BCQ-T2	100 mA	0.38 V	1.3 mV	30 mV
2.7 V $\pm$ 2.0%	S-814A27AMC-BCR-T2	-	100 mA	0.38 V	1.35 mV	30 mV
2.8 V $\pm$ 2.0%	S-814A28AMC-BCS-T2	S-814A28AUC-BCS-T2	100 mA	0.38 V	1.4 mV	30 mV
3.0 V $\pm$ 2.0%	S-814A30AMC-BCU-T2	S-814A30AUC-BCU-T2	110 mA	0.30 V	1.5 mV	30 mV
3.1 V $\pm$ 2.0%	S-814A31AMC-BCV-T2	S-814A31AUC-BCV-T2	110 mA	0.30 V	1.55 mV	30 mV
3.3 V $\pm$ 2.0%	S-814A33AMC-BCX-T2	S-814A33AUC-BCX-T2	110 mA	0.30 V	1.65 mV	30 mV
3.4 V $\pm$ 2.0%	S-814A34AMC-BCY-T2	-	110 mA	0.30 V	1.7 mV	30 mV
3.5 V $\pm$ 2.0%	S-814A35AMC-BCZ-T2	-	110 mA	0.24 V	1.75 mV	30 mV
3.7 V $\pm$ 2.0%	S-814A37AMC-BDB-T2	-	110 mA	0.24 V	1.85 mV	30 mV
3.8 V $\pm$ 2.0%	S-814A38AMC-BDC-T2	S-814A38AUC-BDC-T2	110 mA	0.24 V	1.9 mV	30 mV
4.0 V $\pm$ 2.0%	S-814A40AMC-BDE-T2	S-814A40AUC-BDE-T2	135 mA	0.20 V	2 mV	30 mV
4.6 V $\pm$ 2.0%	S-814A46AMC-BDK-T2	-	135 mA	0.18 V	2.3 mV	30 mV
5.0 V $\pm$ 2.0%	S-814A50AMC-BDO-T2	S-814A50AUC-BDO-T2	180 mA	0.17 V	2.5 mV	30 mV

\*1  $V_{OUT}(S) + 1 V \leq V_{IN} \leq 10 V$

$V_{OUT}(S)$  : Nominal output voltage

\*2  $V_{OUT}(S) + 0.5 V \leq V_{IN} \leq 10 V$ ,  $I_{OUT} = 10 \mu A, 30 mA$

\*3  $V_{IN} = V_{OUT}(S) + 1 V$ ,  $10 \mu A \leq I_{OUT} \leq 80 mA$

Please contact our sales office when a product with output voltage you need does not appear in this list or if you need a product with inverse logic for the ON/OFF terminal.

The S-816 series is a low dropout controller for positive voltage regulator. Using an external PNP transistor, the S-816 series will deliver a low dropout regulator for the range of hundreds mA to 1A and more.

Improved phase compensation circuit assures excellent transient response despite the low current consumption, which enables the use where the line variation and/or the load variation is large.

The S-816 series has overcurrent protection and power off function.

Together with SOT-23-5 miniature package and low current consumption feature, the S-816 series meets the requirement of battery-powered portable equipment. Applicable input voltage of 16 V permits the direct input from an AC adapter.

### FEATURES

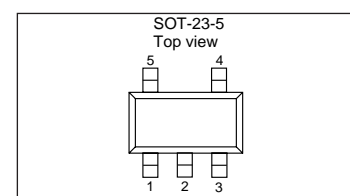
- Low current consumption
  - Operation : 30  $\mu$ A typ.  
40  $\mu$ A max.
  - Power off : 1  $\mu$ A max.
- Input voltage range : 16 V max.
- Output voltage tolerance :  $\pm$ 2.0%
- Output voltage range : Selectable between 2.5 V and 6.0 V in steps of 0.1 V.
- Power-off function.
- A built-in current source (10  $\mu$ A) eliminates the need of a base-emitter resistance.
- Overcurrent (base current) protection.

### SELECT GUIDES

Output Voltage	Model No.	Package	Drop-out Voltage (I <sub>OUT</sub> =100 mA)	Input stability (I <sub>OUT</sub> =50 mA)	Load stability (1 mA~1 A)	Current consumption		Input Voltage Max.
						Operation	Powered off	
2.5 V $\pm$ 2.0%	S-816A25AMC-BAA-T2	SOT-23-5	100 mV	0.01% (V <sub>IN</sub> =3.5 to 16 V)	Max. 60 mV (V <sub>IN</sub> =3.5 V)	Max. 40 $\mu$ A	Max. 1 $\mu$ A	16 V
3.0 V $\pm$ 2.0%	S-816A30AMC-BAF-T2	SOT-23-5	100 mV	0.01% (V <sub>IN</sub> =4.0 to 16 V)	Max. 60 mV (V <sub>IN</sub> =4.0 V)	Max. 40 $\mu$ A	Max. 1 $\mu$ A	16 V
3.3 V $\pm$ 2.0%	S-816A33AMC-BAI-T2	SOT-23-5	100 mV	0.01% (V <sub>IN</sub> =4.3 to 16 V)	Max. 60 mV (V <sub>IN</sub> =4.3 V)	Max. 40 $\mu$ A	Max. 1 $\mu$ A	16 V
3.7 V $\pm$ 2.0%	S-816A37AMC-BAM-T2	SOT-23-5	100 mV	0.01% (V <sub>IN</sub> =4.7 to 16 V)	Max. 60 mV (V <sub>IN</sub> =4.7 V)	Max. 40 $\mu$ A	Max. 1 $\mu$ A	16 V
4.0 V $\pm$ 2.0%	S-816A40AMC-BAP-T2	SOT-23-5	100 mV	0.01% (V <sub>IN</sub> =5.0 to 16 V)	Max. 60 mV (V <sub>IN</sub> =5.0 V)	Max. 40 $\mu$ A	Max. 1 $\mu$ A	16 V
5.0 V $\pm$ 2.0%	S-816A50AMC-BAZ-T2	SOT-23-5	100 mV	0.01% (V <sub>IN</sub> =6.0 to 16 V)	Max. 60 mV (V <sub>IN</sub> =6.0 V)	Max. 40 $\mu$ A	Max. 1 $\mu$ A	16 V

Please contact our sales office when you need another output voltage product.

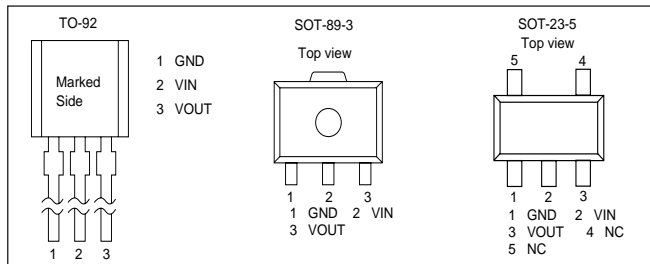
### PIN CONFIGURATIONS



Pin No.	Pin Name	Functions
1	EXT	Output pin for base-current control
2	VSS	GND pin
3	ON/OFF	Power-off pin ("H" active)
4	VIN	IC power supply pin
5	VOUT	Output voltage monitoring pin

The S-812XXSG series is a family of positive voltage regulators with precise output voltage. The low power consumption (2.5  $\mu$ A max.) assures extended battery life and small SOT-23-5 package improves components density on the PCB. Available in TO-92, SOT-89-3 and SOT-23-5 packages.

## PIN CONFIGURATIONS



## FEATURES

- Output voltage tolerance :  $\pm 2.4\%$  ( $V_{OUT} \leq 2.6$  V)  
:  $\pm 2.0\%$  ( $V_{OUT} \geq 2.7$  V)
- Low current consumption : 1.2  $\mu$ A typ., 2.5  $\mu$ A max.
- Wide operating voltage range : 16 V max. ( $V_{OUT} \geq 2.7$  V)  
: 10 V max. ( $V_{OUT} \leq 2.6$  V)
- Wide operating temperature range : -40  $^{\circ}$ C to + 85  $^{\circ}$ C
- Package : TO-92, SOT-89-3, SOT-23-5

## APPLICATIONS

- High stability reference voltage
- Constant voltage power supply for battery-powered equipment, communication equipment, video equipment, etc.

## SPECIFICATIONS

Output voltage	TO-92 <sup>*1</sup>	SOT-89-3 <sup>*2</sup>	SOT-23-5 <sup>*2</sup>	I/O voltage difference Typ.	Line regulation 1	Line regulation 2	Load regulation Typ.	Current consumption Typ.	Input voltage Max.
1.1 V $\pm$ 2.4%	S-81211SGY-X	S-81211SGUP-DQA-X	S-81211SG-QA-X	0.05 V (I <sub>out</sub> =0.5 mA)	10 to 50 mV	10 to 77 mV	10 mV	1.2 $\mu$ A	10 V
1.2 V $\pm$ 2.4%	S-81212SGY-X	S-81212SGUP-DQC-X		0.04 V (I <sub>out</sub> =0.5 mA)	10 to 50 mV	10 to 84 mV	10 mV	1.2 $\mu$ A	10 V
1.3 V $\pm$ 2.4%	S-81213SGY-X	S-81213SGUP-DQG-X		0.02 V (I <sub>out</sub> =0.5 mA)	10 to 50 mV	10 to 91 mV	10 mV	1.2 $\mu$ A	10 V
1.4 V $\pm$ 2.4%		S-81214SGUP-DQN-X		0.04 V (I <sub>out</sub> =0.5 mA)	7 to 36 mV	7 to 98 mV	80 mV	1.2 $\mu$ A	10 V
1.5 V $\pm$ 2.4%	S-81215SGY-X	S-81215SGUP-DQK-X	S-81215SG-QK-X	0.03 V (I <sub>out</sub> =0.5 mA)	7 to 39 mV	7 to 105 mV	80 mV	1.2 $\mu$ A	10 V
1.6 V $\pm$ 2.4%	S-81216SGY-X	S-81216SGUP-DQP-X		0.02 V (I <sub>out</sub> =0.5 mA)	7 to 41 mV	7 to 42 mV	80 mV	1.2 $\mu$ A	10 V
1.7 V $\pm$ 2.4%	S-81217SGY-X	S-81217SGUP-DQQ-X	S-81217SG-QQ-X	0.77 V (I <sub>out</sub> =10 mA)	8 to 43 mV	8 to 119 mV	80 mV	1.2 $\mu$ A	10 V
1.8 V $\pm$ 2.4%	S-81218SGY-X	S-81218SGUP-DQR-X	S-81218SG-QR-X	0.72 V (I <sub>out</sub> =10 mA)	8 to 45 mV	8 to 126 mV	80 mV	1.2 $\mu$ A	10 V
1.9 V $\pm$ 2.4%	S-81219SGY-X	S-81219SGUP-DQT-X		0.67 V (I <sub>out</sub> =10 mA)	8 to 47 mV	8 to 133 mV	80 mV	1.2 $\mu$ A	10 V
2 V $\pm$ 2.4%	S-81220SGY-X	S-81220SGUP-DQS-X	S-81220SG-QS-X	0.63 V (I <sub>out</sub> =10 mA)	8 to 48 mV	8 to 140 mV	80 mV	1.2 $\mu$ A	10 V
2.1 V $\pm$ 2.4%	S-81221SGY-X	S-81221SGUP-DQU-X	S-81221SG-QU-X	0.59 V (I <sub>out</sub> =10 mA)	9 to 50 mV	9 to 147 mV	80 mV	1.2 $\mu$ A	10 V
2.2 V $\pm$ 2.4%	S-81222SGY-X	S-81222SGUP-DQV-X	S-81222SG-QV-X	0.56 V (I <sub>out</sub> =10 mA)	9 to 52 mV	9 to 154 mV	80 mV	1.2 $\mu$ A	10 V
2.3 V $\pm$ 2.4%	S-81223SGY-X	S-81223SGUP-DQW-X	S-81223SG-QW-X	0.53 V (I <sub>out</sub> =10 mA)	9 to 54 mV	9 to 161 mV	80 mV	1.2 $\mu$ A	10 V
2.4 V $\pm$ 2.4%	S-81224SGY-X	S-81224SGUP-DQX-X	S-81224SG-QX-X	0.49 V (I <sub>out</sub> =10 mA)	10 to 55 mV	10 to 168 mV	80 mV	1.2 $\mu$ A	10 V
2.5 V $\pm$ 2.4%	S-81225SGY-X	S-81225SGUP-DQH-X	S-81225SG-QH-X	0.59 V (I <sub>out</sub> =10 mA)	10 to 57 mV	10 to 175 mV	80 mV	1.2 $\mu$ A	10 V
2.6 V $\pm$ 2.4%	S-81226SGY-X	S-81226SGUP-DQY-X	S-81226SG-QY-X	0.55 V (I <sub>out</sub> =10 mA)	10 to 58 mV	10 to 182 mV	80 mV	1.2 $\mu$ A	10 V
2.7 V $\pm$ 2.0%		S-81227SGUP-DQZ-X	S-81227SG-QZ-X	0.52 V (I <sub>out</sub> =10 mA)	36 to 108 mV	36 to 189 mV	80 mV	1.2 $\mu$ A	16 V
2.8 V $\pm$ 2.0%		S-81228SGUP-DQ0-X	S-81228SG-Q0-X	0.49 V (I <sub>out</sub> =10 mA)	37 to 111 mV	37 to 196 mV	80 mV	1.2 $\mu$ A	16 V
2.9 V $\pm$ 2.0%		S-81229SGUP-DQ2-X	S-81229SG-Q2-X	0.46 V (I <sub>out</sub> =10 mA)	38 to 114 mV	38 to 223 mV	80 mV	1.2 $\mu$ A	16 V
3 V $\pm$ 2.0%	S-81230SGY-X	S-81230SGUP-DQB-X	S-81230SG-QB-X	0.44 V (I <sub>out</sub> =10 mA)	39 to 78 mV	39 to 210 mV	60 mV	1.2 $\mu$ A	16 V
3.1 V $\pm$ 2.0%			S-81231SG-Q3-X	0.42 V (I <sub>out</sub> =10 mA)	40 to 80 mV	40 to 217 mV	60 mV	1.2 $\mu$ A	16 V
3.2 V $\pm$ 2.0%		S-81232SGUP-DQ4-X	S-81232SG-Q4-X	0.39 V (I <sub>out</sub> =10 mA)	41 to 82 mV	41 to 224 mV	60 mV	1.2 $\mu$ A	16 V
3.3 V $\pm$ 2.0%	S-81233SGY-X	S-81233SGUP-DQF-X	S-81233SG-QF-X	0.37 V (I <sub>out</sub> =10 mA)	42 to 84 mV	42 to 231 mV	60 mV	1.2 $\mu$ A	16 V
3.4 V $\pm$ 2.0%			S-81234SG-Q6-X	0.35 V (I <sub>out</sub> =10 mA)	43 to 86 mV	43 to 238 mV	60 mV	1.2 $\mu$ A	16 V
3.5 V $\pm$ 2.0%	S-81235SGY-X	S-81235SGUP-DQI-X	S-81235SG-QI-X	0.34 V (I <sub>out</sub> =10 mA)	44 to 88 mV	44 to 245 mV	60 mV	1.2 $\mu$ A	16 V
3.6 V $\pm$ 2.0%		S-81236SGUP-DQ7-X		0.32 V (I <sub>out</sub> =10 mA)	45 to 90 mV	45 to 252 mV	60 mV	1.2 $\mu$ A	16 V
3.7 V $\pm$ 2.0%	S-81237SGY-X	S-81237SGUP-DQE-X	S-81237SG-QE-X	0.31 V (I <sub>out</sub> =10 mA)	46 to 92 mV	46 to 259 mV	60 mV	1.2 $\mu$ A	16 V
3.8 V $\pm$ 2.0%		S-81238SGUP-DQ8-X	S-81238SG-Q8-X	0.29 V (I <sub>out</sub> =10 mA)	47 to 93 mV	47 to 266 mV	60 mV	1.2 $\mu$ A	16 V
3.9 V $\pm$ 2.0%				0.28 V (I <sub>out</sub> =10 mA)	48 to 95 mV	48 to 273 mV	60 mV	1.2 $\mu$ A	16 V
4 V $\pm$ 2.0%	S-81240SGY-X	S-81240SGUP-DQJ-X	S-81240SG-QJ-X	0.27 V (I <sub>out</sub> =10 mA)	48 to 96 mV	48 to 280 mV	50 mV	1.2 $\mu$ A	16 V
4.1 V $\pm$ 2.0%				0.26 V (I <sub>out</sub> =10 mA)	49 to 98 mV	49 to 287 mV	50 mV	1.2 $\mu$ A	16 V
4.2 V $\pm$ 2.0%		S-81242SGUP-DIB-X	S-81242SG-IB-X	0.24 V (I <sub>out</sub> =10 mA)	50 to 100 mV	50 to 294 mV	50 mV	1.2 $\mu$ A	16 V
4.3 V $\pm$ 2.0%	S-81243SGY-X	S-81243SGUP-DIC-X		0.23 V (I <sub>out</sub> =10 mA)	51 to 101 mV	51 to 301 mV	50 mV	1.2 $\mu$ A	16 V
4.4 V $\pm$ 2.0%				0.22 V (I <sub>out</sub> =10 mA)	52 to 103 mV	52 to 308 mV	50 mV	1.2 $\mu$ A	16 V
4.5 V $\pm$ 2.0%	S-81245SGY-X	S-81245SGUP-DQ5-X	S-81245SG-Q5-X	0.21 V (I <sub>out</sub> =10 mA)	52 to 104 mV	52 to 315 mV	50 mV	1.2 $\mu$ A	16 V
4.6 V $\pm$ 2.0%	S-81246SGY-X	S-81246SGUP-DQM-X	S-81246SG-QM-X	0.20 V (I <sub>out</sub> =10 mA)	53 to 105 mV	53 to 322 mV	50 mV	1.2 $\mu$ A	16 V
4.7 V $\pm$ 2.0%		S-81247SGUP-DIE-X	S-81247SG-IE-X	0.19 V (I <sub>out</sub> =10 mA)	54 to 107 mV	54 to 329 mV	50 mV	1.2 $\mu$ A	16 V
4.8 V $\pm$ 2.0%			S-81248SG-IF-X	0.18 V (I <sub>out</sub> =10 mA)	54 to 108 mV	54 to 336 mV	50 mV	1.2 $\mu$ A	16 V
4.9 V $\pm$ 2.0%				0.17 V (I <sub>out</sub> =10 mA)	55 to 109 mV	55 to 343 mV	50 mV	1.2 $\mu$ A	16 V
5 V $\pm$ 2.0%	S-81250SGY-X	S-81250SGUP-DQD-X	S-81250SG-QD-X	0.16 V (I <sub>out</sub> =10 mA)	55 to 110 mV	55 to 350 mV	40 mV	1.2 $\mu$ A	16 V
5.1 V $\pm$ 2.0%				0.16 V (I <sub>out</sub> =10 mA)	56 to 112 mV	56 to 357 mV	40 mV	1.2 $\mu$ A	16 V
5.2 V $\pm$ 2.0%	S-81252SGY-X	S-81252SGUP-DQL-X	S-81252SG-QL-X	0.15 V (I <sub>out</sub> =10 mA)	57 to 113 mV	57 to 364 mV	40 mV	1.2 $\mu$ A	16 V
5.3 V $\pm$ 2.0%		S-81253SGUP-DIJ-X	S-81253SG-IJ-X	0.14 V (I <sub>out</sub> =10 mA)	57 to 114 mV	57 to 371 mV	40 mV	1.2 $\mu$ A	16 V
5.4 V $\pm$ 2.0%		S-81254SGUP-DIK-X		0.13 V (I <sub>out</sub> =10 mA)	58 to 115 mV	58 to 378 mV	40 mV	1.2 $\mu$ A	16 V
5.5 V $\pm$ 2.0%		S-81255SGUP-DIL-X		0.13 V (I <sub>out</sub> =10 mA)	58 to 116 mV	58 to 385 mV	40 mV	1.2 $\mu$ A	16 V
5.6 V $\pm$ 2.0%	S-81256SGY-X	S-81256SGUP-DIM-X		0.12 V (I <sub>out</sub> =10 mA)	59 to 117 mV	59 to 392 mV	40 mV	1.2 $\mu$ A	16 V

\* 1) In the TO-92 package, "X" varies depending upon the packing form : B : Loose T, Z : Tape

\* 2) In the SOT package, "X" varies depending upon the packing form :  
T : Tape (T1 and T2 are available depending upon the direction of the IC. T2 is standard.)  
S : Stick (Stick is not available for SOT-23-5)

## SMALL-PACKAGE PWM CONTROL STEP-UP SWITCHING REGULATOR

S-8323/8327 series

The S-8323/8327 series is a family of PWM control stepup switching regulators. Optimally designed control circuit provides high efficiency in the wide range by changing the duty ratio automatically between 0% and 83% according to the load.

A step-up switching regulator can be constructed by externally connecting only a coil, capacitors and a diode to the S-8323 series. These features, along with its small package and low current consumptions, make the S-8323 series ideal as a power supply for portable equipment. For applications requiring a high output current, the S-8327 series is also available with an external transistor.

For applying a smaller coil, high frequency series (250 kHz) is also available. (H, J series)

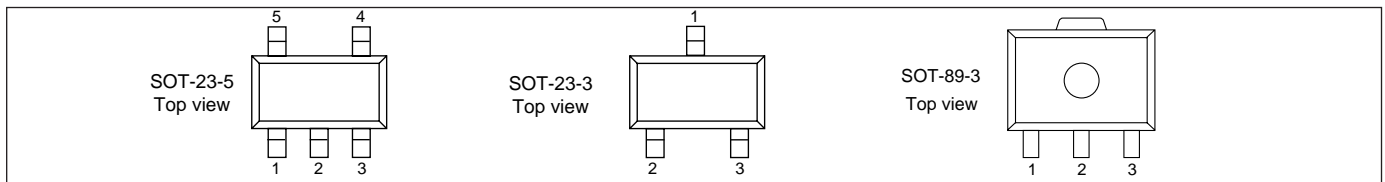
### FEATURES

- Low voltage operation : 0.9V (A to D series) ( $I_{OUT}=A$  mA)  
: 1.4 V (H, J series)
- Low current consumption  
Operation : 17.2  $\mu$ A typ.( $V_{OUT}=3$  V, 50 kHz)  
: 53.9  $\mu$ A typ.( $V_{OUT}=3$  V, 250 kHz)  
Shutdown : 0.5  $\mu$ A max.
- Duty ratio : 0% to 83% (A to D series)
- External components : Coil, Diode, Capacitors
- Output voltage tolerance :  $\pm 2.4\%$
- Oscillation frequency : 30 kHz, 50 kHz, 100 kHz, 250 kHz
- Soft start function
- Shutdown function
- Large output currents can be obtained with an external transistor (S-8327 series)
- Small Package : SOT-23-5, SOT-23-3, SOT-89-3
- Available for step-down and inverting application.

### APPLICATIONS

- Power supplies for portable equipment such as pagers, handy calculators, and remote controllers
- Constant voltage power supplies for cameras, video equipment, communications equipment and microcomputers.

### PIN CONFIGURATIONS



S-8323AXXMC/S-8327BXXMC/S-8323HXXMC/S-8327HXXMC  
SOT-23-5

Pin No.	Pin Name	Functions
1	ON / OFF	Shutdown pin "H" : normal operation (stepping up operation) "L" : stop stepping up (whole circuit stop)
2	VOUT	Output voltage pin and power supply pin
3	-	N.C. (Non Connection)
4	VSS	GND pin
5	CONT	External inductor connection pin (for S-8323 Series)
	EXT	External transistor connection pin (for S-8327 Series)

S-8323DXXMC/S-8327EXXMC/S-8323JXXMC/S-8327JXXMC  
SOT-23-5

Pin No.	Pin name	Functions
1	VOUT	Output voltage pin
2	VDD	Power supply pin
3	-	N.C. (Non Connection)
4	VSS	GND pin
5	CONT	External inductor connection pin (for S-8323 Series)
	EXT	External transistor connection pin (for S-8327 Series)

S-8323AXXMA/S-8323CXXMA/S-8327BXXMA  
SOT-23-3

Pin No.	Pin Name	Functions
1	VOUT	Output voltage pin and power supply pin
2	VSS	GND pin
3	CONT	External inductor connection pin (for S-8323 Series)
	EXT	External transistor connection pin (for S-8327 Series)

S-8323AXXUA/S-8327BXXUA  
SOT-89-3

Pin No.	Pin Name	Functions
1	VSS	GND pin
2	VOUT	Output voltage pin and power supply pin
3	CONT	External inductor connection pin (for S-8323 Series)
	EXT	External transistor connection pin (for S-8327 Series)

### SELECTION GUIDE

Product Name	Built in Power transistor	with external power transistor	Switching frequency(kHz)	Shutdown function	$V_{DD}/V_{OUT}$ separate type	Package	Application
S-8323AXXMC	○	-	50	○	-	SOT-23-5	With a shutdown function
S-8323AXXMA	○	-	50	-	-	SOT-23-3	Without shutdown function
S-8323AXXUA	○	-	50	-	-	SOT-89-3	Without shutdown function
S-8323DXXMC	○	-	50	-	○	SOT-23-5	For variable output voltage step-up DC/DC converter and step-down, inverted DC/DC converter
S-8323CXXMA	○	-	30	-	-	SOT-23-3	For pagers
S-8327BXXMC	-	○	100	○	-	SOT-23-5	For large load current with shutdown function
S-8327BXXMA	-	○	100	-	-	SOT-23-3	For large load current without shutdown function
S-8327BXXUA	-	○	100	-	-	SOT-89-3	For large load current without shutdown function
S-8327EXXMC	-	○	100	-	○	SOT-23-5	For variable output voltage
S-8323HXXMC	○	-	250	○	-	SOT-23-5	For making external parts smaller with a shutdown function
S-8323JXXMC	○	-	250	-	○	SOT-23-5	For variable output voltage by step-up DC/DC converter and step-down, inverted output DC/DC converter with an external resistor
S-8327HXXMC	-	○	250	○	-	SOT-23-5	For large load current with shutdown function
S-8327JXXMC	-	○	250	-	○	SOT-23-5	For variable output voltage



## ■ PRODUCT LIST

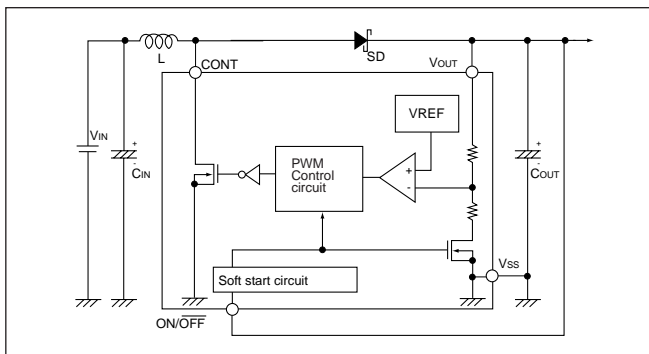
Item Output Voltage (V)	S-8323AXXMC Series	S-8323AXXMA Series	S-8323AXXUA Series	S-8323CXXMA Series	S-8323DXXMC Series	S-8323HXXMC Series	S-8323JXXMC Series
2.0	S-8323A20MC-ELA-T2	-	-	-	S-8323D20MC-EZA-T2	-	-
2.5	S-8323A25MC-ELF-T2	S-8323A25MA-ELF-T2	S-8323A25UA-ELF-T2	S-8323C25MA-ENF-T2	-	-	S-8323J25MC-FQF-T2
2.7	S-8323A27MC-ELH-T2	S-8323A27MA-ELH-T2	S-8323A27UA-ELH-T2	S-8323C27MA-ENH-T2	-	-	-
2.8	S-8323A28MC-ELI-T2	-	-	-	-	-	-
3.0	S-8323A30MC-ELK-T2	S-8323A30MA-ELK-T2	S-8323A30UA-ELK-T2	S-8323C30MA-ENK-T2	S-8323D30MC-EZK-T2	S-8323H30MC-F4K-T2	S-8323J30MC-FQK-T2
3.3	S-8323A33MC-ELN-T2	S-8323A33MA-ELN-T2	S-8323A33UA-ELN-T2	-	-	S-8323H33MC-F4N-T2	S-8323J33MC-FQN-T2
3.8	S-8323A38MC-ELS-T2	-	-	-	-	-	-
4.4	S-8323A44MC-ELY-T2	-	-	-	-	-	-
4.8	S-8323A48MC-EMC-T2	-	-	-	-	S-8323H48MC-F5C-T2	-
5.0	S-8323A50MC-EME-T2	S-8323A50MA-EME-T2	S-8323A50UA-EME-T2	-	S-8323D50MC-E3E-T2	S-8323H50MC-F5E-T2	S-8323J50MC-FRE-T2
5.2	S-8323A52MC-EMG-T2	-	-	-	-	-	-

Item Output Voltage (V)	S-8327BXXMC Series	S-8327BXXMA Series	S-8327BXXUA Series	S-8327EXXMC Series	S-8327HXXMC Series	S-8327JXXMC Series
2.0	-	-	-	S-8327E20MC-EVA-T2	-	-
2.5	S-8327B25MC-ERF-T2	S-8327B25MA-ERF-T2	S-8327B25UA-ERF-T2	-	-	S-8327J25MC-F8F-T2
2.7	S-8327B27MC-ERH-T2	S-8327B27MA-ERH-T2	S-8327B27UA-ERH-T2	-	-	-
2.8	S-8327B28MC-ERI-T2	-	-	-	-	-
3.0	S-8327B30MC-ERK-T2	S-8327B30MA-ERK-T2	S-8327B30UA-ERK-T2	-	S-8327H30MC-FWK-T2	S-8327J30MC-F8K-T2
3.2	S-8327B32MC-ERM-T2	-	-	-	-	-
3.3	S-8327B33MC-ERN-T2	S-8327B33MA-ERN-T2	S-8327B33UA-ERN-T2	-	S-8327H33MC-FWN-T2	S-8327J33MC-F8N-T2
3.6	S-8327B36MC-ERQ-T2	-	-	-	S-8327H36MC-FWQ-T2	-
4.8	S-8327B48MC-ESC-T2	-	-	-	-	-
5.0	S-8327B50MC-ESE-T2	S-8327B50MA-ESE-T2	S-8327B50UA-ESE-T2	S-8327E50MC-EKE-T2	S-8327H50MC-FXE-T2	S-8327J50MC-F9E-T2
5.2	S-8327B52MC-ESG-T2	-	-	-	S-8327H52MC-FXG-T2	-
5.4	S-8327B54MC-ESI-T2	-	-	-	-	-
5.6	-	-	-	-	S-8327H56MC-FXK-T2	-
6.0	S-8327B60MC-ESO-T2	-	-	-	-	-
7.0	-	-	-	S-8327E70MC-EKY-T2	-	-

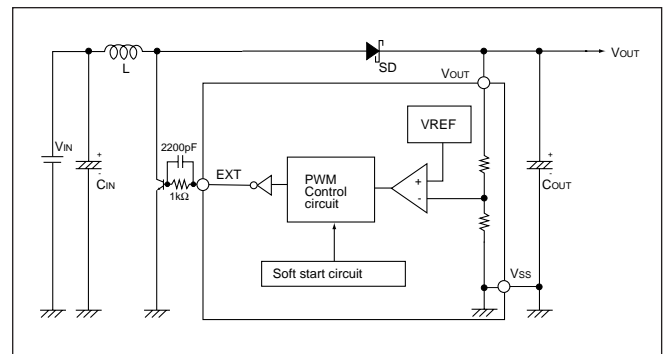
\* Please ask an SII representative if you need another output voltage product.

## ■ BLOCK DIAGRAM

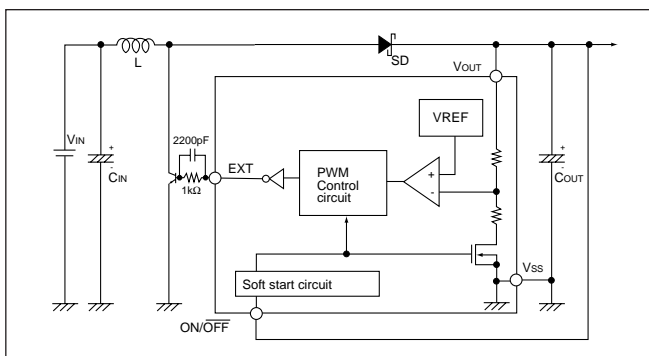
(1) S-8323AXXMC, S-8323HXXMC



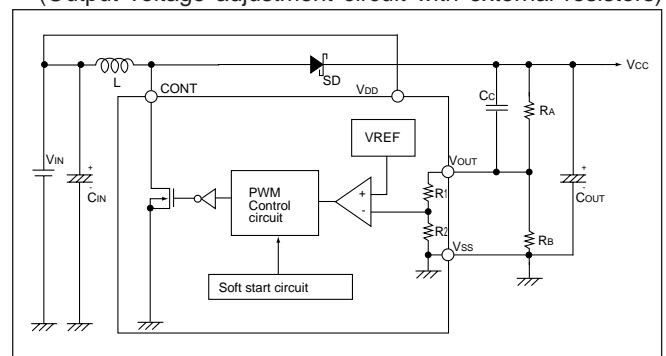
(4) S-8327BXXMA, S-8327BXXUA



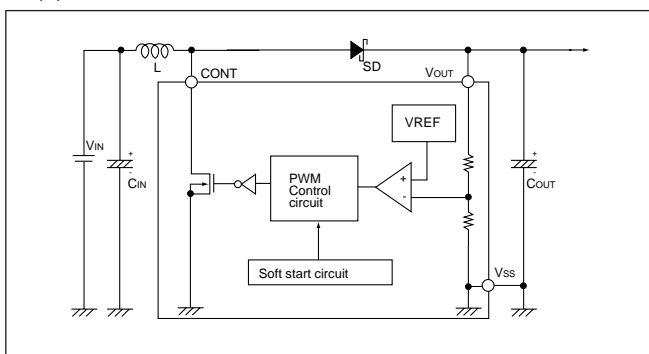
(2) S-8327BXXMC, S-8327HXXMC



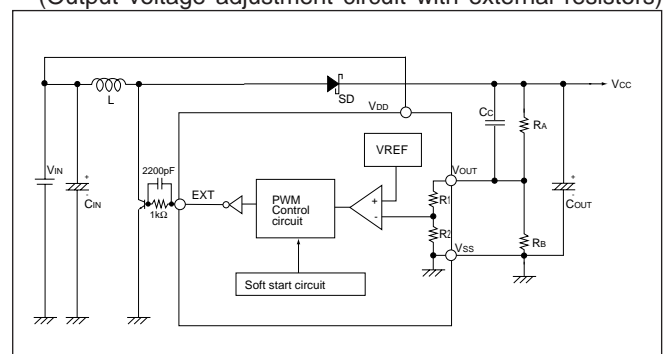
(5) S-8323DXXMC, S-8323JXXMC  
(Output voltage adjustment circuit with external resistors)



(3) S-8323AXXMA, S-8323AXXUA, S-8323CXXMA



(6) S-8327EXXMC, S-8327JXXMC  
(Output voltage adjustment circuit with external resistors)



## SMALL-PACKAGE PWM/PFM CONTROL STEP-UP SWITCHING REGULATOR

S-8324/8328 series

The S-8324/8328 series is a family of PWM/PFM control step-up switching regulators. Novel control circuit provides high efficiency in the mode range by changing the control method between PWM and PFM according to the load.

A step-up switching regulator can be constructed by externally connecting only a coil, capacitors and a diode to the S-8324 series. These features, along with its small package and low current consumption, make the S-8324 series ideal as a power supply for portable equipment in which high efficiency is indispensable. For applications requiring high output current, the S-8328 series is also available with an external transistor. For applying a smaller coil, high frequency series (250kHz) is also available.

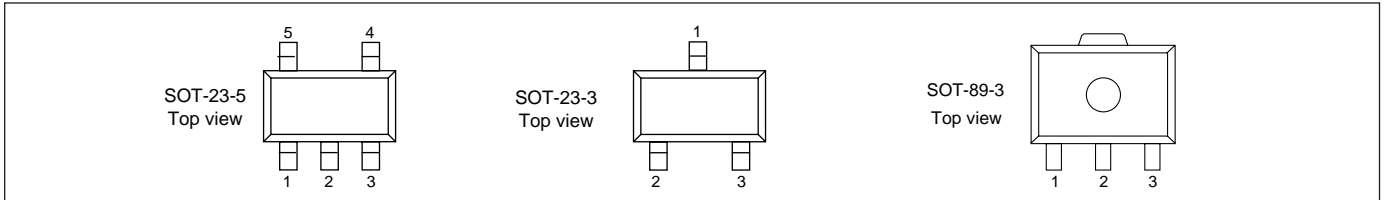
### FEATURES

- Low voltage operation : 0.9 V (A to D series)  
: 1.4 V (H,J series)
- Low current consumption  
Operation : 17.2  $\mu$ A typ. (Vout=3 V 50 kHz)  
: 53.9  $\mu$ A typ. (Vout=3 V 250 kHz)  
Shutdown : 0.5  $\mu$ A max.
- Duty ratio : PFM/PWM switchover control circuit  
PWM control : 15 to 83% typ. (15 to 73% : H,J series)  
PFM control : 15% typ.
- External components : Coil, Diode, Capacitors
- Output voltage tolerance :  $\pm$ 2.4%
- Oscillation frequency : 30 kHz, 50 kHz, 100 kHz, 250 kHz,
- Soft start function
- Shutdown function
- Large output currents can be obtained with an external transistor (S-8328 series)
- Small package : SOT-23-5, SOT-23-3, SOT-89-3
- Available for step-down and inverting application.

### APPLICATIONS

- Power supplies for portable equipment such as pagers, handy calculators, and remote controllers
- Constant voltage power supplies for cameras, video equipment, communications equipment and microcomputers.

### PIN CONFIGURATIONS



S-8324AXXMC/S-8328BXXMC/S-8324HXXMC/S-8328HXXMC  
SOT-23-5

Pin No.	Pin Name	Functions
1	ON / OFF	Shutdown pin "H" : normal operation (stepping up operation) "L" : stop stepping up (whole circuit stop)
2	VOUT	Output voltage pin and power supply pin
3	-	N. C. (Non Connection)
4	VSS	GND pin
5	CONT	External inductor connection pin (for S-8324 Series)
	EXT	External transistor connection pin (for S-8328 Series)

S-8324AXXMA/S-8324CXXMA/S-8328BXXMA  
SOT-23-3

Pin No.	Pin Name	Functions
1	VOUT	Output voltage pin and power supply pin
2	VSS	GND pin
3	CONT	External inductor connection pin (for S-8324 Series)
	EXT	External transistor connection pin (for S-8328 Series)

S-8324DXXMC/S-8328EXXMC/S-8324JXXMC/S-8328JXXMC  
SOT-23-5

Pin No.	Pin Name	Functions
1	VOUT	Output voltage pin
2	VDD	Power supply pin
3	-	N. C. (Non Connection)
4	VSS	GND pin
5	CONT	External inductor connection pin (for S-8324 Series)
	EXT	External transistor connection pin (for S-8328 Series)

S-8324AXXUA/S-8328BXXUA  
SOT-89-3

Pin No.	Pin Name	Functions
1	VSS	GND pin
2	VOUT	Output voltage pin and power supply pin
3	CONT	External inductor connection pin (for S-8324 Series)
	EXT	External transistor connection pin (for S-8328 Series)

### SELECTION GUIDE

Product Name	Built in Power transistor	with external power transistor	Switching frequency(kHz)	Shutdown function	V <sub>DD</sub> /V <sub>OUT</sub> separate type	Package	Application
S-8324AXXMC	○	-	50	○	-	SOT-23-5	With a shutdown function
S-8324AXXMA	○	-	50	-	-	SOT-23-3	Without shutdown function
S-8324AXXUA	○	-	50	-	-	SOT-89-3	Without shutdown function
S-8324DXXMC	○	-	50	-	○	SOT-23-5	For variable output voltage step-up DC/DC converter and step-down, inverted DC/DC converter
S-8324CXXMA	○	-	30	-	-	SOT-23-3	For pagers
S-8328BXXMC	-	○	100	○	-	SOT-23-5	For large load current with shutdown function
S-8328BXXMA	-	○	100	-	-	SOT-23-3	For large load current without shutdown function
S-8328BXXUA	-	○	100	-	-	SOT-89-3	For large load current without shutdown function
S-8328EXXMC	-	○	100	-	○	SOT-23-5	For variable output voltage
S-8324HXXMC	○	-	250	○	-	SOT-23-5	For making external parts smaller with a shutdown function
S-8324JXXMC	○	-	250	-	○	SOT-23-5	For variable output voltage by step-up DC/DC converter and step-down, inverted output DC/DC converter with an external resistor
S-8328HXXMC	-	○	250	○	-	SOT-23-5	For large load current with shutdown function
S-8328JXXMC	-	○	250	-	○	SOT-23-5	For variable output voltage

## PRODUCT LIST

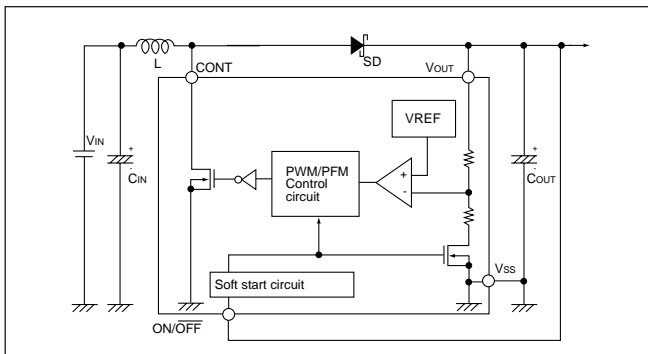
Item Output Voltage (V)	S-8324AXXMC Series	S-8324AXXMA Series	S-8324AXXUA Series	S-8324CXXMA Series	S-8324DXXMC Series	S-8324HXXMC Series	S-8324JXXMC Series
2.0	-	-	-	-	S-8324D20MC-E2A-T2	-	-
2.5	S-8324A25MC-E0F-T2	S-8324A25MA-E0F-T2	S-8324A25UA-E0F-T2	S-8324C25MA-E0F-T2	-	-	S-8324J25MC-FUF-T2
2.7	S-8324A27MC-E0H-T2	S-8324A27MA-E0H-T2	S-8324A27UA-E0H-T2	S-8324C27MA-E0H-T2	-	-	-
2.8	S-8324A28MC-E0I-T2	-	S-8324A28UA-E0I-T2	-	-	-	-
3.0	S-8324A30MC-E0K-T2	S-8324A30MA-E0K-T2	S-8324A30UA-E0K-T2	S-8324C30MA-E0K-T2	S-8324D30MC-E2K-T2	S-8324H30MC-F6K-T2	S-8324J30MC-FUK-T2
3.3	S-8324A33MC-E0N-T2	S-8324A33MA-E0N-T2	S-8324A33UA-E0N-T2	-	-	S-8324H33MC-F6N-T2	S-8324J33MC-FUN-T2
5.0	S-8324A50MC-EPE-T2	S-8324A50MA-EPE-T2	S-8324A50UA-EPE-T2	-	S-8324D50MC-E4E-T2	-	S-8324J50MC-FVE-T2
5.2	-	-	-	-	-	S-8324H52MC-F7G-T2	-
5.3	-	-	-	-	-	S-8324H53MC-F7H-T2	-
5.4	-	-	-	-	-	S-8324H54MC-F7I-T2	-
5.5	-	-	-	-	-	S-8324H55MC-F7J-T2	-

Item Output Voltage (V)	S-8328BXXMC Series	S-8328BXXMA Series	S-8328BXXUA Series	S-8328EXXMC Series	S-8328HXXMC Series	S-8328JXXMC Series
2.0	-	-	-	S-8328E20MC-EYA-T2	-	-
2.4	S-8328B24MC-EWE-T2	-	-	-	-	-
2.5	S-8328B25MC-EWF-T2	S-8328B25MA-EWF-T2	S-8328B25UA-EWF-T2	-	S-8328H25MC-FYF-T2	S-8328J25MC-F2F-T2
2.7	S-8328B27MC-EWH-T2	S-8328B27MA-EWH-T2	S-8328B27UA-EWH-T2	-	-	-
2.8	S-8328B28MC-EWI-T2	-	-	-	-	-
3.0	S-8328B30MC-EWK-T2	S-8328B30MA-EWK-T2	S-8328B30UA-EWK-T2	-	S-8328H30MC-FYK-T2	S-8328J30MC-F2K-T2
3.2	S-8328B32MC-EWM-T2	-	-	-	S-8328H32MC-FYM-T2	-
3.3	S-8328B33MC-EWN-T2	S-8328B33MA-EWN-T2	S-8328B33UA-EWN-T2	-	S-8328H33MC-FYN-T2	S-8328J33MC-F2N-T2
3.4	S-8328B34MC-EWO-T2	-	-	-	-	-
3.6	S-8328B36MC-EWQ-T2	-	-	-	-	-
3.8	S-8328B38MC-EWS-T2	-	-	-	-	-
4.9	S-8328B49MC-EXD-T2	-	-	-	-	-
5.0	S-8328B50MC-EXE-T2	S-8328B50MA-EXE-T2	S-8328B50UA-EXE-T2	S-8328E50MC-E9E-T2	S-8328H50MC-FZE-T2	S-8328J50MC-F3E-T2
5.1	S-8328B51MC-EXF-T2	-	-	-	-	-
5.2	S-8328B52MC-EXG-T2	-	-	-	-	-
5.4	S-8328B54MC-EXI-T2	-	-	-	-	-
5.5	S-8328B55MC-EXJ-T2	-	-	-	S-8328H55MC-FZJ-T2	-

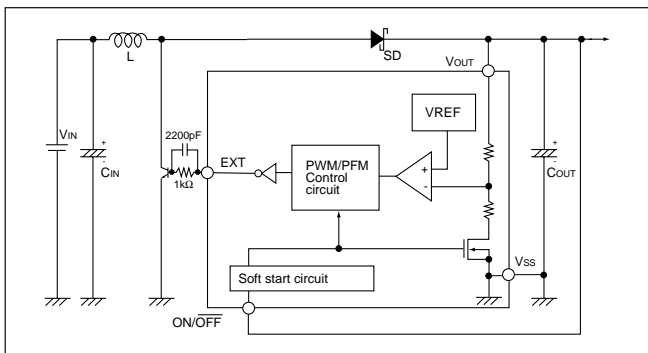
\* Please ask an SII representative if you need another output voltage product.

## BLOCK DIAGRAM

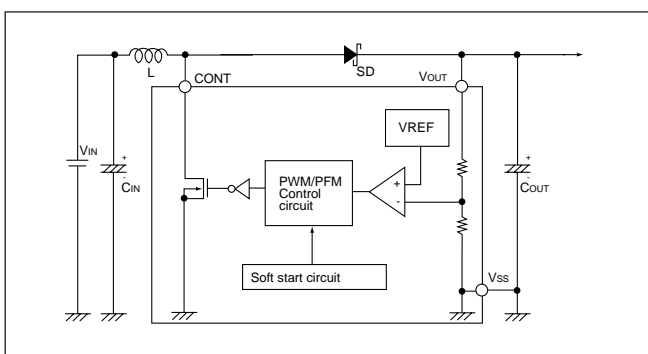
(1) S-8324AXXMC, S-8324HXXMC



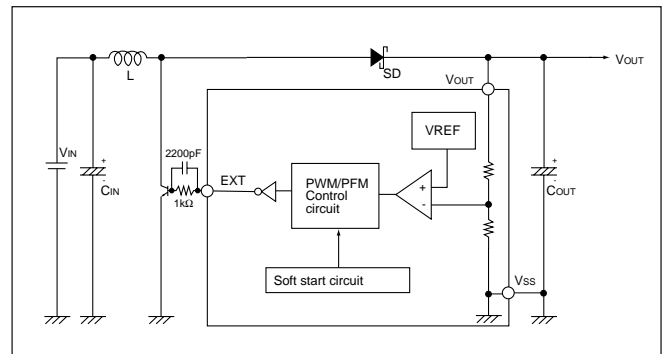
(2) S-8328BXXMC, S-8328HXXMC



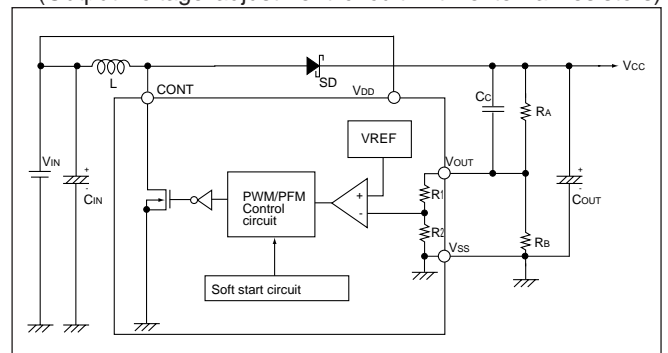
(3) S-8324AXXMA, S-8324AXXUA, S-8324CXXMA



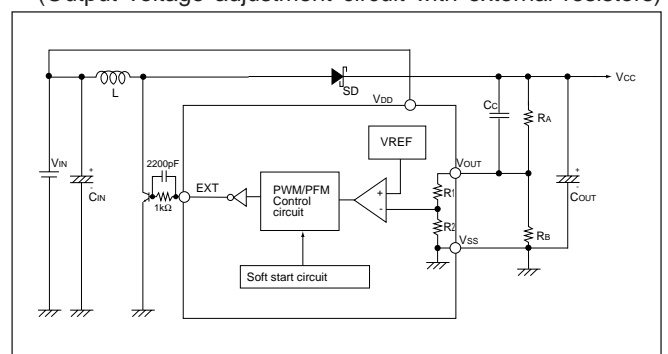
(4) S-8328BXXMA, S-8328BXXUA



(5) S-8324DXXMC, S-8324JXXMC  
(Output voltage adjustment circuit with external resistors)



(6) S-8328EXXMC, S-8328JXXMC  
(Output voltage adjustment circuit with external resistors)

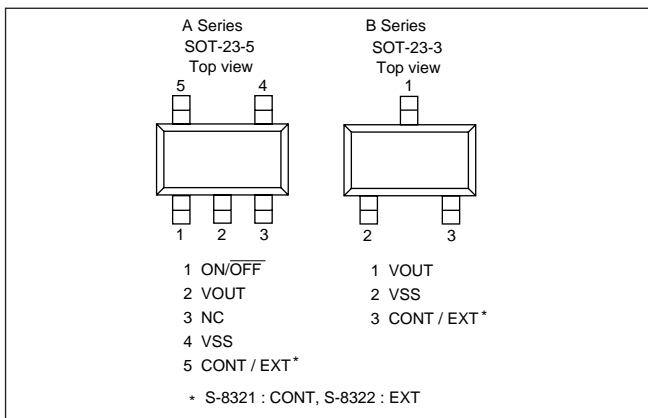


The S-8321/8322 series Consists of a reference voltage source, an oscillation circuit, a power MOSFET and a comparator. The output voltage of these devices are fixed internally. Shutdown function is available. New PFM scheme realizes low ripple noise compared with our former products. The S-8321 series easily forms a step-up switching regulator using only an external coil, a diode and capacitors. The S-8322 series employs an external transistor to boost the output current. These series are suitable for use as power sources for portable devices marked by their super small package and low current consumption.

### FEATURES

- Low input voltage : 0.9 V ( $I_{OUT}=1$  mA)
- Low current consumption
  - Operation : 6.8  $\mu$ A typ. ( $V_{OUT}=3$ V, No load)
  - Shutdown : 0.5  $\mu$ A max.
- Duty ratio : Automatic switchover PFM control
- External components : Coil, Diode, Capacitors
- Output voltage tolerance :  $\pm 2.4\%$
- Shutdown function (A series)
- Large output currents can be obtained with an external transistor (S-8322 series)
- A series : SOT-23-5 package
- B series : SOT-23-3 package

### PIN CONFIGURATIONS



### APPLICATIONS

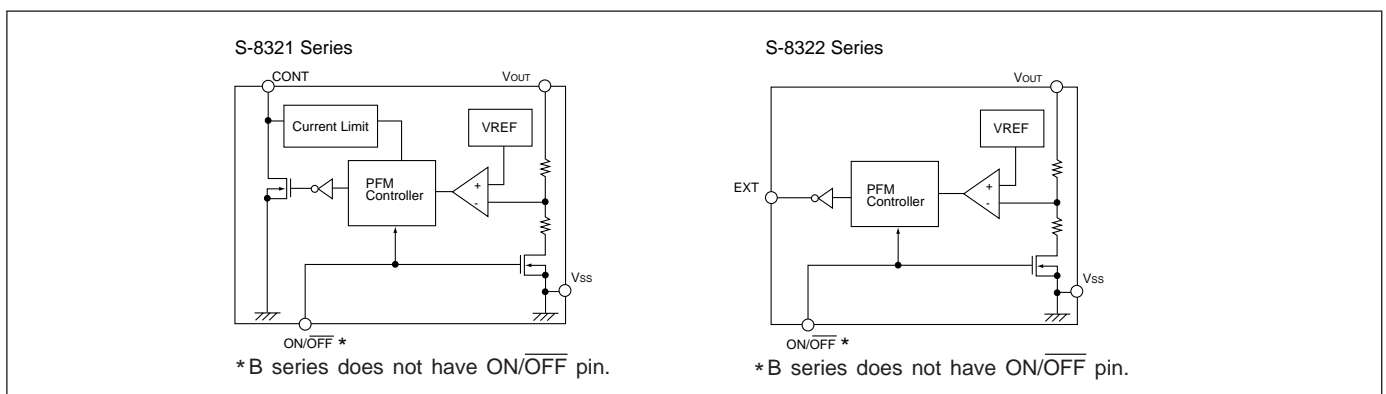
- Power supplies for portable equipment such as pagers, handy calculators, and remote controllers
- Constant voltage power supplies for cameras, video equipment, and communications equipment
- Power supply for microcomputers

### SELECTION GUIDE

Output Voltage (V)	S-8321A Series	S-8322A Series	S-8321B Series	S-8322B Series
2.2	S-8321AOMP-DNO-T2	-	-	-
2.5	S-8321AJMP-DNJ-T2	S-8322AJMP-DOJ-T2	S-8321BJMP-DTJ-T2	S-8322BJMP-DUJ-T2
2.7	S-8321ALMP-DNL-T2	S-8322ALMP-DOL-T2	S-8321BLMP-DTL-T2	S-8322BLMP-DUL-T2
2.8	S-8321ATMP-DNT-T2	-	-	-
3.0	S-8321AIMP-DNI-T2	S-8322AIMP-DOI-T2	S-8321BIMP-DTI-T2	S-8322BIMP-DUI-T2
3.1	-	S-8322ARMP-DOR-T2	-	-
3.2	S-8321AHMP-DNH-T2	S-8322AHMP-DOH-T2	S-8321BHMP-DTH-T2	S-8322BHMP-DUH-T2
3.3	S-8321AGMP-DNG-T2	S-8322AGMP-DOG-T2	S-8321BGMP-DTG-T2	S-8322BGMP-DUG-T2
3.4	S-8321ASMP-DNS-T2	-	-	-
3.5	S-8321AFMP-DNF-T2	S-8322AFMP-DOF-T2	S-8321BFMP-DTF-T2	S-8322BFMP-DUF-T2
3.6	S-8321AQMP-DNQ-T2	S-8322AQMP-DOQ-T2	-	-
3.7	S-8321AEMP-DNE-T2	S-8322AEMP-DOE-T2	S-8321BEMP-DTE-T2	S-8322BEMP-DUE-T2
4.0	S-8321ADMP-DND-T2	S-8322ADMP-DOD-T2	S-8321BDMP-DTD-T2	S-8322BDMP-DUD-T2
4.2	S-8321ACMP-DNC-T2	S-8322ACMP-DOC-T2	S-8321BCMP-DTC-T2	S-8322BCMP-DUC-T2
4.5	S-8321AUMP-DNU-T2	-	-	-
4.7	S-8321ABMP-DNB-T2	S-8322ABMP-DOB-T2	S-8321BBMP-DTB-T2	S-8322BBMP-DUB-T2
5.0	S-8321AAMP-DNA-T2	S-8322AAMP-DOA-T2	S-8321BAMP-DTA-T2	S-8322BAMP-DUA-T2
5.2	-	S-8322APMP-DOP-T2	-	-
5.5	S-8321AMMP-DNM-T2	-	S-8321BMMP-DTM-T2	S-8322BMMP-DUM-T2

Please contact our sales office when you need another output voltage product.

### BLOCK DIAGRAM



# HIGH FREQUENCY STEP-UP SWITCHING REGULATOR CONTROLLER

S-8340/8341 series

The S-8340/8341 series is a family of PWM control (S-8340) and PWM/PFM switchover control (S-8341) CMOS booster switching regulator controllers made up of reference voltage source, oscillator circuit, error amplifier, phase compensating circuit, PWM control circuit, etc. High oscillation frequency of 300 kHz or 600 kHz permits large output currents with the use of small external parts. In addition, speed up of the output stage enables the high speed switching of low on resistance Nch Power MOS.

The S-8340 provides high efficiency, excellent transient characteristic and low ripple output resulted from optimally designed error amplifier, phase compensation circuit and PWM control circuit which varies duty ratio linearly from 0% to 82%.

The S-8341 achieves high efficiency in all load range brought from the PWM/PFM switchover circuit which enters PWM mode when the duty ratio is higher than 27% and PFM mode when lower.

## FEATURES

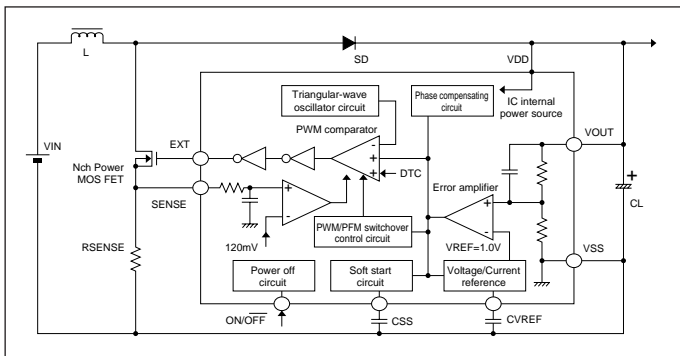
- Oscillation frequency : 300 kHz or 600 kHz
- Output voltage range : 2.5 V to 6.0 V (0.1 V step)
- Output voltage tolerance :  $\pm 2.0\%$
- Variable output voltage is also available.  
VREF = 1.0 V
- Externally parts : A transistor, a coil, a diode, 3 capacitors, and a resistor.
- Duty ratio : 0%-82% PWM control (S-8340)  
27%-82% PWM/PFM switchover control (S-8341)
- Oscillation is guaranteed at a low voltage 0.9V operation
- Current limit circuit : Set by an external resistor RSENSE
- Soft start function : Set by an externally capacitor CSS
- Power off function
- Package : 8-pin TSSOP

## APPLICATIONS

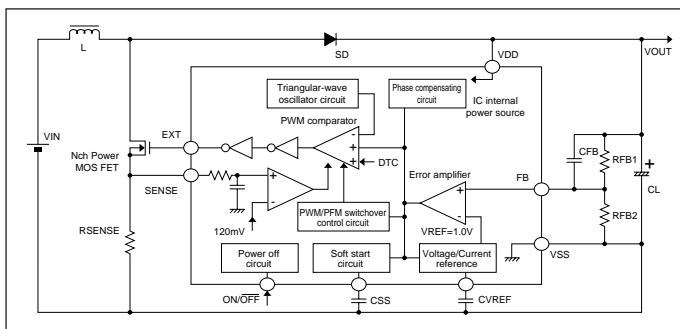
- Power source for portable devices such as PDAs, electronic organizers and mobile phones.
- Power source for audio devices such as portable CD players, and headphone stereos.
- Main and sub power source for notebook computers and peripheral equipment.
- Constant voltage power for cameras, video machinery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

## BLOCK DIAGRAM

<Product type with internally set output voltage>



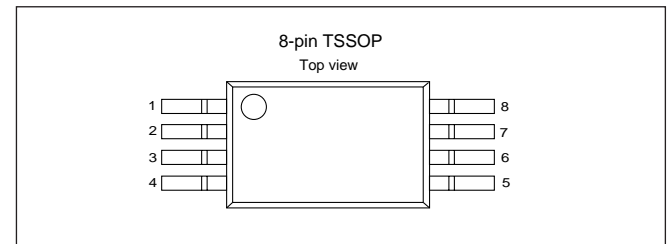
<Product type with externally set output voltage>



## PRODUCT LIST

Output voltage (V)	S-8340AXXAFT Series fosc=600kHz, PWM control	S-8341AXXAFT Series fosc=600kHz, PWM/PFM switchover control	S-8340CXXAFT Series fosc=300kHz, PWM control	S-8341CXXAFT Series fosc=300kHz, PWM/PFM switchover control
2.5V $\pm$ 2.0%	S-8340A25AFT-T2	S-8341A25AFT-T2	S-8340C25AFT-T2	S-8341C25AFT-T2
3.0V $\pm$ 2.0%	S-8340A30AFT-T2	S-8341A30AFT-T2	S-8340C30AFT-T2	S-8341C30AFT-T2
3.3V $\pm$ 2.0%	S-8340A33AFT-T2	S-8341A33AFT-T2	S-8340C33AFT-T2	S-8341C33AFT-T2
5.0V $\pm$ 2.0%	S-8340A50AFT-T2	S-8341A50AFT-T2	S-8340C50AFT-T2	S-8341C50AFT-T2
Variable	S-8340B00AFT-T2	S-8341B00AFT-T2	S-8340D00AFT-T2	S-8341D00AFT-T2

## PIN CONFIGURATIONS



Pin No.	Pin Name	Functions
1	VSS	GND pin
2	CVREF	Reference voltage source pass capacitor connection pin
3	CSS	Soft start capacitor connection pin
4	ON/OFF	Power off pin "H" : Ordinary operations (booster operations) "L" : Booster shut-down (all circuit shut-down)
5	VDD	IC power supply pin
6	VOUT (FB)	Output voltage pin (FB for externally set types)
7	EXT	Externally mounted transistor connector pin
8	SENSE	Current limiting detection pin

Please contact our sales office when a product with output voltage you need does not appear in this list.

## STEP-UP SWITCHING REGULATOR FOR LCD BIAS SUPPLY

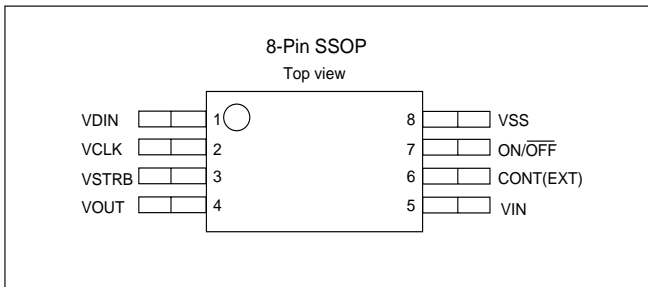
S-8330/8331 series

The S-8330/8331 series is a CMOS PWM-control step-up switching regulator which consists of a reference voltage source, an oscillation circuit, a power MOS FET (for S-8330 series), and an error amplifier. The output voltage can be adjusted by electronic volume. Shutdown function is available. The S-8330 series features low current consumption due to CMOS structure, and a step-up switching regulator constructed by externally connecting only a coil, capacitors and a diode. Smallness of 8-pin SSOP package and fewness of external components make the S-8330 series ideal for LCD bias generators of portable equipment. For applications requiring high output current, an external transistor controller S-8331 series is also available.

### FEATURES

- Maximum output voltage : 20 V to 30 V (2 V step)  
12 V range can be adjusted by electronic volume
- Output current : 5 mA ( $V_{IN}=5\text{ V}, V_{OUT}=30\text{ V}$ )
- Low current consumption :
  - Operation : 100  $\mu\text{A}$  (typ.) ( $V_{IN}=5\text{ V}$  180 kHz)
  - Shutdown : 1.0  $\mu\text{A}$  (max.)
- Shutdown function : Stepping up operation is stopped, and Vout pin is shorted to GND at shutdown.
- Input voltage range : 2.0 to 9.0V
- Soft start function
- CR oscillation circuit : 180 kHz typ. (A series)  
50 kHz typ. (B series)
- 8-pin SSOP package
- Built-in 8bit electronic volume
- External transistor type is available (S-8331 series)

### PIN CONFIGURATIONS



Pin No.	Pin Name	Function
1	VDIN	Electric volume data input pin
2	VCLK	Electric volume clock input pin
3	VSTRB	Electric volume strobe signal input pin
4	VOUT	Output voltage pin
5	VIN	Power supply pin
6	CONT	External inductor connection pin (S-8330Series:Open drain output)
	EXT	External transistor connection pin (S-8331Series:CMOS output)
7	ON / OFF	Shutdown pin "H" : normal operation (stepping up operation) "L" : stop stepping up
8	VSS	GND pin

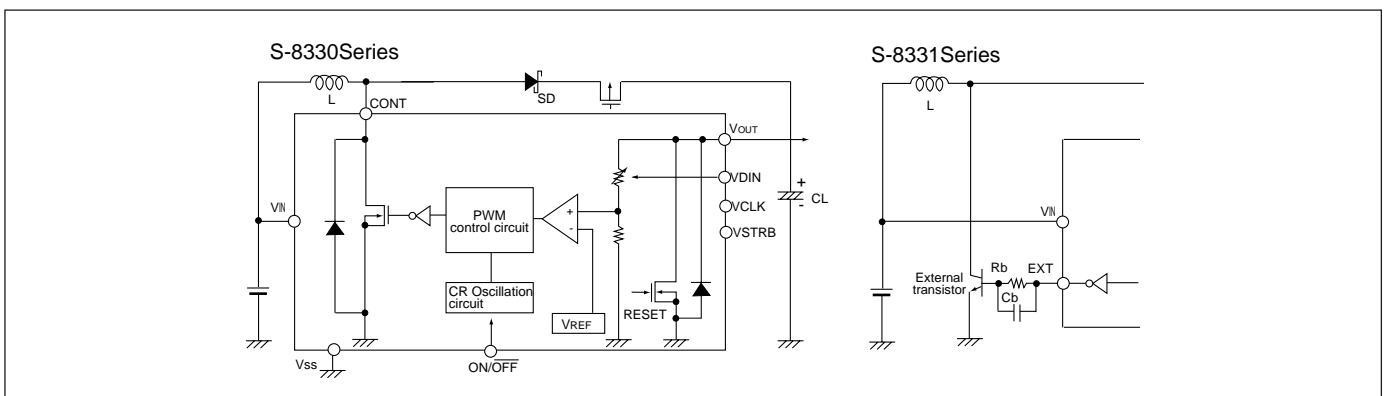
### APPLICATIONS

- Power supplies for medium size or large size LCD panel.
- Power supplies for portable equipment such as pagers, handy calculators, and remote controllers
- Constant voltage power supplies for cameras, video equipment, and communications equipment

### SELECTION GUIDE

Output voltage range (V)	S-8330AXXFS Series	S-8330BXXFS Series	S-8331 Series
8 to 20V	S-8330A20FS-T2	S-8330B20FS-T2	S-8331A20FS-T2
10 to 22V	S-8330A22FS-T2	S-8330B22FS-T2	S-8331A22FS-T2
12 to 24V	S-8330A24FS-T2	S-8330B24FS-T2	S-8331A24FS-T2
14 to 26V	S-8330A26FS-T2	S-8330B26FS-T2	S-8331A26FS-T2
16 to 28V	S-8330A28FS-T2	S-8330B28FS-T2	S-8331A28FS-T2
18 to 30V	S-8330A30FS-T2	S-8330B30FS-T2	S-8331A30FS-T2

### BLOCK DIAGRAM





# STEP-DOWN SWITCHING REGULATOR CONTROLLER

# S-8520/8521 series

The S-8520/8521 series are CMOS step-down switching regulator controllers with PWM-control (S-8520) and PWM/PFM-switched control (S-8521).

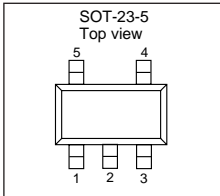
The S-8520 series provides low-ripple output, high-efficiency, and excellent transient characteristics due to PWM control circuit capable of varying the duty ratio linearly from 0% up to 100%. The series also contains soft-start circuit that prevents overshoot at startup.

The S-8521 series works with either PWM control or PFM control, and can switch from one to the other. It normally operates using PWM control with a duty ratio of 25% to 100%, and under a light load, it automatically switches to PFM control with a duty ratio of 25%. This series ensures high efficiency over a wide range of conditions, from standby mode to full operation.

They serve as ideal power supply for portable devices together with the SOT-23-5 minipackage low current consumption.

Moreover, high oscillation frequency, 300kHz (E, F series) is also available.

## PIN CONFIGURATIONS



Pin No.	Pin Name	Function
1	ON/OFF	Power-off terminal "H" : Normal operation (Step-down operation) "L" : Step-down operation stopped (All circuit deactivated)
2	VSS	GND pin
3	VOU	Output voltage monitoring terminal
4	EXT	Connection terminal for external transistor
5	VIN	IC power supply terminal

## PRODUCT LIST

A, B Series (Oscillation frequency 180k Hz) . B Series (Oscillation frequency 180k Hz)

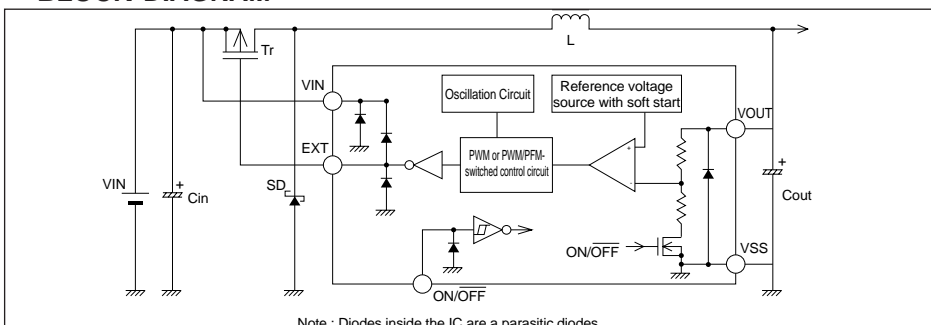
Output Voltage (V)	S-8520XXMC Series	S-8521AXXMC Series	S-8520BXXMC Series	S-8521BXXMC Series	S-8520CXXMC Series	S-8521CXXMC Series
1.6	-	-	-	-	-	S-8521C16MC-BTB-T2
1.8	-	-	S-8520B18MC-ARD-T2	S-8521B18MC-ATD-T2	-	-
1.9	-	-	-	S-8521B19MC-ATE-T2	-	-
2.0	-	-	-	S-8521B20MC-ATF-T2	-	-
2.1	S-8520A21MC-AVG-T2	-	-	S-8521B21MC-ATG-T2	-	-
2.5	S-8520A25MC-AVK-T2	S-8521A25MC-AXK-T2	S-8520B25MC-ARK-T2	S-8521B25MC-ATK-T2	S-8520C25MC-BRK-T2	S-8521C25MC-BTK-T2
2.7	S-8520A27MC-AVM-T2	S-8521A27MC-AXM-T2	S-8520B27MC-ARM-T2	S-8521B27MC-ATM-T2	S-8520C27MC-BRM-T2	S-8521C27MC-BTM-T2
2.8	S-8520A28MC-AVN-T2	S-8521A28MC-AXN-T2	S-8520B28MC-ARN-T2	S-8521B28MC-ATN-T2	S-8520C28MC-BRN-T2	S-8521C28MC-BTN-T2
2.9	S-8520A29MC-AVO-T2	S-8521A29MC-AXO-T2	S-8520B29MC-ARO-T2	S-8521B29MC-ATO-T2	S-8520C29MC-BRO-T2	S-8521C29MC-BTO-T2
3.0	S-8520A30MC-AVP-T2	S-8521A30MC-AXP-T2	S-8520B30MC-ARP-T2	S-8521B30MC-ATP-T2	S-8520C30MC-BRP-T2	S-8521C30MC-BTP-T2
3.1	S-8520A31MC-AVQ-T2	S-8521A31MC-AXQ-T2	S-8520B31MC-ARQ-T2	S-8521B31MC-ATQ-T2	S-8520C31MC-BRQ-T2	S-8521C31MC-BTQ-T2
3.2	S-8520A32MC-AVR-T2	S-8521A32MC-AXR-T2	S-8520B32MC-ARR-T2	S-8521B32MC-ATR-T2	S-8520C32MC-BRR-T2	S-8521C32MC-BTR-T2
3.3	S-8520A33MC-AVS-T2	S-8521A33MC-AXS-T2	S-8520B33MC-ARS-T2	S-8521B33MC-ATS-T2	S-8520C33MC-BRS-T2	S-8521C33MC-BTS-T2
3.4	S-8520A34MC-AVF-T2	S-8521A34MC-AXT-T2	S-8520B34MC-ART-T2	S-8521B34MC-ATT-T2	S-8520C34MC-BRT-T2	S-8521C34MC-BTT-T2
3.5	S-8520A35MC-AVU-T2	S-8521A35MC-AXU-T2	S-8520B35MC-ARU-T2	S-8521B35MC-ATU-T2	S-8520C35MC-BRU-T2	S-8521C35MC-BTU-T2
3.6	S-8520A36MC-AVV-T2	S-8521A36MC-AXV-T2	S-8520B36MC-ARV-T2	S-8521B36MC-ATV-T2	S-8520C36MC-BRV-T2	S-8521C36MC-BTV-T2
5.0	S-8520A50MC-AVJ-T2	S-8521A50MC-AYJ-T2	S-8520B50MC-ASJ-T2	S-8521B50MC-AUJ-T2	S-8520C50MC-BSJ-T2	S-8521C50MC-BUJ-T2

D Series (Oscillation frequency 60k Hz) . E, F Series (Oscillation frequency 300k Hz)

Output Voltage (V)	S-8520DXXMC Series	S-8521DXXMC Series	S-8520EXXMC Series	S-8521EXXMC Series	S-8520FXXMC Series	S-8521FXXMC Series
1.5	-	-	-	S-8521E15MC-BLA-T2	-	-
1.6	-	S-8521D16MC-BXB-T2	-	-	-	-
1.8	-	-	S-8520E18MC-BJD-T2	S-8521E18MC-BLD-T2	S-8520F18MC-BND-T2	S-8521F18MC-BPD-T2
2.0	-	S-8521D20MC-BXF-T2	-	S-8521E20MC-BLF-T2	-	-
2.5	S-8520D25MC-BVK-T2	S-8521D25MC-BXK-T2	S-8520E25MC-BJK-T2	-	S-8520F25MC-BNK-T2	-
2.7	S-8520D27MC-BVM-T2	S-8521D27MC-BXM-T2	-	-	S-8520F27MC-BNM-T2	-
2.8	S-8520D28MC-BVN-T2	S-8521D28MC-BXN-T2	-	S-8521E30MC-BLP-T2	-	-
2.9	S-8520D29MC-BVO-T2	S-8521D29MC-BXO-T2	-	-	-	-
3.0	S-8520D30MC-BVP-T2	S-8521D30MC-BXP-T2	S-8520E30MC-BJP-T2	-	S-8520F30MC-BNP-T2	S-8521F30MC-BPP-T2
3.1	S-8520D31MC-BVQ-T2	S-8521D31MC-BXQ-T2	-	-	-	-
3.2	S-8520D32MC-BVR-T2	S-8521D32MC-BXR-T2	-	-	-	-
3.3	S-8520D33MC-BVS-T2	S-8521D33MC-BXS-T2	S-8520E33MC-BJS-T2	S-8521E33MC-BLS-T2	S-8520F33MC-BNS-T2	S-8521F33MC-BPS-T2
3.4	S-8520D34MC-BVT-T2	S-8521D34MC-BXT-T2	-	-	S-8520F34MC-BNT-T2	-
3.5	S-8520D35MC-BVU-T2	S-8521D35MC-BXU-T2	-	S-8521E35MC-BLU-T2	-	-
3.6	S-8520D36MC-BVV-T2	S-8521D36MC-BXV-T2	-	-	-	-
5.0	S-8520D50MC-BWJ-T2	S-8521D50MC-BYJ-T2	S-8520E50MC-BKJ-T2	S-8521E50MC-BMJ-T2	S-8520F50MC-BOJ-T2	S-8521F50MC-BQJ-T2

Some products described here in are under development.

## BLOCK DIAGRAM



Note : Diodes inside the IC are a parasitic diodes.

## FEATURES

- Low current consumption:
  - Operation : 60  $\mu$ A max. (A & B series)  
21  $\mu$ A max. (C & D series)  
100  $\mu$ A max. (E & F series)
  - Power off : 0.5  $\mu$ A max.
- Input voltage : 2.5 V to 16 V (B & D & F series)  
2.5 V to 10 V (A & C & E series)
- Output voltage : 1.5V to 6.0V (0.1V step)
- Duty ratio : 0% to 100% PWM control (S-8520)  
25% to 100% PWM/PFM control (S-8521)
- External components : A P-ch power MOSFET or PNP transistor, a coil, a diode and capacitors. (If a PNP transistor is used, a base resistance and a capacitor are required.)
- Oscillation frequency: 180 kHz type. (A & B series), 60 kHz type. (C & D series), or 300 kHz type. (E & F series).
- Soft-start function: 8 msec type. (A & B series) or 12 msec type (C & D series) or 4.5 msec type (E & F series).
- Power-off function.
- Overload protection circuit. Overload detection time: 4 msec type. (A series) or 14 msec type. (C series) or 2.6 msec type (E series).

## APPLICATIONS

- On-board power supply of battery devices for portable telephones, electronic organizers, PDAs.
- Power supplies for audio equipment, including portable CD players and headphone stereos.
- Fixed voltage power supply for cameras, video equipment and communications equipment.

## HIGH FREQUENCY STEP-DOWN SWITCHING REGULATOR CONTROLLER ▶ UNDER DEVELOPMENT S-8540/8541 series

The S-8540/8541 series are PWM control (S-8540) and PWM/PFM switchover control (S-8541) CMOS step-down switching regulation controllers consisting of reference voltage source, oscillation circuit, error amplifier, phase compensation circuit, PWM control circuit and current limiting circuit. The very high oscillation frequency of 600kHz (300kHz) makes for a highly efficient step-down switching regulator with large output currents with the use of small external parts.

The S-8540 features PWM control circuit which allows the duty ratio to be linearly varied between 0% - 100% as well as optimized error amplifier and phase compensation circuit to realize low ripple, high efficiency and excellent transient properties.

The S-8541, which includes a PWM/PFM switchover control circuit, operates under PWM control at duties higher than 30% and under PFM control at lower duties to realize high efficiency in all load range. With its 8-pin MSOP package and its high oscillating frequency, the S-8540/8541 series is an ideal power source for portable equipment.

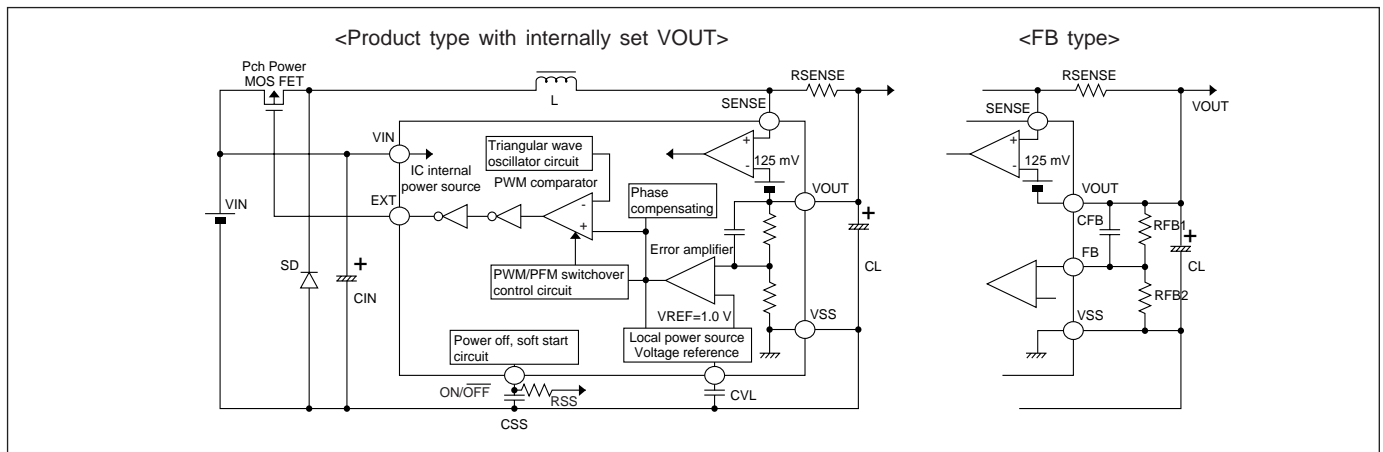
### ■ FEATURES

- Oscillation frequency : 300 kHz, 600 kHz
- Output voltage range : 1.5 V to 7.0 V (0.1 V step) accuracy  $\pm 2.0\%$
- Variable output voltage product (FB) is also available.  $V_{REF} = 1.0\text{ V}$
- External parts consist only of a transistor, a coil, a diode and 3 capacitors.
- Duty : 30% (during PFM control), 30-100% (during PWM control) integrated PWM/PFM switchover circuit
- Current limit circuit set by an external resistor RSENSE.
- Soft start function set by an external capacitor CSS and an external resistor RSS.
- Power off function
- Small package 8-pin MSOP

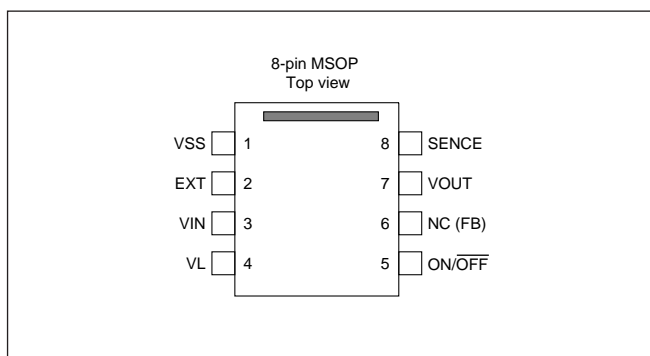
### ■ APPLICATIONS

- Power source for portable devices such as PDAs, electronic organizers and mobile phones.
- Power source for portable audio devices such as portable CD players and headphone stereos.
- Main or auxiliary power sources for notebook computers and peripheral equipment.

### ■ BLOCK DIAGRAM AND EXTERNAL CIRCUIT CONNECTION DIAGRAM



### ■ PIN CONFIGURATIONS



Pin No.	Pin Name	Functions
1	VSS	GND pin
2	EXT	External transistor connection pin
3	VIN	IC power supply pin
4	VL	Local power SOURCE pin
5	ON/OFF	Power off pin "H" : Ordinary operations (step-down operations) "L" : Stop Step-down (entire circuit shut-down)
6	NC(FB)	NC for fixed voltage (FB for variable voltage)
7	VOUT	Output voltage pin
8	SENSE	Current limit detection pin

# SYNCHRONOUS RECTIFYING STEP-DOWN SWITCHING REGULATOR CONTROLLER

▶ UNDER DEVELOPMENT S-8532 series

The S-8532 series is a PWM control CMOS step-down switching regulation controller consisting of a synchronous rectifying circuit, reference voltage source, oscillation circuit, error amplifier, phase compensation circuit and PWM control circuit. Oscillation frequency of 300kHz makes for a highly efficient step-down switching regulator with large output currents with the use of small external parts. Furthermore, with its synchronous rectifying circuit, its efficiency is improved by 3-10% compared to conventional step-down switching regulators.

The S-8532 series features PWM control circuit which allows the duty ratio to be linearly varied between 0% - 100% as well as optimized error amplifier and phase compensation circuit to realize low ripple, high efficiency and excellent transient properties.

With its 8-pin TSSOP package, synchronous rectifying circuit and high oscillating frequency, the S-8532 series is an ideal power source for portable equipment.

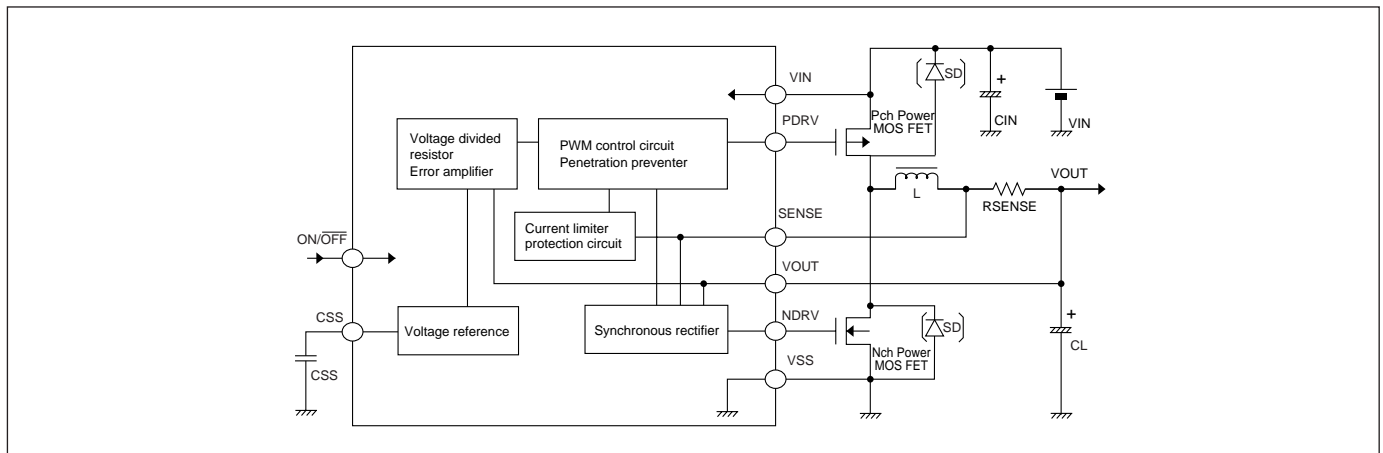
## ■ FEATURES

- The battery can be utilized to its limit by using both Pch and Nch MOS transistors for the external MOS and realizing a duty ratio of 100%.
- Current limit circuit set by an external resistor RSENSE.
- Oscillation frequency : 300 kHz
- Input voltage range : 2.7 V to 16.0 V
- Output voltage range : 1.5 V to 6.0 V (0.1 V step)  
accuracy  $\pm 2.0\%$
- Soft start function set by an external capacitor CSS.
- Power off function

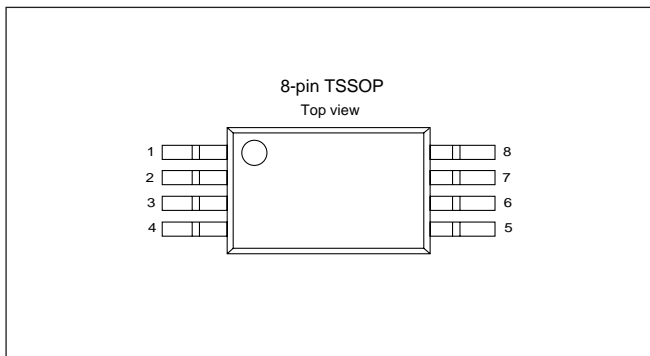
## ■ APPLICATIONS

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

## ■ BLOCK, EXTERNALLY MOUNTED CIRCUIT CONNECTION DIAGRAM



## ■ PIN CONFIGURATIONS



Pin No.	Pin Name	Functions
1	SENCE	Current detection pin
2	VOUT	Output voltage pin
3	ON/OFF	Power off pin "H" : Ordinary operations (step-down operations) "L" : Stop step-down (entire circuit shut-down)
4	CSS	Soft start capacitor connection pin
5	VSS	GND pin
6	NDRV	External Nch connection pin
7	PDRV	External Pch connection pin
8	VIN	IC power supply pin

Consisting of an RC oscillation circuit, a switching regulator, a voltage regulator and a Schottky diode, the S-8430AF performs two functions. It serves as a voltage regulator when the input voltage is higher than the output. When the input voltage is lower than the output, it serves as a step-up switching regulator and a voltage regulator. The output level is kept constant. The output voltage can be selected from 3V and 5V. The S-8430AF has shutdown function that stops the internal RC oscillation circuit by an external signal.

### APPLICATIONS

- Compact camera
- Pager
- Battery-powered devices
- Handy copier
- Handy terminal

### SPECIFICATIONS

S-8430AF-T1/T2

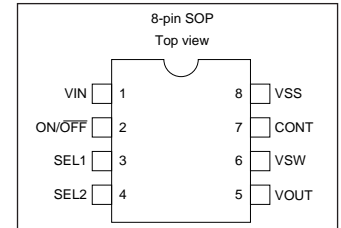
(Ta=25 °C)

Parameter	Input voltage	Output voltage		Current consumption		Operation start-up voltage	Oscillation frequency
		V <sub>IN</sub> =2 V I <sub>OUT</sub> =30 mA	V <sub>IN</sub> =3 V I <sub>OUT</sub> =30 mA	V <sub>IN</sub> =3 V	V <sub>IN</sub> =7 V		
Conditions	-	No load, SEL2=High				No load SEL2=Low V <sub>OUT</sub> ≥ 2 V	V <sub>IN</sub> =3 V
		SEL2=Low ON/OFF=High	SEL2=High ON/OFF=High	SEL1=High ON/OFF=High	SEL1=Low ON/OFF=Low		
Rating	Min.	-	2.85 V	4.80 V	-	0.9 V	20 kHz
	Typ.	-	3.00 V	5.00 V	11 μA	-	40 kHz
	Max.	10.0 V	3.15 V	5.20 V	25 μA	0.2 μA	-

### FEATURES

- Low current consumption : Operation 11 μA typ.  
Power off 0.2 μA max.
- High-precision output voltage: 3.0 V ± 5%, 5.0 V ± 4%
- Low voltage operation
- Selectable output voltage (switchable from 3 V and 5 V)
- RC oscillating circuit
- Power off function
- Selectable output voltage at shutdown (switchable from GND and nearly input voltage)
- Built-in Schottky-diode
- Package : 8-pin SOP

### PIN CONFIGURATIONS

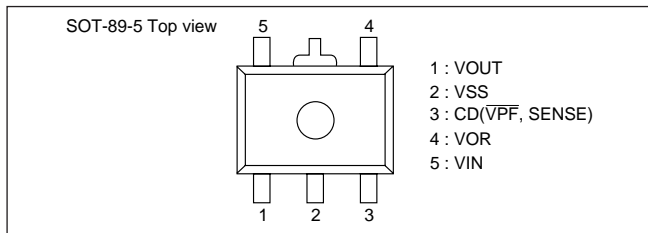


# HIGH WITHSTAND-VOLTAGE VOLTAGE REGULATOR WITH RESET FUNCTION

S-87X series

The S-87X series integrates a low drop-out (LDO) voltage regulator and a voltage detector on one chip, and the IC can withstand an input voltage as high as 24 V. Available in SOT-89-5 package, in the operating temperature range of -40 to +85 °C.

## PIN CONFIGURATIONS



## FEATURES

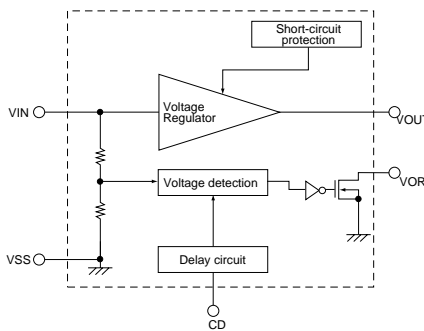
- Accuracy of output voltage :  $\pm 2.4\%$   
: 2.6 V to 5.8 V (0.1 V step)
- Accuracy of detection voltage :  $\pm 2.4\%$   
(For the S-87XXXXF series, the release voltage  $\pm 1.1\%$ )  
: 2.1 V to 11.3 V (0.1 V step)
- Low I/O voltage difference : 0.15 V<sub>typ.</sub>(I<sub>OUT</sub>=30 mA, V<sub>OUT</sub>=5.0 V)  
: 0.45 V<sub>typ.</sub>(I<sub>OUT</sub>=30 mA, V<sub>OUT</sub>=3.0 V)
- Low current consumption : Operation : 8  $\mu$ A max.  
: Power off : 3.5  $\mu$ A max.  
(For only the S-87XXXXC/E/G series)
- Wide operating voltage range : 24 V max.
- Wide operating temperature range : -40 °C to +85 °C
- Built-in delay circuit or shutdown circuit
- Small package : SOT-89-5
- Built-in short-circuit protection

## APPLICATIONS

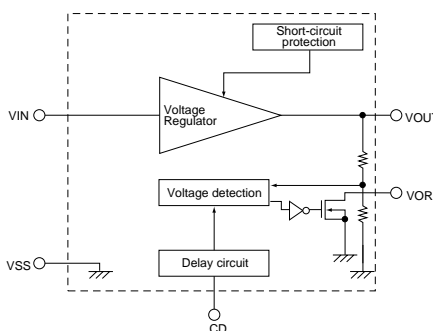
- Constant voltage power supply or reset circuit of battery-powered equipment. VTR, camera, communications equipment, or others.
- Lithium-ion secondary battery pack

## BLOCK DIAGRAM

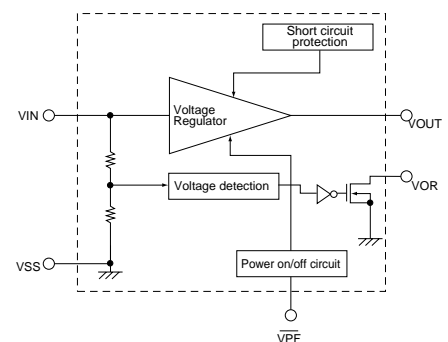
1) Built-in Delay Circuit, V<sub>IN</sub> Detection (S-87XXXXA/F series)



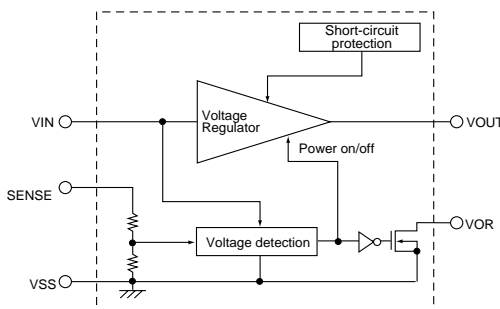
2) Built-in Delay Circuit, V<sub>OUT</sub> Detection (S-87XXXXB series)



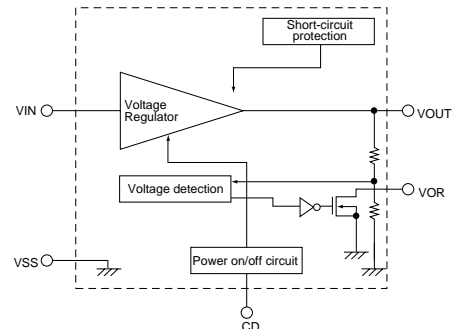
3) Built-in Shutdown Circuit (regulators only) V<sub>IN</sub> Detection (S-87XXXXC series)



4) Built-in Power ON/OFF (regulators only) SENSE Detection (S-87XXXXE series)



5) Built-in Power ON/OFF (regulators only) V<sub>OUT</sub> Detection (S-87XXXXG series)



## FUNCTION TABLE

Series name	Voltage detector (VD)	Detection voltage accuracy (%)	Release voltage accuracy (%)	Built-in delay circuit	Shutdown function	
					VR	
S-87XXXXA	V <sub>IN</sub> detection	$\pm 2.4\%$	-	Yes	No	
S-87XXXXB	V <sub>OUT</sub> detection	$\pm 2.4\%$	-	Yes	No	
S-87XXXXC	V <sub>IN</sub> detection	$\pm 2.4\%$	-	No	Yes	
S-87XXXXE	SENSE detection	$\pm 2.4\%$	-	No	Yes	
S-87XXXXF	V <sub>IN</sub> detection	-	$\pm 1.1\%$	Yes	No	
S-87XXXXG	V <sub>OUT</sub> detection	$\pm 2.4\%$	-	No	Yes	

## SELECTION GUIDE

VR output voltage	VD detection voltage	S-87XXXXA Series	S-87XXXXB Series	S-87XXXXC Series	S-87XXXXC Series
5.6 V	3.5 V	-	S-875635BUP-AGA-T2	-	-
5.2 V	9.4 V	-	-	S-875294CUP-AHC-T2	-
5.2 V	7.1 V	-	-	S-875271CUP-AHA-T2	-
5.2 V	5.5 V	-	-	S-875255CUP-AHB-T2	-
5.0 V	11.0 V	-	-	S-875080CUP-ACG-T2	-
5.0 V	7.7 V	-	-	S-875077CUP-ACF-T2	-
5.0 V	6.1 V	-	-	S-875061CUP-ACH-T2	-
5.0 V	4.5 V	S-875045AUP-AAA-T2	S-875045BUP-ABA-T2	S-875045CUP-ACA-T2	-
5.0 V	4.3 V	S-875043AUP-AAB-T2	S-875043BUP-ABB-T2	S-875043CUP-ACB-T2	-
5.0 V	4.1 V	S-875041AUP-AAC-T2	S-875041BUP-ABC-T2	S-875041CUP-ACC-T2	-
5.0 V	3.9 V	S-875039AUP-AAD-T2	S-875039BUP-ABD-T2	S-875039CUP-ACD-T2	-
5.0 V	3.7 V	S-875037AUP-AAE-T2	S-875037BUP-ABE-T2	S-875037CUP-ACE-T2	S-875037GUP-ANE-T2
3.3 V	6.1 V	-	-	S-873361CUP-AOH-T2	-
3.3 V	2.5 V	-	S-873325BUP-ALA-T2	-	-
3.0 V	6.9 V	-	-	S-873069CUP-AFF-T2	-
3.0 V	5.9 V	-	-	S-873059CUP-AFG-T2	-
3.0 V	2.5 V	S-873025AUP-ADA-T2	S-873025BUP-AEA-T2	S-873025CUP-AFA-T2	-
3.0 V	2.4 V	S-873024AUP-ADB-T2	S-873024BUP-AEB-T2	S-873024CUP-AFB-T2	-
3.0 V	2.3 V	S-873023AUP-ADC-T2	S-873023BUP-AEC-T2	S-873023CUP-AFC-T2	-
3.0 V	2.2 V	S-873022AUP-ADD-T2	S-873022BUP-AED-T2	S-873022CUP-AFD-T2	-
3.0 V	2.1 V	S-873021AUP-ADE-T2	S-873021BUP-AEE-T2	S-873021CUP-AFE-T2	-

VR output voltage	VD detection voltage	S-87XXXXE Series
5.0 V	7.7 V	S-875077EUP-AJF-T2
5.0 V	6.1 V	S-875061EUP-AJH-T2
3.3 V	3.0 V	S-873330EUP-APB-T2
3.0 V	8.2 V	S-873082EUP-AMC-T2
3.0 V	6.2 V	S-873062EUP-AMB-T2

VR output voltage	VD detection voltage	S-87XXXXF Series
5.0 V	8.7 V	S-875087FUP-AKA-T2

\* Please design all applications of S-87X series with safety.

## BATTERY BACKUP IC

## S-8423 series

The S-8423 series is a switchover control IC for main and backup power supplies in 3V microcontroller applications, and consists of two voltage regulators, a switchover circuit and three voltage detectors (CS, RESET, PREEND). Due to built-in switch control circuit with special sequence and pre-end detection of battery, the S-8423 series can afford a one-chip backup system.

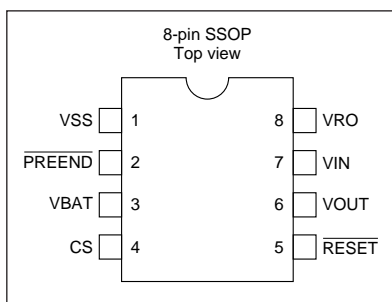
### APPLICATIONS

- Portable VTR camera
- Memory card
- Digital still camera
- Memory backup devices

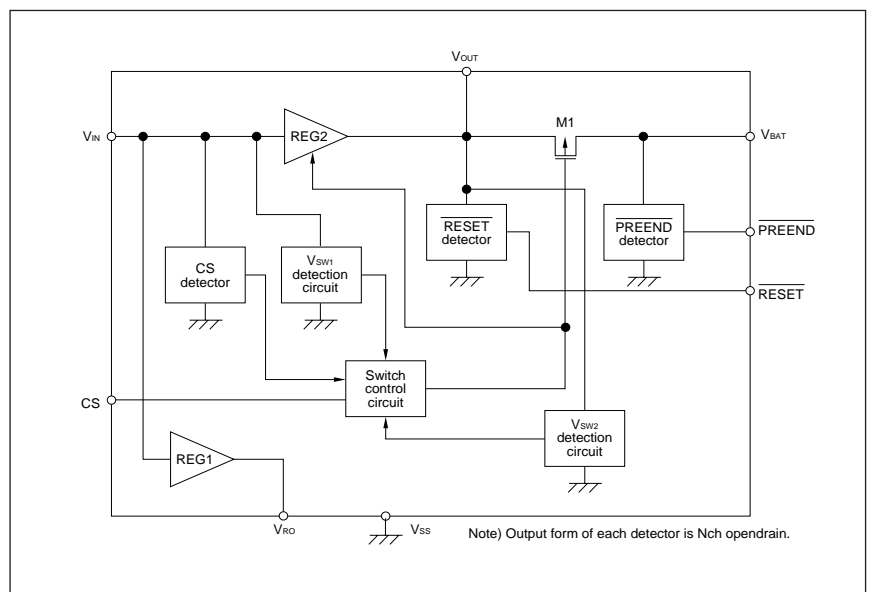
### FEATURES

- Switch control circuit  
When the voltage of the main power connected to the VIN terminal is less than CS release voltage, the backup voltage is not output to the VOUT terminal even when the backup power is connected to the VBAT terminal.
- Low current consumption  
Normal operation : 43  $\mu$ A max. ( $V_{IN}=6$  V)  
Backup : 2.1  $\mu$ A max.
- Small input/output voltage difference : 0.35 V max. ( $I_{OUT}=50$  mA)
- Output voltage accuracy :  $\pm 2\%$
- Detection voltage accuracy :  $\pm 2\%$
- 8-pin SSOP package

### PIN CONFIGURATIONS



### BLOCK DIAGRAM



### SPECIFICATIONS

Model No.	Output voltage (V) [ $V_{RO}=V_{OUT}$ ]			CS detection voltage (V)			CS release voltage (V)			RESET detection voltage (V)		
	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.
S-8423AFS-T2	3.23	3.30	3.37	3.919	4.000	4.081	4.003	4.100	4.197	2.253	2.300	2.347
S-8423LFS-T2	4.90	5.00	5.10	4.507	4.600	4.693	4.609	4.719	4.828	2.253	2.300	2.347
S-8423NFS-T2	3.135	3.200	3.265	3.234	3.300	3.366	3.315	3.400	3.485	2.351	2.400	2.449

( $T_a=25^\circ\text{C}$ )

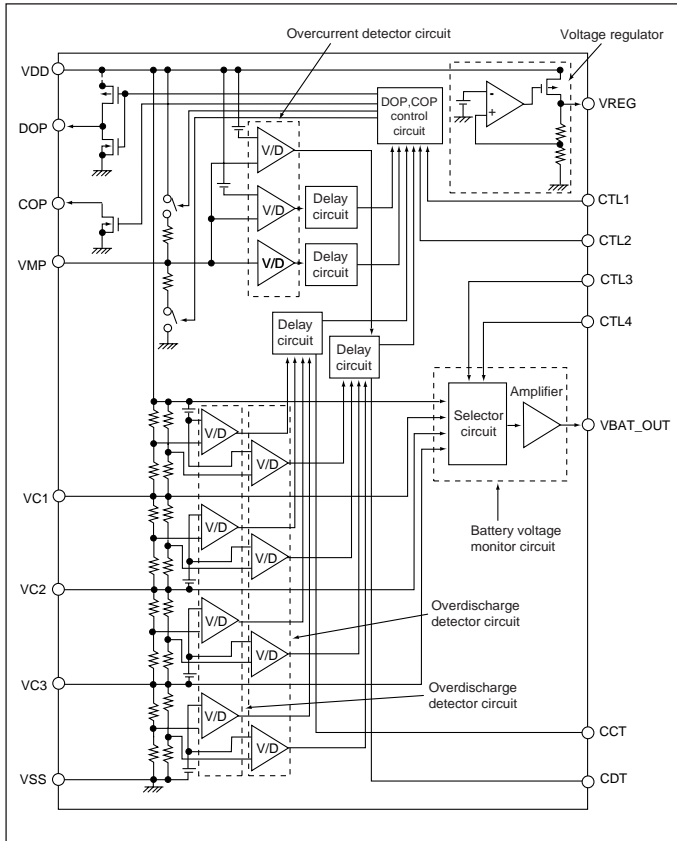


## BATTERY PROTECTION IC FOR 3- OR 4-SERIES CELLS

► UNDER DEVELOPMENT S-8243A/B series

The S-8243A/B series is designed for protection of lithium-ion batteries with three or four cells, and incorporates a high-accuracy voltage detector circuit, a delay circuit, a battery voltage monitor amplifier, and a voltage regulator. The S-8243A series is used for three-series cells. The S-8243B series is used for four-series cells.

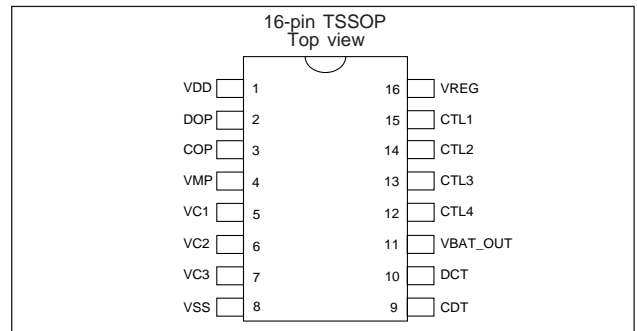
### ■ BLOCK DIAGRAM



### ■ FEATURES

- High-precision voltage detector circuit
  - Overcharge detection voltage range :  $3.90 \pm 0.025 \text{ V}$  to  $4.40 \pm 0.025 \text{ V}$  (0.05V step)
  - Overcharge release voltage range :  $3.80 \pm 0.050 \text{ V}$  to  $4.40 \pm 0.050 \text{ V}$  (0.05V step)
  - Overdischarge detection voltage range :  $2.0 \pm 0.08 \text{ V}$  to  $3.0 \pm 0.08 \text{ V}$  (0.1V step)
  - Overdischarge detection voltage range :  $2.0 \pm 0.10 \text{ V}$  to  $3.4 \pm 0.10 \text{ V}$  (0.1V step)
  - Overcurrent detection voltage 1 range :  $0.05 \pm 0.025 \text{ V}$  to  $0.30 \pm 0.025 \text{ V}$  (0.05V step)
  - Overcurrent detection voltage 2 range :  $0.5 \pm 0.1 \text{ V}$
  - Overcurrent detection voltage 3 range :  $VDD/2 \pm 20\%$
- Battery voltage monitor amplifier :  $VBAT\_OUT = VBAT \times 0.2 \pm 1.0\%$
- Voltage regulator :  $VOUT = 3.3 \text{ V} \pm 2.4\%$  (3 mA max.)
- High input-voltage device (absolute maximum rating: 26V)
- Wide operating voltage range : 6 to 24 V
- Three overcurrent detection levels
- The delay times for overcharge detection, overdischarge detection, and overcurrent detection 1 are set via an external capacitor
- Charge/discharge prohibition circuit via the control pin
- Wide operating temperature range : - 40 to +85 °C
- Low current consumption:
  - Operation : 120  $\mu\text{A}$  max. (+25 °C)
  - Power-down : 0.1  $\mu\text{A}$  max. (+25 °C)

### ■ PIN CONFIGURATIONS



## BATTERY PROTECTION IC FOR 1 CELL

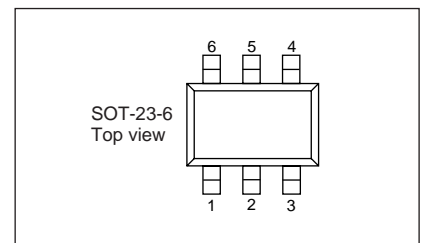
► UNDER DEVELOPMENT S-8261 series

The S-8261 is a series of lithium-ion or lithium polymer rechargeable battery protection ICs incorporating high-accuracy voltage detection circuit and delay circuits. It is suitable for overcharge, overdischarge, and overcurrent protection of a single-cell lithium-ion or lithium polymer rechargeable battery pack. The input voltage specification of the charge device connection pin is improved from that of the current S-8241 series.

### ■ FEATURES

- Internal high-accuracy voltage detector circuit
  - Overcharge detection voltage range : 3.9 V to 4.4 V (0.5 V step) accuracy :  $\pm 30 \text{ mV}$  (-5 °C to +55 °C)
  - Overcharge release voltage range : 3.8 V to 4.4 V (0.5 V step) accuracy :  $\pm 50 \text{ mV}$
  - Overdischarge detection voltage range : 2.0 V to 3.0 V (0.1 V step) accuracy :  $\pm 50 \text{ mV}$
  - Overdischarge release voltage range : 2.0 V to 3.4 V (0.1 V step) accuracy :  $\pm 70 \text{ mV}$
  - Overcurrent detection voltage 1 range : 0.05 V to 0.3 V (0.05 V step) accuracy :  $\pm 20 \text{ mV}$
  - Overcurrent detection voltage 2 range : 0.5 V (fixed) accuracy :  $\pm 100 \text{ mV}$
- High input-voltage device for the charger device connection pin (absolute maximum rating: 28 V)
- The delay time for every detection can be set within the internal circuit. Accuracy :  $\pm 30\%$
- Internal three overcurrent detection level (overcurrent 1, overcurrent 2, short-circuit)
- Selection of power-down mode
- Charge detection and abnormal charge current detection capabilities
- Low current consumption:
  - Operation: 3.0  $\mu\text{A}$  typ., 5.0  $\mu\text{A}$  max.
  - Power-down: 0.1  $\mu\text{A}$  max.
- Wide operating temperature range : -40 to 85 °C
- Small package: SOT-23-6 (6-pin)

### ■ PIN CONFIGURATIONS



No.	Name	Description
1	DO	Output pin for FET gate control for (CMOS output)
2	VM	Input pin for voltage detector between VSS to VM (overcurrent detection pin)
3	CO	Output pin for FET gate control for charge(CMOS output)
4	DP	Test pin for measurement of delay time
5	VDD	Positive power input pin
6	VSS	Negative power input pin

## BATTERY PROTECTION IC FOR 1 CELL

▶ NEW

S-8241 series

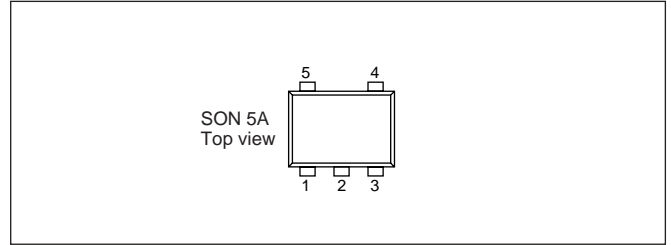
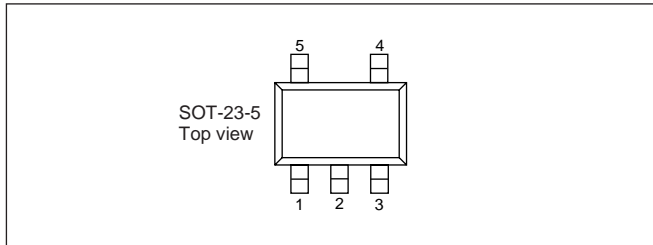
The S-8241 is a series of lithium-ion or lithium polymer rechargeable battery protection ICs incorporating high-accuracy voltage detection circuit and delay circuits. It is suitable for overcharge, overdischarge, and overcurrent protection of a single-cell lithium-ion or lithium polymer rechargeable battery pack.

### FEATURES

- Internal high-accuracy voltage detector circuit
  - Overcharge detection voltage range : 3.9 V to 4.4 V (0.5 V step)  
accuracy :  $\pm 30$  mV (-5 °C to +55 °C)
  - Overcharge release voltage range : 3.8 V to 4.4 V (0.5 V step)  
accuracy :  $\pm 50$  mV
  - Overdischarge detection voltage range : 2.0 V to 3.0 V (0.1 V step)  
accuracy :  $\pm 80$  mV
  - Overdischarge release voltage range: 2.0 V to 3.4 V (0.1 V step)  
accuracy :  $\pm 100$  mV

- Overcurrent detection voltage 1 range : 0.05 V to 0.3 V (0.05 V step)  
accuracy:  $\pm 20$  mV
- Overcurrent detection voltage 2 range : 0.5 V (fixed)  
accuracy:  $\pm 100$  mV
- High input-voltage device for the charger device connection pin (absolute maximum rating: 26 V)
- The delay time for every detection can be set within the internal circuit. Accuracy :  $\pm 30\%$
- Internal three overcurrent detection level (overcurrent 1, overcurrent 2, short-circuit)
- Selection of power-down mode
- Charge detection and abnormal charge current detection capabilities
- Low current consumption:
  - Operation: 3.0  $\mu$ A typ., 5.0  $\mu$ A max.
  - Power-down: 0.1  $\mu$ A max.
- Wide operating temperature range : -40 to 85 °C
- Small package: SOT-23-5 (5-pin), SON5A (5-pin)

### PIN CONFIGURATIONS



No.	Name	Description
1	VM	Input pin for voltage detection between VM and VSS. (Overcurrent detection pin)
2	VDD	Positive power supply pin
3	VSS	Negative power supply pin
4	DO	CMOS output pin for FET gate control for discharge
5	CO	CMOS output pin for FET gate control for charge

No.	Name	Description
1	VM	Input pin for voltage detection between VM and VSS. (Overcurrent detection pin)
2	VDD	Positive power supply pin
3	CO	CMOS output pin for FET gate control for charge
4	DO	CMOS output pin for FET gate control for discharge
5	VSS	Negative power supply pin

### SELECTION GUIDE

Model/item	Over charge detection voltage	Over charge release voltage	Over discharge detection voltage	Over discharge release voltage	Over current detection voltage 1	0V battery charging function	Delay time* combination	Powerdown function
S-8241ABAMC-GBA-T2	4.275 V	4.075 V	2.3 V	2.9 V	0.100 V	Unavailable	(1)	Available
S-8241ABCMC-GBC-T2	4.350 V	4.100 V	2.3 V	2.8 V	0.075 V	Unavailable	(1)	Available
S-8241ABDMC-GBD-T2	4.275 V	4.175 V	2.3 V	2.4 V	0.100 V	Available	(1)	Available
S-8241ABDPN-KBD-TF								
S-8241ABEMC-GBE-T2	4.295 V	4.095 V	2.3 V	3.0 V	0.200 V	Unavailable	(1)	Available
S-8241ABFMC-GBF-T2	4.325 V	4.075 V	2.5 V	2.9 V	0.100 V	Unavailable	(1)	Available
S-8241ABGMC-GBG-T2	4.200 V	4.100 V	2.3 V	3.0 V	0.100 V	Unavailable	(1)	Available
S-8241ABHMC-GBH-T2	4.325 V	4.125 V	2.3 V	2.3 V	0.100 V	Available	(1)	Available
S-8241ABIMC-GBI-T2	4.280 V	4.080 V	2.3 V	2.3 V	0.160 V	Unavailable	(1)	Available
S-8241ABKMC-GBK-T2	4.325 V	4.075 V	2.5 V	2.9 V	0.150 V	Unavailable	(1)	Available
S-8241ABLMC-GBL-T2	4.320 V	4.070 V	2.5 V	2.9 V	0.100 V	Unavailable	(1)	Available
S-8241ABNPN-KBN-TF	4.350 V	4.050 V	2.35 V	2.65 V	0.150 V	Available	(1)	Available
S-8241ABOMC-GBO-T2	4.350 V	4.15 V	2.3 V	3.0 V	0.150 V	Available	(2)	Available
S-8241ABPMC-GBP-T2	4.350 V	4.15 V	2.3 V	3.0 V	0.200 V	Available	(2)	Available

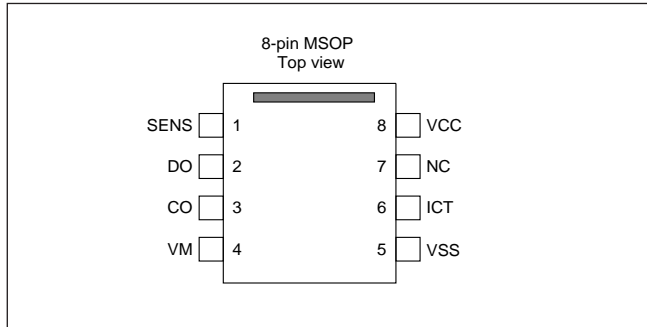
\* Delay time combination (1) and (2):

Delay time combination	Overcharge detection delay time	Overdischarge detection delay time	Overcurrent 1 detection delay time
(1)	1.0 s	125 ms	8 ms
(2)	0.125 s	31 ms	16 ms

The 8231 is a series of lithium-ion rechargeable battery protection ICs incorporating high-accuracy voltage detection circuits and delay circuits.

It is suitable for a single-cell lithium-ion battery pack.

## PIN CONFIGURATIONS



## SELECTION GUIDE

Model/Item	Over charge detection voltage (V)	Over charge release voltage (V)	Over discharge detection voltage (V)	Over discharge release voltage (V)	Over current detection voltage (V)	Over charge detection delay (C=0.047/μF)(Sec)	OV battery charging function	Final over charge magnification
<b>A Series</b>	±25mV accuracy	±50mV accuracy	±80mV accuracy	±100mV accuracy	±20mV accuracy	-	-	-
S-8231AAFN-CAA-T2	4.25	4.05	2.30	2.70	0.100	1.0	Available	1.24
S-8231ABFN-CAB-T2	4.35	4.10	2.30	3.00	0.100	1.0	Available	1.24
S-8231ACFN-CAC-T2	4.25	4.05	2.30	2.50	0.120	0.5	Unavailable	1.24
S-8231ADFN-CAD-T2	4.25	4.05	2.30	2.50	0.240	0.5	Unavailable	1.24
S-8231AEFN-CAE-T2	4.25	3.95	2.30	3.00	0.100	1.0	Available	1.24
S-8231AGFN-CAG-T2	4.25	4.05	2.30	2.70	0.150	1.0	Available	1.24
S-8231AHFN-CAH-T2	4.35	4.28	2.30	2.80	0.100	1.0	Available	1.24
S-8231AIFN-CAI-T2	4.25	4.05 *2	2.30	2.70	0.150	1.0	Available	1.24
S-8231AJFN-CAJ-T2	4.25	4.05	2.30	2.50	0.120	0.5	Available	1.24
S-8231AKFN-CAK-T2	4.25	4.05	2.30	2.50	0.240	0.5	Available	1.24
S-8231ALFN-CAL-T2	4.295	4.20	2.50	3.00	0.150	1.0	Unavailable	1.10
S-8231AMFN-CAM-T2	4.25	4.05	2.30	2.70	0.130	1.0	Unavailable	1.24
S-8231ANFN-CAN-T2	4.35	4.10	2.30	3.00	0.100	0.5	Unavailable	1.24
S-8231AOFN-CAO-T2	4.295	4.295 *1	2.30	3.00	0.300	1.0	Unavailable	1.10
S-8231AQFN-CAQ-T2	4.20	4.10	2.30	2.50	0.200	1.0	Unavailable	1.24
S-8231ARFN-CAR-T2	4.20	4.10	2.30	2.50	0.100	1.0	Unavailable	1.24
S-8231ASFN-CAS-T2	4.12	4.12 *1	2.30	2.50	0.200	1.0	Unavailable	1.10
S-8231ATFN-CAT-T2	4.35	4.10	2.30	3.00	0.250	1.0	Available	1.24
S-8231AUFN-CAU-T2	4.28	4.05	2.30	2.70	0.130	1.0	Available	1.24
S-8231AVFN-CAV-T2	4.28	4.05	2.30	2.70	0.130	1.0	Unavailable	1.24
S-8231AWFN-CAW-T2	4.28	4.18	2.30	2.90	0.080	1.0	Unavailable	1.24
S-8231AXFN-CAX-T2	4.295	4.295 *1	2.30	3.00	0.300	1.0	Unavailable	Unavailable
S-8231AYFN-CAY-T2	4.35	4.28	2.30	2.80	0.100	1.0	Available	Unavailable
<b>B Series</b>	Accuracy differs depending on products.	±50mV accuracy	±80mV accuracy	±100mV accuracy	±20mV accuracy	-	-	-
S-8231BAFN-CCA-T2	4.18 *3	3.98	2.60	2.90	0.110	1.0	Available	1.24
S-8231BBFN-CCB-T2	4.18 *3	4.08	2.30	2.90	0.110	1.0	Available	1.24

Change in the detection voltage is available in products other than the above listed ones. Contact our sales office.

\* Please design all applications of S-8231A/B series with safety.

## FEATURES

- High-accuracy voltage detection circuit
    - Overcharge detection voltage : 4.00 V ± 25 mV to 4.60 V ± 25 mV  
: 5 mV step
    - Overcharge release voltage : 3.70 V ± 50 mV to 4.60 V ± 50 mV  
: 5 mV step

(The overcharge release voltage can be selected within the range where the difference from overcharge detection voltage is 0 to 0.3 V)

  - Overdischarge detection voltage : 1.70 V ± 80 mV to 2.50 V ± 80 mV  
: 50 mV step
  - Overdischarge release voltage : 1.70 V ± 100 mV to 3.50 V ± 100 mV  
: 50 mV step
- (The overdischarge release voltage can be selected within the range where a difference from overdischarge detection voltage is 0 to 1.0 V)
- Overcurrent detection voltage 1 : 0.06 V ± 20 mV to 0.30 V ± 20 mV  
: 5 mV step
  - High input-voltage device (absolute maximum rating: 18 V)
  - Wide operating voltage range : 1.5 V to 16 V
  - The delay time for every detection can be set via an external capacitor.
 

Each delay time for Overcharge detection, Overdischarge detection, Overcurrent detection are "100:10:1" or "50:10:1"
  - Two overcurrent detection levels (protection for short-circuiting)
  - Internal auxiliary overvoltage detection circuit (Fail safe for overcharge detection voltage)
  - OV battery charge function (Prohibition is optional)
  - Low current consumption
    - Operation : 7.5 μA typ. 13.7 μA max.  
(-40 to +85 °C)
    - Power-down mode : 0.2 nA typ. 0.14 μA max.  
(-40 to +85 °C)
  - 8-pin MSOP package : 4.0 mm x 2.95 mm

\*1) No overcharge detection / release hysteresis.

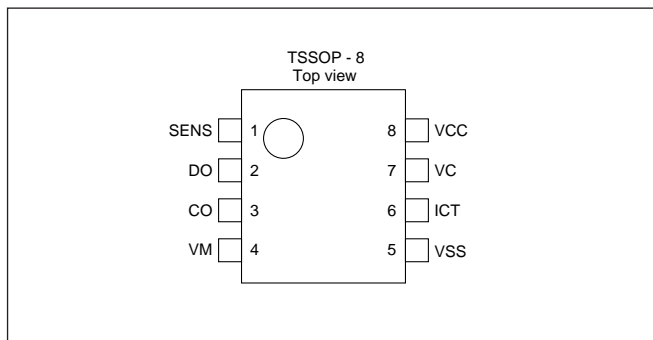
\*2) Both charging and discharging are unable after overcharge detection. (Overcharge lock)

\*3) In the range between 0 °C and 50 °C, an accuracy of detection voltage is assured as ±30 mV.

The S-8232 is a series of lithium-ion rechargeable battery protection ICs incorporating high-accuracy voltage detection circuits and delay circuits.

It is suitable for a 2 series-cell lithium-ion battery pack.

### PIN CONFIGURATIONS



### FEATURES

- Internal high-accuracy voltage detection circuit
    - Overcharge detection voltage : 3.90 V ± 25 mV to 4.60 V ± 25 mV : 5 mV step
    - Overcharge release voltage : 3.60 V ± 50 mV to 4.60 V ± 50 mV : 5 mV step

(The over charge release voltage can be selected within the range where a difference from overcharge detection voltage is 0 to 0.3 V)
  - Overdischarge detection voltage : 1.70 V ± 80 mV to 2.60 V ± 80 mV : 50 mV step
  - Overdischarge release voltage : 1.70 V ± 100 mV to 3.80 V ± 100 mV : 50 mV step
- (The overdischarge release voltage can be selected within the range where a difference from overdischarge detection voltage is 0 to 1.2V)
- Overcurrent detection voltage 1 : 0.07 V ± 20 mV to 0.30 V ± 20 mV : 5 mV step
  - High input-voltage device (absolute maximum rating: 18 V)
  - Wide operating voltage range : 2.0 V to 16 V
  - The delay time for every detection can be set via an external capacitor. Each delay time for overcharge detection, overdischarge detection, overcurrent detection are 100:10:1
  - Two overcurrent detection levels (protection for short-circuiting)
  - Internal auxiliary overvoltage detection circuit (Fail safe for over voltage)
  - 0V battery charging function (Prohibition is optional)
  - Low current consumption
    - Operation : 7.5 μA typ. 14.2 μA max (-40 to +85 °C)
    - Power-down mode : 0.2 nA typ. 0.1 μA max (-40 to +85 °C)
  - 8-pin TSSOP package : 6.4 mm x 3.1 mm

### SELECTION GUIDE

Model/item	Overcharge detection voltage	Overcharge release voltage	Over discharge detection voltage	Overdischarge release voltage	Over current detection voltage 1	Over charge detection delay (C3=0.22 μF)	0V battery charging function
S-8232AAFT-T2	4.25 V±25 mV	4.05 V±50 mV	2.40 V±80 mV	3.00 V±100 mV	0.150 V±20 mV	1.0 sec	Available
S-8232ABFT-T2	4.35 V±25 mV	4.15 V±50 mV	2.30 V±80 mV	3.00 V±100 mV	0.300 V±20 mV	1.0 sec	Available
S-8232ACFT-T2	4.35 V±25 mV	4.15 V±50 mV	2.30 V±80 mV	3.00 V±100 mV	0.300 V±20 mV	1.0 sec	Unavailable
S-8232AEFT-T2	4.35 V±25 mV	4.28 V±50 mV	2.15 V±80 mV	2.80 V±100 mV	0.100 V±20 mV	1.0 sec	Available
S-8232AFFT-T2	4.25 V±25 mV	4.05 V±50 mV	2.30 V±80 mV	2.70 V±100 mV	0.300 V±20 mV	1.0 sec	Available
S-8232AGFT-T2	4.25 V±25 mV	4.05 V±50 mV	2.20 V±80 mV	2.40 V±100 mV	0.200 V±20 mV	1.0 sec	Available
S-8232AHFT-T2	4.25 V±25 mV	4.05 V±50 mV	2.20 V±80 mV	2.40 V±100 mV	0.300 V±20 mV	1.0 sec	Available
S-8232AIFT-T2	4.325 V±25 mV	4.325 V *1,2	2.40 V±80 mV	3.00 V±100 mV	0.300 V±20 mV	1.0 sec	Unavailable
S-8232AJFT-T2	4.25 V±25 mV	4.05 V±50 mV	2.40 V±80 mV	3.00 V±100 mV	0.150 V±20 mV	1.0 sec	Unavailable
S-8232AKFT-T2	4.20 V±25 mV	4.00 V±50 mV	2.30 V±80 mV	2.90 V±100 mV	0.200 V±20 mV	1.0 sec	Available
S-8232ALFT-T2	4.30 V±25 mV	4.05 V±50 mV	2.00 V±80 mV	3.00 V±100 mV	0.200 V±20 mV	1.0 sec	Available
S-8232AMFT-T2	4.19 V±25 mV	4.19 V *1	2.00 V±80 mV	3.00 V±100 mV	0.190 V±20 mV	1.0 sec	Available
S-8232ANFT-T2	4.325 V±25 mV	4.325 V *1,3	2.40 V±80 mV	3.00 V±100 mV	0.300 V±20 mV	1.0 sec	Unavailable
S-8232AOFT-T2	4.30 V±25 mV	4.05 V±50 mV	2.00 V±80 mV	3.00 V±100 mV	0.230 V±20 mV	1.0 sec	Available
S-8232APFT-T2	4.28 V±25 mV	4.05 V ±50 mV	2.30 V±80 mV	2.90 V±100 mV	0.100 V±20 mV	1.0 sec	Unavailable

\*1) No over charge detection/release hysteresis.

\*2) Final over charge magnification: x 1.11. Others: x 1.25.

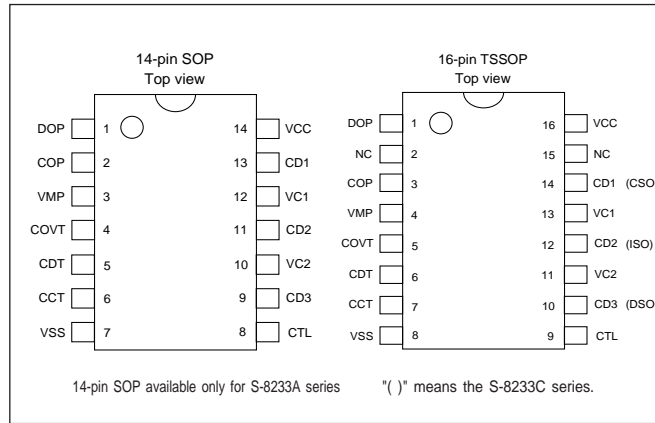
\*3) Without Final over charge function

Change in the detection voltage is available in products other than the above listed ones. Please contact our sales office.

\* Please design all applications of S-8232 series with safety.

The S-8233A series is a series of lithium-ion rechargeable battery protection ICs incorporating high-accuracy voltage detectors and a delay circuit. This series is suitable for protecting a three-cell pack.

**■ PIN CONFIGURATIONS**



**■ FEATURES**

- Internal high-accuracy voltage detection circuit
  - Overcharge detection voltage : 4.10 V ± 0.05 V to 4.35 V ± 0.05 V : 0.05 V step
  - Accuracy of overcharge detection voltage ± 25mV (B series)
  - Overcharge release voltage : 3.85 V ± 0.10 V to 4.35 V ± 0.10 V : 0.05 V step

(The overcharge release voltage can be selected within the range where a difference from overcharge detection voltage is 0 to 0.3 V)

- Overdischarge detection voltage : 2.00 V ± 0.08 V to 2.70 V ± 0.08 V : 0.10 V step
- Overdischarge release voltage : 2.00 V ± 0.10 V to 3.70 V ± 0.10 V : 0.10 V step

(The overdischarge release voltage can be selected within the range where a difference from overdischarge detection voltage is 0 to 1.0V)

- Overcurrent detection voltage 1 : 0.15 V ± 10% to 0.50 V ± 10% : 0.05 V step
- Function for checking battery-pack status (C series)
- High input-voltage device (absolute maximum rating: 26 V)
- Wide operating voltage range : 2 V to 24 V
- The delay time for every detection can be set via an external capacitor.
- Three over current detection levels (protection for short-circuiting)
- Internal charge/discharge prohibition circuit via the control terminal
- The function for charging batteries from 0 V is available.
- Low current consumption
  - Operation : 50 μA max. (+25 °C)
  - Power-down : 0.1 μA max. (+25 °C)
- 14-pin SOP package (A series Only)  
16-pin TSSOP package available

**■ SELECTION GUIDE**

• S-8233A series

14 pin SOP	16 pin TSSOP	Overcharge detection voltage	Overcharge release voltage	Overdischarge detection voltage	Overdischarge release voltage	Overcharge release voltage 1	0V battery charging function
S-8233ACFE-TB	S-8233ACFT-TB	4.25 V±50 mV	4.05 V±100 mV	2.00 V±80 mV	2.30 V±100 mV	0.20 V±10%	Unavailable
S-8233ADFE-TB	S-8233ADFT-TB	4.10 V±50 mV	*1	2.00 V±80 mV	2.30 V±100 mV	0.20 V±10%	Unavailable
S-8233AEFE-TB	S-8233AEFT-TB	4.25 V±50 mV	4.10 V±100 mV	2.30 V±80 mV	2.70 V±100 mV	0.15 V±10%	Unavailable
S-8233AFFE-TB	S-8233AFFT-TB	4.35 V±50 mV	4.05 V±100 mV	2.40 V±80 mV	2.70 V±100 mV	0.50 V±10%	Available
S-8233AGFE-TB	S-8233AGFT-TB	4.25 V±50 mV	4.05 V±100 mV	2.40 V±80 mV	2.70 V±100 mV	0.40 V±10%	Available
S-8233AIFE-TB	S-8233AIFT-TB	4.25 V±50 mV	4.10 V±100 mV	2.30 V±80 mV	3.00 V±100 mV	0.15 V±10%	Unavailable
S-8233AJFE-TB	-	4.35 V±50 mV	4.05 V±100 mV	2.40 V±80 mV	2.70 V±100 mV	0.30 V±10%	Unavailable

\*1 No overcharge detection hysteresis.

• S-8233B series

16 pin TSSOP	Overcharge detection voltage	Overcharge release voltage	Overdischarge detection voltage	Overdischarge release voltage	Overcurrent detection voltage 1	0V battery charging function	Conditioning function	CTL logic *2
S-8233BAFT-TB	4.225 V±0.025 V	4.225 V *1	2.30 V±0.08 V	2.70 V±0.10 V	0.20 V±10%	Unavailable	Available	Normal
S-8233BBFT-TB	4.325 V±0.025 V	4.15 V±0.10 V	2.30 V±0.08 V	2.70 V±0.10 V	0.20 V±10%	Unavailable	Unavailable	Inverting

\*1 No overcharge detection / release hysteresis.

\*2 Normal : Both charging and discharging are prohibited by turning off the charging FET and the discharging FET when the control pin is floated.

Inverting : Both charging and discharging are prohibited when the control pin is set at VSS level.

• S-8233C series

16 pin TSSOP	Overcharge detection voltage	Overcharge release voltage	Overdischarge detection voltage	Overdischarge release voltage	Overcurrent detection voltage 1	0V battery charging function
S-8233CAFT-TB	4.25 V±0.05 V	4.05 V±0.10 V	2.00 V±0.08 V	2.30 V±0.10 V	0.25 V±10%	Unavailable

Change in the detection voltage is available in products other than the above listed ones. Contact our sales office.

\* Please design all applications of S-8233A/B/C series with safety.

## BATTERY PROTECTION IC FOR 1 TO 4-SERIES CELLS (FOR SECONDARY PROTECTION)

S-8244 Series

The S-8244 series is a secondary protection IC for lithium-ion rechargeable batteries utilizing precise voltage detection circuit and delay circuit. The S-8244 supports 1 to 4-series cells by creating a short between terminals for cells.

### FEATURES

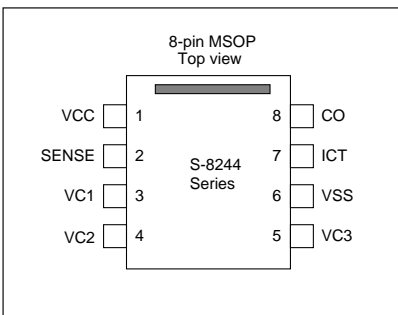
- High precision voltage detection circuit  
Overcharge detection voltage : 3.7 V to 4.5 V (5 mV step)  
:  $\pm 25$  mV (+25 °C)  
:  $\pm 50$  mV (-40 °C to +85 °C)  
Hysteresis : Choose from the following five  
0.38 V  $\pm$  0.1 V, 0.25 V  $\pm$  0.07 V,  
0.13 V  $\pm$  0.04 V, 0.045 V  $\pm$  0.02 V or none
- High withstand-voltage device : (absolute maximum rating: 26 V)
- Wide operating voltage range : 3.6-24 V (Within this range, the delay circuit will operate normally after detecting overvoltage.)
- Delay time upon detection can be set by an external capacitor.
- Low current consumption  
When each cell is 3.5 V : 3.0  $\mu$ A max. (+25 °C)  
When each cell is 2.3 V : 2.4  $\mu$ A max. (+25 °C)
- Small package 8-pin MSOP
- Output logic and form : Select one of the following four  
Active high CMOS output  
Active low CMOS output  
Active low Pch open-drain output  
Active high Nch open-drain output  
(Note: 0.045 V hysteresis products support only CMOS output.)

### SELECTION GUIDE

Model/Item	Over charge detection voltage	Over charge hysteresis voltage	Output logic and form
S-8244AAAFN-CEA-T2	4.45 $\pm$ 0.025 V	0.38 V $\pm$ 0.1 V	Active high CMOS output
S-8244AABFN-CEB-T2	4.2 $\pm$ 0.025 V	0V	Active high Nch open-drain output
S-8244AACFN-CEC-T2	4.115 $\pm$ 0.025 V	0.13 V $\pm$ 0.04 V	Active high CMOS output
S-8244AADFN-CED-T2	4.2 $\pm$ 0.025 V	0 V	Active low Pch open-drain output
S-8244AAEFN-CEE-T2	4.225 $\pm$ 0.025 V	0 V	Active high Nch open-drain output
S-8244AAFFN-CEF-T2	4.35 $\pm$ 0.025 V	0.045 V $\pm$ 0.02 V	Active high CMOS output
S-8244AAGFN-CEG-T2	4.45 $\pm$ 0.025 V	0.045 V $\pm$ 0.02 V	Active high CMOS output
S-8244AAHFN-CEH-T2	4.3 $\pm$ 0.025 V	0.25 V $\pm$ 0.07 V	Active high CMOS output

\* Detection voltages other than those listed above are also available. Please contact our sales office.

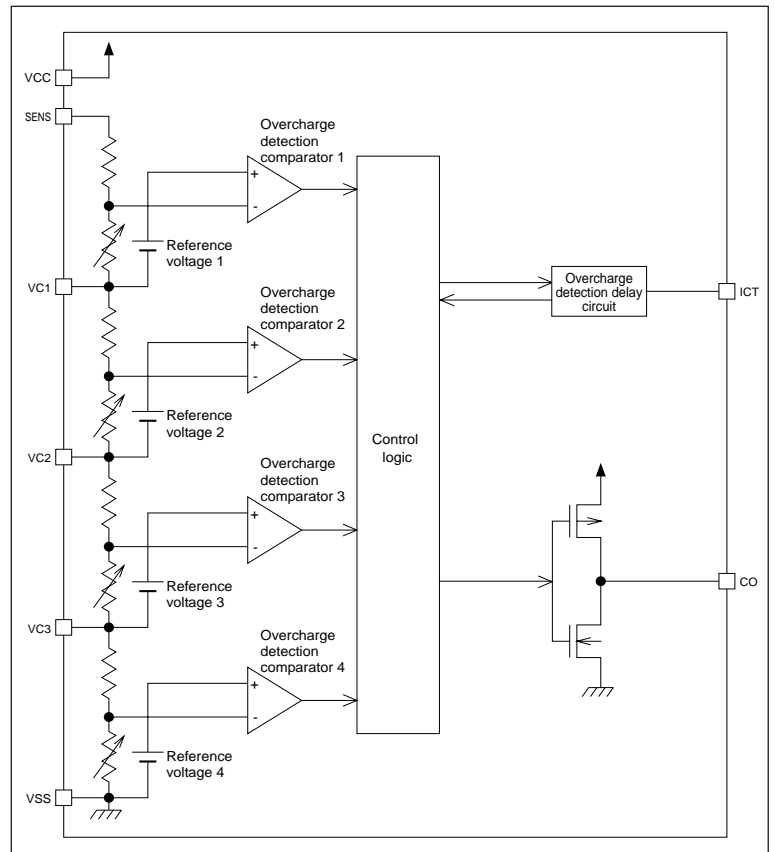
### PIN CONFIGURATIONS



Pin No.	Pin Name	Functions
1	VCC	Positive power supply input pin
2	SENSE	Positive voltage connection pin for Battery 1
3	VC1	Negative voltage connection pin for Battery 1, Positive voltage connection pin for Battery 2
4	VC2	Negative voltage connection pin for Battery 2, Positive voltage connection pin for Battery 3
5	VC3	Negative voltage connection pin for Battery 3, Positive voltage connection pin for Battery 4
6	VSS	Negative power supply input pin, Negative voltage connection pin for Battery 4
7	ICT	Capacitor connection pin for overcharge detection delay
8	CO	FET gate connection pin for charge control

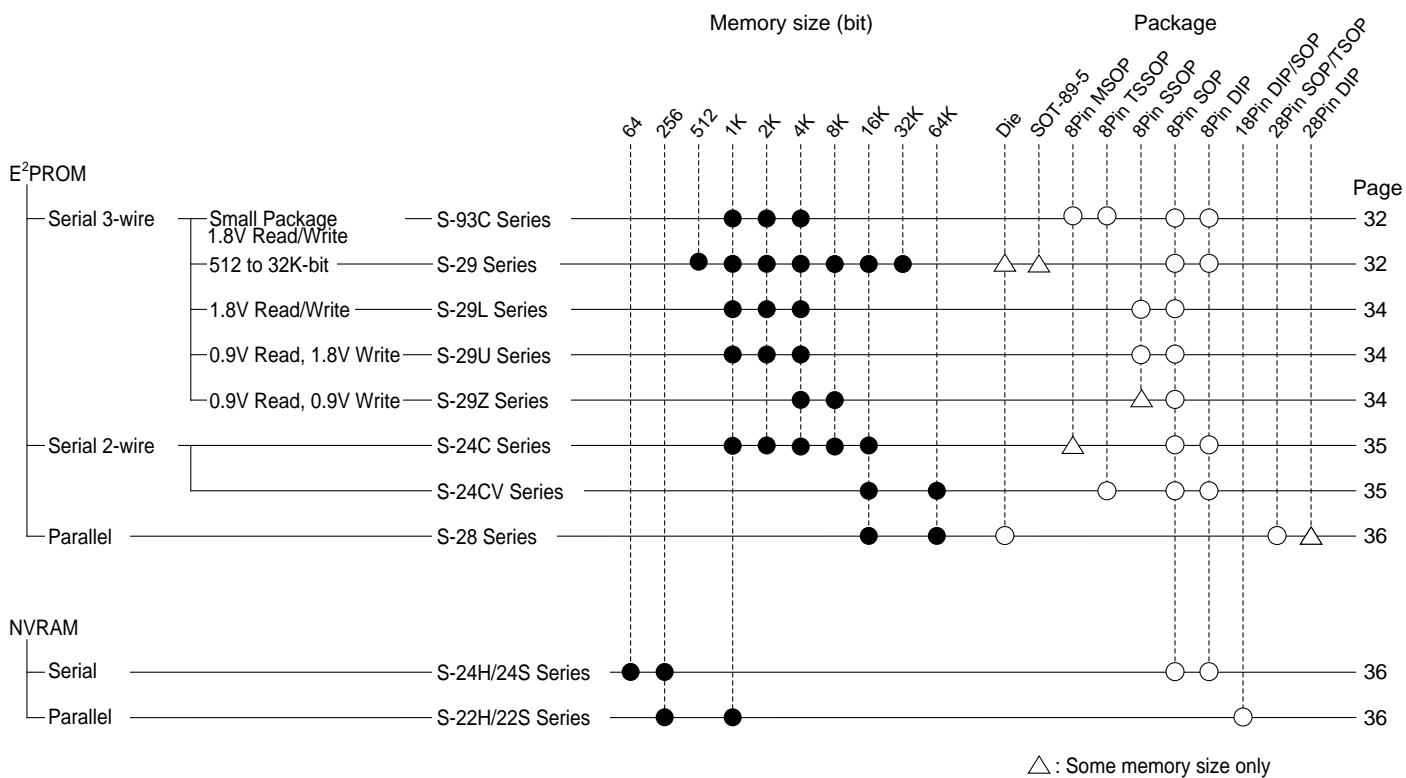
\* Please design all applications of S-8244 series with safety.

### BLOCK DIAGRAM





## Memory Line-up



By using the CMOS Silicon-gate process and the floating gate memory cell, these series of devices realize high reliability. The line-up variety offers the best product in each application.

**FEATURES**

- Low current consumption  
Standby : 1.0  $\mu$ A max.
- Wide operating voltage : 1.8 V to 5.5 V (S-93CX6A)
- Write operation with a built-in timer
- Erase data mode and write all mode
- Data retention : 10 years
- Endurance :  $10^5$  cycles/word  
1K-bit to 32K-bit :  $10^6$  cycles/word also available.
- Operating temperature : -40 °C to 85 °C

**APPLICATIONS**

- Data storage for 5 V commercial devices.
- Data storage for 3 V low current consumption portable devices.

**SPECIFICATIONS**

Memory size	Model No.	Organization	Instruction code conformability	Functions				Package	Pin config No.	Operating voltage		Current consumption		Clock frequency Max.
				Continuous read operation *1	Memory protection *2	CS Active *3	Micro computer interface *4			Read	Write	Read Max.	Standby Max.	
512 bit	S-2900A	64 x 8	SII original	-	-	H	○	8DIP/SOP SOT-89-5 Die	1	1.5 to 5.5 V	2.7 to 5.5 V	1.4 mA(5.5 V) 0.4 mA(1.5 V)	1.0 $\mu$ A	2.0 MHz
1K bit	S-93C46A	64 x 16	NM93CS46	○	-	H	-	8DIP/SOP 8TSSOP 8MSOP	2	1.8 to 5.5 V	1.8 to 5.5 V	0.8 mA (5.5 V) 0.4 mA (2.5 V)	1.0 $\mu$ A	0.25 MHz(1.8 V) to 2.0 MHz(5.5 V)
	S-29130A	64 x 16	NM93CS46	○	-	H	-	8DIP/SOP	3	1.8 to 6.5 V	2.5 to 6.5 V		1.0 $\mu$ A	2.0 MHz
	S-29131A	32 x 16 + 32 x 16	NM93CS46	○	○	H	-	8DIP/SOP	4					
	S-29190A	64 x 16	SII original	○	-	H	○	8DIP/SOP	4					
	S-29191A	32 x 16 + 32 x 16	SII original	○	○	H	○	8DIP/SOP	4					
	S-29194A	32 x 16 + 32 x 16	SII original	○	○	L	○	8DIP/SOP	4					
2K bit	S-93C56A	128 x 16	NM93CS56	○	-	H	-	8DIP/SOP 8TSSOP 8MSOP	2			1.8 to 5.5 V		
	S-29220A	128 x 16	NM93CS56	○	-	H	-	8DIP/SOP	3	1.8 to 6.5 V	2.5 to 6.5 V	1.0 $\mu$ A	2.0 MHz	
	S-29221A	64 x 16 + 64 x 16	NM93CS56	○	○	H	-	8DIP/SOP	4					
	S-29231A	64 x 16 + 64 x 16	CAT33C102	○	○	H	-	8DIP/SOP	4					
	S-29230A	128 x 16	CAT35C102	○	-	H	-	8DIP/SOP	4					
	S-29290A	128 x 16	SII original	○	-	H	○	8DIP/SOP	4					
	S-29291A	64 x 16 + 64 x 16	SII original	○	○	H	○	8DIP/SOP	4					
	S-29294A	64 x 16 + 64 x 16	SII original	○	○	L	○	8DIP/SOP	4					
S-29255A	128 x 16	M6M80021	-	△	L	○	8DIP/SOP	5	1.8 to 6.5 V					2.7 to 6.5 V
4K bit	S-93C66A	256 x 16	NM93CS66	○	-	H	-	8DIP/SOP 8TSSOP 8MSOP	2	1.8 to 5.5 V	1.8 to 5.5 V	0.8 mA (5.5 V) 0.4 mA (2.5 V)	1.0 $\mu$ A	0.25 MHz(1.8 V) to 2.0 MHz(5.5 V)
	S-29331A	128 x 16 + 128 x 16	NM93CS66	○	○	H	-	8DIP/SOP	4	1.8 to 6.5 V	2.5 to 6.5 V		1.0 $\mu$ A	2.0 MHz
	S-29330A	256 x 16	NM93CS66	○	-	H	-	8DIP/SOP	3					
	S-29390A	256 x 16	SII original	○	-	H	○	8DIP/SOP	4					
	S-29391A	128 x 16 + 128 x 16	SII original	○	○	H	○	8DIP/SOP	4					
	S-29394A	128 x 16 + 128 x 16	SII original	○	○	L	○	8DIP/SOP	4					
S-29355A	256 x 16	M6M80041	-	△	L	○	8DIP/SOP	5	1.8 to 6.5 V			2.7 to 6.5 V		
8K bit	S-29430A	512 x 16	NM93CXX	○	-	H	-	8DIP/SOP	6	1.8 to 5.5 V	2.5 to 5.5 V	1.2 mA (5.5 V) 0.4 mA (2.5 V)	1.0 $\mu$ A	0.20 MHz (1.8 V) to 1.4 MHz (5.5 V)
	S-29453A	512 x 16	M6M800X1	○	-	L	○	8DIP/SOP	4					
16K bit	S-29530A	1024x16	NM93C86A	○	-	H	-	8DIP/SOP	6	1.8 to 5.5 V	1.8 to 5.5 V	0.4 mA (2.5 V)	1.0 $\mu$ A	0.20 MHz (1.8 V) to 1.4 MHz (5.5 V)
	S-29590A		SII original	○	-	H	○							
32K bit	S-29630A	2048x16	NM93CXX	○	-	H	-	Die	6	1.8 to 5.5 V	1.8 to 5.5 V	0.4 mA (2.5 V)	1.0 $\mu$ A	0.20 MHz (1.8 V) to 1.4 MHz (5.5 V)
	S-29690A		SII original	○	-	H	○							

\* 1 In continuous read operation address is incremented sequentially every 16-bit word.

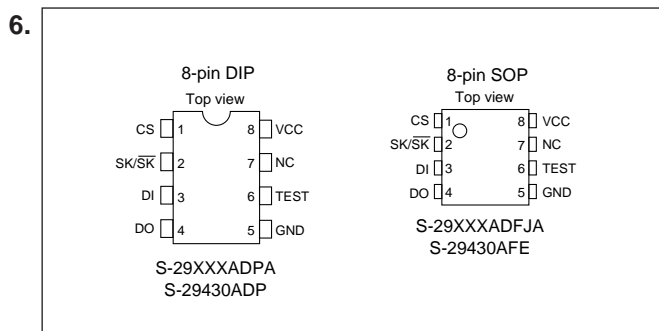
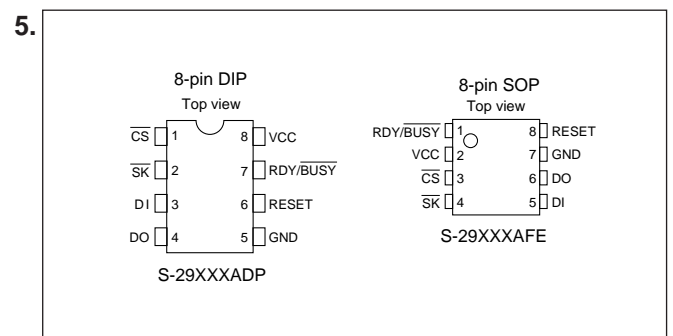
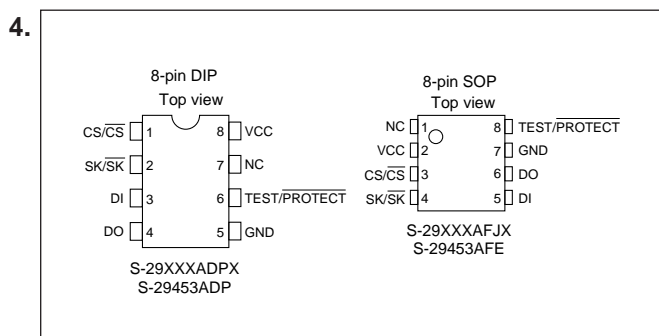
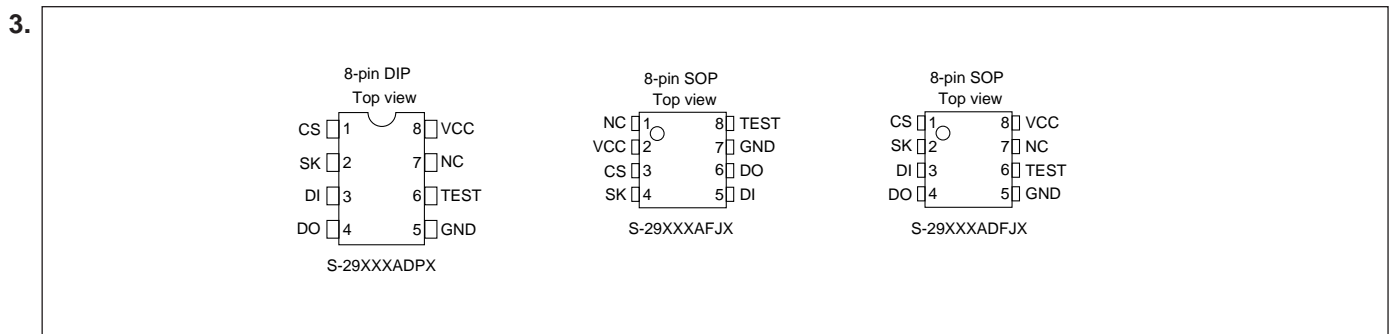
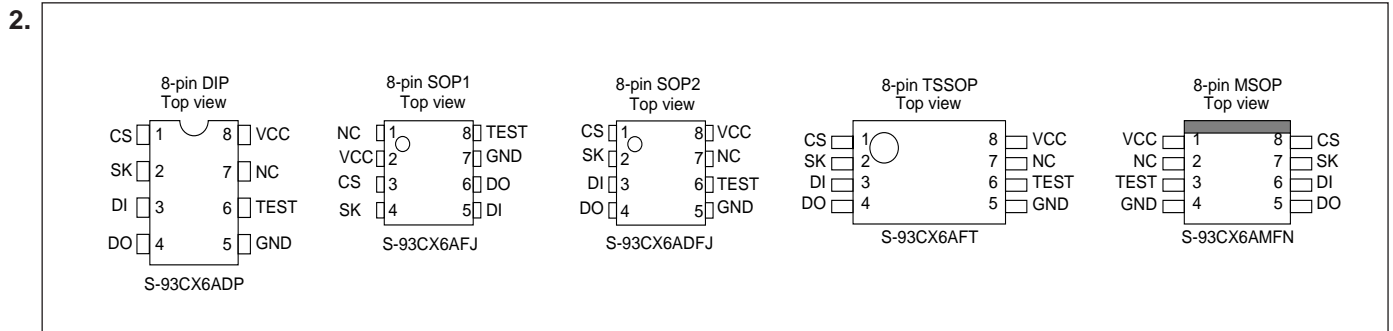
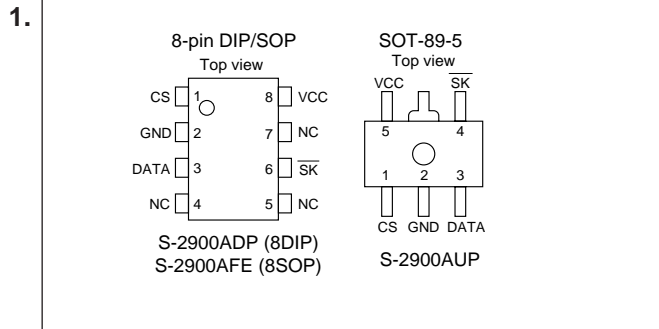
\* 2 50% memory protection from the first address.

\* 3 CS : chip select

\* 4 8-bit composition instruction enables easy interface with serial port.

△: Memory protection by RESET pin

## PIN CONFIGURATIONS

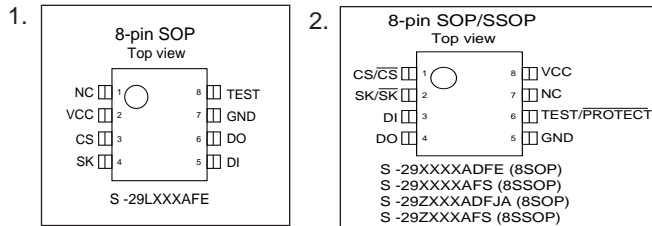


The S-29L series, the S-29U series and the S-29Z series are serial E<sup>2</sup>PROMs characterized by low power consumption and low operating voltage.

The S-29L series, which can be operated from 1.8V, are suitable for 3-volt battery driven portable equipment.

The S-29U series and the S-29Z series, which can be operated from 0.9V, are suitable for 1.5-volt battery driven portable equipment.

### PIN CONFIGURATIONS



### FEATURES

- Low operating voltage
  - S-29L series : Read 1.8 to 5.5 V, Write 1.8 to 5.5 V
  - S-29U series : Read 0.9 to 3.6 V, Write 1.8 to 3.6 V
  - S-29Z series : Read 0.9 to 3.6 V, Write 0.9 to 3.6 V
- Low current consumption
- Endurance
  - : 10<sup>5</sup> cycles/word
  - : 10<sup>6</sup> cycles/word also available (S-29L/29U series only).
- Data retention : 10 years
- Operating temperature : -40 °C to +85 °C
- Package : 8-pin SOP or 8-pin SSOP  
(Mounting area of SSOP is 62% of that of SOP)

### SPECIFICATIONS

Memory size	Model No.	Instruction code conformability	Function				Pin Config No.	Operating voltage		Current consumption		Clock frequency Max.	Package						
			Continuous read operation *1	Memory protection *2	CS Active *3	Micro computer Interface *4		Read	Write	Read Max.	Standby Max.								
1K bit (x 16 bit)	S-29L130A	NM93CS46	○	-	H	-	1,2	1.8 V to 5.5 V	1.8 V to 5.5 V	0.4 mA to 0.8 mA (1.8 V) (5.5 V)	0.4 μA to 0.8 μA (1.8 V) (5.5 V)	0.25M Hz to 2.0M Hz (1.8 V) (5.5 V)	8SOP/ SSOP						
	S-29L131A	NM93CS46	○	○	H	-	2												
	S-29L194A	SII original	○	○	L	○	2												
2K bit (x 16 bit)	S-29L220A	NM93CS56	○	-	H	-	1,2							0.9 V to 3.6 V	1.8 V to 3.6 V	0.2 mA to 0.6 mA (0.9 V) (3.6 V)	1.0 μA to 2.0 μA [-10 to +70 °C]	500k Hz (3.6 V) [-10 to +70 °C]	8SOP/ SSOP
	S-29L221A	NM93CS56	○	○	H	-	2												
	S-29L294A	SII original	○	○	L	○	2												
4K bit (x 16 bit)	S-29L330A	NM93CS66	○	-	H	-	1,2	0.9 V to 3.6 V	0.9 V to 3.6 V	0.2 mA to 0.6 mA (0.9 V) (3.6 V)	2.0 μA [-40 to +85 °C]	500kHz (3.6 V) [-40 to +85 °C]	8SOP/ SSOP						
	S-29L331A	NM93CS66	○	○	H	-	2												
	S-29L394A	SII original	○	○	L	○	2												
4K bit (x 16 bit)	S-29Z330A	NM93CS66	○	-	H	-	2							0.9 V to 3.6 V	0.9 V to 3.6 V	0.2 mA to 0.6 mA (0.9 V) (3.6 V)	1.0 μA [-10 to +70 °C]	10k Hz(0.9 V) to 500k Hz(3.6 V) [-10 to +70 °C]	8SOP/ SSOP
	S-29Z331A	NM93CS66	○	○	H	-	2												
	S-29Z394A	SII original	○	○	L	○	2												
8K bit (x 16 bit)	S-29Z430A	NM93CSXX	○	-	H	-	2	0.9 V to 3.6 V	0.9 V to 3.6 V	0.2 mA to 0.6 mA (0.9 V) (3.6 V)	2.0 μA [-40 to +85 °C]	5k Hz(0.9 V) to 500k Hz(3.6 V) [-40 to +85 °C]	8SOP						
	S-29Z431A	NM93CSXX	○	○	H	-	2												
	S-29Z494A	SII original	○	○	L	○	2												

\*1 In continuous read operation address is incremented sequentially every 16th bit.

\*2 50% memory protection from the first address.

\*3 CS : chip select

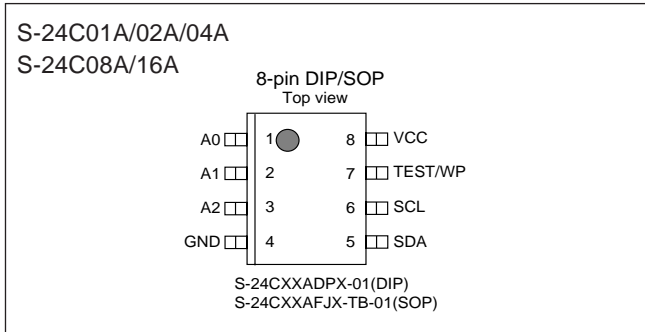
\*4 8-bit composition instruction enables easy interface with serial port.

## 2-WIRE BUS SERIAL E<sup>2</sup>PROM

## S-24C series

S-24C series are 2-wire bus serial E<sup>2</sup>PROMs characterized by low power consumption and wide operating voltage. Page write and sequential read are capable. Programming time for both byte write and page write is 1ms max. at 5V±10% operation in S-24CxxA series.

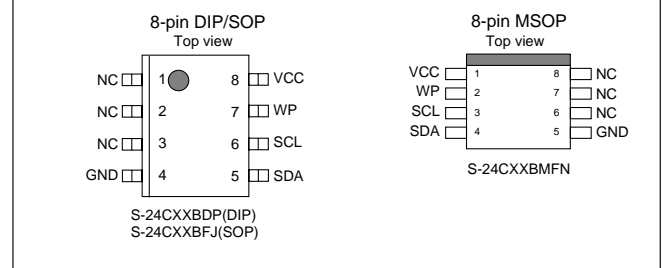
### PIN CONFIGURATIONS



### FEATURES

- Low current consumption
- Wide operating voltage
- Page write
- Sequential read
- Endurance : 10<sup>5</sup> cycles/word  
1K-bit to 4K-bit : 10<sup>6</sup> cycles/word also available.
- Data retention : 10 years
- Program time : 1ms max. (S-24CxxA series, V<sub>cc</sub>=5V±10%)

### S-24C01B/02B/04B



### SPECIFICATIONS

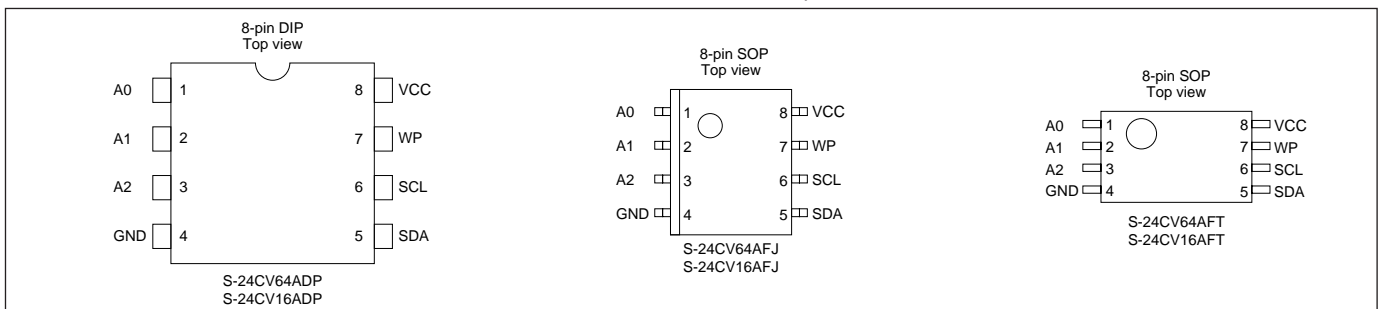
Item Model No.	Memory size	Composition	Page write	Operating voltage		Current consumption		Clock frequency Max.	Package
				Read	Write	Read Max.	Standby Max.		
S-24C01A	1K bits	128 x 8 bits	8 bytes	1.8 V to 5.5 V	2.5 V to 5.5 V	0.3 mA (3.3 V)	0.6 μA (3.3 V)	100k Hz	8DIP/SOP
S-24C02A	2K bits	256 x 8 bits	8 bytes			0.4 mA (5.5 V)	1.0 μA (5.5 V)		
S-24C04A	4K bits	512 x 8 bits	16 bytes						
S-24C08A	8K bits	1K x 8 bits	16 bytes	1.8 V to 5.5 V	2.5 V to 5.5 V	0.8 mA	0.6 μA (3.3 V)	400k Hz (4.5 to 5.5 V)	
S-24C16A	16K bits	2K x 8 bits	16 bytes			(5.5 V, 400k Hz)	1.0 μA (5.5 V)	100k Hz (1.8 to 5.5 V)	
S-24C01B	1K bits	128 x 8 bits	8 bytes						
S-24C02B	2K bits	256 x 8 bits	8 bytes	2.0 V to 5.5 V	2.0 V to 5.5 V	0.8 mA	1.0 μA (5.5 V)	400k Hz (4.5 to 5.5 V)	8DIP 8SOP 8MSOP
S-24C04B	4K bits	512 x 8 bits	16 bytes			(5.5 V, 400k Hz)		100k Hz (2.0 to 5.5 V)	

## 2-WIRE SERIAL EEPROM

## UNDER DEVELOPMENT S-24CV series

The S-24CV is a series of 2-wire, low power 16k/64k-bit EEPROMs with wide operating range. They are organized as 2048-word x 8-bit, and 8192-word x 8-bit respectively. Page write and sequential read are capable.

### PIN CONFIGURATIONS



### SPECIFICATIONS

Item Model	Memory size	Organization	Page write size	Operating voltage range		Current consumption		Clock frequency Max.	Package
				Read	Write	Read Max.	Stand by Max		
S-24CV64A	64 k bits	8192 x 8	32 bytes	1.8 V to 5.5 V	2.5 V to 5.5 V	0.8 mA max.	5.0 μA max.	400k Hz	8DIP/8SOP
S-24CV16A	16 k bits	2048 x 8	16 bytes	1.8 V to 5.5 V	2.5 V to 5.5 V	0.8 mA max.	5.0 μA max.	400k Hz	/8TSSOP

## PARALLEL E<sup>2</sup>PROM

S-28 series

The S-2812A and the S-2817A are 2K x 8-bit, and the S-2860B and the S-2864B are 8K x 8-bit parallel E<sup>2</sup>PROMs that feature low current consumption. The S-2812A and the S-2860B operate within a wide voltage range and can operate at 3 V. The S-2817A and the S-2864B operate at 5 V ± 10%.

### ■ SPECIFICATIONS

Model No.	Item	Memory size	Composition	Operating voltage		Current consumption		Address access time Max.	Package
				Read	Write	Operating Max.	Standby Max.		
S-2812A		16K bit	2K x 8 bit	1.8 to 5.5 V	2.7 to 5.5 V	30 mA	1.0 μA	150 ns	28 DIP/SOP/TSOP
S-2817A		16K bit	2K x 8 bit	5 V ± 10%	5 V ± 10%				Die
S-2860B		64K bit	8K x 8 bit	1.8 to 5.5 V	2.7 to 5.5 V				28 SOP/TSOP
S-2864B		64K bit	8K x 8 bit	5 V ± 10%	5 V ± 10%				Die

### ■ FEATURES

- Low current consumption
- Data retention : 10 years
- Erase/write cycles : 10<sup>5</sup> cycles
- 32-byte page write
- Data polling

## NVRAM

S-22H/22S series, S-24H/24S series

The NVRAM (non-volatile RAM) is a CMOS non-volatile memory device combining CMOS static RAM and non-volatile electrically erasable and programmable ROM (E<sup>2</sup>PROM) as its back-up on a bit-by-bit basis. Since the RAM is an asynchronously full CMOS static RAM, its current consumption is very low.

### ■ APPLICATIONS

- Constants setting
- Data memory
- Rewritable programs and firmware
- System configuration setting
- System parameters and part No. setting
- System status monitor

### ■ SPECIFICATIONS

Model No.	Item	Memory size	Organization	Operating voltage	Current consumption		Static RAM operation			Store operation	Array recall operation	Package
					Operating Max.	Standby Max.	Clock frequency Max.	Read cycle time Min.	Write cycle time Min.	Store time Max.	Recall cycle time Min.	
S-24H30		64-bit	8 x 8 Serial	5 V ± 10%	10 mA	1.0 μA	1M Hz	-	-	10 ms	2500 ns	8 DIP/SOP
S-24S30		64-bit	8 x 8 Serial	5 V ± 10%	10 mA	1.0 μA	1M Hz	-	-	10 ms	2500 ns	8 DIP/SOP
S-24H45		256-bit	16 x 16 Serial	5 V ± 10%	10 mA	1.0 μA	1M Hz	-	-	10 ms	2500 ns	8 DIP/SOP
S-24S45		256-bit	16 x 16 Serial	5 V ± 10%	10 mA	1.0 μA	1M Hz	-	-	10 ms	2500 ns	8 DIP/SOP
S-22H10		256-bit	64 x 4 Parallel	5 V ± 10%	30 mA	1.0 μA	-	200 ns	200 ns	10 ms	1300 ns	18 DIP/SOP
S-22S10		256-bit	64 x 4 Parallel	5 V ± 10%	30 mA	1.0 μA	-	200 ns	200 ns	10 ms	1300 ns	18 DIP/SOP
S-22H12		1K-bit	256 x 4 Parallel	5 V ± 10%	30 mA	1.0 μA	-	200 ns	200 ns	10 ms	1300 ns	18 DIP/SOP
S-22S12		1K-bit	256 x 4 Parallel	5 V ± 10%	30 mA	1.0 μA	-	200 ns	200 ns	10 ms	1300 ns	18 DIP/SOP

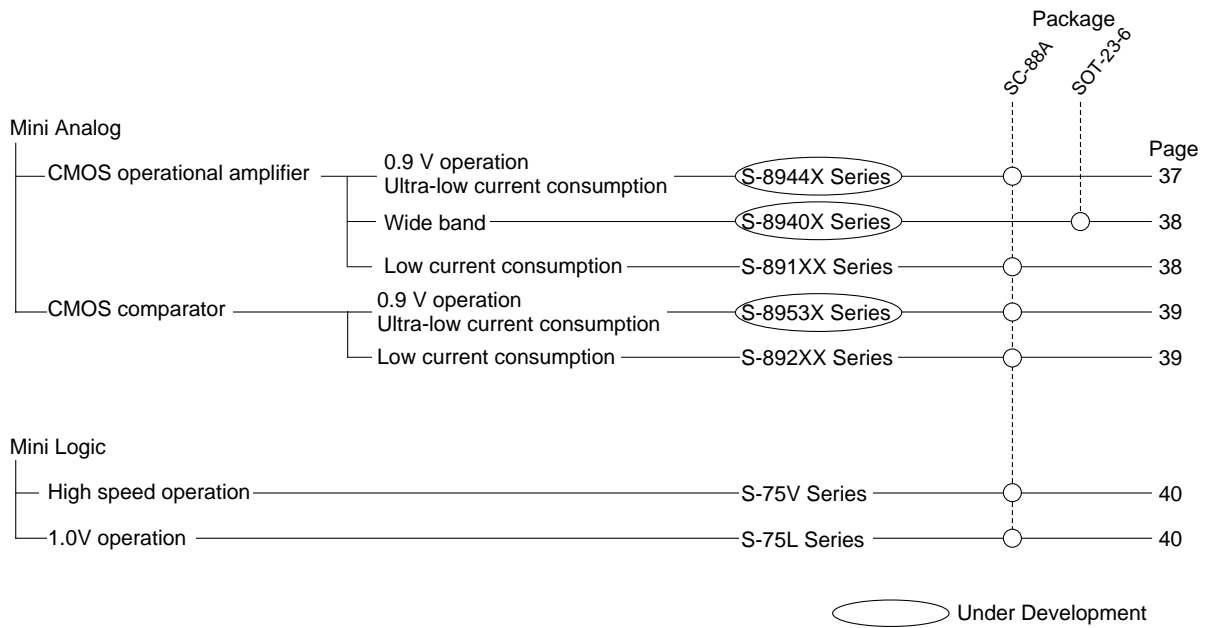
Note) S-22H/24H: All inputs/outputs are TTL compatible, and can be connected directly to TTL.  
S-22S/24S: Store and recall terminals are Schmitt inputs.

### ■ FEATURES

- 5-V single power operation E<sup>2</sup>PROM
- Store and recall are controlled by a narrow signal width: >200ns (parallel type)
- Store cycles for E<sup>2</sup>PROM : 10<sup>5</sup> cycles
- Data retention : 10 years
- Erroneous store protection : ≃ 3.5 V
- Wide operating temperature : -40 °C to +85 °C



## LINEUP OF GENERAL PURPOSE ICs



### MINI ANALOG SERIES CMOS SINGLE OPERATIONAL AMPLIFIER

▶ UNDER DEVELOPMENT

S-8944x series

The mini analog series integrates a wide use analog circuit in an ultra-small package. The S-8944XA series is a CMOS amplifier that features 0.9 V low voltage operation and 0.5  $\mu$ A ultra-low current consumption. The S-8944XA is best for use in battery driven portable devices due to rail-to-rail operation and no need for external parts resulted from internal phase compensation.

\* Rail-to-Rail is a registered trade mark of MOTOROLA.

#### FEATURES

- Low-operating voltage:  $V_{DD} = 0.9$  to 5.5 V
- Ultra-low current consumption:  $I_{DD} = 0.5 \mu\text{A}$  (typ.)
- Input/output Rail-to-Rail:  $V_{SS}$  to  $V_{DD}$
- Low input offset voltage: 4.0 mV max.
- No external parts is needed due to the internal phase compensation
- Small package (SC-88A: 2.0 mm x 2.1 mm)

#### APPLICATIONS

- Portable telephone, digital camera, PDA, portable AV devices

#### SELECTION GUIDE

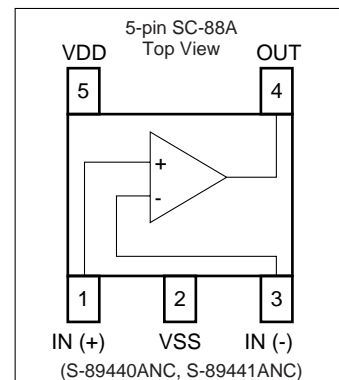
Input offset voltage	Model
10 mV max.	S-89440ANC-TB
4 mV max.	S-89441ANC-TB

#### SPECIFICATIONS

$T_a = 25^\circ\text{C}$

Model	S-89441ANC		
Absolute maximum input power voltage	7 V		
Operating temperature range	-40 to 85 $^\circ\text{C}$		
Package	SC-88A		
Operating voltage range	0.9 to 5.5 V		
Power voltage $V_{DD}$	at 0.9 V	at 1.8 V	at 3.0 V
Current consumption	0.9 $\mu\text{A}$ max.	0.9 $\mu\text{A}$ max.	0.9 $\mu\text{A}$ max.
Input offset voltage	4 mV max.	4 mV max.	4 mV max.
Input offset current	1 pA	1 pA	1 pA
Input bias current	1 pA	1 pA	1 pA
Common phase input voltage range	0 to 0.9 V	0 to 1.8 V	0 to 3.0 V
Voltage gain (open-loop)	70 dB	70 dB	70 dB
Maximum output amplitude voltage $V_{OH}$	0.85 V min.	1.75 V min.	2.95 V min.
Maximum output amplitude voltage $V_{OL}$	0.05 V max.	0.05 V max.	0.05 V max.
Slew rate	6.5 V/ms	6.5 V/ms	6.5 V/ms
Cut-off frequency	3.8 kHz	3.8 kHz	3.8 kHz
Sink current	10 $\mu\text{A}$ min.	220 $\mu\text{A}$ min.	220 $\mu\text{A}$ min.
Source current	30 $\mu\text{A}$ min.	220 $\mu\text{A}$ min.	400 $\mu\text{A}$ min.

#### PIN CONFIGURATIONS



## MINI ANALOG SERIES CMOS SINGLE OPERATIONAL AMPLIFIER

▶ UNDER DEVELOPMENT

S-8940X series

The mini analog series integrates a wide use analog circuit in an ultra-small package. The S-8940XA series is a CMOS operational amplifier that features 5 MHz wide band operating. The S-8940X series is best for use in battery driven

portable devices due to rail-to-rail operation and no need for external parts resulted from internal phase compensation.

\* Rail-to-Rail is a registered trade mark of MOTOROLA.

### SELECTION GUIDE

Input offset voltage	Model
10 mV max.	S-89400AND-TB
4 mV max.	S-89401AND-TB

### SPECIFICATIONS

Ta=25 °C, typ

Model	S-89401AND		
Absolute maximum input power voltage	7 V		
Operating temperature range	-40 to 85 °C		
Package	SC-88A		
Operating voltage range	0.9 to 5.5 V		
Power voltage VDD	at 1.2 V	at 1.8 V	at 3.0 V
Current consumption	1.0 mA max.	1.2 mA max.	1.4 mA max.
Input offset voltage	4 mV max.	4 mV max.	4 mV max.
Input offset current	1 pA	1 pA	1 pA
Input bias current	1 pA	1 pA	1 pA
Common phase input voltage range	0 to 1.2 V	0 to 1.8 V	0 to 3.0 V
Voltage gain (open-loop)	80 dB	90 dB	90 dB
Maximum output amplitude voltage VOH	1.15 V min.	1.75 V min.	2.95 V min.
Maximum output amplitude voltage VOL	0.05 V max.	0.05 V max.	0.05 V max.
Slew rate	10 V/μs	10 V/μs	10 V/μs
Cut-off frequency	5 MHz	5 MHz	5 MHz
Sink current	400 μA min.	900 μA min.	900 μA min.
Source current	750 μA min.	800 μA min.	800 μA min.

### APPLICATIONS

- Portable telephone, digital camera, PDA, portable AV devices

## MINI ANALOG SERIES CMOS SINGLE OPERATIONAL AMPLIFIER

S-891xx series

The mini analog series integrates a wide use analog circuit in an ultra-small package. The S-891X0A is a CMOS operational amplifier with a wide operating voltage range and ultra-low current consumption. The S-891X0A provides the best solution for battery powered portable equipment.

### FEATURES

- Low operating voltage : VDD= 1.8 to 5.5 V
- Low current consumption : IDD = 50 μA (S-89110ANC)  
: IDD = 10 μA (S-89120ANC)
- Low input offset voltage : 4.0 mV max.
- Small package : SC-88A

### SPECIFICATIONS

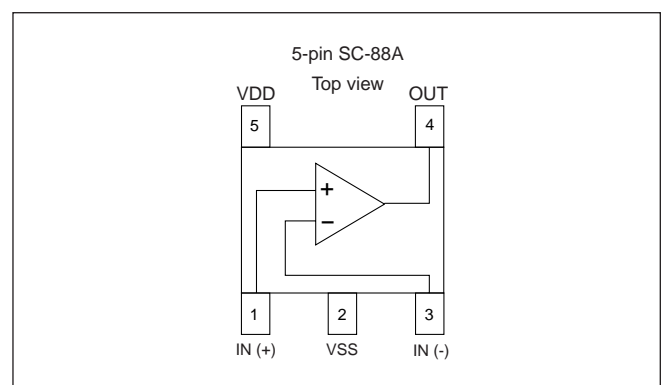
Ta = 25 °C

Model No.	S-89110ANC		S-89120ANC	
Absolute maximum rating (supply voltage)	10 V		10V	
Operation temperature range	-40 to 85 °C		-40 to 85 °C	
Package	SC-88A		SC-88A	
Operating voltage	1.8 to 5.5 V		1.8 to 5.5 V	
Power supply voltage (VDD)	at 1.8 V	at 3.0 V	at 1.8 V	at 3.0 V
Current consumption	50 μA typ.	50 μA typ.	10 μA typ.	10 μA typ.
Input offset voltage	4 mV max.	4 mV max.	4 mV max.	4 mV max.
Input offset current	1 pA	1 pA	1 pA	1 pA
Input bias current	1 pA	1 pA	1 pA	1 pA
Common-mode input voltage range	0 to 1.1 V	0 to 2.3 V	0 to 1.1 V	0 to 2.3 V
Voltage gain (open loop)	80 dB	80 dB	80 dB	80 dB
Max. output swing voltage (VOH)	1.7 V min.	2.9 V min.	1.7 V min.	2.9 V min.
Slew rate	0.07 V/μs	0.07 V/μs	0.015 V/μs	0.015 V/μs
Cut-off frequency	160K Hz	175K Hz	30K Hz	35K Hz
Sink current	5 mA min.	20 mA min.	5 mA min.	20 mA min.
Source current	100 μA min.	120 μA min.	20 μA min.	25 μA min.

### APPLICATIONS

- Cellular phone, PDA, Camera, Digital camera
- Camera integrated VCRs
- Notebook PCs

### PIN CONFIGURATIONS



## MINI ANALOG SERIES CMOS SINGLE COMPARATOR

▶ UNDER DEVELOPMENT

S-8953X series

The mini analog series integrates a wide use analog circuit in an ultra-small package. The S-8953XA series is a CMOS comparator that features 0.9 V low voltage operation and 0.7  $\mu$ A ultra-low current consumption. The S-8953X series is best for use in battery driven portable devices due to rail-to-rail operation and no need for external parts resulted from internal phase compensation.

\* Rail-to-Rail is a registered trade mark of MOTOROLA.

### SELECTION GUIDE

Input offset voltage	Model
10 mV max.	S-89530ANC-TB
4 mV max.	S-89531ANC-TB

### SPECIFICATION

Ta=25 °C, typ.

Model	S-89531ANC		
Absolute maximum input power voltage	7 V		
Operating temperature range	-40 to 85 °C		
Package	SC-88A		
Operating voltage range	0.9 to 5.5 V		
Power voltage VDD	at 0.9 V	at 1.8 V	at 3.0 V
Current consumption	1.0 $\mu$ A max.	1.1 $\mu$ A max.	1.2 $\mu$ A max.
Input offset voltage	4 mV max.	4 mV max.	4 mV max.
Input offset current	1 pA	1 pA	1 pA
Input bias current	1 pA	1 pA	1 pA
Common phase input voltage range	0 to 0.9 V	0 to 1.8 V	0 to 3.0 V
Voltage gain (close-loop)	90 dB	90 dB	90 dB
Maximum output amplitude voltage VOH	0.85 V min.	1.75 V min.	2.95 V min.
Maximum output amplitude voltage VOL	0.05 V max.	0.05 V max.	0.05 V max.
Cut-off frequency	6.5 V/ms	6.5 V/ms	6.5 V/ms
Sink current	5 $\mu$ A min.	150 $\mu$ A min.	380 $\mu$ A min.
Source current	5 $\mu$ A min.	150 $\mu$ A min.	380 $\mu$ A min.

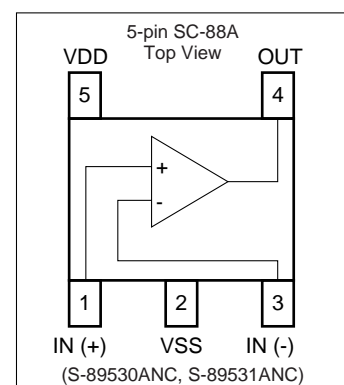
### FEATURES

- Low-operating voltage: VDD = 0.9 to 5.5 V
- Ultra-low current consumption: IDD = 0.7  $\mu$ A typ. at 0.9 V
- Input/output Rail-to-Rail: VSS to VDD
- Low input offset voltage: 4.0 mV max.
- No external parts is needed due to the internal phase compensation
- Small package (SC-88A: 2.0 mm x 2.1 mm)

### APPLICATIONS

- Portable telephone, digital camera, PDA, portable AV devices

### PIN CONFIGURATIONS



## MINI ANALOG SERIES CMOS SINGLE COMPARATOR

S-892xx series

The mini analog series integrates a wide are analog circuit in an ultra-small package. The S-892XXA is a CMOS type single comparator with a wide operating voltage range and ultra-low current consumption. The S-892XXA provides the best solution for battery powered portable equipment.

### SPECIFICATIONS

Ta = 25 °C, typ.

Model No.	S-89210ACNC		S-89220ACNC	
Absolute maximum rating (supply voltage)	10 V		10 V	
Operation temperature range	-40 to 85 °C		-40 to 85 °C	
Package	SC-88A		SC-88A	
Operating voltage	1.8 to 5.5 V		1.8 to 5.5 V	
Power supply voltage (VDD)	at 1.8 V	at 3.0 V	at 1.8 V	at 3.0 V
Current consumption	50 $\mu$ A typ.	50 $\mu$ A typ.	10 $\mu$ A typ.	10 $\mu$ A typ.
Input offset voltage	4 mV max.	4 mV max.	4 mV max.	4 mV max.
Commen-mode input voltage range	0 to 1.1 V	0 to 2.3 V	0 to 1.1 V	0 to 2.3 V
Max. output swing voltage (VOH)	1.5 V min.	2.7 V min.	1.5 V min.	2.7 V min.
Sink current	5 mA min.	10 mA min.	5 mA min.	10 mA min.
Source current	100 $\mu$ A min.	120 $\mu$ A min.	20 $\mu$ A min.	25 $\mu$ A min.
Rise propagation delay time	20 $\mu$ s	30 $\mu$ s	100 $\mu$ s	150 $\mu$ s
Fall propagation delay time	5 $\mu$ s	6 $\mu$ s	25 $\mu$ s	30 $\mu$ s
Rise response time	1.2 $\mu$ s	2 $\mu$ s	6 $\mu$ s	10 $\mu$ s
Fall response time	1.2 $\mu$ s	2 $\mu$ s	6 $\mu$ s	10 $\mu$ s

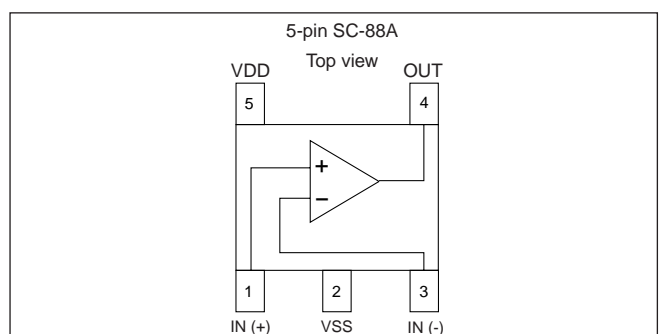
### FEATURES

- Low operating voltage : VDD= 1.8 to 5.5V
- Low current consumption : IDD = 50  $\mu$ A (S-89210ACNC)  
: IDD = 10  $\mu$ A (S-89220ACNC)
- Low input offset voltage : 4.0 mV max.
- Small package : SC-88A

### APPLICATIONS

- Cellular phone, PDA, Camera, Digital camera
- Camera integrated VCRs
- Notebook PCs

### PIN CONFIGURATIONS



The mini logic series features one standard logic gate in a super small package and plays complimentary role in input/output signal of microcomputer, gate array and so on. S-75V series realizes high speed operation compatible to LSTTL. S-75L series can operate between 1.0 V to 3.6 V, which is suitable for small portable equipment with battery drive.

### FEATURES

- Wide operating power supply range : 2.0 V to 5.5 V (S-75V series)  
: 1.0 V to 3.6 V (S-75L series)  
: 1.0  $\mu$ A max. at 5.5 V, 25°C (S-75V series)
- All inputs have power down protection function.
- Super small package : SC-88A

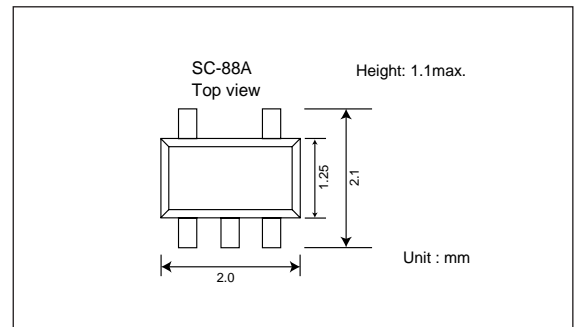
### APPLICATIONS

- Cellular phone, PDA, Camera, Digital camera
- Videocoder, DVC, DVD, Pager etc.
- PC, Laptop PC and Peripheral equipment

### SPECIFICATIONS

Series No.	VHS series	LV series
Model No.	S-75VXXANC	S-75LXXANC
Propagation delay time NAND GATE (CL=15pF)	3.7 ns typ. (at Vcc=5 V)	7.0 ns typ. (at Vcc=3 V)
Operating voltage	2 V to 5.5 V	1 V to 3.6 V
Operating temperature	-40 to +85 °C	-40 to +85 °C
Output current	IOH -8 mA min. (Vcc=4.5 V)	-1 mA min. (Vcc=1.5 V)
	IOL 8 mA min. (Vcc=4.5 V)	1 mA min. (Vcc=1.5 V)
Package	SC-88A	SC-88A
Function	Model No.	Model No.
2NAND	S-75V00ANC	S-75L00ANC
2NOR	S-75V02ANC	S-75L02ANC
INV1	S-75V04ANC	S-75L04ANC
INV2	S-75VU04ANC	S-75LU04ANC
2AND	S-75V08ANC	S-75L08ANC
Schmitt INV	S-75V14ANC	S-75L14ANC
2OR	S-75V32ANC	S-75L32ANC
EX-OR	S-75V86ANC	S-75L86ANC

### DIMENSIONS



### PIN CONFIGURATIONS AND FUNCTIONS

	<p>S-75V00ANC, S-75L00ANC 2-input NAND gate</p> <p><math>Y = A \cdot B</math></p>	<p>S-75V02ANC, S-75L02ANC 2-input NOR gate</p> <p><math>Y = A + B</math></p>
<p>S-75V04ANC, S-75L04ANC Inverter</p> <p><math>Y = \bar{A}</math></p>	<p>S-75VU04ANC, S-75LU04ANC Inverter(unbuffered)</p> <p><math>Y = \bar{A}</math></p>	<p>S-75V08ANC, S-75L08ANC 2-input AND gate</p> <p><math>Y = A \cdot B</math></p>
<p>S-75V14ANC, S-75L14ANC Schmitt trigger inverter</p> <p><math>Y = \bar{A}</math></p>	<p>S-75V32ANC, S-75L32ANC 2-input OR gate</p> <p><math>Y = A + B</math></p>	<p>S-75V86ANC, S-75L86ANC 2-input exclusive OR gate</p> <p><math>Y = \bar{A} \cdot B + A \cdot \bar{B}</math></p>

## ASSP Line-up

		Package										
		Die	8pin SSOP	8pin SOP	10pin SSOP	20pin TSSOP	32pin QFP	44pin QFP	64pin SQFP	Page		
Communications	Paging Decoder embedded Microcomputer								○	S-70L01AQS	42	
	Paging Decoder IC	1.5V system							○	S-70L41BFT	42	
		3V system							○	S-7041BFT	42	
	Microcomputer for Telephones								○	S-7040D	43	
									○	S-7292AF	43	
Timers	Realtime Clock	2-wire	Interrupt Function		○					S-3530A	43	
			32kHz constant output		○					S-3531A	43	
		3-wire	Low voltage/ ultra low consumption		○			○			S-35L32A	44
			Interrupt Function		○						S-3511A	44
			32kHz constant output						○		S-3513B	45
			Low voltage/ ultra low consumption		○			○			S-35L12A	45
										○	S-3510 Series	46

The S-70L01AQS microcomputer incorporates a decoder conforming to CCIR\* Radio Paging Decode 1 (POCSAG\*\* Code), a melody generator, a LCD driver and a timer. Only attaching externally a radiation circuit, a LCD panel, E<sup>2</sup>PROM for ID purpose and other parts makes it easy to create a numeric pager.

The circuit without DC/DC converter can also be configured by attaching E<sup>2</sup>PROM S-29U131A because it is operated at

min. 0.9V. The circuit configuration reduces radiation noises and power consumption.

The decoder can support decoding, error correction and data length conversion like decoder IC S-70L41BFT and is provided with several customizing functions.

A 76.8k Hz quartz crystal oscillator is used to respond to data rates 512, 1200 and 2400 bps.

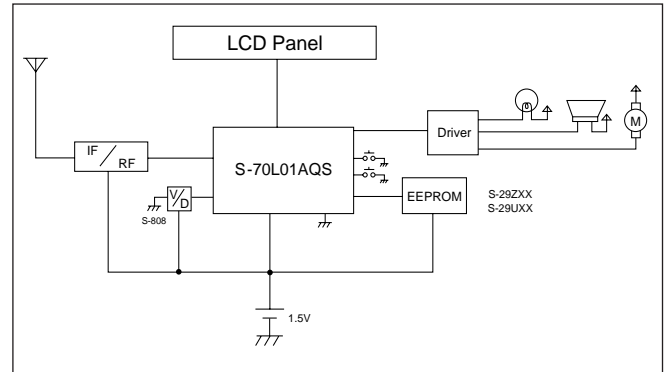
\* CCIR : International Radio Consultative Committee

\*\* POCSAG : Post Office Code Standardization Advisory Group

### ■ SPECIFICATIONS

Features	Product Name	S-70L01AQS		
	Low voltage operation	0.9 V to 2.2 V		
	Low current consumption	10 $\mu$ A typ. (at 1.5 V)		
	HALT mode current consumption	6 $\mu$ A typ. (at 1.5 V)		
	Crystal oscillator	76.8k Hz		
	Minimum instruction execution time	52 $\mu$ s		
Functions	Microcomputer	CPU Core	8bit CPU (65C02)	
		ROM	8K x 8 bit	
		RAM	512 x 8 bit	
		Port	Input	4 lines
			I/O	8 lines
		Timer/Counter	8-bit programmable timer Timer for a watch	
		LCD driver configuration	32SEG x 4COM	
		Melody generator	Available	
	Decoder	Address	6 addresses	
		Frame	6 frames	
		Data rate	512/1200/2400bps	
		Error correction	2-bit error random correction	
	Package	64-pin SQFP		

### ■ APPLICATIONS



## PAGING DECODER IC (POCSAG)

## S-7041BFT/70L41BFT

The S-7041BFT/70L41BFT is a decoder IC conforming to the CCIR\* Radio Paging Code 1 (POCSAG\*\* code). Data and command are interfaced between this decoder IC and the host CPU through serial interface. Buffer registers can make the host CPU wait under sub clock mode. New synchronizing method enables power saving effectively. The timing of battery-saving signal and the number of error correction bit can

be selected depending on register value. Data length conversion function provides easy handling of Chinese characters.

\* CCIR : International Radio Consultative Committee

\*\* POCSAG : Post Office Code Standardization Advisory Group

### ■ SPECIFICATIONS

Model No.	Item	Operating voltage range	Current consumption	Data Rate	User address	User frame	Data length conversion	External elements	Note	Package
S-7041BFT		1.7 to 3.6 V (3.0 V typ.)	10 $\mu$ A typ. (3.0 V)	512 bps/ 1200 bps/ 2400 bps	6	2	4 bits or 7 bits or 8 bits	Crystal (76k Hz), C <sub>0</sub> , (R <sub>F</sub> , C <sub>0</sub> , and R <sub>D</sub> are built in.)	8 bit serial CPU interface (S-70L41BFT: Built-in level sifter) Built-in buffer register Power down mode Command operation from CPU	20 TSSOP
S-70L41BFT		0.9 to 2.2 V (1.5 V typ.)	6 $\mu$ A typ. (1.5 V)							



## PAGING DECODER IC (POCSAG)

S-7040D

The S-7040D are decoder ICs according to the CCIR\* Radio Paging Code 1 (POCSAG\*\* code). They internally process the POCSAG signals for a pager. Additionally, the decoded data are transferred to an external microcomputer, so they can also be used for a display pager. Eight kinds of call-tone cadences let users know which call or message is received.

### FUNCTIONS

- Power-on clearing
- BCH correction up to 2 bits
- Battery saving
- Battery low alert
- Extended function
- Direct interface to CPU

### SPECIFICATIONS

Model No.	Item	Operating voltage range	Current consumption	Data rate	User address	User frame	Call-tone	External elements	ID-ROM	Note	Package
S-7040DQP		1.7 to 3.6 V (3.0 V typ.)	50 $\mu$ A max. (at 3.0 V)	512 bps (32 kHz/76 kHz quartz) 1200 bps (76 kHz quartz)	4	2	AddressA, C; 4 cadences AddressB, D; 4 cadences	Quartz Crystal (32k Hz/76k Hz), C <sub>6</sub> , R <sub>F</sub> , (C <sub>6</sub> and R <sub>6</sub> are built in.)	Direct interface to the S-29131A (E <sup>2</sup> PROM)	Input Noise filter Direct interface to CPU, CPU controlling output terminal and CPU reference clock output terminal LED and vibrator output terminal	32 QFP

They are provided with a battery saving function that drives the signal receiving circuit intermittently. When 76.8kHz crystal is applied, the decoder can work with data rate of both 512 bps and 1200 bps.

\* CCIR : International Radio Consultative Committee

\*\* POCSAG : Post Office Code Standardization Advisory Group

## 4-BIT MICROCOMPUTER FOR TELEPHONE

S-7292AF

The S-7292AF is a CMOS 4-bit microcomputer for telephone sets, which integrates on one chip a program memory (ROM), a data memory (RAM), an I/O port, a serial I/O, a timer and a dialer circuit. At power failure, the power can be supplied by telephone line inputs. It is usable for cordless telephone set and multifunction telephone set.

### FEATURES

- Low voltage operation
- Low current consumption
- Built-in watchdog timer
- Standby function
- DP or  $\overline{DP}$  can be selected by mask option
- 4 terminals for telephone function: HS, BEEP,  $\overline{KT}$ , TONE-OUT
- OTP version : S-72P92AF

### APPLICATIONS

- Standard telephone set
- Cordless telephone set
- Answering machine
- Personal facsimile

### SPECIFICATIONS

Model No.	Item	ROM	RAM	Operating voltage range		Current consumption			I/O line	Serial I/O	Timer (3)			Package
				*1 PULSE mode	DTMF mode	*2 PULSE mode	*3 DTMF mode	*4 Standby Max.			Timer 1	Timer 2	Timer 3	
S-7292AF		3K x 16 bit	768 x 4 bit	1.7 to 5.5 V	2.0 to 5.5 V	0.20 mA	0.35 mA	2.5 $\mu$ A	*5 33 (including telephone terminal)	1ch (8-bit clock synchronous type)	8-bit general timer	8-bit dial pulse timer	Selectable 150Hz or 300Hz	44 QFP

\*1: Crystal used \*2, \*3, \*4: At 2.4 V operation, output terminal not loaded

\*5: Input: 10, output: 12

Input and output: 11 (including key I/O terminal)

## REALTIME CLOCK (2-WIRE)

S-3530A/3531A

The S-3530A/3531A is 2-wire interface CMOS realtime clock that supplies timer data when requested by the CPU.

Because of CPU connection by 2-wire and 2 systems of interrupt/alarm function, software process in host side is reduced. (S-3530A)

Constant voltage drive of oscillation circuit provides low current consumption. The package is a miniature and thin 8-pin SSOP.

### FEATURES

- Low current consumption : 0.7  $\mu$ A typ. ( $V_{DD}=3.0$  V)
- Wide operating voltage : 1.7 V to 5.5 V
- BCD input/output of second, minute, hour, day, date, month and year
- Interface to CPU with 2 lines
- Built-in automatic calendar
- Built-in voltage detector
- Built-in constant voltage circuit
- Built-in flag generation circuit during power-on and power-down
- Built-in alarm interrupter
- Steady-state interrupt frequency/duty setting function
- Built-in 32 kHz crystal oscillation circuit (Internal Cd, External Cg and Crystal)
- 32 kHz firm output (S-3531A)
- 8-pin SSOP package

### SPECIFICATIONS

Model No.	Item	Operating voltage range	Current consumption Typ. $V_{DD}=3.0$ V		Oscillating frequency deviation (Deviation between ICs)	Voltage deviation of oscillating frequency $V_{DD}=1.7$ V to 5.5 V	Package
			During non-communication	During communication			
S-3530AEFS		1.7 to 5.5 V	0.7 $\mu$ A	12 $\mu$ A	$\pm 10$ ppm	$\pm 3$ ppm/V	8 SSOP Die
S-3531AEFS							

## REALTIME CLOCK (2-WIRE)

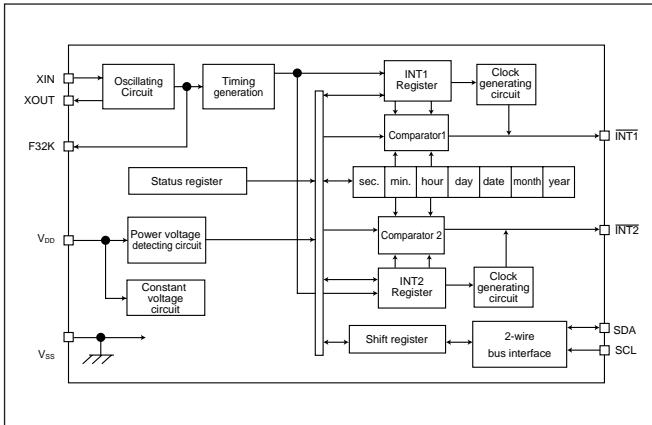
S-35L32A

The S-35L32A is 2-wire interface CMOS realtime clock that supplies timer data when requested by the CPU.

Because of CPU connection by 2-wire, 2 systems of interrupt/alarm function and 32 KHz firm output, software process in host side is reduced.

Constant voltage drive of oscillation circuit provides low current consumption. The shipping form are a die or a miniature and thin 10-pin SSOP package.

### ■ BLOCK DIAGRAM



### ■ FEATURES

- Low current consumption : 0.55  $\mu$ A typ.( $V_{DD}=3.0$  V,  $T_a=25$  °C)
- Wide operating voltage : 1.3 to 3.6 V (1.65 to 3.6 V with the power voltage detecting circuit built-in)
- BCD input/output of second, minute, hour, day, date, month and year
- Interface to CPU with 2 lines
- Built-in automatic calendar
- Built-in voltage detector
- Built-in constant voltage circuit
- Built-in flag generation circuit during power-on and power-down
- Built-in alarm interrupter (2 systems)
- 32 kHz firm output
- Steady-state interrupt frequency/duty setting function
- Built-in 32 kHz oscillation circuit (Internal Cd, External Cg and Crystal)
- Die or 10-pin SSOP package (pin pitch: 0.5 mm)

### ■ APPLICATIONS

- Cellular
- PHS
- Various pagers
- TV, Video
- Camera

## REALTIME CLOCK

S-3511A

The S-3511A is CMOS realtime clock that supplies timer data according when requested by the CPU. Software processing reduced by connecting the CPU via a 3-wire and interrupt/alarm function.

Constant voltage drive of oscillation circuit provides low current consumption. The package is a miniature and thin 8-pin SSOP.

### ■ SPECIFICATIONS

### ■ FEATURES

- Low current consumption : 0.7  $\mu$ A typ.( $V_{DD}=3.0$  V)
- Wide operating voltage : 1.7 V to 5.5 V
- BCD input/output of second, minute, hour, day, date, month and year
- Interface to CPU with 3 lines
- Built-in automatic calendar
- Built-in voltage detector
- Built-in constant voltage circuit
- Built-in alarm interrupter
- Steady-state interrupt frequency/duty setting function
- Built-in 32 kHz oscillation circuit (Internal Cd, External Cg and Crystal)
- 8-pin SSOP package

Model No.	Item	Operating voltage range	Current consumption Typ. $V_{DD}=3.0$ V		Oscillating frequency deviation (Deviation between ICs)	Voltage deviation of oscillating frequency $V_{DD}=1.7$ V to 5.5 V	Package
			During non communication	During communication			
S-3511AEFS		1.7 to 5.5 V	0.7 $\mu$ A	5.5 $\mu$ A	$\pm 10$ ppm	$\pm 3$ ppm/V	8 SSOP Die

The S-3513B is CMOS realtime clock that supplies timer data according when requested by the CPU. Connection with the CPU is performed with 3-wires, and obtaining 32kHz output pin makes it possible to supply to the other ICs. Constant voltage drive of oscillation circuit provides low current consumption. The package is a miniature and thin 8-pin SSOP.

■ FEATURES

- Low current consumption : 0.7  $\mu$ A typ.( $V_{DD}=3.0$  V)
- Wide operating voltage : 1.7 V to 5.5 V
- BCD input/output of second, minute, hour, day, date, month and year
- Interface to CPU with 3 lines
- Built-in automatic calender
- Built-in voltage detector
- Built-in constant voltage circuit
- Built-in flag generation circuit during power-on and power-down
- Built-in 32 kHz oscillation circuit (Internal Cd, External Cg and crystal)
- 32 kHz clock constant output
- 8-pin SSOP package

■ SPECIFICATIONS

Model No.	Item	Operating voltage range	Current consumption Typ. $V_{DD}=3.0$ V		Oscillating frequency deviation (Deviation between ICs)	Voltage deviation of oscillating frequency $V_{DD}=1.7$ V to 5.5 V	Package
			During non communication	During communication			
S-3513BEFS		1.7 to 5.5 V	0.7 $\mu$ A	5.5 $\mu$ A	$\pm 10$ ppm	$\pm 3$ ppm/V	8 SSOP

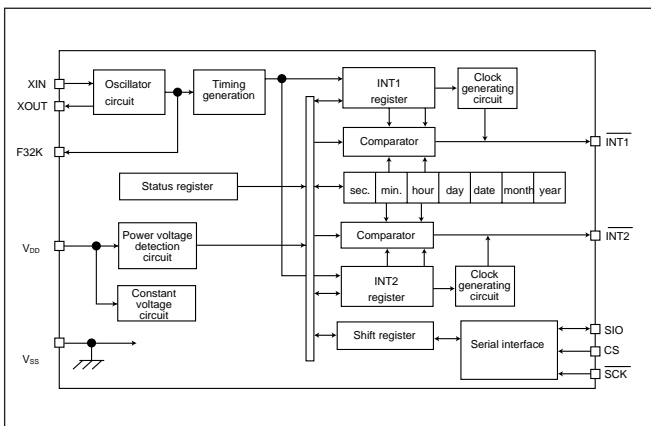
S-35L12A is a CMOS real-time clock IC that is capable of delivering and establishing all types of clock and calendar data in accordance with the needs determined by the CPU. Connection with the CPU is performed with 3 signals, and with the possession of 2 interrupt/alarm function systems and 32kHz secured output, it is possible to reduce the host's software processing.

Further, operations are performed with low consumption power due to oscillator circuits being carried out with constant voltage. Delivery form is a die or an ultra compact, thin type of SSOP 10 pin package.

■ FEATURES

- Low current consumption : 0.55  $\mu$ A typ.( $V_{DD}=3.0$  V,  $T_a=25$  °C)
- Wide operating voltage range : 1.3 to 3.6 V (1.65 to 3.6 V with the power voltage detection circuit built-in)
- BCD input and output is entered as year, month, day, day of the week, hour, minute and second
- CPU interface performed with 3 wires
- A function that automatically calculates leap years until 2099 is built-in
- Built-in power voltage detection circuit
- Built-in constant voltage circuit
- Built-in flag generating circuit for power on and power off
- Built-in alarm interrupter (2 systems)
- 32kHz constant output
- Steady-state interrupt frequency/duty setting function
- 32kHz oscillator circuit built-in (Cd built-in, Cg and Crystal attached)
- Die or 10 pin SSOP package (pin pinch : 0.5 mm)

■ BLOCK DIAGRAM



■ APPLICATIONS

- Cellular phones
- PHS
- Various pagers
- TV, Video
- Camera

**REALTIME CLOCK** **S-3510 series**

The S-3510 series are CMOS realtime clocks that supply timer data serially according to the requirement from CPU. They feature low power consumption, low voltage operation and small 8-pin SOP package. They are suitable for portable equipment.

**FEATURES**

- BCD output of year, month, day, hour and minute.
- Automatic operation for a leap year
- Communicable with CPU through 3 lines
- Built-in voltage detection circuit
- Built-in constant voltage circuit
- 8-pin SOP package

**SPECIFICATIONS**

Model No.	Item	Operating voltage range	Current consumption Typ. $V_{DD}=3.0V$		Oscillating frequency deviation (Deviation between ICs)	Voltage deviation of oscillating frequency $V_{DD}=1.7 V$ to $5.5 V$	Package
			During non communication	During communication			
S-3510ANFJ	1.7 to 5.5 V	1.2 $\mu A$	10 $\mu A$		$\pm 10$ ppm	$\pm 3$ ppm/V	8 SOP
S-3510ACFJ			30 $\mu A$				

## Microcomputer Line-up

		Page
4-bit	S-13XX Series	1.5V type (L version : Low voltage operation) ————— 47
		3V type ————— 47
	S-14XX Series	1.5V type (L version : Low voltage operation) ————— 48
		3V type ————— 48
8-bit	S-18XX Series ————— 48	

### 4-BIT SINGLE CHIP MICROCOMPUTER

### S-13XX series

The S-13XX series is a CMOS 4-bit microcomputer, which integrates a 4-bit CPU, a program memory (ROM), a data memory (RAM) and an I/O port on one chip. Powered by batteries, it is ideal for compact portable equipment.

#### ■ APPLICATIONS

- Remote controller
- Toys
- Compact portable equipment

#### ■ SPECIFICATIONS

Model No.	Item	Applications	ROM	RAM	Operating voltage	Timer	Port	Features	Package
S-1340AF	Remote controller		512 x 8 bits	16 x 4 bits	1.8 to 6.0 V (500k Hz)	1	12	• Carrer output circuit	20SOP
S-1341AF			768 x 8 bits	16 x 4 bits		1	14	• Low voltage detection circuit	20SOP
S-1342AF			768 x 8 bits	16 x 4 bits		1	16	• The evaluation with a software is available on S-13P40AF, S-13P41AF, S-13P42AF, and S-13P43AF.	22SOP
S-1343AF			1K x 8 bits	32 x 4 bits		1	20		28SOP
S-13L40AF			512 x 8 bits	16 x 4 bits	1.2 to 3.6 V (500k Hz)	1	12	• 1.5V version of the S-1340AF	20SOP
S-13L41AF			768 x 8 bits	16 x 4 bits		1	14	• 1.5V version of the S-1341AF	20SOP
S-13L42AF			768 x 8 bits	16 x 4 bits		1	16	• 1.5V version of the S-1342AF	22SOP
S-13L43AF			1K x 8 bits	32 x 4 bits		1	20	• 1.5V version of the S-1343AF	28SOP
S-13P40AF			512 x 8 bits	16 x 4 bits	1.8 to 5.5 V (500k Hz)	1	12	• OTP version of the S-1340AF (Specification differs partly.)	20SOP
S-13P41AF			768 x 8 bits	16 x 4 bits		1	14	• OTP version of the S-1341AF (Specification differs partly.)	20SOP
S-13P42AF			768 x 8 bits	16 x 4 bits		1	16	• OTP version of the S-1342AF (Specification differs partly.)	22SOP
S-13P43AF			1K x 8 bits	32 x 4 bits		1	20	• OTP version of the S-1343AF (Specification differs partly.)	28SOP
S-13P48A	Keyless entry	512 x 8 bits	16 x 4 bits	1.8 to 5.5 V (600k Hz)		1	12	• RC oscillation    • OTP	18SOP/20SSOP

## 4-BIT SINGLE CHIP MICROCOMPUTER

## S-14XX series

The S-14XX series is a CMOS 4-bit microcomputer, which integrates a 4-bit CPU, a program memory (ROM), a data memory (RAM) and an I/O port on one chip. Powered by batteries, it is ideal for compact portable equipment.

### ■ SPECIFICATIONS

Model No.	Applications	ROM	RAM	Operating voltage	Timer	Serial I/O	Port	LCD driver	Features	Package
S-1400CF	System controller	4K x 16 bits	512 x 4 bits	2.0 to 3.6V(32kHz) 2.2 to 3.6V(1MHz)	2	8 bits x 1ch	28	32Segment 4/3common	• Low voltage operation • Built-in LCD drive power supply • Piggyback:S-1408B	80QFP
S-1450AF	Remote controller with LCD	3K x 16 bits	128 x 4 bits	2.0 to 3.6V(455kHz)	1	-	24	24Segment 4/3common	• Carrier wave output circuit	64QFP
S-1455BF	Remote controller with LCD	3K x 16 bits	256 x 4 bits	2.0 to 3.6V(32kHz) 2.0 to 3.6V(455kHz)	2	-	17	24Segment 4/3common	• Carrier wave output circuit • Twin clock	54QFP
S-1460CF	Pre-set remote controller	4K x 16 bits	128 x 4 bits	1.8 to 3.6V(1MHz)	2	-	20	-	• Built-in low voltage detection circuit • OTP version : S-14P60AF	28SOP
S-1460BF		4K x 16 bits	128 x 4 bits	2.2 to 6.0V(1MHz)	2	-	20	-	• Built-in low voltage detection circuit • OTP version : S-14P60AF	28SOP
S-1462AF		2K x 16 bits	128 x 4 bits		2	-	14	-	• Built-in carrier pulse counter	22SOP
S-1463AF		2K x 16 bits	128 x 4 bits	2	-	16	-	• Built-in carrier pulse counter	24SOP	
S-14L60CF		4K x 16 bits	128 x 4 bits	1.2 to 3.6V(1MHz)	2	-	20	-	• 1.5V version of the S-1460BF	28SOP
S-14L62AF		2K x 16 bits	128 x 4 bits		2	-	14	-	• 1.5V version of the S-1462AF	22SOP
S-14L63AF		2K x 16 bits	128 x 4 bits		2	-	16	-	• 1.5V version of the S-1463AF	24SOP
S-14L42AF		Single function Remote controller	1K x 14 bits	64 x 4 bits	-	2	-	14	-	• Low voltage operation (1.5 V)
S-14L05AQS	System controller, Pager	4K x 16 bits	768 x 4 bits	0.9 to 2.2 V(32k Hz) 1.1 to 2.2 V(400k Hz)	2	8 bits x 1ch	32	48Segment 4/3common	• 0.9V operation • Built-in LCD drive power supply • Built-in 16 level detection circuit	100SQFP

\* The S-14P60AF(OTP version) can be used for the S-1462AF,S-14L62AF,S-1463AF,S-14L63AF when software evaluation.

### ■ APPLICATIONS

- VTR, TV, cassette deck, CD player, Camera
- Office equipment, copier
- Equipment for learning, toy
- Pager, security system
- Remote controller (S-1480AF, S-14L42AF, S-1460CF, S-14L60CF, S-1462AF, S-14L62AF, S-1463AF, S-14L63AF, S-1455BF)

## 8-BIT SINGLE CHIP MICROCOMPUTER

## S-18XX series

The S-18XX series is a CMOS 8-bit microcomputer, which integrates an 8-bit CPU, an 8K-byte program memory (ROM), a data memory (RAM), an I/O port, timer and a counter on one chip. Powered by batteries, it is ideal for compact portable equipment.

### ■ SPECIFICATIONS

Model No.	Applications	ROM	RAM	Operating voltage	Timer	Serial I/O	A/D Converter	Port	LCD Driver	Features	Package
S-1810CF	Universal remote controller	8K x 8 bits	4K x 8 bits	2.2 to 6.0V(4MHz)	3	8 bits x 1ch	-	32	-	• Built-in 32 k SRAM • Built-in carry signal generation circuit • Built-in operation amplifier for received signals • Built-in • S-18P10BF (OTD version) available	54QFP
S-1820CF	Universal remote controller	8K x 8 bits	2.3K x 8 bits	2.2 to 6.0 V(4M Hz)	3	8 bits x 1ch	-	32	-	• Built-in 10 k SRAM • Built-in carry signal generation circuit • Built-in operation amplifier for received signals • Built-in • S-18P10BF (OTD version) available	54QFP
S-1830AF	Universal remote controller	8K x 8 bits	1.3K x 8 bits	2.2 to 6.0 V(4M Hz)	3	8 bits x 1ch	-	30	-	• Built-in 8 k SRAM • Built-in carry signal generation circuit • Built-in operation amplifier for received signals • Built-in	44QFP
S-1845AF	Pre-set remote controller with LCD	8K x 8 bits	256 x 8 bits	2.2 to 6.0 V(32k Hz) 2.2 to 6.0 V(4M Hz)	4	8 bits x 1ch	-	32	32Segment 4/3 common	• Built-in carry pulse counter • Twin clocks • S-18P46AF (OTP version)	80QFP
S-1850AF	System controller	8K x 8 bits	256 x 8 bits	2.4 to 6.0 V(4.9M Hz) 4.5 to 6.0 V(9.8M Hz)	4	8 bits x 1ch (Synchronous/Asynchronous)	8 bits x 8ch	52	-	• External memory mode • Built-in low voltage operation A/D converter	64QFP
S-1800AF	System controller	8K x 8 bits	256 x 8 bits	*1 2.7 to 6.0 V(4.19M Hz)	4	8 bits x 2ch	-	72	-	• Switching capability of the system clock • Low voltage high-speed operation • S-18P02AF (OTP version) [Under development]	80QFP
S-1801AF		16K x 8 bits	256 x 8 bits	*2 2.2 to 6.0 V(4.19M Hz)							
S-1802AF		24K x 8 bits	512 x 8 bits	*3							
S-1870AFE	Pre-set remote controller	12K x 8 bits	96 x 8 bits	2.2 to 6.0 V(4M Hz)	2	-	-	21	-	• Low voltage detection circuit • S-18P72AFE (OTP version) available	28SOP

\*1 The shortest instruction execution time: 0.95  $\mu$ s

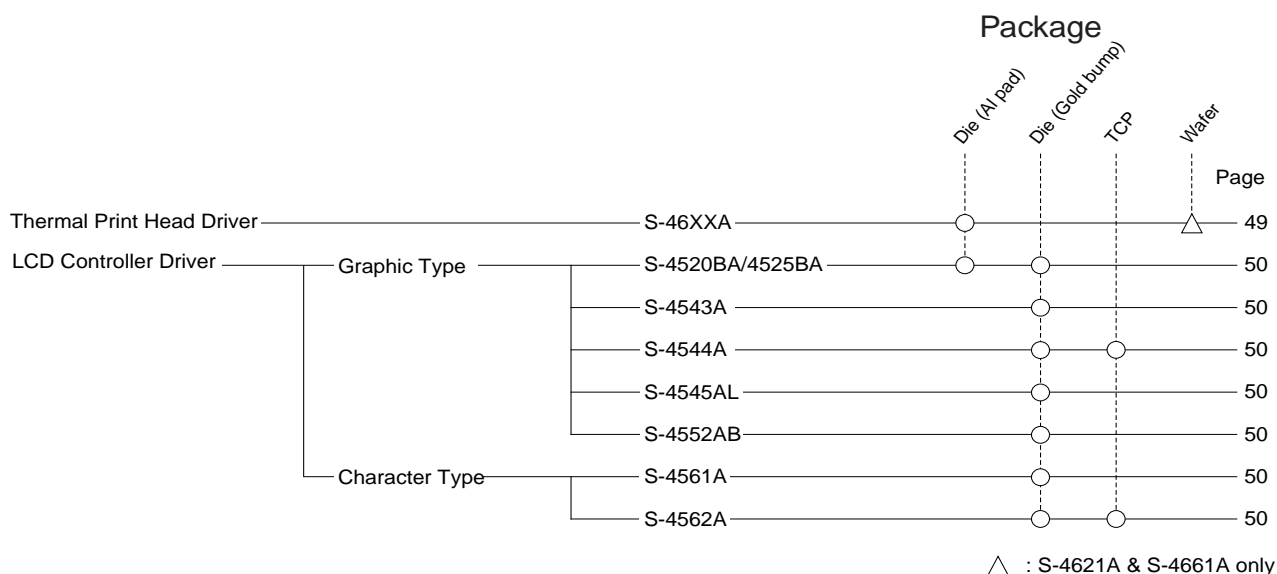
\*2 The shortest instruction execution time: 3.8  $\mu$ s

\*3 The shortest instruction execution time: 1  $\mu$ s

- The S-1380AF can be evaluated with a software on S-18P10BF (OHPversion).



## Driver line-up



## THERMAL HEAD DRIVER

## S-46XXA

The S-46XXA is a thermal head driver that is made up of a 64/128/144 bit register and latch, as well as a Nch-open-drain output, making it possible to directly drive the thermal head. Since it possesses a clock input pin and serial data output pin, it is extremely versatile and rich in expansion properties, with the extension of bit lengths also possible.

### FEATURES

- Thermal head is driven directly
- Low consumption voltage design that utilizes CMOS technology
- High speed operations
- No thermal runaway due to the utilization of MOS FET in the driver
- Built-in power sequence-free circuit
- Since the driver output terminals are arranged on one side, connection with the heating element is made easily
- Latch and enable input (logical switchover function)

### APPLICATION

- Thermal printers
- Barcode printers
- Lamp drivers
- Video printers
- Data serial-parallel converter
- LED printers
- Graphic printers

### SPECIFICATIONS

Item Model No.	Driver output number	Driver maximum withstand voltage	Driver output current		Driver output pin		Clock frequency (Max.)	Delivery form
			Typ.	Max.	Pad pitch	Arrangement		
S-4602A	64 bit	36 V	15 mA	30 mA	75 μm	One-side staggered	10M Hz (cascade connection)	Die
S-4610A	64 bit	36 V	50 mA	70 mA	110 μm	One-side one line	5M Hz (cascade connection)	Die
S-4611A	64 bit	36 V	50 mA	70 mA	110 μm	One-side one line	14M Hz (Die)	Die
S-4612A	64 bit	36 V	50 mA	70 mA	110 μm	One-side one line	5M Hz (cascade connection)	Die
S-4621A	64 bit	36 V	30 mA	50 mA	110 μm	One-side one line	5M Hz (cascade connection)	Die/Wafer
S-4622A	64 bit	10 V	60 mA	70 mA	110 μm	One-side one line	5M Hz (cascade connection)	Die
S-4630A	64 bit	36 V	9 mA	15 mA	110 μm	One-side one line	5M Hz (cascade connection)	Die
S-4661A	144 bit	36 V	8 mA	12 mA	55 μm	One-side staggered	5M Hz (cascade connection)	Die/Wafer
<b>NEW</b> S-4670A	128 bit	36 V	15 mA	24 mA	58 μm	One-side staggered	16M Hz (Die)	Die
S-4680A	64 bit	36 V	30 mA	50 mA	75 μm	One-side staggered	8M Hz (cascade connection)	Die

## GRAPHIC LCD CONTROLLER DRIVER

S-452X/454X/455X

The S-4520BA/4525BA are controller driver ICs for use with a graphic LCD (Liquid Crystal Display) controller driver that has an 80 family/68 family MPU interface, 61-segment driver output, and 16 common driver output. The S-4543 is a controller driver IC for use with a graphic LCD controller driver that has a 68 family MPU interface, serial interface, 120-segment driver output, and 33 common driver output. The S-4544A/4545AL/4552AB are controller driver ICs for use with a graphic LCD controller driver that has an 80 family/68 family interface, serial interface, LCD power circuit, and 128-segment driver output and 33 common driver output, 101-segment driver output and 33 common driver output, and 96-segment driver output and 51 common driver output respectively.

### ■ FEATURES

- Wide operating voltage range
- Low current consumption
- Internal CR oscillator circuit
- Suitable for use of TAB or COB from the slimmed chip (S-454X)

S-4544A/4545AL/4552AB

- Internal step-up voltage circuit
- Ultra-low current consumption via power save mode

### ■ APPLICATIONS

- Display system for portable devices

### ■ SPECIFICATIONS

Item Model	Power voltage range		Driver output	Display RAM size (unit: bit)	Duty	Bias	MPU interface	Shape
	Logic power	LCD drive power						
S-4520BA	- 2.4 to - 7.0 V	- 3.5 to - 13.0 V	16 common 61-segment	32 x 80	1/16, 1/32	1/5, 1/6	8-bit parallel	AL pad die Gold bump die
S-4525BA	- 2.4 to - 7.0 V	- 3.5 to - 13.0 V	16 common 61-segment	32 x 80	1/16, 1/32	1/2, 1/4	8-bit parallel	
S-4543A	- 2.4 to - 5.5 V	- 2.7 to - 11.5 V	32 common + Icon common 120-segment	4026	1/32, 1/33	-	8-bit parallel / Serial	Gold bump die
S-4544A	- 2.4 to - 5.5 V	- 2.7 to - 11.0 V	32 common + Icon common 16 common + Icon common 128-segment	65 x 128	1/17, 1/33	1/4, 1/5, 1/6.7	8-bit parallel / Serial	Gold bump die TCP
S-4545AL	- 2.4 to - 5.5 V	- 4.5 to - 11.0 V	32 common + Icon common 101-segment	33 x 101	1/33	1/5, 1/6	8-bit parallel / Serial	Gold bump die
S-4552AB	- 2.4 to - 3.6 V	- 5.8 to - 13.0 V	50 common + Icon common 96-segment	51 x 96	1/51	1/6, 1/7, 1/8, 1/9	8-bit parallel / Serial	Gold bump die

## CHARACTER TYPE LCD CONTROLLER DRIVER

S-4561A/4562A

The S-4561A/4562A is a 17 or 33 common, 60 segment output character LCD driver with built-in CGROM. It displays independently of the CPU through the use of internal oscillating circuit or clock input. It has a wide variety of command instruction which minimize the load of the CPU. It also features a wide voltage range, low power consumption, and a power save function, making the S-4561A/4562A a suitable display for system applications in portable electronics.

### ■ FEATURES

- Built-in CGROM : 9600 bits (240 characters)
- Built-in CGRAM : 320 bits (8 characters)
- 33 or 17 common : Software setting (S-4562A)
- Built-in Booster, CR oscillating circuit, Drive voltage command fine adjustment circuit and bias register
- Low current consumption during power save.
- Various commands.
- Slim chip is suitable for TAB, COG.

### ■ SPECIFICATIONS

Item Model No.	Operating voltage		Driver output	Duty	Bias	Booster	MPU interface	Form
	Logic	LCD driver						
S-4561A	2.4 to 3.6 V	2.7 to 6.5 V	16-common+Icon common 60-segment	1/17	1/4, 1/5	Dual	8-bit parallel / 4-bit parallel / Serial	Die (Gold bump)
S-4562A	-2.4 to -5.5 V	-2.7 to -11.0 V	32-common+Icon common 16-common+Icon common 60-segment	1/33, 1/17	1/4, 1/5, 1/6.7	Dual/Triple	8-bit parallel / Serial	Die (Gold bump) TCP

■ SENSOR LINE-UP

		Package	Page
Sensor IC	S-8110A	SC-82AB	51
	High-precision S-8120A	SOT-23-3	51
Temperature switch IC	<u>S-8130 Series</u>	8pin MSOP	52
Linear image sensor IC for contact image sensor	S-86XXXWI	Wafer	53

○ Under Development

TEMPERATURE SENSOR IC

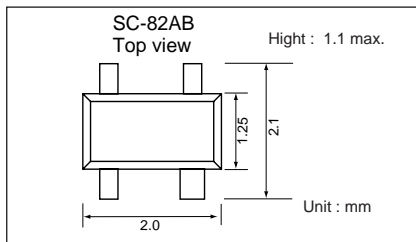
S-8110/8120 Series

The S-8110/8120 Series are high-precision temperature compensation ICs on a single chip with a linear output voltage for temperature. Each chip is composed of a temperature sensor, a constant current circuit, and an operational amplifier. It can be used at temperatures ranging from -40°C to +100°C. These devices have much better linearity than other temperature sensors such as thermistors; they can be used for a wide range of temperature control applications.

■ DIMENSIONS

SC-82AB (typ.)

S-8110ANP  
S-8120ANP



■ FEATURES

- Linear output voltage for temperature
- Low current consumption
- Built-in operational amplifier
- V<sub>SS</sub> based output
- Compact package SC-82AB

■ APPLICATIONS

- High-frequency circuit such as portable phone and radio equipment
- Compensation of Oscillation frequency in crystal oscillator
- LCD contrast compensation
- Temperature detection in battery management
- Compensation of amplifier gain
- Heat prevention for charged batteries or halogen lights
- Compensation of auto focus circuit

■ SPECIFICATIONS

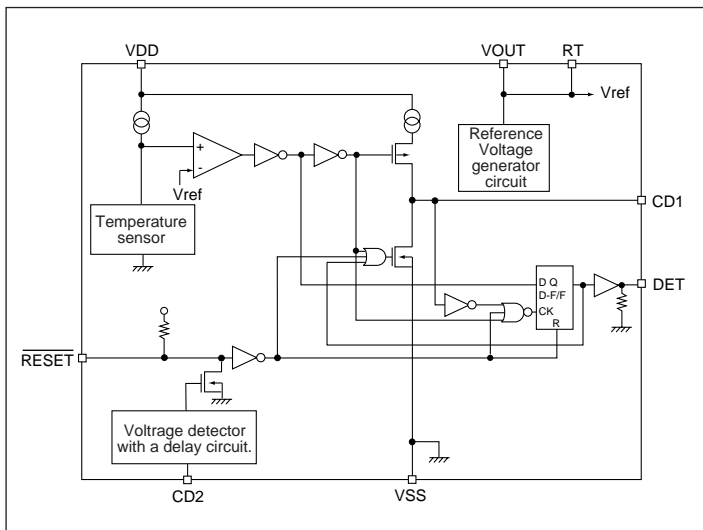
Model No.	Item	Operating voltage range	Temperature sensitivity Typ.	Output accuracy	Linearity	Operating temperature range	Current consumption Typ. (T <sub>a</sub> =+25 °C)	Package
S-8110AMP	S-8110ANP	2.4 to 6.0 V	-8.5 mV/ °C	± 5.0 °C	± 0.5% typ.	-40 to +100 °C	4.5 μA	SOT-23-3
S-8110ANP								SC-82AB
S-8120AMP	S-8120ANP	2.4 to 6.0 V	-8.5 mV/ °C	± 2.5 °C	± 0.5% typ.	-40 to +100 °C	4.5 μA	SOT-23-3
S-8120ANP								SC-82AB

The S-8130A is a temperature switch IC that detects temperature in accuracy of  $\pm 2.5\text{ }^{\circ}\text{C}$ . A temperature sensor with a temperature coefficient of  $-10\text{ mV}/^{\circ}\text{C}$ , a reference voltage generator circuit, a comparator, a voltage detector circuit, and a noise protection circuit are integrated on a single chip to be able to operate at 2.6 V. The operating temperature range from  $-40\text{ }^{\circ}\text{C}$  to  $+100\text{ }^{\circ}\text{C}$ . The S-8130A is superior in linearity over conventional temperature sensors like thermistors. It can be applied to an ever expanding wide range of applications that call for high-accuracy thermal control.

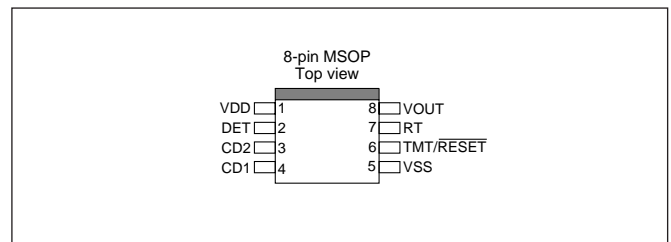
### FEATURES

- Detecting temperature Accuracy:  $\pm 2.5\text{ }^{\circ}\text{C}$  ( $-40\text{ }^{\circ}\text{C}$  to  $100\text{ }^{\circ}\text{C}$ )
- Vss standard output
- Low voltage operation :  $V_{\text{DD min.}} = 2.6\text{ V}$
- Low current consumption :  $150\text{ }\mu\text{A typ.}$  ( $+25\text{ }^{\circ}\text{C}$ )
- Small plastic package : 8-pin MSOP
- Internal temperature detection error protection circuit
- Detecting temperature adjustable via internal reference voltage generator circuit or an out side resistance.
- The thermistor can be used by mounting externally.

### BLOCK DIAGRAM



### PIN CONFIGURATIONS



No.	Name	Description
1	VDD	Positive power input pin
2	DET	Temperature detection output pin: active "High"
3	CD2	Connects a capacitor for delay time setting of the voltage detector circuit
4	CD1	Connects a capacitor for error operation protection time setting
5	VSS	Ground pin
6	TMT/RESET	TMT/RESET Connects a thermistor or reset in/out pin (active low)
7	RT	Reference voltage input pin
8	VOUT	Reference voltage output pin for the internal comparator

S-8603AWI/8604BWI/8605AWI/8631AWI/8632AWI/8642AWI/8660AWI are linear image sensor ICs ideal for multi-chip contact image sensors. This device synchronizes analog image signals received from the light receiving element with the clock and outputs them sequentially. Models S-8603, 8604 and 8631AWI are low current consumption products that use phototransistors for the light receiving element. S-8605 includes an integrated amplification circuit. Models S-8632, 8642 and 8660AWI use photodiodes for the light receiving element and offer high-density and good picture quality. The S-8604DWI operates 3V single power supply. The S-8652AWI and the S-8671AWI are designed for use in color image sensors and have resolution 400 dpi x RGB, 600 dpi x RGB respectively.

■ FEATURES

- Reading widths supports various sizes.
  - Can be used to read various document sizes by changing the number of linearly arranged chips.
- Double-input driven: SI and CLK
  - Easy to start using start and clock.
- Fast operation
- Integrated output amplification circuit (S-8605/32/42/60/52/71AWI)
- Low power consumption : 5 V single power source, CMOS scanning circuit (S-8604DWI: 3 V)
- Photodiode light receiving element with good picture quality (S-8632/42/60/52/71AWI)
- With resolution switching feature
  - 600dpi/300dpi (S-8660AWI)
  - 400dpi/200dpi (S-8642AWI)
- For color image sensor (S-8652/71AWI)

■ SPECIFICATIONS

Model No.	Resolution	Reading Width	Light receiving element	Clock Frequency	Output Amplification	Sensitivity	Format
S-8603AWI	8 dpm	8.00 mm	Photo-Tr	2.5M Hz	-	8 V/lux • sec	wafer
S-8604BWI	8 dpm	8.00 mm	Photo-Tr	2.5M Hz	-	8 V/lux • sec	wafer
*S-8604DWI	8 dpm	8.00 mm	Photo-Tr	2.5M Hz	-	8 V/lux • sec	wafer
S-8605AWI	8 dpm	12.00 mm	Photo-Tr	2.0M Hz	Integrated	15 V/lux • sec	wafer
S-8631AWI	300 dpi	8.13 mm	Photo-Tr	4.0M Hz	-	10V/lux • sec	wafer
S-8632AWI	300 dpi	8.13 mm	Photo-Di	4.0M Hz	Integrated	7 V/lux • sec	wafer
NEW S-8642AWI	400 dpi/200 dpi	12.20 mm	Photo-Di	2.0M Hz	Integrated	75 V/lux • sec	wafer
NEW S-8660AWI	600 dpi/300 dpi	12.20 mm	Photo-Di	2.0M Hz	Integrated	75 V/lux • sec	wafer
*S-8652AWI	400 dpi x RGB	12.20 mm	Photo-Di	5.0M Hz	Integrated	25 V/lux • sec	wafer
*S-8671AWI	600 dpi x RGB	12.20 mm	Photo-Di	5.0M Hz	Integrated	25 V/lux • sec	wafer

\* Under development

## DIMENSIONS

(Unit: mm)

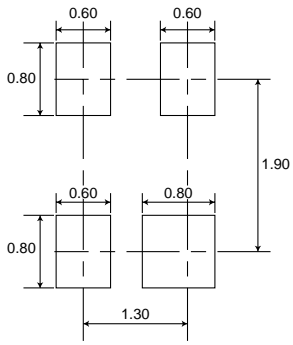
<p><b>SC-82AB</b></p>	<p><b>SOT-89-5</b></p>
<p><b>SC-88A</b></p>	<p><b>8-PIN MSOP</b></p>
<p><b>SOT-23-3</b></p>	<p><b>8-PIN TSSOP</b></p>
<p><b>SOT-23-5</b></p>	<p><b>8-PIN SSOP</b></p>
<p><b>SOT-89-3</b></p>	<p><b>SON5A</b></p>



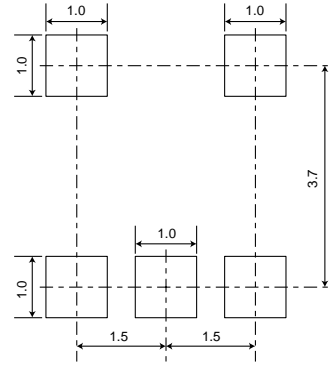
## LAND PATTERN RECOMMENDATION

(Unit: mm)

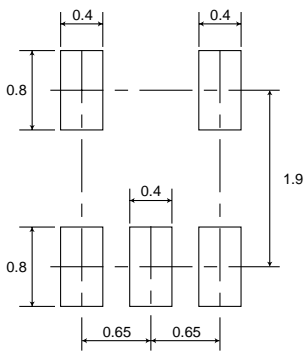
**SC-82AB**



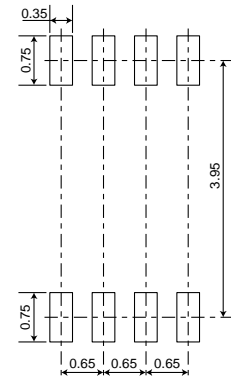
**SOT-89-5**



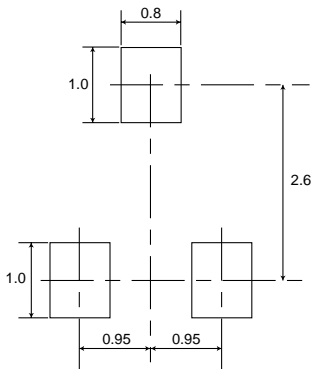
**SC-88A**



**8-PIN MSOP**

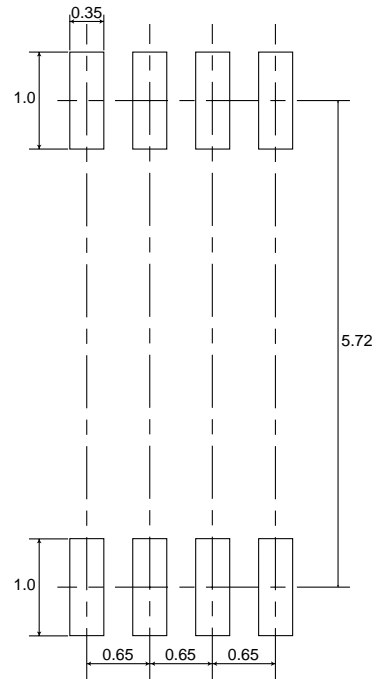


**SOT-23-3**

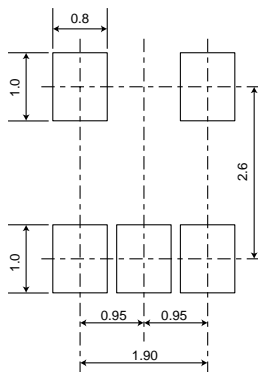


**8-PIN TSSOP**

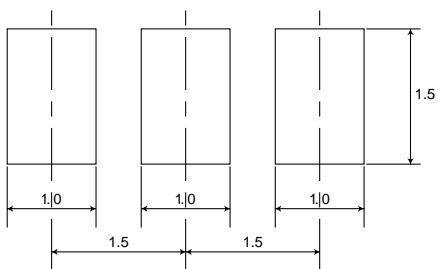
**8-PIN SSOP**



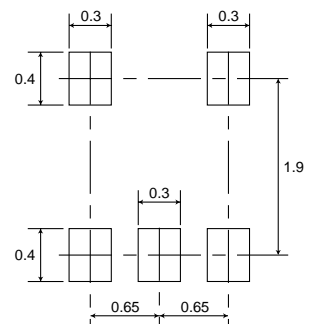
**SOT-23-5**



**SOT-89-3**



**SON5A**



## Limited production for replacement

Production is not continued as to following products.

### **<Power supply ICs>**

S-805 Series, S-812XXAG Series, S-812XXHG Series, S-812XXPG Series, S-802 Series, S-8311 Series, S-8420 Series, S-8435/36 Series, S-8440AF, S-8470 Series, S-87050 Series, S-8850 Series, S-806 Series, S-813 Series, S-8491 Series, S-8437/38 Series

### **<Memory>**

S-2510A, S-2911I/2911R, S-2914I/2914R, S-2917I, S-2918I, S-2921R, S-2922R, S-2924R, S-2927A, S-2940I, S-2961I, S-2980I, S-29X3A/29X3C, S-29X4A, S-29X9A/29X9C/29X9G, S-2100R

### **<ASSP>**

S-7038AF, S-7040A/7040B, S-7116A, S-3520CF, S-8081B

### **<Microcomputer>**

S-1445A

### **<Driver>**

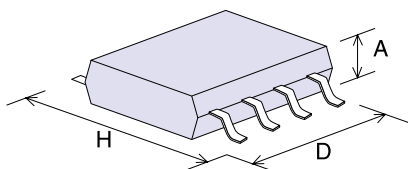
S-4601A, S-4620A, S-4640A

### **<Sensor>**

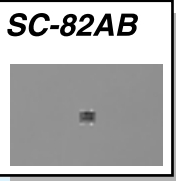
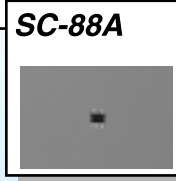
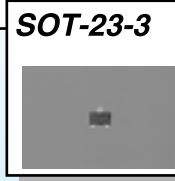
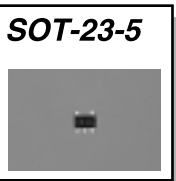
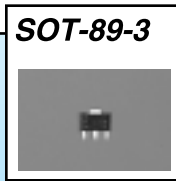
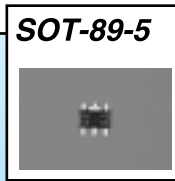
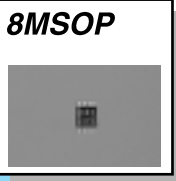
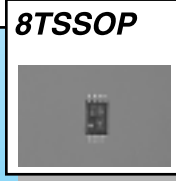
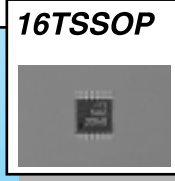

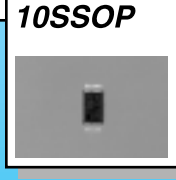

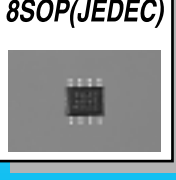

S-8100BF, S-8101AMP, S-8110BNP, S-8120BNP, S-8270A

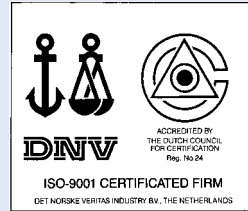
Note: Products with an underline are added newly in this IC catalog.

- The information herein is subject to change without notice.
- Neither reproduction nor duplication of this catalog in whole or part is allowed without the prior written approval of Seiko Instruments Inc.
- Circuits and respective application methods described herein are for reference only. Seiko Instruments Inc. is not responsible for any and all infringement or damages to the rights of third parties (including industrial properties) caused by the use of circuits or application methods herein. Seiko Instruments Inc. shall not license any industrial properties owned by Seiko Instruments Inc. or any third party through this catalog.
- When products described herein include Strategic Products (or Services) stipulated in the Foreign Exchange and Trade Control Law, they shall not be exported without permission of governmental authorities.
- The products described herein are designed for consumer equipment and cannot be used as part of any device or equipment which influences the human body or requires a significantly high reliability, such as physical exercise equipment, medical equipment, disaster prevention equipment, gas related equipment, vehicles, aircraft and equipment mounted on vehicles.
- Although Seiko Instruments Inc. exerts the greatest possible effort to ensure high quality and reliability, the failure or malfunction of semiconductor products may occur. The user of these products should therefore give thorough consideration to safety design, including redundancy, fire-prevention measures, and malfunction prevention, to prevent any accidents, fires, or community damage that may ensue.



Unit : mm

 <p><b>SC-82AB</b></p>	H 2.1 D 2.0 A 1.1 max.	 <p><b>SC-88A</b></p>	H 2.1 D 2.0 A 1.1 max.	 <p><b>SOT-23-3</b></p>	A		H 2.8 D 2.9 A 1.3 max.		
	S-808xxNP S-817xxANB S-8110/20xNP		S-891xxANC S-892xxANC S-75VxxANC S-75LxxANC		S-8944xANC S-8953xANC	S-8321/22BxMP S-8323/27/24/28xxMA S-8110/20AMP			
 <p><b>SOT-23-5</b></p>	H 2.8 D 2.9 A 1.3 max.	 <p><b>SOT-89-3</b></p>	H 4.0 D 4.5 A 1.6 max.	 <p><b>SOT-89-5</b></p>	A		H 4.5 D 4.5 A 1.6 max.		
	S-808xxMP S-809xxMP S-814xxAMC S-816AxxAMC S-8323/27/24/28xxMC		S-801 S-807xxSx S-812xxSG S-8321/22AxMP S-8520/21xxMC S-8241		S-808xxUP S-812xxSGUP S-8323/27/24/28xxUA	S-807xxAx	S-814xxAUC S-87xxUP S-818AxxAUC		
 <p><b>8MSOP</b></p>	H 4.0 D 2.95 A 1.3 max.	 <p><b>8TSSOP</b></p>	H 6.4 D 3.0 A 1.1 max.	 <p><b>16TSSOP</b></p>	A		H 6.4 D 5.1 A 1.1 max.		
	S-93Cx6AMFN S-8231xxFN S-8244xxFN S-8540/41		S-93Cx6AFT S-8232xxFT S-8423xFT S-8340/41xxAFT S-8532		S-8233xxFT S-8243xxxFT				
 <p><b>8SSOP</b></p>	H 6.4 D 3.1 A 1.3 max.	 <p><b>10SSOP</b></p>	H 6.4 D 3.1 A 1.3 max.	 <p><b>SON5A</b></p>	A		H 2.1 D 2.0 A 0.85 max.		
	S-8330/31xxFS S-8423xFS S-29L/U/ZxxFS		S-3530/31/11xFS		S-35L32AEFS S-35L12AEFS			S-8241xxxPN	
 <p><b>8SOP(JEDEC)</b></p>	H 6.0 D 4.9 A 1.75 max.	 <p><b>8SOP(EIAJ)</b></p>	H 6.2 D 5.2 A 1.7 max.						
	S-93Cx6AxFJ S-29xxFJ S-29Zx30ADFJA S-3510AxFJ		S-24CxxFJ	S-8430AF S-2900AFE S-294xxAFE S-29L/UxxFE			S-29x55AFE		



The Semiconductor Division of Seiko Instruments Inc. who manufactures the products described in this catalog holds the ISO-9001 quality system certificate.

**SII**   
Seiko Instruments Inc.

[www.sii.co.jp/compo](http://www.sii.co.jp/compo)

**Seiko Instruments Inc.**

1-8, Nakase, Mihama-ku, Chiba-shi, Chiba 261, Japan  
Components Sales Div.  
Telephone :+81-43-211-1196 Facsimile :+81-43-211-8032  
E-mail:component@sii.co.jp

Seiko Instruments USA Inc.  
Electronic Components Div.  
2990 W. Lomita Blvd., Torrance, CA 90505, U.S.A.  
Telephone :800-934-9334 Facsimile :+1-909-975-5699  
E-mail:seiko-eed@salesupport.com

Seiko Instruments GmbH  
Siemensstrasse 9b 63263 Neu-Isenburg, Germany  
Telephone :+49-6102-297-0 Facsimile :+49-6102-297-320  
E-mail:sig@compuserve.com

Seiko Instruments (H.K.) Ltd.  
4-5 / F, Wyler Centre 2,200 Tai Lin Pai Road, Kwai Chung,  
N.T., Kowloon, Hong Kong  
Telephone :+852-2421-8611 Facsimile :+852-2480-5479  
E-mail:sales@sih.com.hk

Seiko Instruments Taiwan Inc.  
4FL, No.40, Sec. 2, Min Chuan E. Rd., Taipei, Taiwan, R.O.C.  
Telephone :+886-2-2563-5001 Facsimile :+886-2-2521-9519  
E-mail:public@sic.com.tw

Seiko Instruments Singapore Pte. Ltd.  
2, Marsiling Lane Singapore 739144  
Telephone :+65-269-1370 Facsimile :+65-269-9729  
E-mail :seikocsd@pacific.net.sg

Seiko Instruments France S.A.R.L.  
Centre d'affaires La Boursidiere-BP72  
92357 Le Plessis-Robinson, Cedex, France  
Telephone: +33-1-4629-9590  
Facsimile: +33-1-4629-9599

Released in Sep. 2000

(Specification are subject to change without notice.)  
This catalog is printed on recycled paper.

CAT. NO. 1-0009-180/SH