

S1F81100 Series

System Power Supply IC

■ DESCRIPTION

The S1F81100 is a System Power Supply IC. From the Li-Ion/Li-polymer battery, 4 channels of output voltage are generated via external devices. The 4 channels are independent of each other and can be controlled separately.

On this series, an I²C controller (for the slave function), input and output voltage detecting functions, general purpose I/O pins and a sleep function are provided as well as three PWM controller channels and one series regulator channel.

The S1F81100 is also equipped with an I/O pin dedicated to interfacing with the XScale™ processor, and is most suitable for use as a power supply unit for mobile devices such as PDAs equipped with an XScale™ processor (PXA250/210) mounted and a smart-phone.

■ FEATURES

The features of the S1F81100 include the following:

- Input voltage: V_{IN} 3.3V to 5.5V (if at least either V_{CC2} or V_{CC3} is 3.3V)
2.8V to 5.5V (if both V_{CC2} and V_{CC3} are 2.5V or lower)
- Backup voltage: V_{BAK} 2.2V to 3.6V
- Regulator: 4 channels

CH-1 (V_{CC1}): PWM controller

Fast (1MHz) synchronized rectification type PWM controller

(Connected to an external component to configure a switching regulator.)

Features include a fast response circuit using a current/voltage returning system, a short-circuit-proof circuit, more compact external components by a fast clock, and a sub-regulator.

Output voltage: 1.5/1.4/1.3/1.2/1.1/1.0/0.9/0.8 V

One of these values is to be selected via the I²C controller.

Accuracy: within $\pm 5\%$

<u>Output current:</u>	Main unit:	In the sleep status:	OFF.
		In operation:	Max.: 500mA
	Sub unit:	Max.: 20mA	

CH-2 (V_{CC2}): PWM controller

Fast synchronized rectification type PWM controller

(Connected to an external component to configure a switching regulator.)

Features include a fast response circuit using a current/voltage returning system, a short-circuit-proof circuit, more compact external components by a fast clock, and a sub-regulator.

Output voltage: 3.3/2.5/1.8 V

One is to be selected from the mask options.

Accuracy: within $\pm 5\%$

<u>Output current:</u>	Main unit:	In the deep sleep status:	OFF.
		In operation:	Max.: 1A
	Sub unit:	Max.: 10mA	

CH-3 (V_{CC3}): PWM controller

Fast synchronized rectification type PWM controller

(Connected to an external component to configure a switching regulator.)

Features include a fast response circuit using a current/voltage returning system, a short-circuit-proof circuit, more compact external components by a fast clock, and a sub-regulator.

Output voltage: 3.3/2.5/1.8 V

One is to be selected from the mask options.

Accuracy: within $\pm 5\%$

<u>Output current:</u>	Main unit:	In the deep sleep status:	OFF.
		In operation:	Max.: 1A
	Sub unit:	Max.: 10mA	

S1F81100 Series

CH-4 (Vcc4): Series regulator

A low power consumption type Series Regulator.

Output voltage: 1.5/1.4/1.3/1.2/1.1/1.0/0.9/0.8 V ... the same voltage is output as CH-1

Output current: In the sleep status: OFF.

In operation: Max: 20mA

- Conversion Efficiency: Switching regulator (CH-1): Max. 80% or more
Switching regulator (CH-2/CH-3): Max. 90% or more
- Shutdown current: Typ. 1μA
- External interface: Built-in interfaces in the I²C controller (SDA, SCL and AD_EN, for the slave function only).
- Output voltage detecting function: 1 channel (nVCC_FLT)
The Low output is applied if the detected voltage of one of the four channels fails to comply with the specs.
- Input voltage detecting function: 1 channel (nBAT_FLT)
The Low output is applied if the detected input voltage fails to comply with the specs.
- Resetting function: 1 channel (XRST(I), nRESET(O))
- Sleep function: 1 channel (PWR_EN, WUP)

■ BLOCK DIAGRAM

The following is a block diagram of the S1F81100.

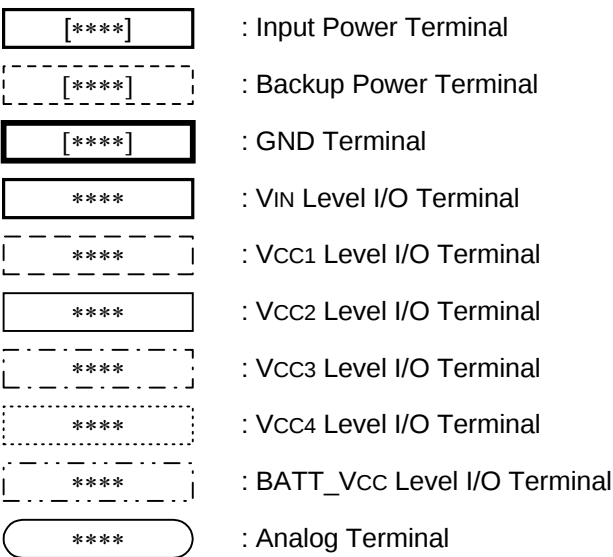


Fig.1 Notation of Pin Voltage levels in Fig.2

S1F81100 Series

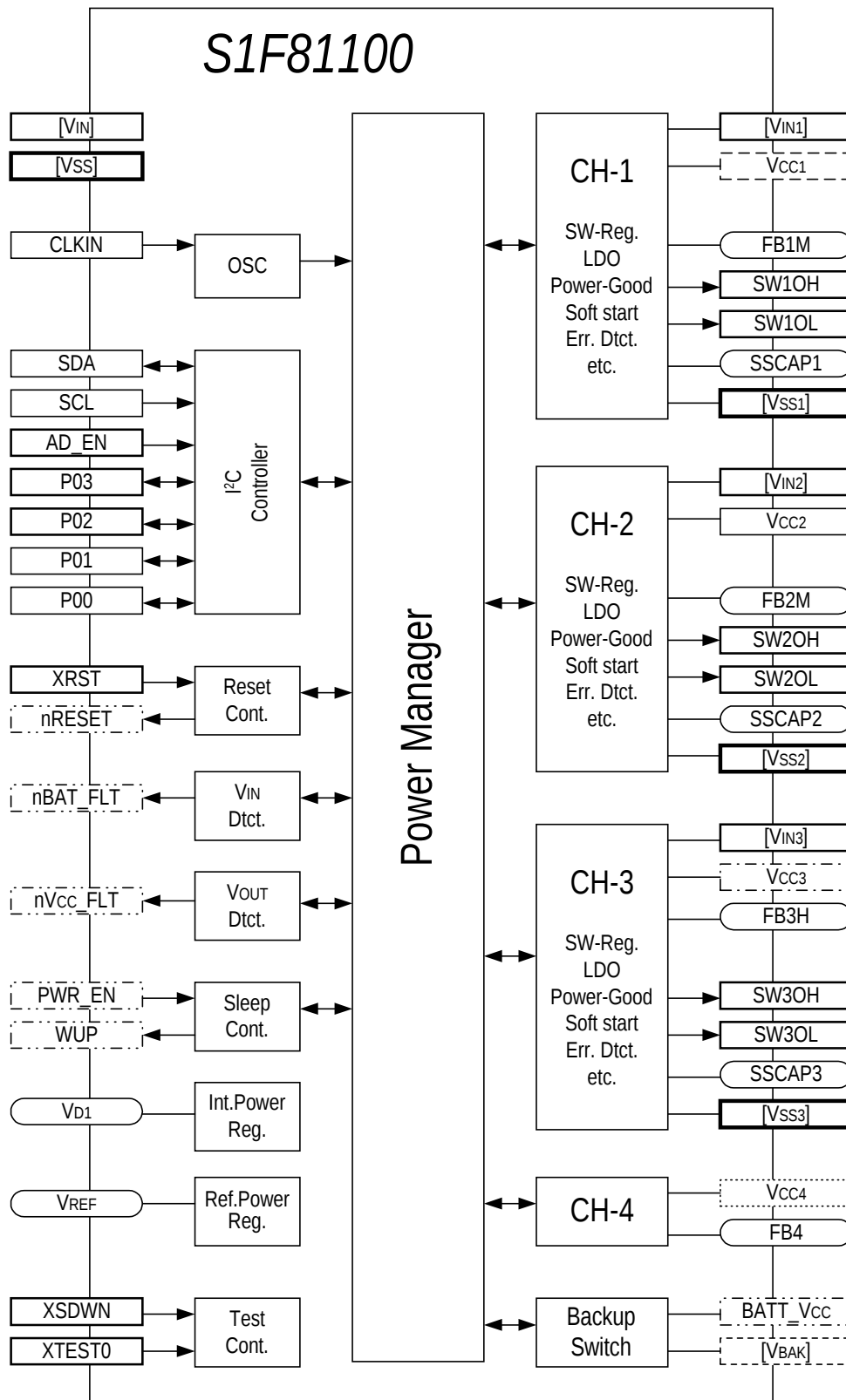
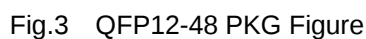


Fig.2 S1F81100 Block diagram

■ PIN ASSIGNMENT



1	FB3M	13	FB4	25	VD1	37	XPOR(N.C.)
2	SW3OL	14	VCC4	26	VBAK	38	P02
3	VSS3	15	VIN	27	BATT_Vcc	39	P03
4	VCC1	16	XRST	28	PWR_EN	40	VCC2
5	VIN1	17	XTEST0	29	WUP	41	VIN2
6	SW1OH	18	XSDWN	30	nRESET	42	SW2OH
7	FB1M	19	AD_EN	31	nBAT_FLT	43	FB2M
8	SW1OL	20	TCLK(N.C.)	32	nVcc_FLT	44	SW2OL
9	VSS1	21	CLKIN	33	P00	45	VSS2
10	SSCAP3	22	Vss	34	P01	46	VCC3
11	SSCAP2	23	TIREF(N.C.)	35	SCL	47	VIN3
12	SSCAP1	24	VREF	36	SDA	48	SW3OH

S1F81100 Series

PIN DESCRIPTION

Table.2(a) S1F81100 Pin List

[Power supply/controlling Pins]			
Name	I/O	Level	Function
VIN	—	—	Voltage (+) input pin
VSS	—	—	Voltage (-) input pin
VBAK	—	—	Backup voltage (+) input pin
Vd1	—	—	Internal constant voltage output pin
VREF	—	—	Reference voltage output pin
BATT_Vcc	—	—	Interface voltage output pin
nVcc_FLT	O	BATT_Vcc	Output voltage detection result output pin
nBAT_FLT	O	BATT_Vcc	Input voltage detection result output pin
nRESET	O	BATT_Vcc	System reset signal output pin
PWR_EN	I	BATT_Vcc	Sleep state setting input pin
WUP	O	BATT_Vcc	Sleep state flag output pin
CLKIN	I	Vcc2	Clock input pin
XRST	I	VIN	Resetting input pin
XTEST0	I	VIN	Testing input pin
XSDWN	I	VIN	Ultra-power-saving mode input pin
P00 to 01	I/O	Vcc2	General purpose I/O pin
P02 to 03	I/O	VIN	General purpose I/O pin
SCL	I	Vcc2	I ² C clock input pin
SDA	I/O	Vcc2	I ² C data I/O pin
AD_EN	I	VIN	I ² C address enabling input pin
[CH-1 related pins]			
Name	I/O	Function	
VIN1	—	Voltage (+) input pin	
SW1OH	O	Switching P-ch power MOS Tr. drive signal output pin	
SW1OL	O	Switching N-ch power MOS Tr. drive signal output pin	
SSCAP1	—	CH-1 soft start setting pin	
FB1M	—	Output current feedback (M) input pin	
Vcc1	—	Output current feedback (L) input pin [regulator output voltage]	
VSS1	—	Voltage (-) input pin	

Table.2(b) S1F81100 Pin List

[CH-2 related pins]		
Name	I/O	Function
VIN2	—	Voltage (+) input pin
SW2OH	O	Switching P-ch power MOS Tr. drive signal output pin
SW2OL	O	Switching N-ch power MOS Tr. drive signal output pin
SSCAP2	—	CH-2 soft start setting pin
FB2M	—	Output current feedback (M) input pin
Vcc2	—	Output current feedback (L) input pin [regulator output voltage]
VSS2	—	Voltage (-) input pin
[CH-3 related pins]		
Name	I/O	Function
VIN3	—	Voltage (+) input pin
SW3OH	O	Switching P-ch power MOS Tr. drive signal output pin
SW3OL	O	Switching N-ch power MOS Tr. drive signal output pin
SSCAP3	—	CH-3 soft start setting pin
FB3M	—	Output current feedback (M) input pin
Vcc3	—	Output current feedback (L) input pin [regulator output voltage]
VSS3	—	Voltage (-) input pin
[CH-4 related pins]		
Name	I/O	Function
Vcc4	O	Vcc4 voltage output pin
FB4	I	Feedback input pin

S1F81100 Series

■ BASIC EXTERNAL CONNECTION DIAGRAM

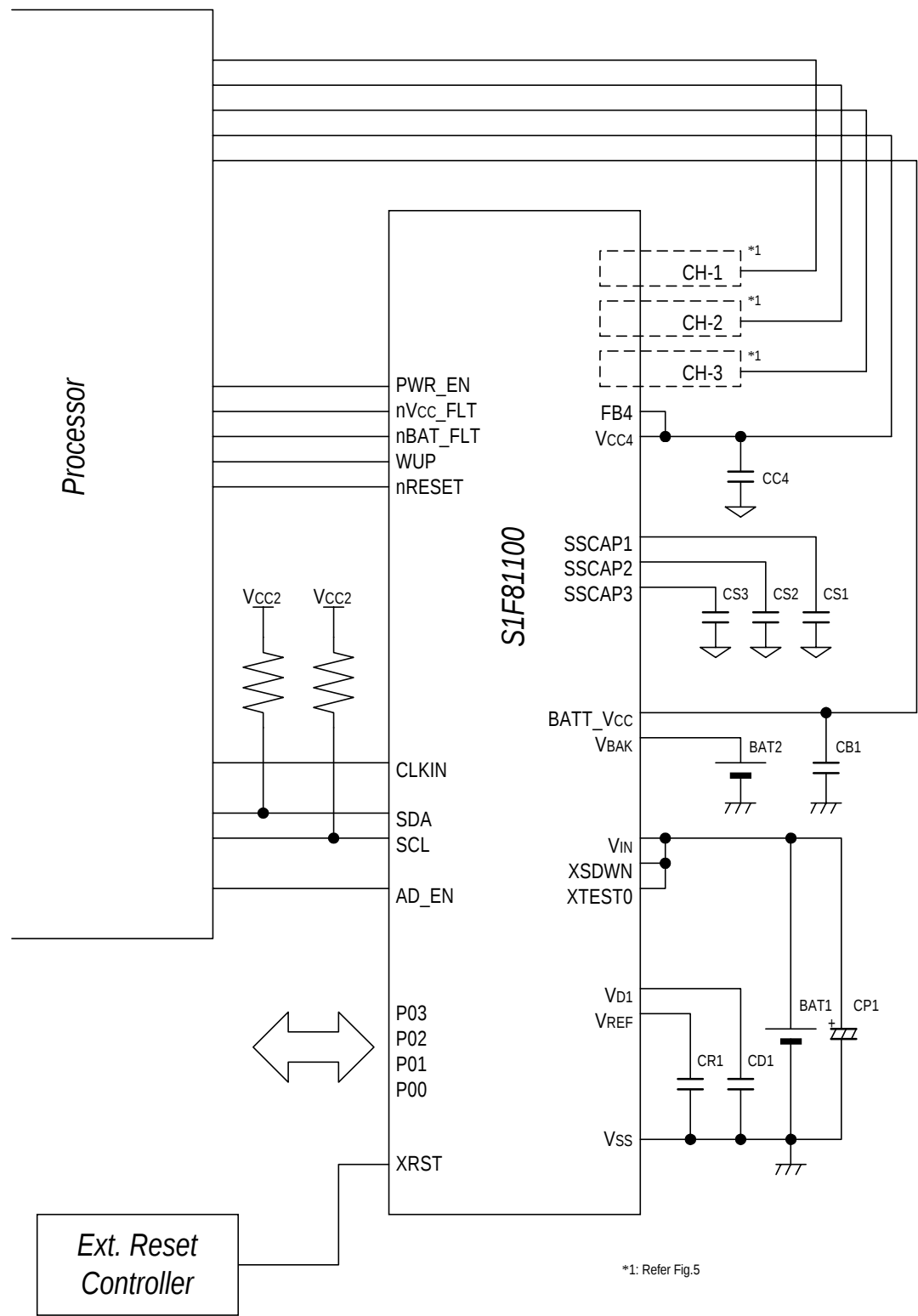


Fig.4 S1F81100 Basic external connection diagram (1)

S1F81100 Series

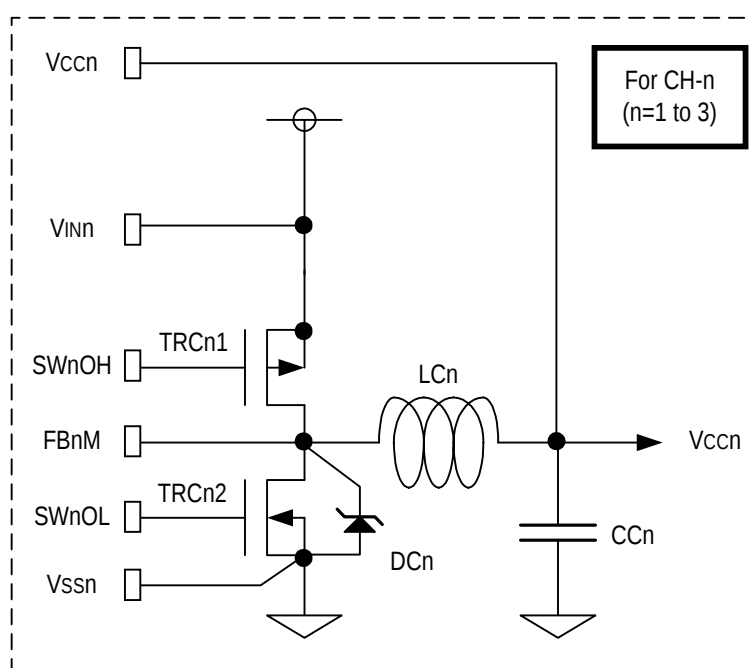


Fig.5 S1F81100 Basic external connection diagram (2)

Table.3 External component list (Examples)

LC1 to 3	Choking Coil	10 μ H	*1
TPC1 to 3	P-ch power MOS Tr.		*2
TNC1 to 3	N-ch power MOS Tr.		*3
DC1 to 3	Schottky diode		*4
CC1 to 3	Capacitors	100 μ F	
CC4	Capacitor	22 μ F	
CS1	Capacitor	0.01 μ F	
CS2 to 3	Capacitors	0.1 μ F	
CB1	Capacitor	0.1 μ F	
CD1	Capacitor	0.1 μ F	
CR1	Capacitor	0.01 μ F	
CP1	Capacitor	4.7 μ F	
BAT1	Li battery	(2.5)3.3 to 5.5V	
BAT2	Coin cell	2.2 to 5.5V	

[Recommended parts]

- *1 SUMIDA/CR43-100, SUMIDA/CR54-100
- *2 HITACHI/HAT1043M
- *3 HITACHI/HAT2053M
- *4 HITACHI/HRW0702A, TOSHIBA/CMS06

S1F81100 Series

NOTICE:

No part of this material may be reproduced or duplicated in any form or by any means without the written permission of Seiko Epson. Seiko Epson reserves the right to make changes to this material without notice. Seiko Epson does not assume any liability of any kind arising out of any inaccuracies contained in this material or due to its application or use in any product or circuit and, further, there is no representation that this material is applicable to products requiring high level reliability, such as, medical products. Moreover, no license to any intellectual property rights is granted by implication or otherwise, and there is no representation or warranty that anything made in accordance with this material will be free from any patent or copyright infringement of a third party. This material or portions thereof may contain technology or the subject relating to strategic products under the control of the Foreign Exchange and Foreign Trade Control Law of Japan and may require an export license from the Ministry of International Trade and Industry or other approval from another government agency.

©Seiko Epson Corporation 2002, All rights reserved.

XScale is a trademark of Intel in U.S.A.

All other product names mentioned herein are trademarks and/or registered trademarks of their respective companies.

SEIKO EPSON CORPORATION

ELECTRONIC DEVICES MARKETING DIVISION

IC Marketing & Engineering Group

ED International Marketing Department

Europe & U.S.A

421-8 Hino, Hino-shi, Tokyo 191-8501, JAPAN
Phone: 042-587-5812 FAX: 042-587-5564

ED International Marketing Department

Asia

421-8 Hino, Hino-shi, Tokyo 191-8501, JAPAN
Phone: 042-587-5814 FAX: 042-587-5110

■ EPSON Electronic devices Website

<http://www.epsondevice.com/>



First issue June, 2002

Printed in Japan (H)

Rev.1.1E