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S6SAP413A

Programable Evaluation Board for 3ch Buck DC/DC + 1ch Buck/Boost with I^2C Interface

Operation Manual

Publication Number S6SAP413A_SS901-00026 Revision 3.0 Issue Date November 28, 2014

Preface

This manual explains how to use the evaluation board. Be sure to read this manual before using the product. For this product, please consult with sales representatives or support representatives.

Handling and Use

Handling and use of this product and notes regarding its safe use are described in the manuals.

Follow the instructions in the manuals to use this product.

Keep this manual at hand so that you can refer to it anytime during use of this product.

Notice on this Document

All information included in this document is current as of the date it is issued. Such information is subject to change without any prior notice.

Please confirm the latest relevant information with the sales representatives.

Caution of the Products Described in this Document

The following precautions apply to the product described in this manual.

⚠**WARNING**	Indicates a potentially hazardous situation which could result in death or serious injury and/or a fault in the user's system if the product is not used correctly.

Electric shock, Damage	Before performing any operation described in this manual, turn off all the power supplies to the system. Performing such an operation with the power on may cause an electric shock or device fault.
Electric shock, Damage	Once the product has been turned on, do not touch any metal part of it. Doing so may cause an electric shock or device fault.

⚠ **CAUTION**	Indicates the presence of a hazard that may cause a minor or moderate injury, damages to this product or devices connected to it, or may cause to loose software resources and other properties such as data, if the device is not used appropriately.

Cuts, Damage	Before moving the product, be sure to turn off all the power supplies and unplug the cables. Watch your step when carrying the product. Do not use the product in an unstable location such as a place exposed to strong vibration or a sloping surface. Doing so may cause the product to fall, resulting in an injury or fault.
Cuts	The product contains sharp edges that are left unavoidably exposed, such as jumper plugs. Handle the product with due care not to get injured with such pointed parts.
Damage	Do not place anything on the product or expose the product to physical shocks. Do not carry the product after the power has been turned on. Doing so may cause a malfunction due to overloading or shock.
Damage	Since the product contains many electronic components, keep it away from direct sunlight, high temperature, and high humidity to prevent condensation. Do not use or store the product where it is exposed to much dust or a strong magnetic or electric field for an extended period of time. Inappropriate operating or storage environments may cause a fault.
Damage	Use the product within the ranges given in the specifications. Operation over the specified ranges may cause a fault.
Damage	To prevent electrostatic breakdown, do not let your finger or other object come into contact with the metal parts of any of the connectors. Before handling the product, touch a metal object (such as a door knob) to discharge any static electricity from your body.
Damage	When turning the power on or off, follow the relevant procedure as described in this document. Before turning the power on, in particular, be sure to finish making all the required connections. Furthermore, be sure to configure and use the product by following the instructions given in this document. Using the product incorrectly or inappropriately may cause a fault.
Damage	Because the product has no casing, it is recommended that it be stored in the original packaging. Transporting the product may cause a damage or fault. Therefore, keep the packaging materials and use them when re-shipping the product.

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S6SAP413A

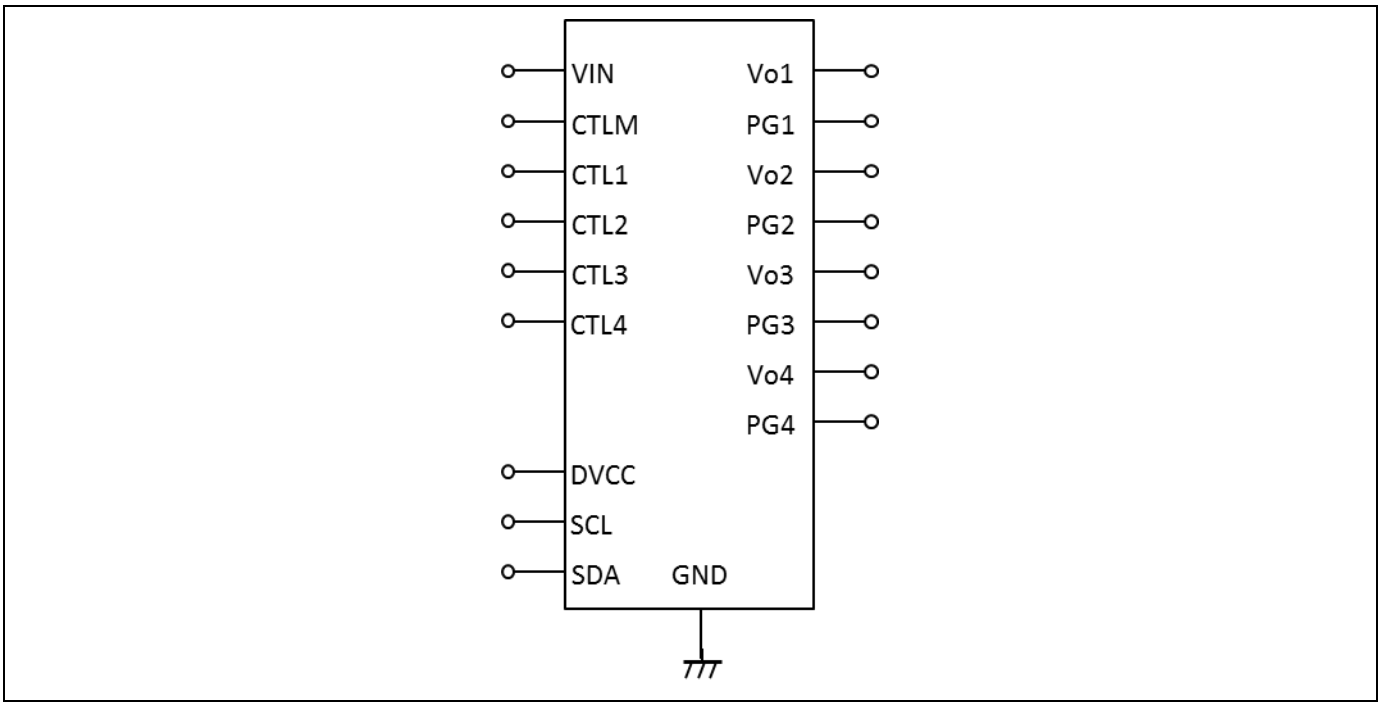
Programable Evaluation board for 3ch Buck DC/DC + 1ch Buck/Boost with I²C Interface

Operation Manual

1. Description

The S6SAP413A is the evaluation board for 3ch Buck + 1ch Buck/Boost DC/DC, S6AP413A. This board implements S6AP413A, and output preset voltage DD1:1.0V, DD2:1.8V, DD3:3.3V, DD4:1.0V (Option-code 79), DD1:1.0V, DD2:1.5V, DD3:3.3V, DD4:1.2V (Option-code 6B). Also, this board implements the I²C interface. The separated communication tool is sold, and it can select the output voltage, soft-start time, ON/OFF sequence, PFM/PWM mode easily with I²C communication using windows PC and prepared software.

Figure1-1 Board Outline



2. Evaluation Board Specification

Table2-1 Evaluation Board Specification

Item	Symbol	Min	Typ	Max	Unit	Option Code
Input voltage	VIN	2.5	3.3	5.5	V	79/6B
Output voltage	Vo1	0.988	1.00	1.012	V	79/6B
Output current	Io1	-	-	2000	mA	79/6B
Output voltage	Vo2	1.778	1.80	1.822	V	79
		1.482	1.50	1.518		6B
Output current	Io2	-	-	1200	mA	79/6B
Output voltage	Vo3	3.23	3.30	3.37	V	79/6B
Output current	Io3	-	-	600	mA	79/6B
Output voltage	Vo4	0.988	1.00	1.012	V	79
		1.185	1.20	1.215		6B
Output current	Io4	-	-	2000	mA	79/6B

Board size : 28mm × 28mm

3. PIN Descriptions

3.1 Input/Output Pin Descriptions

Table3-1 Input/Output Pin Descriptions

Block	Pin Symbol	I/O	Function Description
DD1	Vo1	O	DD1 output terminal
	PG1	O	DD1 POWERGOOD output monitor terminal
DD2	Vo2	O	DD2 output terminal
	PG2	O	DD2 POWERGOOD output monitor terminal
DD3	Vo3	O	DD3 output terminal
	PG3	O	DD3 POWERGOOD output monitor terminal
DD4	Vo4	O	DD4 output terminal
	PG4	O	DD4 POWERGOOD output monitor terminal
CTL	CTL1	I	DD1 control terminal
	CTL2	I	DD2 control terminal
	CTL3	I	DD3 control terminal
	CTL4	I	DD4 control terminal
	CTLM	I	Control terminal for common block and logic block
I^2C	DVCC	I	Power supply terminal for I^2C.
	SCL	I	I^2C clock terminal
	SDA	I/O	I^2C data I/O terminal
COMMON	VIN	I	Power supply terminal
	GND	-	Ground terminal

3.2 Jumper, Switch Descriptions

Table3-2 Jumper, Switch Descriptions

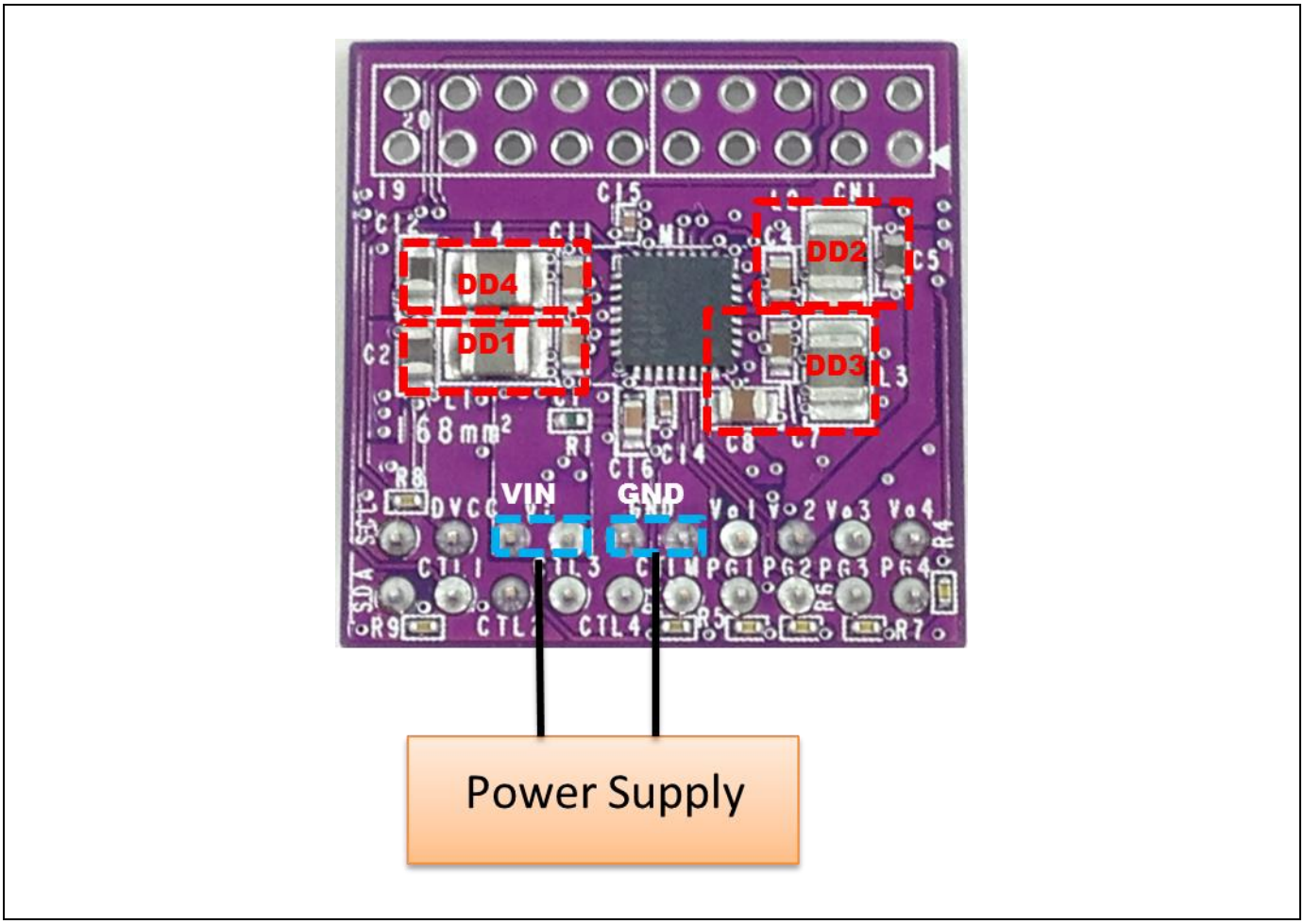
Jumper, Switch	Description	Initial Setting
JP1	Short VIN terminal and VBUS pin (2 pin)	Open
CN1	1,8,12,14,17 : GND pin 2 : VIN pin 4 : DVCC pin 5 : SCL pin 6 : SDA pin 3,7,9,10,11,13,15,16,18,19,20 : open	-

4. Setup and Verification

S6AP413A preset value can be evaluated with stabilized power supply.

1. 3.3V is applied to VIN terminal.
2. CTLM, CTL1, CTL2, CTL3, CTL4 are connected to VIN terminal.
3. Vo1:1.0V, Vo2:1.8V, Vo3:3.3V, Vo4:1.0V is output. (Option code : 79)
   Vo1:1.0V, Vo2:1.5V, Vo3:3.3V, Vo4:1.2V is output. (Option code : 6B)

Figure4-1 For Control Switch Evaluation



5. Component and Wiring Layout

5.1 Component layout

Figure5-1 Component Layout (Layer 1)

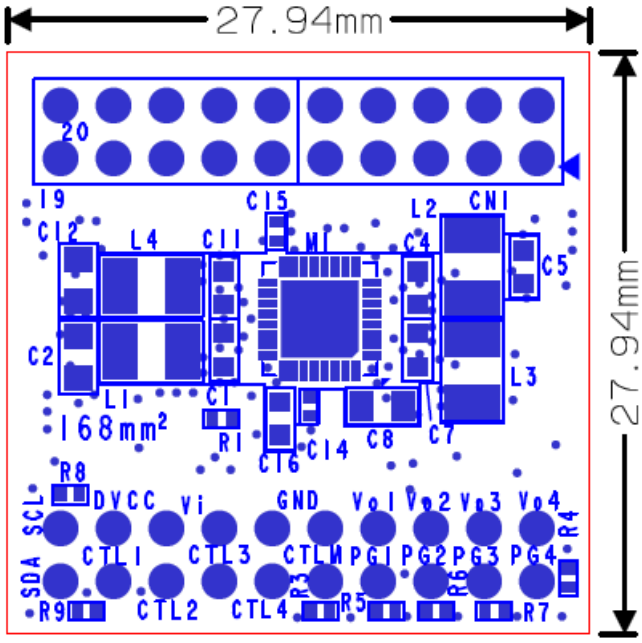
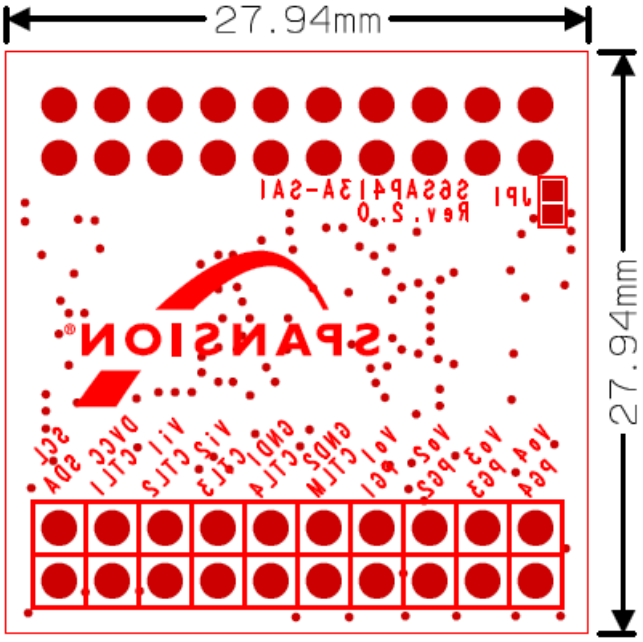


Figure5-2 Component Layout (Layer 4)



5.2 Wiring Layout

Figure5-3 Wiring Layout (Layer 1)

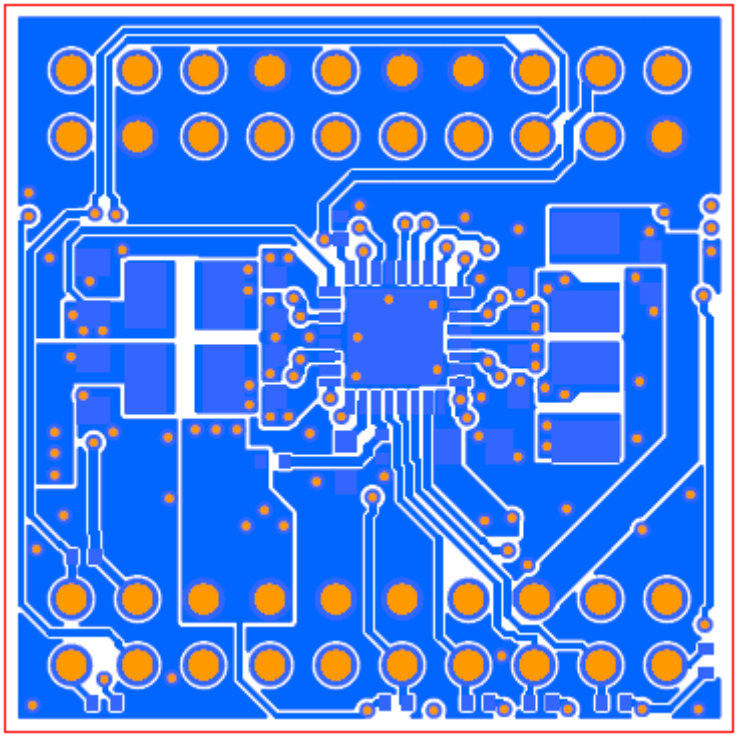


Figure5-4 Wiring Layout (Layer 2)

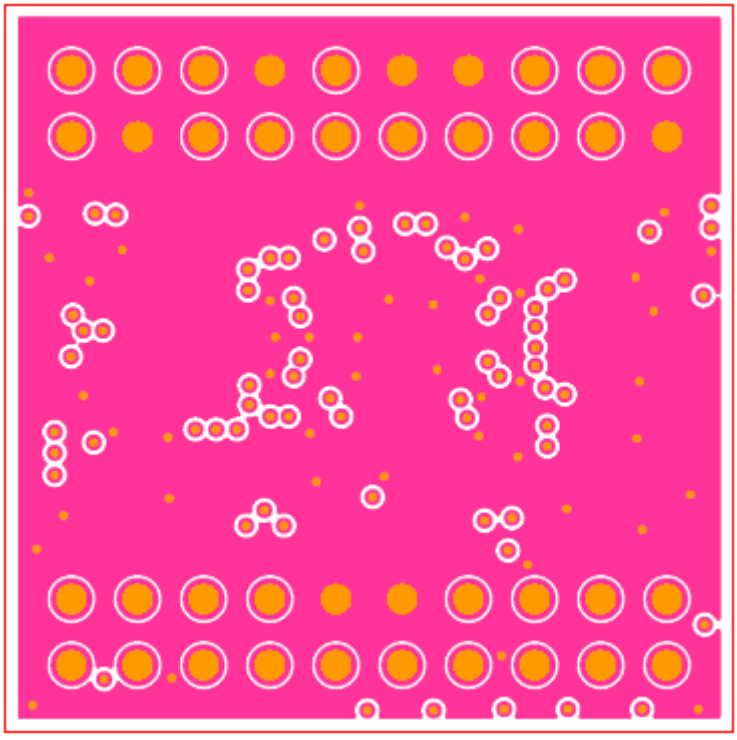


Figure5-5 Wiring Layout (Layer 3)

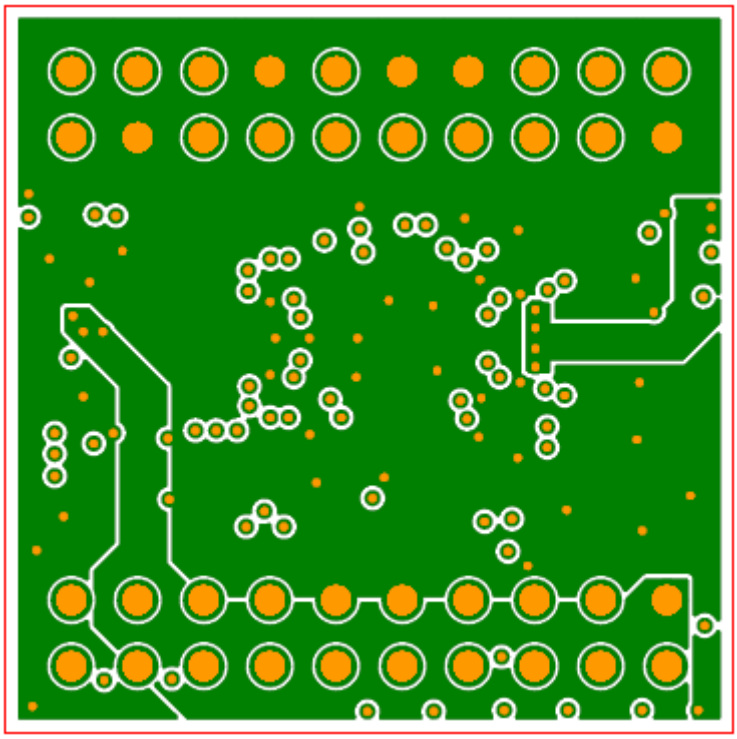
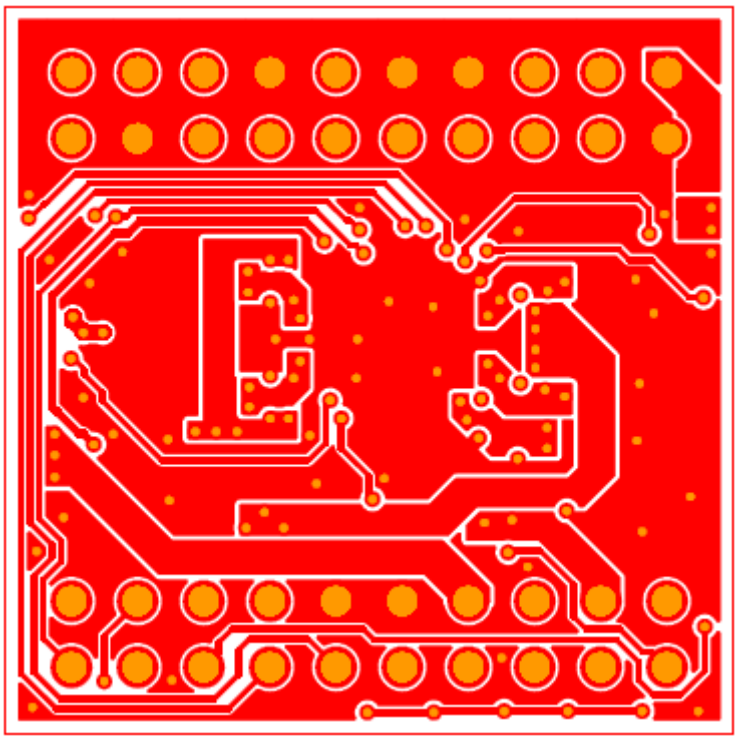
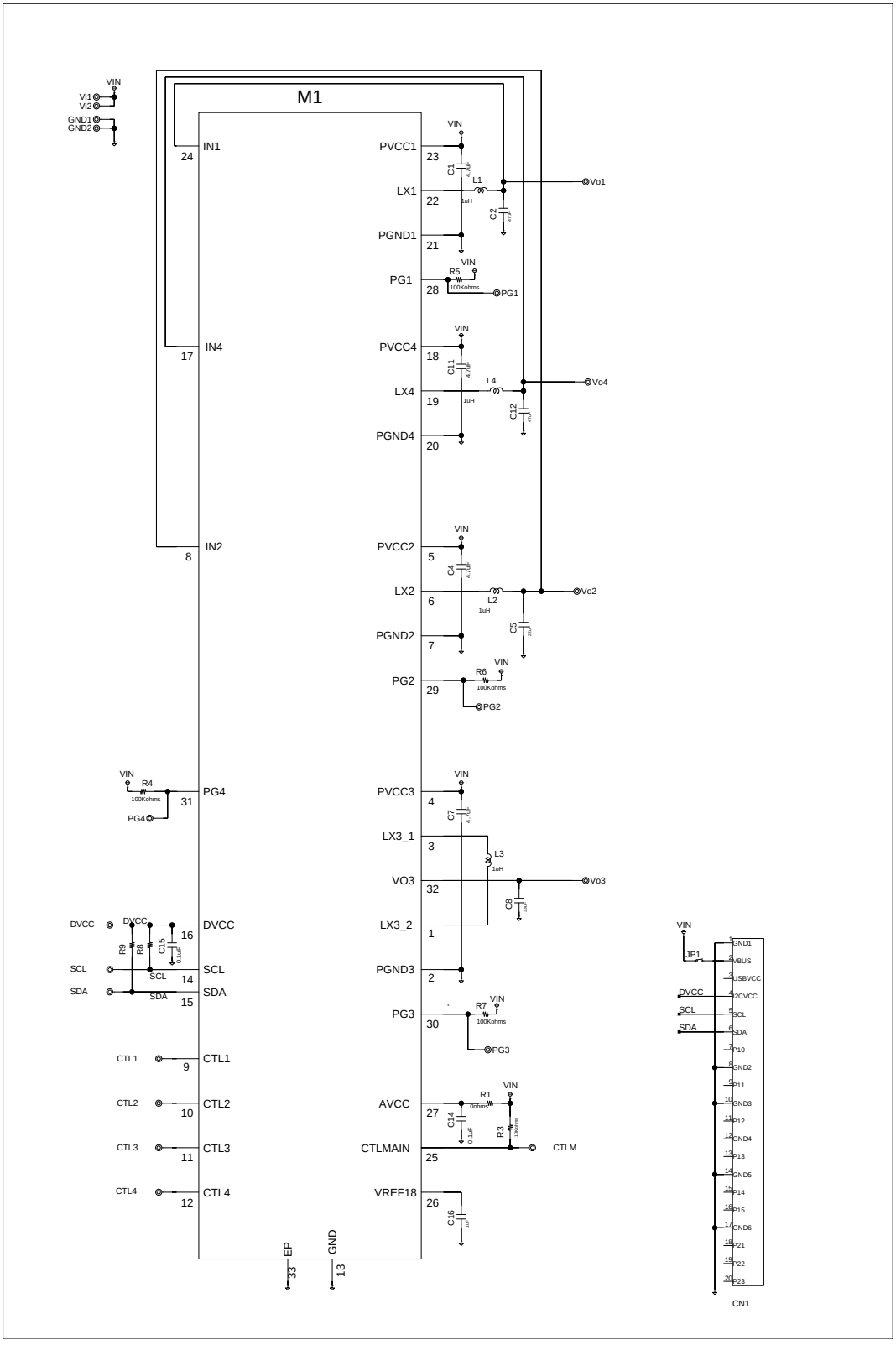


Figure5-6 Wiring Layout (Layer 4)



6. Circuit Schematic

Figure6-1 Circuit Schematic for Power Block



7. Component List

Table7-1 Component List

No.	Component	Item	Parts Number	Vendor	Value	Remarks
1	M1	PMIC	S6AP413A	SPANSION	-	-
2	L1	Inductor	1276AS-H-1R0M	TOKO	1.0µH	-
3	L2	Inductor	1276AS-H-1R0M	TOKO	1.0µH	-
4	L3	Inductor	1276AS-H-1R0M	TOKO	1.0µH	-
5	L4	Inductor	1276AS-H-1R0M	TOKO	1.0µH	-
6	C14	Ceramic Capacitor	C1005JB1H104K050BB	TDK	0.1µF	50V
7	C15	Ceramic Capacitor	C1005JB1H104K050BB	TDK	0.1µF	50V
8	C16	Ceramic Capacitor	C1608X5R1H105K080AB	TDK	1µF	50V
9	C1	Ceramic Capacitor	C1608X5R1V475K080AC	TDK	4.7µF	35V
10	C4	Ceramic Capacitor	C1608X5R1V475K080AC	TDK	4.7µF	35V
11	C7	Ceramic Capacitor	C1608X5R1V475K080AC	TDK	4.7µF	35V
12	C11	Ceramic Capacitor	C1608X5R1V475K080AC	TDK	4.7µF	35V
13	C5	Ceramic Capacitor	C2012X5R1A226K125AB	TDK	22µF	10V
14	C8	Ceramic Capacitor	C2012X5R1A336M125AC	TDK	33µF	10V
15	C2	Ceramic Capacitor	C2012X5R1A476M125AC	TDK	47µF	10V
16	C2	Ceramic Capacitor	C2012X5R1A476M125AC	TDK	47µF	10V
17	R1	Chip Resistor	RK73Z1E	KOA	0Ω	Under 50mV
18	R4	Chip Resistor	RR0816P103D	SUSUMU	10kΩ	±0.5%, ±25ppm/ºC
19	R5	Chip Resistor	RR0510P-104-D	SUSUMU	100kΩ	±0.5%, ±25ppm/ºC
20	R6	Chip Resistor	RR0510P-104-D	SUSUMU	100kΩ	±0.5%, ±25ppm/ºC
21	R7	Chip Resistor	RR0510P-104-D	SUSUMU	100kΩ	±0.5%, ±25ppm/ºC
22	R8	Chip Resistor	RR0510P-222-D	SUSUMU	2.2kΩ	±0.5%, ±25ppm/ºC
23	R9	Chip Resistor	RR0510P-222-D	SUSUMU	2.2kΩ	±0.5%, ±25ppm/ºC
24	CN1	Connector	2214R-20SG-85-F1	Neltron Industrial Co., Ltd.	-	1x20pin header (2.54pitch)Unmounted
25	Vi1/Vi2,GND1/GND2,DVCC,SCL,SDA,CTLM,CTL1,CTL2,CTL3,CTL4,Vo1,PG1,Vo2,PG2,Vo3,PG3,Vo4,PG4	Terminal	HIF3H-20PB-2.54DSA	HIROSE	-	-
26	JP1	Solder jumper	Solder jumper	-	-	Unmounted

These components are compliant with RoHS, and please ask each vendor for details if necessary.

8. Evaluation Board Picture

Figure8-1 Picture (Top)

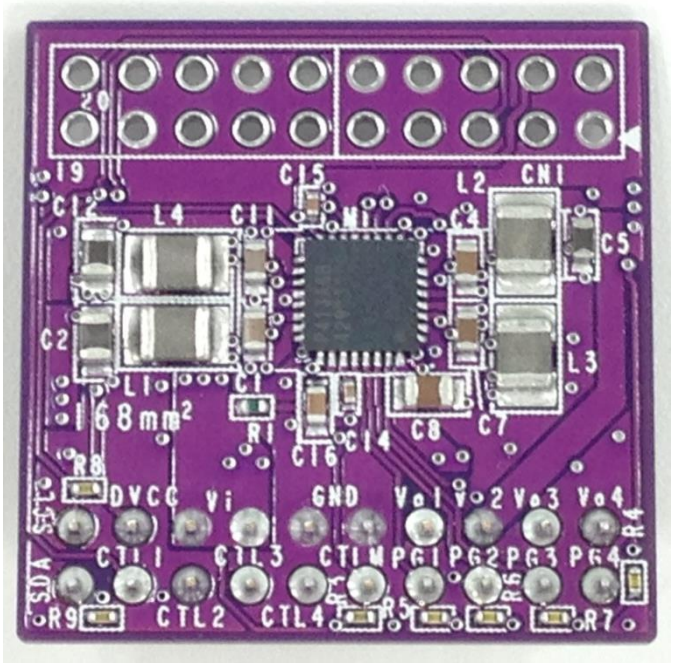
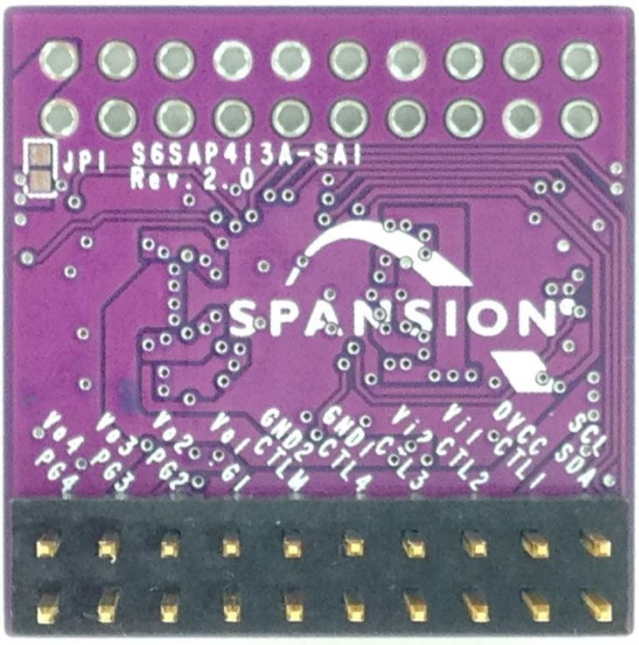


Figure8-2 Picture (Back)



9. Ordering Information

Table9-1 Ordering Information

Part Number	EVB Revision	Note
S6SAP413A79SA1001	Rev 1.0	---
S6SAP413A6BSA1001	Rev 2.0	---

10. Major Changes

Page	Section	Change Results
Revision 1.0		
-	-	Initial release
Revision 2.0		
12	7. Component list	Revised the Component of Component list Vi --> Vi1/Vi2 GND --> GND1/GND2
14	9. Ordering Information	Revised the Part number of Ordering Information S6SPA413A79SA1001 --> S6SAP413A79SA1001
Revision 3.0		
5	1. Description	Adding Option code : 6B
5	2. Evaluation board specification	Adding Option code : 6B
7	4. Setup and verification	Adding Option code : 6B
8	5. Component and wiring layout	Updated to Rev.2.0
11	6. Circuit schematic	Updated
14	9. Ordering Information	Adding the Part number of Ordering Information S6SAP413A6BSA1001

SS901-00026-3v0-E

Spansion • Support Tool Manual

S6SAP413A
Programable Evaluation Board for 3ch Buck + 1ch Buck/Boost DC/DC with I^2C Interface
Operation Manual

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Edited: Communications

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