APEK81850

A81850 Evaluation Board User Guide

DESCRIPTION

The A81850 is a synchronous boost/buck/buck-boost controller with programmable outputs and a SPI communication interface capable of 80 W per channel. The device integrates two half-bridge drivers able to create a dual-channel synchronous boost or buck converter or a single-channel synchronous buck-boost converter.

FEATURES

- Two-channel synchronous boost or buck controllers or single-channel buck-boost controller
- Wide V_{IN} range: 5 to 37 V operating, 40 V transient
- Output voltage ranges:
  - □ Boost mode: 16 to 65 V, with 2% accuracy
  - □ Buck mode: 3.3 to 6 V, with 1.5% accuracy
  - □ Buck-boost mode: 5 to 22 V, with 2% accuracy
- Programmable output voltage
  - □ 8-bit resolution in boost and buck-boost mode
  - □ 3.3 V, 4.5 V, 5 V, 5.5 V, and 6 V in buck mode
- Fixed-frequency operation, 200 to 450 kHz
- Array mode supports in-parallel operation of up to two units (four phases): Units can be synchronized

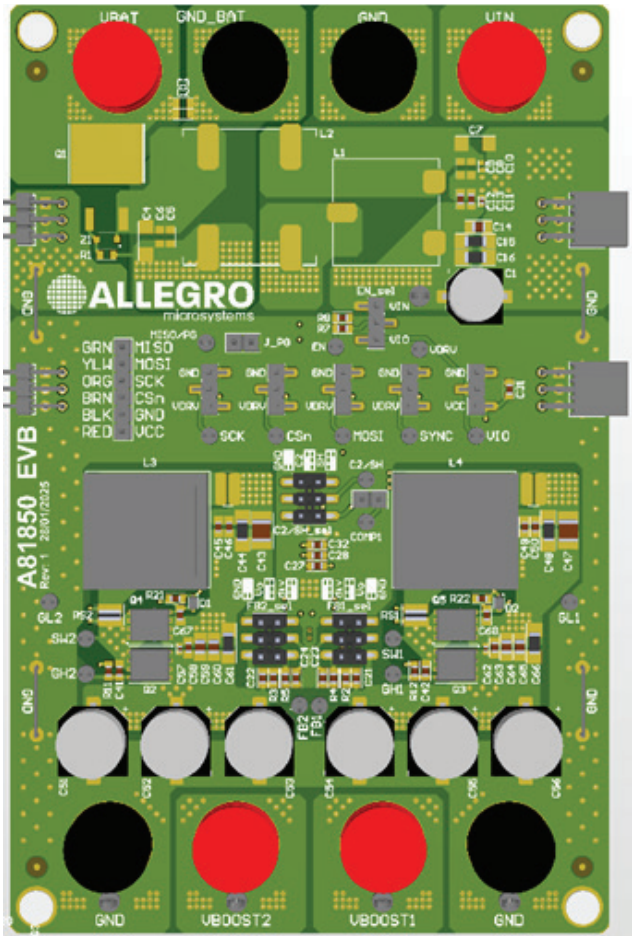


Figure 1: A81850 Boost Evaluation Board

Table 1: A81850 Evaluation Board Configurations

Device Name	Evaluation Board Part Number	Operative Mode
A81850 Boost Evaluation Board	APEK81850KETSR-01-T-Boost	Boost
A81850 Buck Evaluation Board	APEK81850KETSR-01-T-Buck	Buck
A81850 Buck-Boost Evaluation Board	APEK81850KETSR-01-T-BuckBoost	Buck-Boost

Table of Contents

Table 2: Main Electrical Characteristics

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	V_{IN}	V_{IN} must first increase to greater than $V_{UVLO(ON,MAX)}$	5	–	37	V
Undervoltage Lockout Start	$V_{UVLO(ON)}$	V_{IN} rising ramp	5	5.3	5.6	V
Undervoltage Lockout Stop	$V_{UVLO(OFF)}$	V_{IN} falling ramp	4.3	4.5	4.7	V
Enable High Threshold	$V_{EN(HI)}$	V_{EN} rising	1.5	1.75	2	V
Enable Low Threshold	$V_{EN(LO)}$	V_{EN} falling	0.8	0.95	1.1	V
Output Voltage Range Boost	V_{OUT_BOOST}	$V_{OUT\_MAX/VIN} \leq 8$	16	–	65	V
Output Voltage Range Buck-Boost	$V_{OUT\_BUCKBOOST}$		5	–	22	V
Buck Output Voltage Selection_a	$V_{OUTBUCK\_a}$	VOUTx_REGVOLT_SEL[2:0] = 000	–	3.3	–	V
Buck Output Voltage Selection_b	$V_{OUTBUCK\_b}$	VOUTx_REGVOLT_SEL[2:0] = 001	–	4.5	–	V
Buck Output Voltage Selection_c	$V_{OUTBUCK\_c}$	VOUTx_REGVOLT_SEL[2:0] = 010	–	5	–	V
Buck Output Voltage Selection_d	$V_{OUTBUCK\_d}$	VOUTx_REGVOLT_SEL[2:0] = 011	–	5.5	–	V
Buck Output Voltage Selection_e	$V_{OUTBUCK\_e}$	VOUTx_REGVOLT_SEL[2:0] = 100	–	6	–	V

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

USING THE EVALUATION BOARD

This section provides an overview of the connections and configurations of the A81850 evaluation board. Individual dedicated evaluation boards are available for each of the device operative modes: boost, buck and buck-boost.

Jumper Configuration

The device can either work in SPI mode or standalone mode.

For use in SPI mode:

- The six-header jumper provides the pins to allow communication.
- The jumper of the VIO pin must be connected to V_{CC}.
- The SCK, CSn, MOSI jumpers must be left open.
- The SYNC and COMP2 jumpers must be connected with respect to the selected configuration (see Table 3).
- FBx SEL jumper must be connected to VOUT or GND (see Table 3).

For use in stand alone mode:

- The six-header jumper must be left open.
- The jumper of the VIO pin must be connected to GND.
- The SCK, CSn, MOSI, SYNC, and COMP2 jumpers must be connected with respect to the selected configuration (see Table 3).
- FBx SEL jumper must be connected to DIV, resistor divider, or GND (see Table 3).

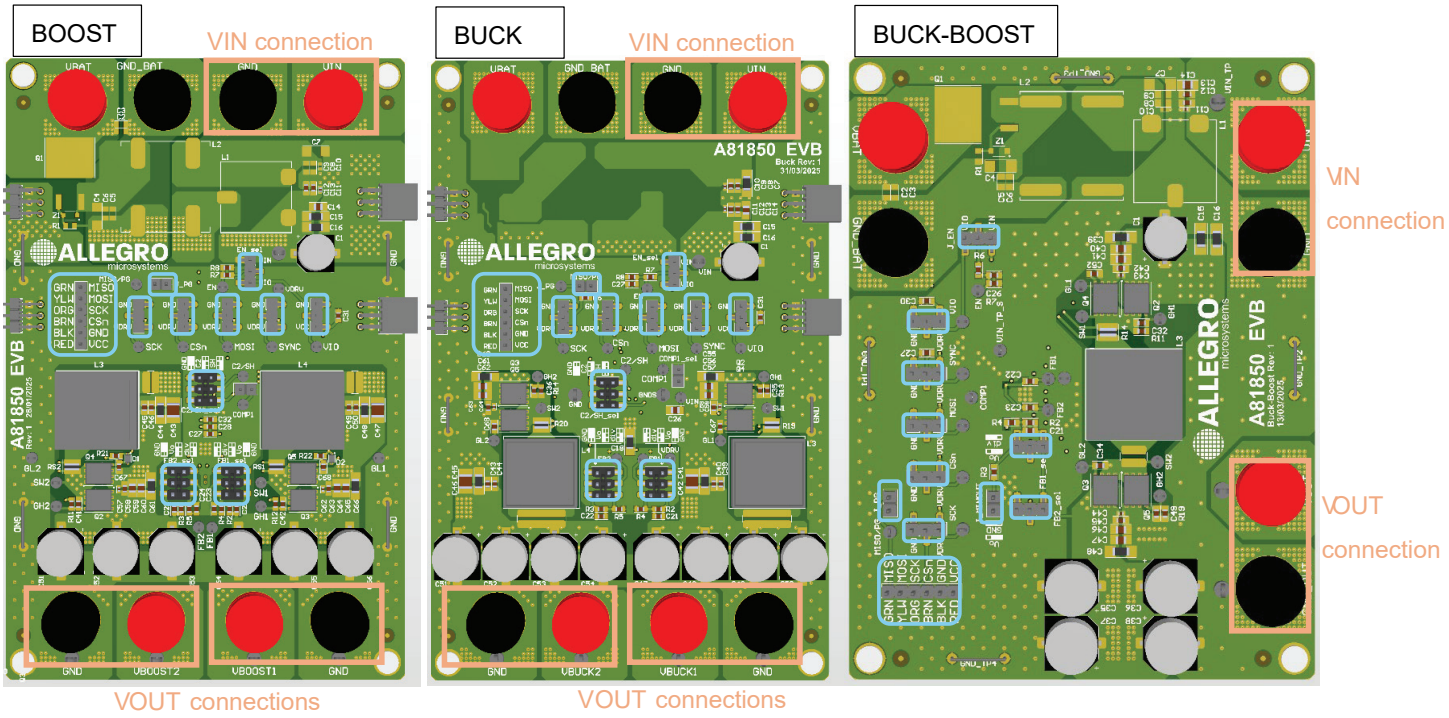


Figure 2: A81850 Evaluation Board: Individual Dedicated Boards for Boost, Buck, and Buck-Boost Configurations

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

Table 3: Device Configuration Table

Configuration	SPI	SA			SPI/SA				
	DCDC_ MODE[2:0]	CSn	SCK	MOSI	COMP1	COMP2/ SHARE	SYNC	VOUT1/FB1	VOUT2/FB2
Boost—1 Channel (80 W)	000	GND	GND	GND	COMP Network	GND	GND	Connected	Not Relevant
Boost Array—1 Channel Peripheral Device (240 W)	000	GND	GND	GND	GND	Connected to Controller	Connected to Controller	Connected	Not Relevant
Boost—2 Independent Channels (80 W/80 W)	011	GND	VDRV	VDRV	COMP Network	COMP Network	VDRV	Connected	Connected
Boost Array—2 Channels Peripheral Device (320 W)	011	GND	VDRV	VDRV	GND	Connected to Controller	Connected to Controller	Connected	Connected
Boost Array—2 Channels Controller Device (160 W)	010	GND	VDRV	GND	COMP Network	GND	VDRV	Connected	Connected
Boost Array—2 Channels Controller Device (>160 W)	010	GND	VDRV	GND	COMP Network	Connected to Peripheral	Connected to Peripheral	Connected	Connected
Buck—1 Channel (80 W)	101	VDRV	GND	VDRV	COMP Network	GND	GND	Connected	Not Relevant
Buck Array—1 Channel Peripheral Device (240 W)	101	VDRV	GND	VDRV	GND	Connected to Controller	Connected to Controller	Connected	Not Relevant
Buck—2 Independent Channels (80 W/80 W)	110	VDRV	VDRV	GND	COMP Network	COMP Network	VDRV	Connected	Connected
Buck Array—2 Channels Peripheral Device (320 W)	110	VDRV	VDRV	GND	GND	Connected to Controller	Connected to Controller	Connected	Connected
Buck Array—2 Channels Controller Device (160 W)	111	VDRV	VDRV	VDRV	COMP Network	GND	VDRV	Connected	Connected
Buck Array—2 Channels Controller Device (>160 W)	111	VDRV	VDRV	VDRV	COMP Network	Connected to Peripheral	Connected to Peripheral	Connected	Connected
Buck-Boost (80 W)	100	VDRV	GND	GND	COMP Network	GND	VDRV	Connected	Not Relevant (SPI) / VOUT SENSE (SA)
Boost Channel 1 (80 W) Boost Channel 2 (80 W)	001	GND	GND	VDRV	COMP Network	COMP Network	GND	Connected	Connected

Power Input

Connect power as follows:

- Connect a power supply to the red and black banana plugs.
- Observe the polarity on the board.
- Connect VIN to the positive supply terminal (red).
- Connect GND to the negative supply terminal (black).

  NOTE: A dedicated test point for VIN is positioned close to the electrolytic capacitance on the buck and boost board, or close to the plug on the buck-boost board.
- Connect the EN jumper to VIN if the device is operating in standalone mode, or either way in SPI mode.

SPI Mode

In SPI mode, once the jumpers are positioned and the SPI and the power supply are connected, the device is ready for turn-on. The device must be configured such that the desired voltage is regulated at the output plugs. The graphical user interface (GUI) facilitates device configuration. To complete the device configuration, follow the sequence shown in Figure 3.

The device has a dedicated pin to communicate faults, FFn; this pin is shared with EN and, once the enable is latched, it starts working as FFn. The dedicated test point in the board called EN can be used to assert faults. In SPI mode, the dedicated fault registers are available to discriminate between failures.

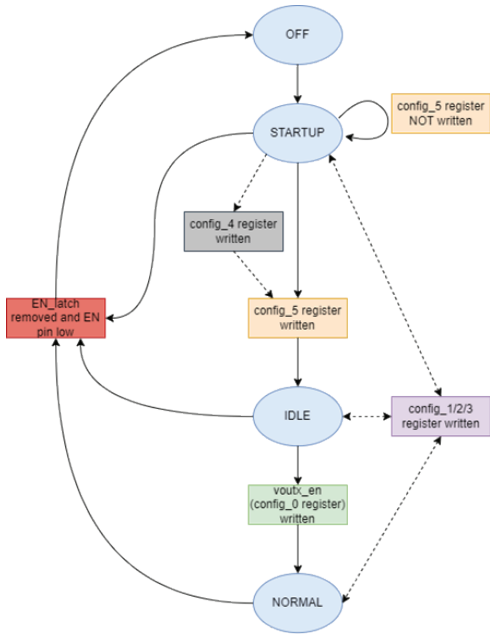


Figure 3: Device Configuration Sequence in SPI Mode

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

Standalone Mode

In standalone mode, the A81850 does not have a method of communication. Thus, once the jumpers are set and the supply is provided, the A81850 starts to regulate the voltage on the output node. The output voltage depends on the size of the resistor divider in the feedback path.

In this operative mode, the enable is not latched. Thus, the EN/FFn pin always functions as enable; the faults are communicated through the MISO/PGOOD pin that, in standalone mode, functions as PGOOD.

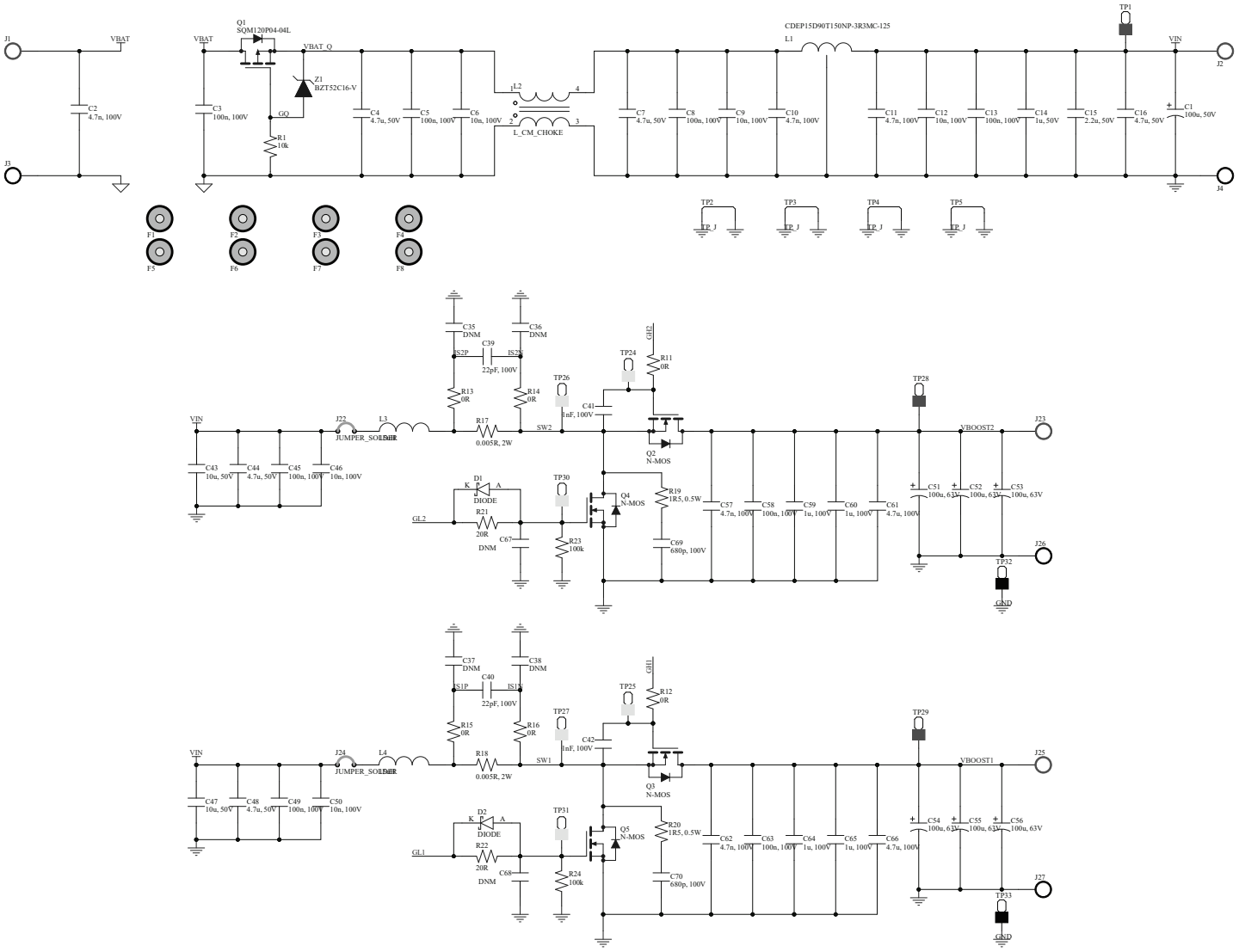
For details about the faults communicated through the FFn or PGOOD pin, refer to the product datasheet.

Figure 4: Boost Power Up

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

SCHEMATIC

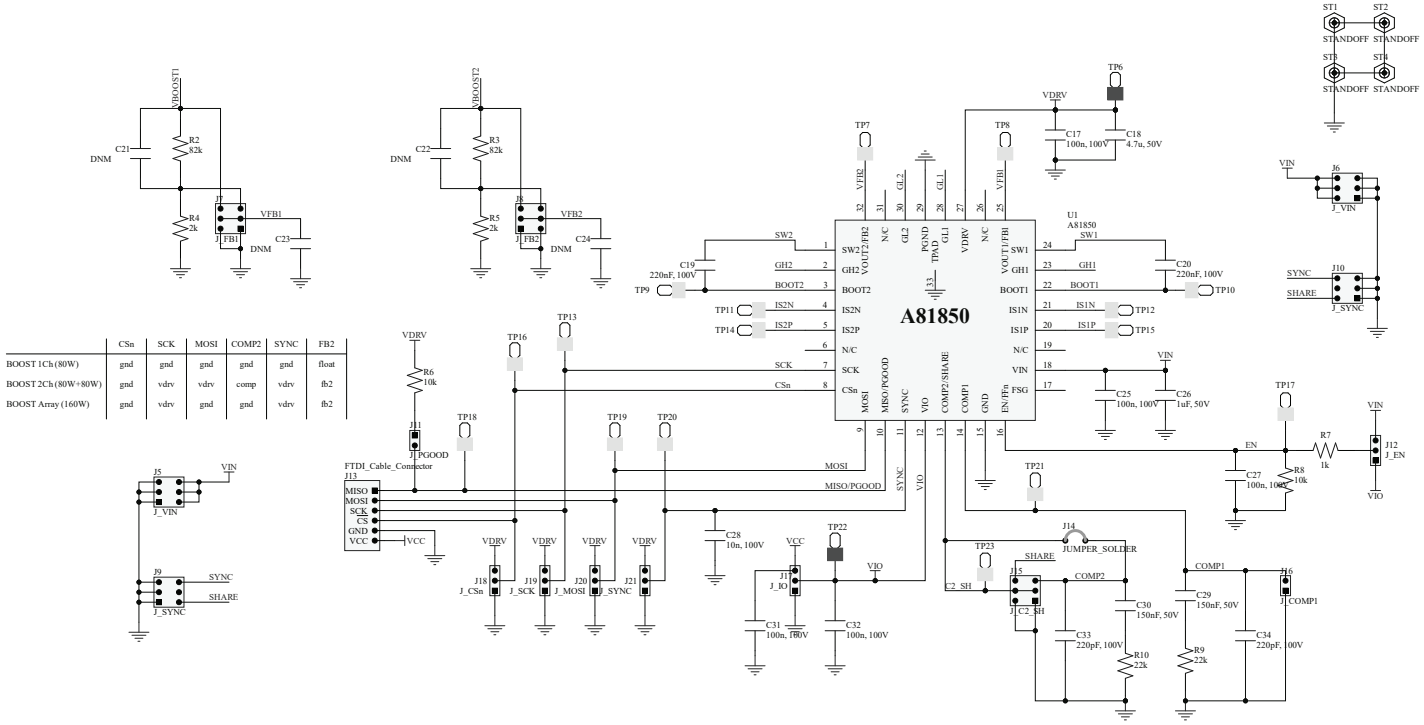
Boost Board Schematic



Continued on next page

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

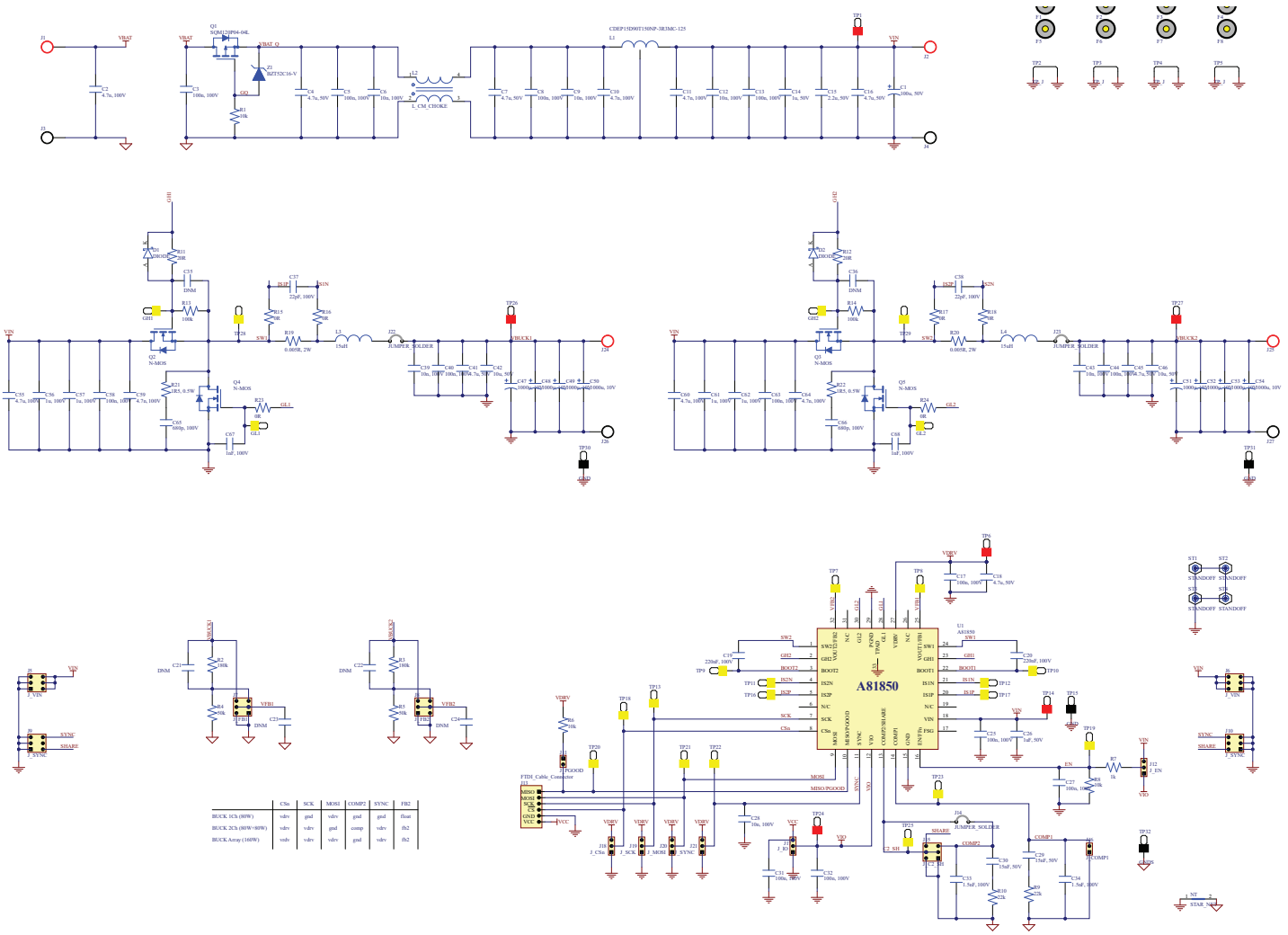
Boost Board Schematic (cont.)



	CSn	SCK	MOSI	COMP2	SYNC	FB2
BOOST 1Ch (80W)	gnd	gnd	gnd	gnd	gnd	float
BOOST 2Ch (80W+80W)	gnd	vdrv	vdrv	comp	vdrv	fb2
BOOST Array (160W)	gnd	vdrv	gnd	gnd	vdrv	fb2

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

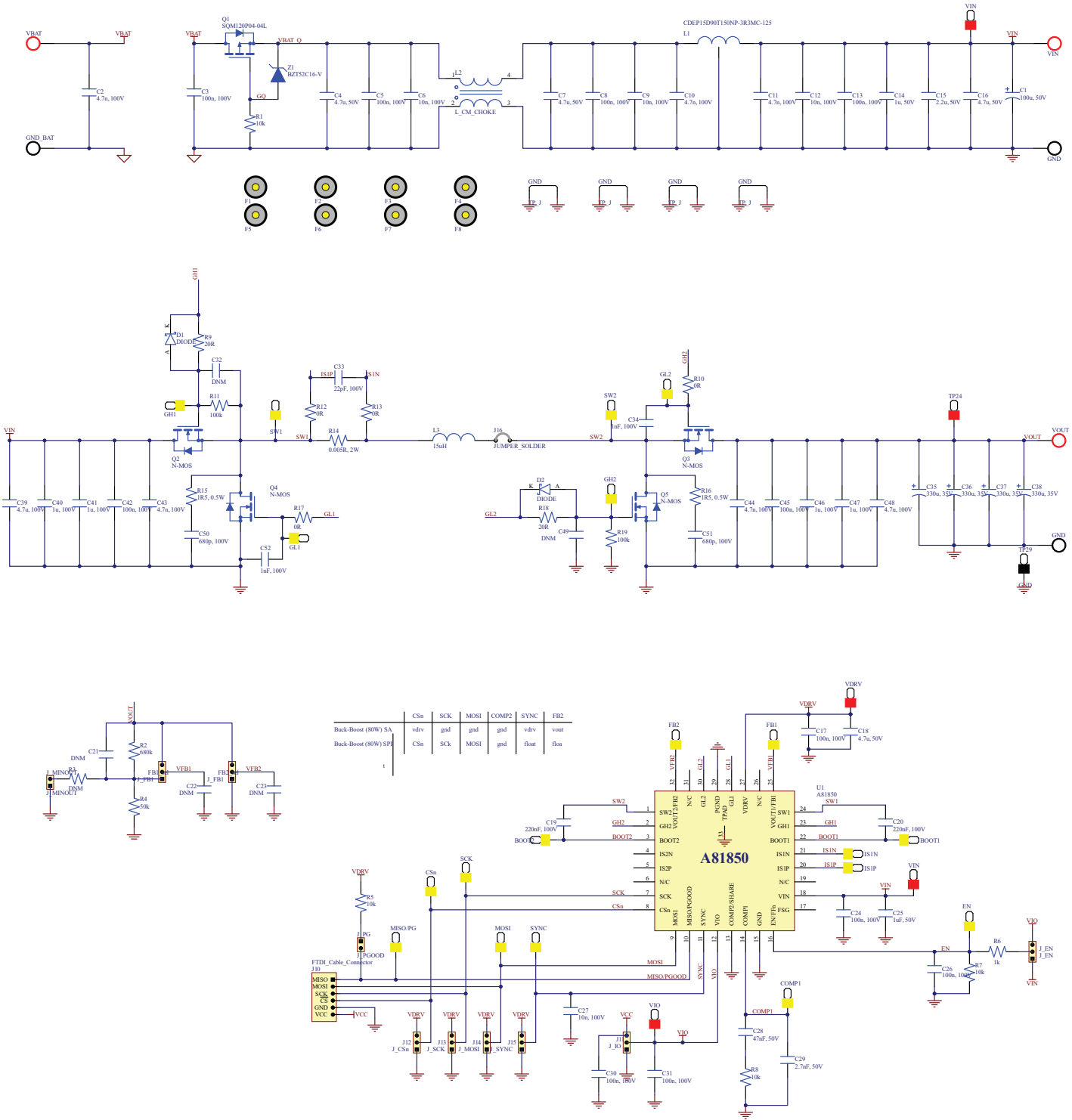
Buck Board Schematic



	CSo	SCK	MOSI	COMP2	SYNC	FB2
BUCK 1Ch (80W)	vdrv	gnd	vdrv	gnd	gnd	float
BUCK 2Ch (80W+80W)	vdrv	vdrv	gnd	comp	vdrv	fb2
BUCK Array (160W)	vndr	vdrv	vdrv	gnd	vdrv	fb2

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

Buck-Boost Board Schematic

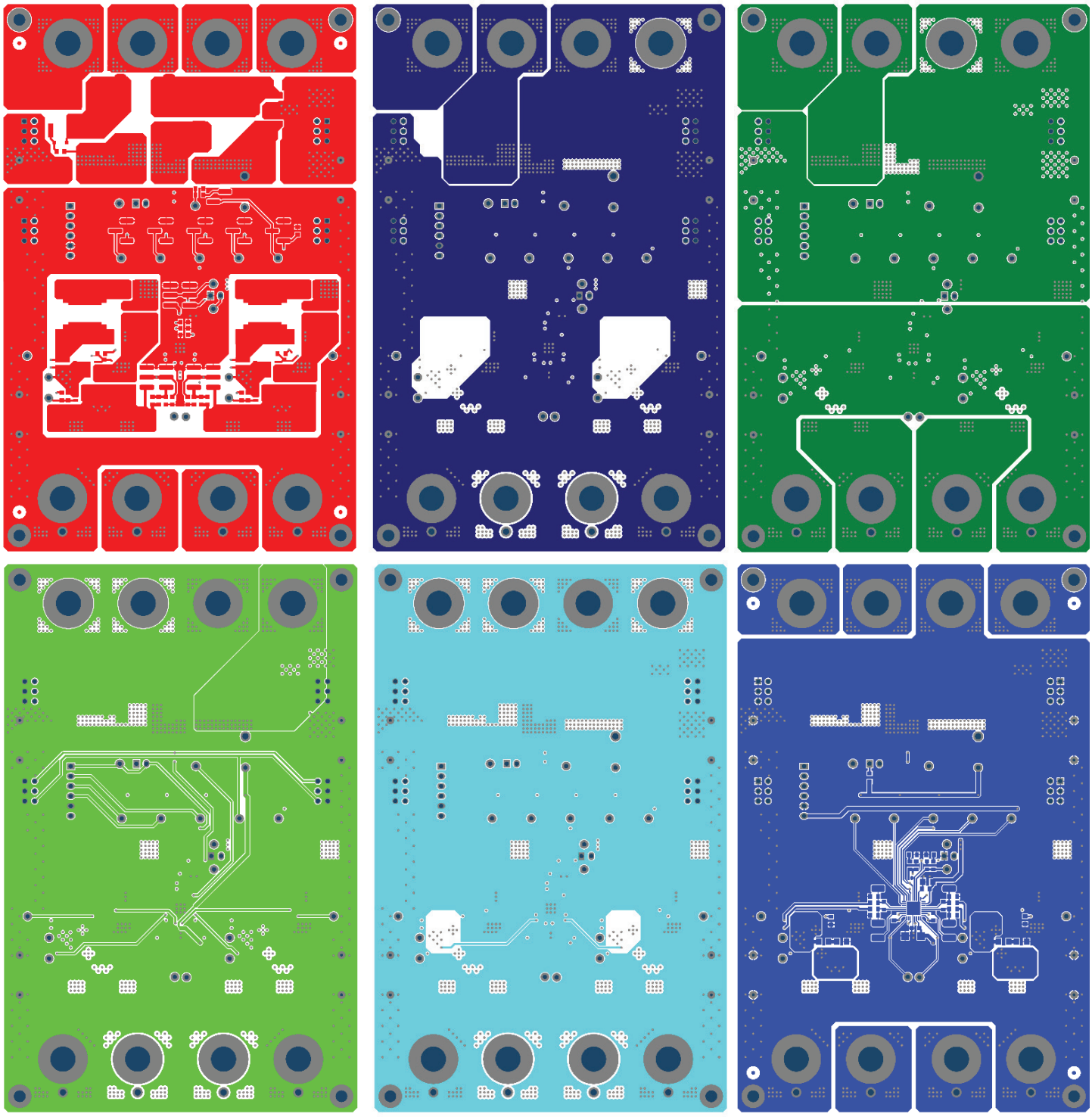


	CSn	SCK	MOSI	COMP2	SYNC	FB2
Buck-Boost (80W) SA	vdrv	gnd	gnd	gnd	vdrv	vout
Buck-Boost (80W) SPI	CSn	SCk	MOSI	gnd	float	floa

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

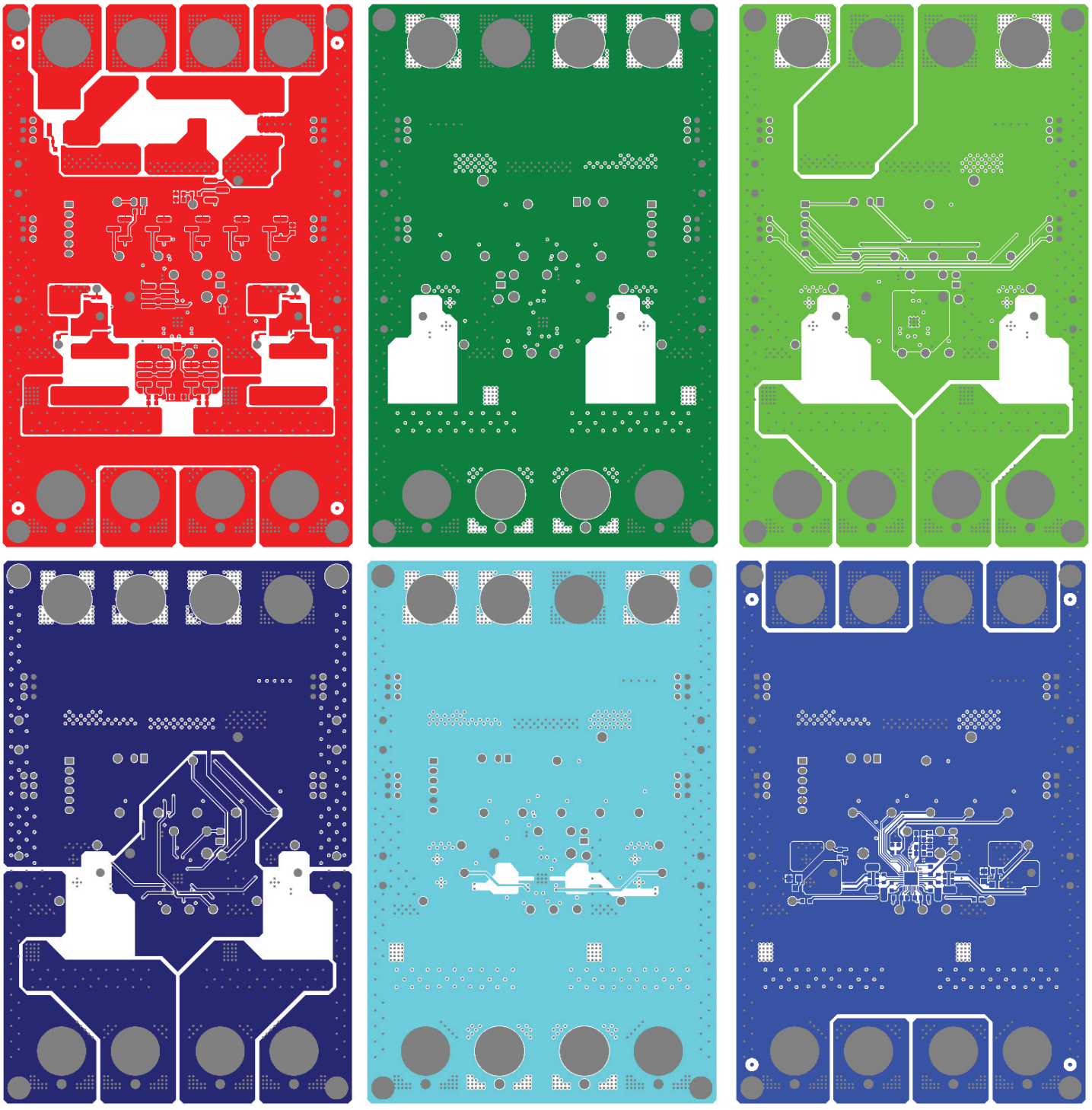
LAYOUT

Boost Board Layout



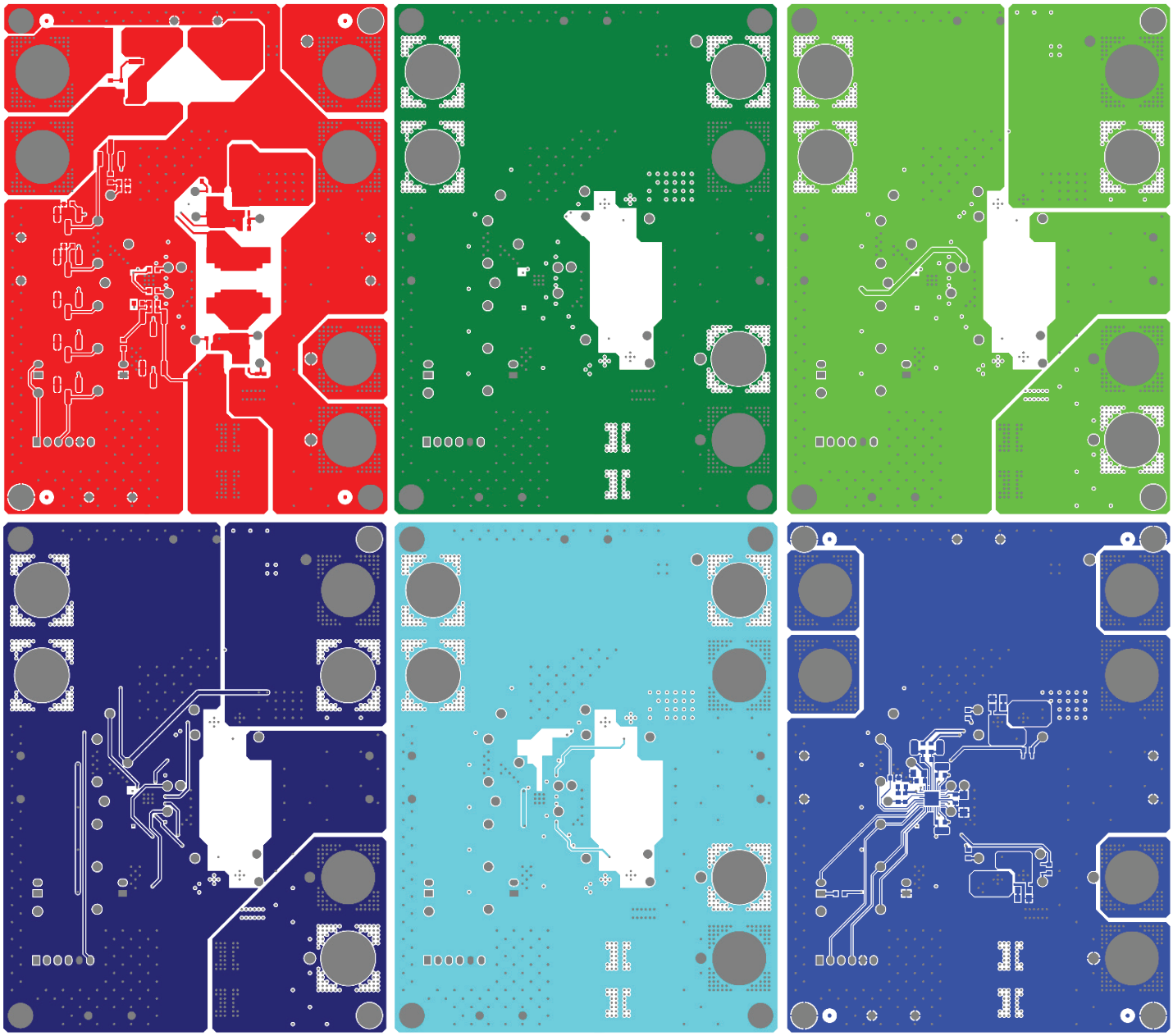
Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

Buck Board Layout



Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

Buck-Boost Board Layout



Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

BILL OF MATERIALS (BOM)

Boost Board BOM

Name	Description	Designator	Quantity	Manufacturer	Manufacturer Part Number
100 µ, 50 V	WE 865080653016	C1	1	WE	865080653016
4.7 n, 100 V	Murata GCD188R72A472KA01D	C2	1	Murata	GCD188R72A472KA01D
100 n, 100 V	Murata GRM188R72A104KA35D	C3, C5, C8, C13, C17, C25, C27, C31, C32, C45, C49, C58, C63	13	Murata	GRM188R72A104KA35D
4.7 µ, 50 V	Murata GRM31CR71H475KA12L	C4, C7, C16, C18, C44, C48	6	Murata	GRM31CR71H475KA12L
10 n, 100 V	Murata GCM188R72A103KA37D	C6, C9, C12, C28, C46, C50	6	Murata	GCM188R72A103KA37D
4.7 n, 100 V	Murata GRM155R72A472KA01D	C10, C11, C57, C62	4	Murata	GRM155R72A472KA01D
1 µ, 50 V	Murata GCM21BR71E105KA56K	C14	1	Murata	GCM21BR71E105KA56K
2.2 µ, 50 V	Murata GCM31CR71H225KA55K	C15	1	Murata	GCM31CR71H225KA55K
220 nF, 100 V	Murata GCM188R72A223KA37J	C19, C20	2	Murata	GCM188R72A223KA37J
DNM	Murata GRM188R72A102KA01J	C21, C22, C23, C24, C67, C68	6	Murata	GRM188R72A102KA01J
1 µF, 50 V	Murata GCM21BR71H105KA03L	C26	1	Murata	GCM21BR71H105KA03L
150 nF, 50 V	Murata GCM188R71H154KA64D	C29, C30	2	Murata	GCM188R71H154KA64D
220 pF, 10012	Murata GRM188R72A221KA01D	C33, C34	2	Murata	GRM188R72A221KA01D
DNM	Murata GRM1885C2A220JA01D	C35, C36, C37, C38	4	Murata	GRM1885C2A220JA01D
22 pF, 10012	Murata GRM1885C2A220JA01D	C39, C40	2	Murata	GRM1885C2A220JA01D
1 nF, 10012	Murata GRM188R72A102KA01J	C41, C42	2	Murata	GRM188R72A102KA01J
10 µ, 5012	Murata GRJ32ER71H106KE11L	C43, C47	2	Murata	GRJ32ER71H106KE11L
100 µ, 63 V	TDK B40910A8107M	C51, C52, C53, C54, C55, C56	6	TDK	B40910A8107M
1 µ, 10012	Murata GRM21BC72A105KE01L	C59, C60, C64, C65	4	Murata	GRM21BC72A105KE01L
4.7 µ, 10012	Murata GRM31CZ72A475KE11K	C61, C66	2	Murata	GRM31CZ72A475KE11K
680 p, 10012	Murata GRM2165C2A681JA01D	C69, C70	2	Murata	GRM2165C2A681JA01D
DIODE	Nexperia PMEG3010CEJ-QX	D1, D2	2	Nexperia	PMEG3010CEJ-QX
Fiducial		F1, F2, F3, F4, F5, F6, F7, F8	8		
VBAT	Pomona 1581-2	J1	1	Pomona	1581-2
VIN	Pomona 1581-2	J2	1	Pomona	1581-2
GND_BAT	Pomona 1581-0	J3	1	Pomona	1581-0
GND	Pomona 1581-0	J4, J26, J27	3	Pomona	1581-0
J_VIN	Samtec SSW-103-02-G-D-RA	J5	1	Samtec	SSW-103-02-G-D-RA
J_VIN	Samtec TSW-103-08-G-D-RA	J6	1	Samtec	TSW-103-08-G-D-RA
J_FB1	Samtec TSM-103-01-L-DV	J7	1	Samtec	TSM-103-01-L-DV
J_FB2	Samtec TSM-103-01-L-DV	J8	1	Samtec	TSM-103-01-L-DV
J_SYNC	Samtec SSW-103-02-G-D-RA	J9	1	Samtec	SSW-103-02-G-D-RA
J_SYNC	Samtec TSW-103-08-G-D-RA	J10	1	Samtec	TSW-103-08-G-D-RA
J_PGOOD	PCB pin 2× 100 mils	J11	1	PCB	
J_EN	Samtec TSM-103-01-L-SV	J12	1	Samtec	TSM-103-01-L-SV
FTDI_Cable_Connector	PCB pin 6× 100 mils	J13	1	PCB	
JUMPER_SOLDER	Jumper with solder pads	J14, J22, J24	3	Jumper	
J_C2_SH	Samtec TSM-103-01-L-DV	J15	1	Samtec	TSM-103-01-L-DV
J_COMP1	PCB pin 2× 100 mils	J16	1	PCB	
J_IO	Samtec TSM-103-01-L-SV	J17	1	Samtec	TSM-103-01-L-SV
J_CSn	Samtec TSM-103-01-L-SV	J18	1	Samtec	TSM-103-01-L-SV
J_SCK	Samtec TSM-103-01-L-SV	J19	1	Samtec	TSM-103-01-L-SV
J_MOSI	Samtec TSM-103-01-L-SV	J20	1	Samtec	TSM-103-01-L-SV
J_SYNC	Samtec TSM-103-01-L-SV	J21	1	Samtec	TSM-103-01-L-SV
VBOOST2	Pomona 1581-2	J23	1	Pomona	1581-2
VBOOST1	Pomona 1581-2	J25	1	Pomona	1581-2

Continued on next page

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

Boost Board BOM (cont.)

Name	Description	Designator	Quantity	Manufacturer	Manufacturer Part Number
CDEP15D90T150NP-3R3MC-125	Sumida CDEP15D90T150NP-3R3MC-125	L1	1	Sumida	CDEP15D90T150NP-3R3MC-125
L_CM_CHOKE	Pulse PA5140.205NL	L2	1	Pulse	PA5140.205NL
15 µH	Coilcraft XGL1712-153	L3, L4	2	Wurth	74439370150
SQM120P04-04L	Vishay SQM120P04-04L	Q1	1	Vishay	SQM120P04-04L
N-MOS	Diodes Inc. DMTH8028LPSWQ-13	Q2, Q3, Q4, Q5	4	Infineon	IAUC28N08S5L230
10 kΩ	Vishay CRCW060310K0FKEI	R1, R6, R8	3	Vishay	CRCW060310K0FKEI
82 kΩ	YAGEO AC0603FR-0782KL	R2, R3	2	YAGEO	AC0603FR-0782KL
2 kΩ	YAGEO RT0603FRE102KL	R4, R5	2	YAGEO	RT0603FRE102KL
1 kΩ	Vishay CRCW06031K00FKED	R7	1	Vishay	CRCW06031K00FKED
22 kΩ	Vishay CRCW060322K0FKEBC	R9, R10	2	Vishay	CRCW060322K0FKEBC
0R	YAGEO RC0603JR-070RL	R11, R12, R13, R14, R15, R16	6	YAGEO	RC0603JR-070RL
0.005R, 2 W	Vishay WFCP06125L000FE66	R17, R18	2	Vishay	WFCP06125L000FE66
1R5, 0.5 W	Panasonic ERJ-6DQF1R5V	R19, R20	2	Panasonic	ERJ-6DQF1R5V
20R	YAGEO RC0603JR-7W20RL	R21, R22	2	YAGEO	RC0603JR-7W20RL
100 kΩ	YAGEO AC0603FR-7W100KL - DNM	R23, R24	2	YAGEO	AC0603FR-7W100KL
STANDOFF	Essentra CBTS100A (5.5 mm × 20 mm M3) + Essentra 50M030050K006 (M3 screw)	ST1, ST2, ST3, ST4	4	Essentra	CBTS100A
VIN	Keystone Electronics 5005	TP1	1	Keystone	Electronics
TP_J	Mill-Max 3360	TP2, TP3, TP4, TP5	4	Mill-Max	3360
VDRV	Keystone Electronics 5000	TP6	1	Keystone Electronics	5000
VFB2	Keystone Electronics 5004	TP7	1	Keystone Electronics	5004
VFB1	Keystone Electronics 5004	TP8	1	Keystone Electronics	5004
BOOT2	Keystone Electronics 9-5015-TL	TP9	1	Keystone Electronics	9-5015-TL
BOOT1	Keystone Electronics 9-5015-TL	TP10	1	Keystone Electronics	9-5015-TL
IS2N	Keystone Electronics 9-5015-TL	TP11	1	Keystone Electronics	9-5015-TL
IS1N	Keystone Electronics 9-5015-TL	TP12	1	Keystone Electronics	9-5015-TL
SCK	Keystone Electronics 5004	TP13	1	Keystone Electronics	5004
IS2P	Keystone Electronics 9-5015-TL	TP14	1	Keystone Electronics	9-5015-TL
IS1P	Keystone Electronics 9-5015-TL	TP15	1	Keystone Electronics	9-5015-TL
CSn	Keystone Electronics 5004	TP16	1	Keystone Electronics	5004
EN	Keystone Electronics 5004	TP17	1	Keystone Electronics	5004
MISO/PGOOD	Keystone Electronics 5004	TP18	1	Keystone Electronics	5004
MOSI	Keystone Electronics 5004	TP19	1	Keystone Electronics	5004
SYNC	Keystone Electronics 5004	TP20	1	Keystone Electronics	5004
COMP1	Keystone Electronics 5004	TP21	1	Keystone Electronics	5004
VIO	Keystone Electronics 5000	TP22	1	Keystone Electronics	5000
COMP2	Keystone Electronics 5004	TP23	1	Keystone Electronics	5004
GH2b	Keystone Electronics 5004	TP24	1	Keystone Electronics	5004
GH1b	Keystone Electronics 5004	TP25	1	Keystone Electronics	5004
SW2	Keystone Electronics 5004	TP26	1	Keystone Electronics	5004
SW1	Keystone Electronics 5004	TP27	1	Keystone Electronics	5004
VBOOST2	Keystone Electronics 5005	TP28	1	Keystone Electronics	5005
VBOOST1	Keystone Electronics 5005	TP29	1	Keystone Electronics	5005
GL2b	Keystone Electronics 5004	TP30	1	Keystone Electronics	5004
GL1b	Keystone Electronics 5004	TP31	1	Keystone Electronics	5004
GND	Keystone Electronics 5006	TP32, TP33	2	Keystone Electronics	5006
A81850	40 V input, 65 V output, 160 W, two channels synchronous boost/buck converter controllers with programmable output and SPI	U1	1		
BZT52C16-V	Diodes Inc. BZT52C16-V	Z1	1	Diodes Inc.	BZT52C16-V

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

Buck Board BOM

Name	Description	Designator	Quantity	Manufacturer	Manufacturer Part Number
100 µ, 50 V	WE 865080653016	C1	1	WE	865080653016
4.7 n, 100 V	Murata GCD188R72A472KA01D	C2	1	Murata	GCD188R72A472KA01D
100 n, 100 V	Murata GRM188R72A104KA35D	C3, C5, C8, C13, C17, C25, C27, C31, C32, C40, C44, C58, C63	13	Murata	GRM188R72A104KA35D
4.7 n, 5014	Murata GRM31CR71H475KA12L	C4, C7, C16, C18, C41, C45	6	Murata	GRM31CR71H475KA12L
10 n, 10014	Murata GCM188R72A103KA37D	C6, C9, C12, C28, C39, C43	6	Murata	GCM188R72A103KA37D
4.7 n, 10014	Murata GRM155R72A472KA01D	C10, C11, C59, C64	4	Murata	GRM155R72A472KA01D
1 µ, 5014	Murata GCM21BR71E105KA56K	C14	1	Murata	GCM21BR71E105KA56K
2.2 µ, 5014	Murata GCM31CR71H225KA55K	C15	1	Murata	GCM31CR71H225KA55K
220 nF, 10014	Murata GCM188R72A223KA37J	C19, C20	2	Murata	GCM188R72A223KA37J
DNM	Murata GRM188R72A102KA01J	C21, C22, C23, C24, C35, C36	6	Murata	GRM188R72A102KA01J
1 µF, 5014	Murata GCM21BR71H105KA03L	C26	1	Murata	GCM21BR71H105KA03L
15 nF, 5014	Murata GCD188R72A153KA01D	C29, C30	2	Murata	GCD188R72A153KA01D
1.5 nF, 10014	Murata GCM188R72A152KA37J	C33, C34	2	Murata	GCM188R72A152KA37J
22 pF, 10014	Murata GRM1885C2A220JA01D	C37, C38	2	Murata	GRM1885C2A220JA01D
10 µ, 5014	Murata GRJ32ER71H106KE11L	C42, C46	2	Murata	GRJ32ER71H106KE11L
1000 µ, 1014	WE 865080257014	C47, C48, C49, C50, C51, C52, C53, C54	8	WE	865080257014
4.7 µ, 10014	Murata GRM31CZ72A475KE11K	C55, C60	2	Murata	GRM31CZ72A475KE11K
1 µ, 10014	Murata GRM21BC72A105KE01L	C56, C57, C61, C62	4	Murata	GRM21BC72A105KE01L
680 p, 10014	Murata GRM2165C2A681JA01D	C65, C66	2	Murata	GRM2165C2A681JA01D
1 nF, 10014	Murata GRM188R72A102KA01J	C67, C68	2	Murata	GRM188R72A102KA01J
DIODE	Nexperia PMEG3010CEJ-QX	D1, D2	2	Nexperia	PMEG3010CEJ-QX
Fiducial		F1, F2, F3, F4, F5, F6, F7, F8	8		
GH1	Keystone Electronics 5004	GH1	1	Keystone Electronics	5004
GH2	Keystone Electronics 5004	GH2	1	Keystone Electronics	5004
GL1	Keystone Electronics 5004	GL1	1	Keystone Electronics	5004
GL2	Keystone Electronics 5004	GL2	1	Keystone Electronics	5004
VBAT	Pomona 1581-2	J1	1	Pomona	1581-2
VIN	Pomona 1581-2	J2	1	Pomona	1581-2
GND_BAT	Pomona 1581-0	J3	1	Pomona	1581-0
GND	Pomona 1581-0	J4, J26, J27	3	Pomona	1581-0
J_VIN	Samtec SSW-103-02-G-D-RA	J5	1	Samtec	SSW-103-02-G-D-RA
J_VIN	Samtec TSW-103-08-G-D-RA	J6	1	Samtec	TSW-103-08-G-D-RA
J_FB1	Samtec TSM-103-01-L-DV	J7	1	Samtec	TSM-103-01-L-DV
J_FB2	Samtec TSM-103-01-L-DV	J8	1	Samtec	TSM-103-01-L-DV
J_SYNC	Samtec SSW-103-02-G-D-RA	J9	1	Samtec	SSW-103-02-G-D-RA
J_SYNC	Samtec TSW-103-08-G-D-RA	J10	1	Samtec	TSW-103-08-G-D-RA
J_PGOOD	PCB pin 2× 100 mils	J11	1		
J_EN	Samtec TSM-103-01-L-SV	J12	1	Samtec	TSM-103-01-L-SV
FTDI_Cable_Connector	PCB pin 6× 100 mils	J13	1		
JUMPER_SOLDER	Jumper with solder pads	J14, J22, J23	3		
J_C2_SH	Samtec TSM-103-01-L-DV	J15	1	Samtec	TSM-103-01-L-DV
J_COMP1	PCB pin 2× 100 mils	J16	1		
J_IO	Samtec TSM-103-01-L-SV	J17	1	Samtec	TSM-103-01-L-SV
J_CSn	Samtec TSM-103-01-L-SV	J18	1	Samtec	TSM-103-01-L-SV
J_SCK	Samtec TSM-103-01-L-SV	J19	1	Samtec	TSM-103-01-L-SV
J_MOSI	Samtec TSM-103-01-L-SV	J20	1	Samtec	TSM-103-01-L-SV
J_SYNC	Samtec TSM-103-01-L-SV	J21	1	Samtec	TSM-103-01-L-SV

Continued on next page

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

Buck Board BOM (cont.)

Name	Description	Designator	Quantity	Manufacturer	Manufacturer Part Number
VBUCK1	Pomona 1581-2	J24	1	Pomona	1581-2
VBUCK2	Pomona 1581-2	J25	1	Pomona	1581-2
CDEP15D90T150NP-3R3MC-125	Sumida CDEP15D90T150NP-3R3MC-125	L1	1	Sumida	CDEP15D90T150NP-3R3MC-125
L_CM_CHOKE	Pulse PA2755NL	L2	1	Pulse	PA2755NL
15 µH	WE 74439370150	L3, L4	2	WE	74439370150
SQM120P04-04L	Vishay SQM120P04-04L	Q1	1	Vishay	SQM120P04-04L
N-MOS	Diodes Inc. DMTH4014LPDQ-13	Q2, Q3, Q4, Q5	4	Diodes Inc.	DMTH4014LPDQ-13
10 kΩ	Vishay CRCW060310K0FKEI	R1, R6, R8	3	Vishay	CRCW060310K0FKEI
180 kΩ	YAGEO RE0603FRE07180KL	R2, R3	2	YAGEO	RE0603FRE07180KL
50 kΩ	YAGEO RC0603FR-0751KL	R4, R5	2	YAGEO	RC0603FR-0751KL
1 kΩ	Vishay CRCW06031K00FKED	R7	1	Vishay	CRCW06031K00FKED
22 kΩ	Vishay CRCW060322K0FKEBC	R9, R10	2	Vishay	CRCW060322K0FKEBC
20R	YAGEO RC0603JR-7W20RL	R11, R12	2	YAGEO	RC0603JR-7W20RL
100 kΩ	YAGEO AC0603FR-7W100KL - DNM	R13, R14	2	YAGEO	AC0603FR-7W100KL
0R	YAGEO RC0603JR-070RL	R15, R16, R17, R18, R23, R24	6	YAGEO	RC0603JR-070RL
0.005R, 2 W	Vishay WFCP06125L000FE66	R19, R20	2	Vishay	WFCP06125L000FE66
1R5, 0.5 W	Panasonic ERJ-6DQF1R5V	R21, R22	2	Panasonic	ERJ-6DQF1R5V
STANDOFF	Essentra CBTS100A (5.5 mm × 20 mm M3) + Essentra 50M030050K006 (M3 screw)	ST1, ST2, ST3, ST4	4	Essentra	CBTS100A
VIN	Keystone Electronics 5005	TP1	1	Keystone Electronics	5005
TP_J	Mill-Max 3360	TP2, TP3, TP4, TP5	4	Mill-Max	3360
VDRV	Keystone Electronics 5000	TP6	1	Keystone Electronics	5000
VFB2	Keystone Electronics 5004	TP7	1	Keystone Electronics	5004
VFB1	Keystone Electronics 5004	TP8	1	Keystone Electronics	5004
BOOT2	Keystone Electronics 9-5015-TL	TP9	1	Keystone Electronics	9-5015-TL
BOOT1	Keystone Electronics 9-5015-TL	TP10	1	Keystone Electronics	9-5015-TL
IS2N	Keystone Electronics 9-5015-TL	TP11	1	Keystone Electronics	9-5015-TL
IS1N	Keystone Electronics 9-5015-TL	TP12	1	Keystone Electronics	9-5015-TL
SCK	Keystone Electronics 5004	TP13	1	Keystone Electronics	5004
VIN_IC	Keystone Electronics 5000	TP14	1	Keystone Electronics	5000
GND	Keystone Electronics 5006	TP15, TP30, TP31	3	Keystone Electronics	5006
IS2P	Keystone Electronics 9-5015-TL	TP16	1	Keystone Electronics	9-5015-TL
IS1P	Keystone Electronics 9-5015-TL	TP17	1	Keystone Electronics	9-5015-TL
CSn	Keystone Electronics 5004	TP18	1	Keystone Electronics	5004
EN	Keystone Electronics 5004	TP19	1	Keystone Electronics	5004
MISO/PGOOD	Keystone Electronics 5004	TP20	1	Keystone Electronics	5004
MOSI	Keystone Electronics 5004	TP21	1	Keystone Electronics	5004
SYNC	Keystone Electronics 5004	TP22	1	Keystone Electronics	5004
COMP1	Keystone Electronics 5004	TP23	1	Keystone Electronics	5004
VIO	Keystone Electronics 5000	TP24	1	Keystone Electronics	5000
COMP2	Keystone Electronics 5004	TP25	1	Keystone Electronics	5004
VBUCK1	Keystone Electronics 5005	TP26	1	Keystone Electronics	5005
VBUCK2	Keystone Electronics 5005	TP27	1	Keystone Electronics	5005
SW1	Keystone Electronics 5004	TP28	1	Keystone Electronics	5004
SW2	Keystone Electronics 5004	TP29	1	Keystone Electronics	5004
GNDS	Keystone Electronics 5006	TP32	1	Keystone Electronics	5006
A81850	40 V input, 65 V output, 160 W, two channels synchronous boost/buck converter controllers with programmable output and SPI	U1	1		
BZT52C16-V	Diodes Inc. BZT52C16-V	Z1	1	Diodes Inc.	BZT52C16-V

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

Buck-Boost Board BOM

Name	Description	Designator	Quantity	Manufacturer	Manufacturer Part Number
BOOT1	Keystone Electronics 9-5015-TL	BOOT1	1	Keystone Electronics	9-5015-TL
BOOT2	Keystone Electronics 9-5015-TL	BOOT2	1	Keystone Electronics	9-5015-TL
100 µ, 5016	WE 865080653016	C1	1	WE	865080653016
4.7 n, 10016	Murata GRM155R72A472KA01D	C11, C43, C44	3	Murata	GRM155R72A472KA01D
10 n, 10016	Murata GCM188R72A103KA37D	C12, C27	2	Murata	GCM188R72A103KA37D
100 n, 10016	Murata GRM188R72A104KA35D	C13, C17, C24, C26, C30, C31, C42, C45	8	Murata	GRM188R72A104KA35D
1 µ, 5016	Murata GCM21BR71E105KA56K	C14	1	Murata	GCM21BR71E105KA56K
2.2 µ, 5016	Murata GCM31CR71H225KA55K	C15	1	Murata	GCM31CR71H225KA55K
4.7 µ, 5016	Murata GRM31CR71H475KA12L	C16, C18	2	Murata	GRM31CR71H475KA12L
220 nF, 10016	Murata GCM188R72A223KA37J	C19, C20	2	Murata	GCM188R72A223KA37J
DNM	Murata GRM188R72A102KA01J	C21, C22, C23, C32, C49, R3	6	Murata	GRM188R72A102KA01J,, RC0603FR-07680KL"
1 µF, 5016	Murata GCM21BR71H105KA03L	C25	1	Murata	GCM21BR71H105KA03L
47 nF, 5016	Murata				
GCJ188R71H473KA12D	C28	1	Murata	GCJ188R71H473KA12D	
2.7 nF, 5016	Murata GRM1885C1H272JA01D	C29	1	Murata	GRM1885C1H272JA01D
22 pF, 10016	Murata GRM1885C2A220JA01D	C33	1	Murata	GRM1885C2A220JA01D
1 nF, 10016	Murata GRM188R72A102KA01J	C34, C52	2	Murata	GRM188R72A102KA01J
330 µ, 35 V	WE 875075661010	C35, C36, C37, C38	4	WE	875075661010
4.7 µ, 10016	Murata GRM31CZ72A475KE11K	C39, C48	2	Murata	GRM31CZ72A475KE11K
1 µ, 10016	Murata GRM21BC72A105KE01L	C40, C41, C46, C47	4	Murata	GRM21BC72A105KE01L
680 p, 10016	Murata GRM2165C2A681JA01D	C50, C51	2	Murata	GRM2165C2A681JA01D
COMP1	Keystone Electronics 5004	COMP1	1	Keystone Electronics	5004
CSn	Keystone Electronics 5004	CSn	1	Keystone Electronics	5004
DIODE	Nexperia PMEG3010CEJ-QX	D1, D2	2	Nexperia	PMEG3010CEJ-QX
EN	Keystone Electronics 5004	EN	1	Keystone Electronics	5004
Fiducial		F1, F2, F3, F4, F5, F6, F7, F8	8		
VFB1	Keystone Electronics 5004	FB1	1	Keystone Electronics	5004
J_FB1	Samtec TSM-103-01-L-SV	FB1_sel, FB2_sel	2	Samtec, Keystone Electronics	TSM-103-01-L-SV, 5004
VFB2	Keystone Electronics 5004	FB2	1	Samtec	TSM-103-01-L-SV
GH1	Keystone Electronics 5004	GH1	1	Keystone Electronics	5004
GH2	Keystone Electronics 5004	GH2	1	Keystone Electronics	5004
GL1	Keystone Electronics 5004	GL1	1	Keystone Electronics	5004
GL2	Keystone Electronics 5004	GL2	1	Keystone Electronics	5004
GND	Pomona 1581-0	GND, GND_OUT	2	Pomona	1581-0
GND_BAT	Pomona 1581-0	GND_BAT	1	Pomona	1581-0
TP_J	Mill-Max 3360	GND_TP1, GND_TP2, GND_TP3, GND_TP4	4	Mill-Max	3360
IS1N	Keystone Electronics 9-5015-TL	IS1N	1	Keystone Electronics	9-5015-TL
IS1P	Keystone Electronics 9-5015-TL	IS1P	1	Keystone Electronics	9-5015-TL
FTDI_Cable_Connector	PCB pin 6× 100 mils	J10	1		
J_IO	Samtec TSM-103-01-L-SV	J11	1	Samtec	TSM-103-01-L-SV
J_CSn	Samtec TSM-103-01-L-SV	J12	1	Samtec	TSM-103-01-L-SV

Continued on next page

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

Buck-Boost Board BOM (cont.)

Name	Description	Designator	Quantity	Manufacturer	Manufacturer Part Number
J_SCK	Samtec TSM-103-01-L-SV	J13	1	Samtec	TSM-103-01-L-SV
J_MOSI	Samtec TSM-103-01-L-SV	J14	1	Samtec	TSM-103-01-L-SV
J_SYNC	Samtec TSM-103-01-L-SV	J15	1	Samtec	TSM-103-01-L-SV
JUMPER_SOLDER	Jumper with solder pads	J16	1		
J_EN	Samtec TSM-103-01-L-SV	J_EN	1	Samtec	TSM-103-01-L-SV
J_MINOUT	PCB pin 2× 100 mils	J_MINOUT	1		
J_PGOOD	PCB pin 2× 100 mils	J_PG	1		
15uH	Coilcraft XGL1712-153	L3	1	Coilcraft	XGL1712-153
MISO/PGOOD	Keystone Electronics 5004	MISO/PG	1	Keystone Electronics	5004
MOSI	Keystone Electronics 5004	MOSI	1	Keystone Electronics	5004
N-MOS	Diodes Inc. DMTH4007LPSQ, Diodes Inc. DMTH8028LPSWQ-13	Q2, Q3, Q4, Q5	4	Diodes Inc.	DMTH8028LPSWQ-13
680 kΩ	YAGEO	R2	1	YAGEO	RC0603FR-07680KL
50 kΩ	YAGEO RC0603FR-0751KL	R4	1	YAGEO	GRM188R72A102KA01J,
10 kΩ	Vishay CRCW060310K0FKEI	R5, R7, R8	3	Vishay	RC0603FR-0751KL, CRCW06031K00FKED, CRCW060310K0FKEI
1 kΩ	Vishay CRCW06031K00FKED	R6	1	Vishay	CRCW060310K0FKEI
20R	YAGEO RC0603JR-7W20RL	R9, R18	2	YAGEO	CRCW060310K0FKEI, RC0603JR-070RL
0R	YAGEO RC0603JR-070RL	R10, R12, R13, R17	4	YAGEO	RC0603JR-7W20RL, AC0603FR-7W100KL, RC0603JR-070RL, ERJ-6DQF1R5V
100 kΩ	YAGEO AC0603FR-7W100KL - DNM	R11, R19	2	YAGEO	RC0603JR-070RL, RC0603JR-7W20RL
0.005R, 2 W	Vishay WFCP06125L000FE66	R14	1	Vishay	RC0603JR-070RL
1R5, 0.5 W	Panasonic ERJ-6DQF1R5V	R15, R16	2	Panasonic	WFCP06125L000FE66, ERJ-6DQF1R5V
SCK	Keystone Electronics 5004	SCK	1	Keystone Electronics	AC0603FR-7W100KL
STANDOFF	Essentra CBTS100A (5.5 mm × 20 mm M3) + Essentra 50M030050K006 (M3 screw)	ST1, ST2, ST3, ST4	4		5004
SW1	Keystone Electronics 5004	SW1	1	Keystone Electronics	
SW2	Keystone Electronics 5004	SW2	1	Keystone Electronics	5004
SYNC	Keystone Electronics 5004	SYNC	1	Keystone Electronics	5004
VOUT	Keystone Electronics 5005	TP24	1	Keystone Electronics	5004
GND	Keystone Electronics 5006	TP29	1	Keystone Electronics	5005
A81850	40 V input, 65 V output, 160 W, two channels synchronous boost/buck converter controllers with programmable output and SPI	U1	1		5006
VBAT	Pomona 1581-2	VBAT	1	Pomona	
VDRV	Keystone Electronics 5000	VDRV	1	Keystone Electronics	1581-2
VIN	Pomona 1581-2	VIN	1	Keystone Electronics	5000
VIN	Keystone Electronics 5005	VIN_TP	1	Keystone Electronics	1581-2
VIN	Keystone Electronics 5000	VIN_TP_S	1	Pomona	5000
VIO	Keystone Electronics 5000	VIO	1	Keystone Electronics	5005
VOUT	Pomona 1581-2	VOUT	1	Pomona	5000

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

RELATED LINKS

Allegro Software Portal (registration is required): https://registration.allegromicro.com/login#/

APPLICATION SUPPORT

Allegro Technical Assistance: https://www.allegromicro.com/en/about-allegro/contact-us/technical-assistance

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

Revision History

Number	Date	Description
–	January 21, 2026	Initial release
1	February 12, 2026	Removed limited distribution markings (all pages) and added evaluation board configurations table (page 1)

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com