Click here to ask an associate for production status of specific part numbers.

Evaluates: MAX14720/MAX14750

MAX14750 Evaluation System

General Description

The MAX14750 evaluation system (EV system) is a fully assembled and tested circuit for evaluating the MAX14720/MAX14750 power-management solutions with I²C capability for space-constrained, battery-powered applications. Both the MAX14720 and MAX14750 integrate a synchronous buck converter, a buck-boost converter, a linear regulator, and a power switch. The MAX14750 provides individual pin enables for each function, while the MAX14720 includes a push-button monitor and sequencing controller. Refer to the MAX14720/MAX14750 IC data sheet for detailed information regarding the operation and features of the devices.

The EV kit comes standard with the MAX14750A installed but can also be used to evaluate the MAX14720 by replacing the MAX14750A (U1) with the MAX14720. Request a free sample of the MAX14720 when ordering the EV kit.

Features

- USB-Power Option
- Flexible Configuration
- On-Board Battery Simulation
- Sense Test Point for Output-Voltage Measurement
- Windows 8®/Windows 10®-Compatible Graphical User Interface (GUI) Software
- Fully Assembled and Tested

EV Kit Contents

- MAXX14750_SYS_EVKIT_A system
- MAXPICO2PMB# board
- Two USB A to USB micro-B cables

***Ordering Information* appears at end of data sheet.**

MAX14750 EV System Photo

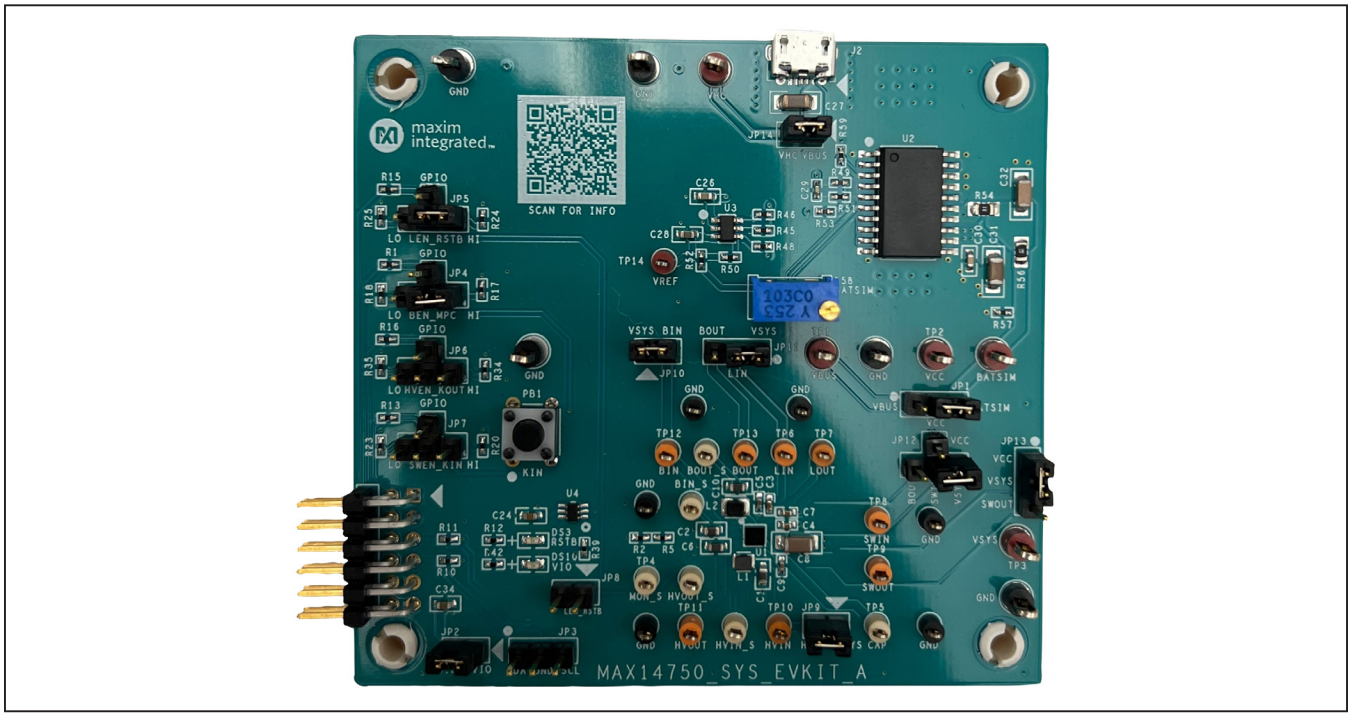


Figure 1. MAX14750 EV System Photo

Windows is a registered trademark and registered service mark of Microsoft Corporation.

319-100855; Rev 0; 12/21

MAX14750 EV Kit Files

FILE	DESCRIPTION
MAXPICO2PMBSetupVXXX.exe	PC GUI Program

Quick Start

Required Equipment

Note: In the following sections, software-related items are identified by **bold** text. Text in **bold** refers to items directly from the install of adapter board software. Text which is **bold and underlined** refers to items from the Windows operating system.

- MAX14750 EV system
- Windows PC with USB ports
- One USB A-to-USB micro-B cable and PICO2PMB adapter board with the latest firmware
- One USB A-to-USB micro-B cable or power supply (for battery simulation or battery voltage)
- One voltmeter

Procedure

The EV system is fully assembled and tested. Follow the steps below to verify board operation.

1) Visit **https://www.maximintegrated.com** to download the latest version of the EV system software, MAXPICO2PMBSetupVXXX.exe located on the MAX14750 EV system web page. Download the EV system software to a temporary folder and unzip the zip file.
2) Install the EV system software on the computer by running the MAXPICO2PMBSetupVXXX.exe program inside the temporary folder.
3) Verify that all jumpers are in their default positions, as shown in Table 1.
4) Make sure JP2 and JP14 are not installed until all connections have been verified.
5) Connect the type-A end of a cable to the PC and micro-USB end of a cable to the MAXPICO2PMB# board, and connect the MAXPICO2PMB# to J1 located on the lower left of the EV kit board.
6) Connect a USB A to micro-B cable from the computer to J2 on the upper right corner of the EV kit board to use VBUS to power the battery simulation circuits on the board, or power the battery simulation circuits from the VHC test point.
7) Use a voltmeter to check VHC is approximately 5V; BATSIM test point is approximately 3.7V. To adjust the BATSIM voltage, turn the R58 BATSIM potentiometer.
8) On the computer, open the MAXPICO2PMB Register Map Tool. The status bar on the bottom of the MAXPICO2PMB Register Map Tool software shows **Not Connected** as shown in Figure 2.
9) Drag the MAX14720-50_Regmap.regmap to the MAXPICO2PMB Register Map Tool.
10) Alternative method to load the Regmap file:
11) Click on the **File** menu, then **Open Register File** and select the appropriate directory by choosing **Browse** to load the MAX14720-50_Regmap.regmap.
12) Once the Regmap has been loaded, the device name and slave address appear on the window (See Figure 3).
13) Click **OK** and Regmap will be populated.
14) Reinstall JP2 and JP16 on the MAX14750_SYS_EVKIT_A and the status of the EV kit tool now show **Connected**. Upon successful connection, the device info populates in the EV kit software (See Figure 4).

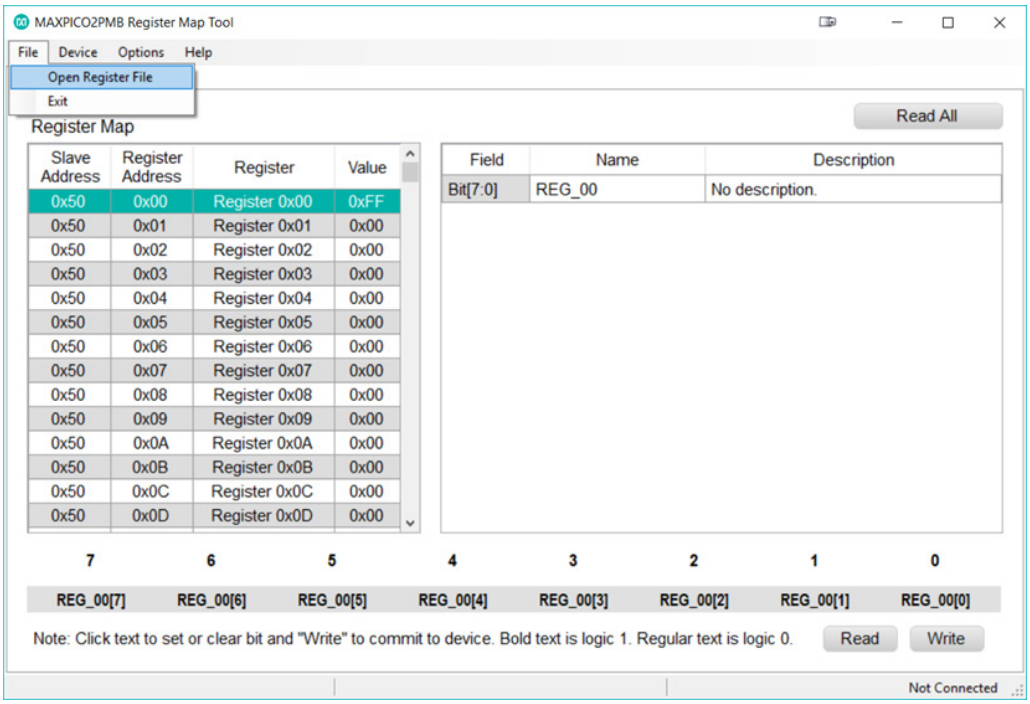


Figure 2. Configuring the EV Kit Tool with MAXPICO2PMB Adapter Board

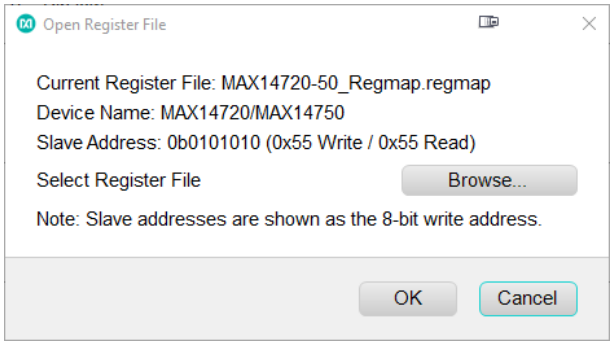


Figure 3. Click OK to Load the Register Map

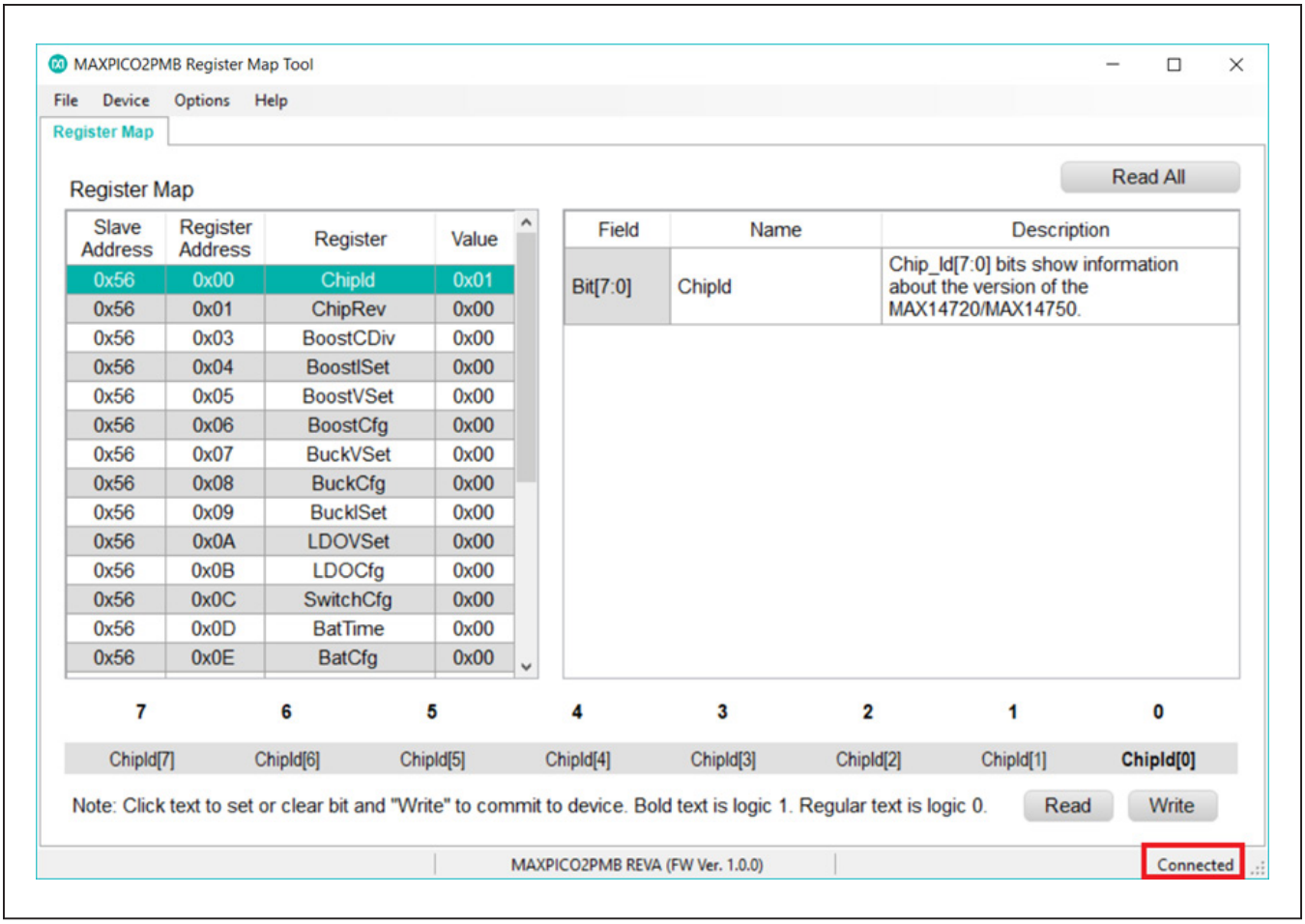


Figure 4. Regmap Populated and Status Shows Connected

Detailed Description of Software

Software Startup

After opening the application, make sure that **Connected** is shown in the status bar at the bottom of the window. If any other message is displayed, check all connections, and verify that the steps in the procedure section were followed in the correct order.

Buck Regulator

MAX14720

1) Register can be read and written by clicking the **Read** and **Write** button.
2) Click **Read All** button to refresh the register map.
3) Connect DMM positive lead to TP12 (BIN) and negative lead to any GND test point.
4) Click on register address **0x08**, BuckCfg.
5) To enable the Buck output, write 1 into bit 3 of register 0x08, BuckEn[0].
6) Ensure that DMM is reading voltage 1.2V-1.8V (depending on MAX14750/14720 OTP) after the previous step and 0x08 register value changed from 0xE0 to 0xE8.

MAX14750

1) For MAX14750, the regulator must be enabled using JP4 jumper to pull BEN high.
2) Use a shunt to connect BEN_MPC to HI in JP4.
3) The same procedure applies to LEN, HVEN, and SWEN.

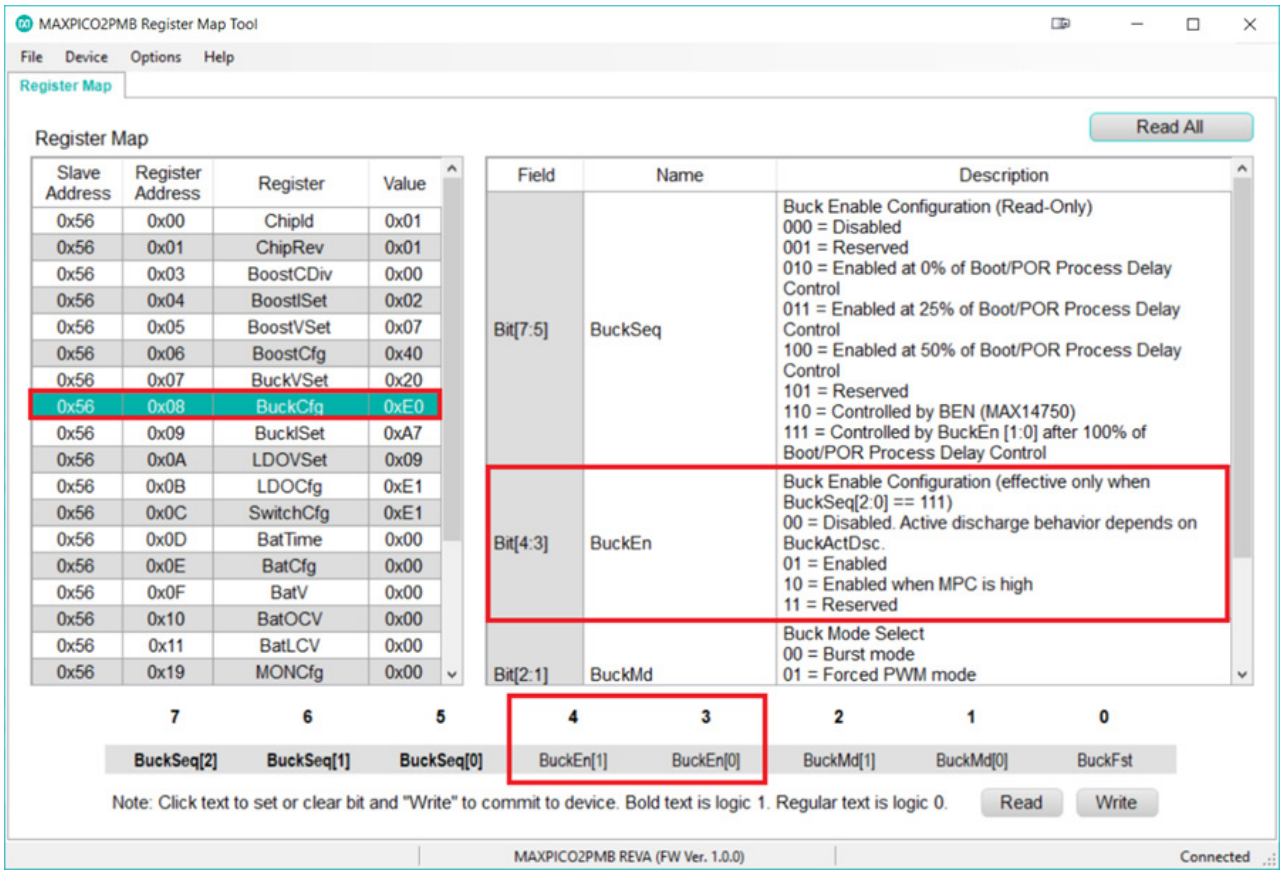


Figure 5. Enabling Buck Regulator

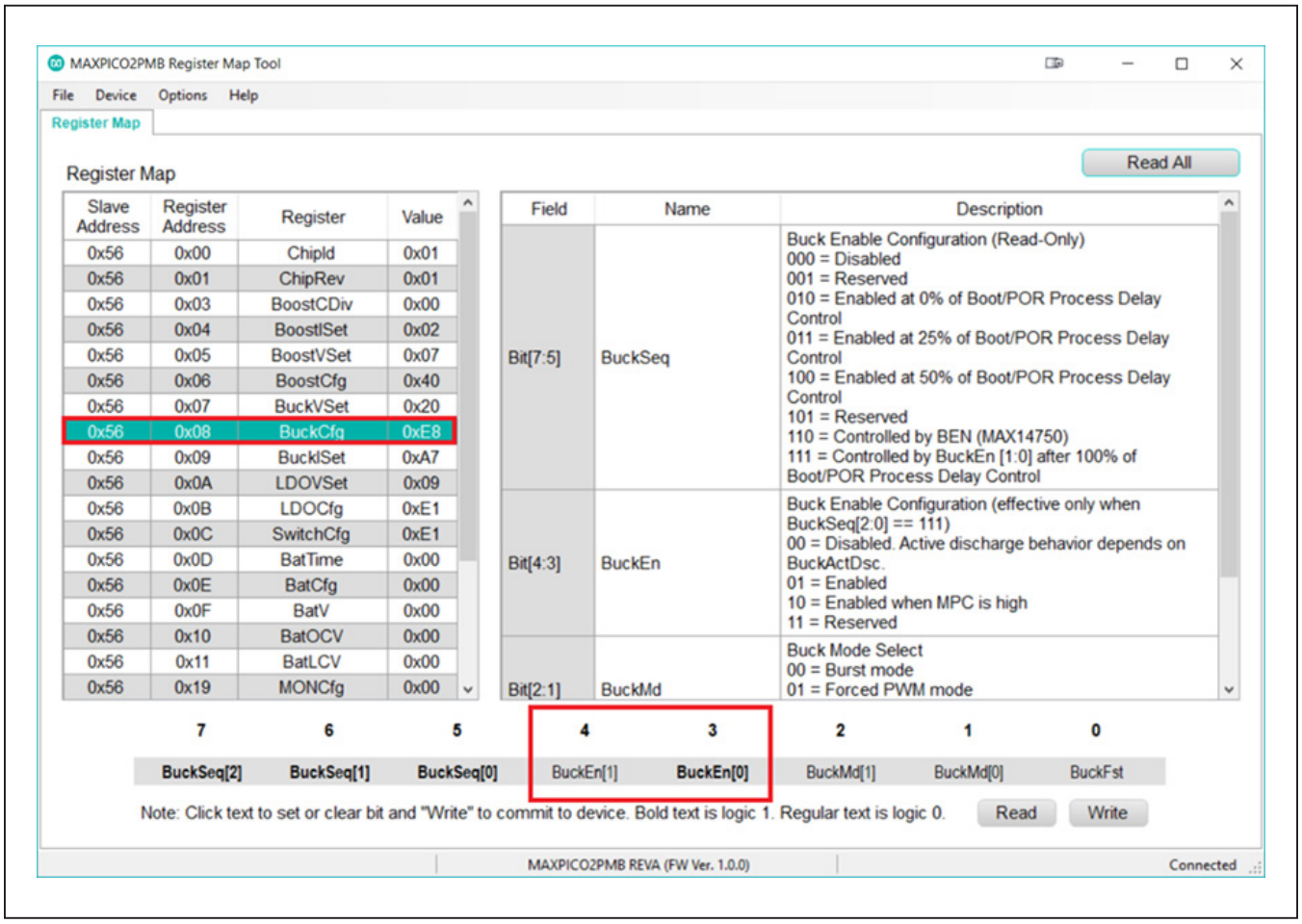


Figure 6. Verifying Buck Regulator is Enabled

Detailed Description of Hardware

To use the EV kit with the EV kit software, connect the MAXPICO2PMB# to the PMOD connector in the bottom left corner of the board. The MAXPICO2PMB# also provides 3.3V to the logic voltage VIO of the EV kit when shunting JP2. Use the JP14 and JP1 USB VBUS to power the battery simulation circuits on the EV kit to supply BAT of the IC. Turning the R58 (BATSIM) potentiometer can change the BATSIM voltage. Connect BATSIM to VCC of the IC with shunt on JP1.

PFNs and MPCs States

The PFNs and MPCs can be pulled up to VIO through a 100kΩ resistor or connected to ground through a 100kΩ resistor.

The MAX14750 provides direct pin control of each function and allows greater flexibility for controlling sequencing. BEN, LEN, HVEN, and SWEN pins can be pulled up using the JP4-JP7 jumpers on the board. The MAX14720 includes a button monitor to power on the part and exit seal mode.

Regulators and Peripherals

All regulator outputs are made available on test points. The inputs to the HVIN, BIN, LIN, and SWIN must be supplied through JP9, JP10, JP11, and JP12, respectively.

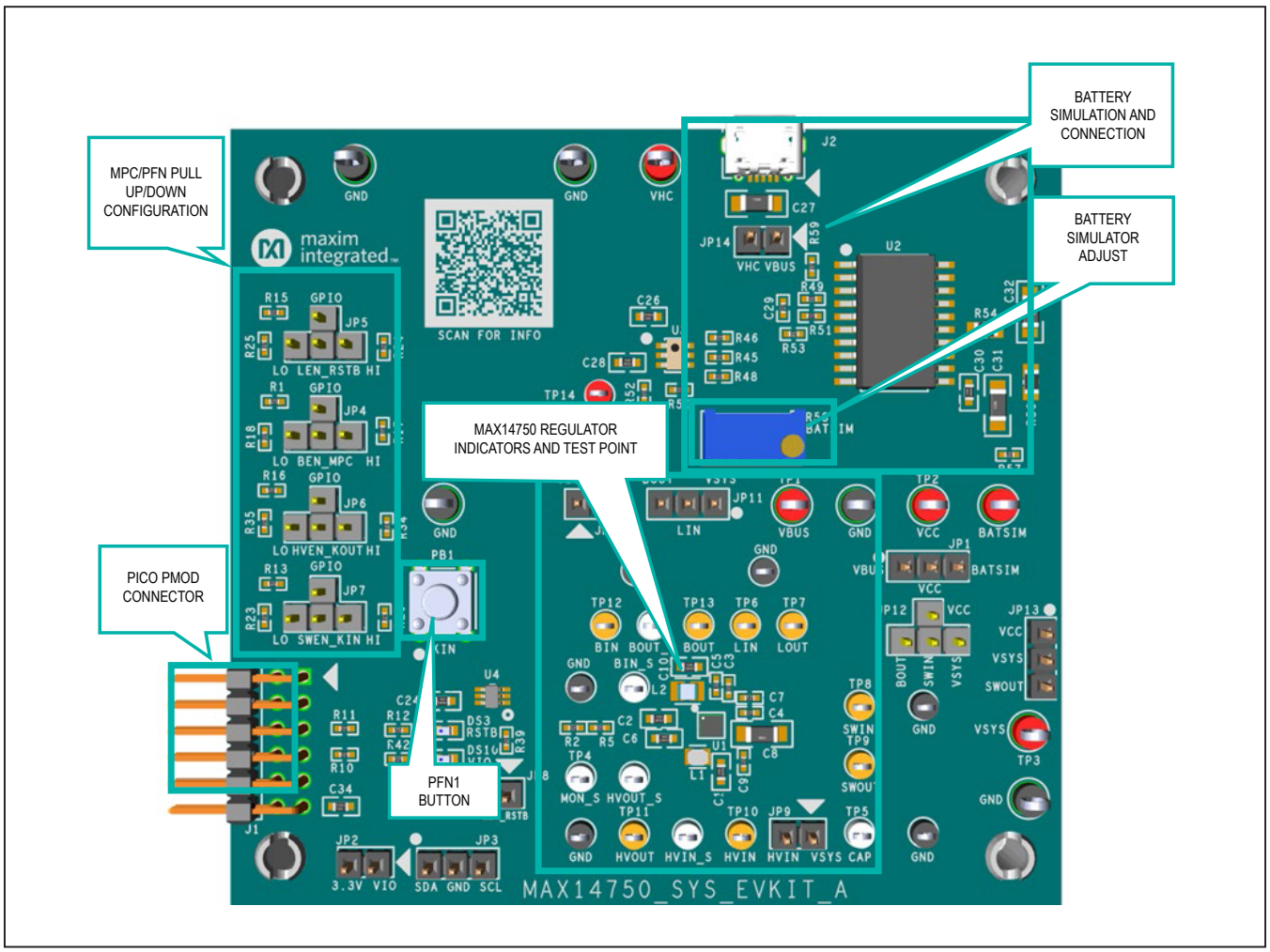


Figure 7. MAX14750_SYS_EVKIT_A

Table 1. Jumper Table

JUMPER	SHUNT POSITION	MAX14750 DESCRIPTION	MAX14720 DESCRIPTION
JP1	1-2	Supplies VCC through VBUS	
	2-3*	Supplies VCC through BATSIM	
JP2	1-2*	VIO connect to 3.3V from PMOD	
JP3	1-2	SDA connects to ground. Used to probe I^2C	
	2-3	SCL connects to ground. Used to probe I^2C	
JP4	1-2	BEN pulldown to ground	MPC pulldown to ground
	1-3	BEN connect to GPIO3	MPC connect to GPIO3
	1-4	BEN pullup to VIO	MPC pullup to VIO
JP5	1-2	LEN pulldown to ground	RSTB pulldown to ground
	1-3	LEN connect to GPIO4	RSTB connect to GPIO4
	1-4	LEN pullup to VIO	RSTB pullup to VIO
JP6	1-2	HVEN pulldown to ground	KOUT pulldown to ground
	1-3	HVEN connect to GPIO2	KOUT connect to GPIO2
	1-4	HVEN pullup to VIO	KOUT pullup to VIO
JP7	1-2	SWEN pulldown to ground	KIN (PFN1) pulldown to ground
	1-3	SWEN connect to GPIO1	KIN (PFN1) connect to GPIO1
	1-4	SWEN pullup to VIO	KIN (PFN1) pullup to VIO
JP8	1-2**	Connects LEN to LED reset indicator	Connects RSTB to LED reset indicator
JP9	1-2*	Supplies HVIN through VSYS	
JP10	1-2*	Supplies BIN through VSYS	
JP11	1-2*	Supplies LIN through VSYS	
	2-3	Supplies LIN through BOUT	
JP12	1-2	Supplies SWIN through BOUT	
	1-3	Supplies SWIN through VCC	
	1-4*	Supplies SWIN through VSYS	
JP13	1-2*	Connects VSYS to VCC	
	2-3	Connects VSYS to SWOUT	
JP14	1-2*	VHC connect to USB VBUS	

**Default position.*

***MAX14720 default position.*

Table 2. Connectors Description

CONNECTOR	DESCRIPTION
J1	Connect to MAXPICO2PMB#
J2	Connect to the USB cable for battery simulation

MAXPICO2PMB Firmware Update

This section covers the procedure to update the PICO2PMB adapter board with the latest firmware by programming a firmware image file (.bin) onto the on-board MAX32625PICO microcontroller.

1) Put the board in maintenance mode by holding the button while the board is being connected to the computer. It may be easier to hold the button while inserting the USB cable at the computer end rather than the micro USB connector end (see Figure 8).
2) If the board enters bootloader mode successfully, the LED on the board turns red and the board appears to the computer as a USB drive named MAINTENANCE.
3) Drag and drop the firmware image file (.bin) into the MAINTENANCE drive and the board will install the new firmware.

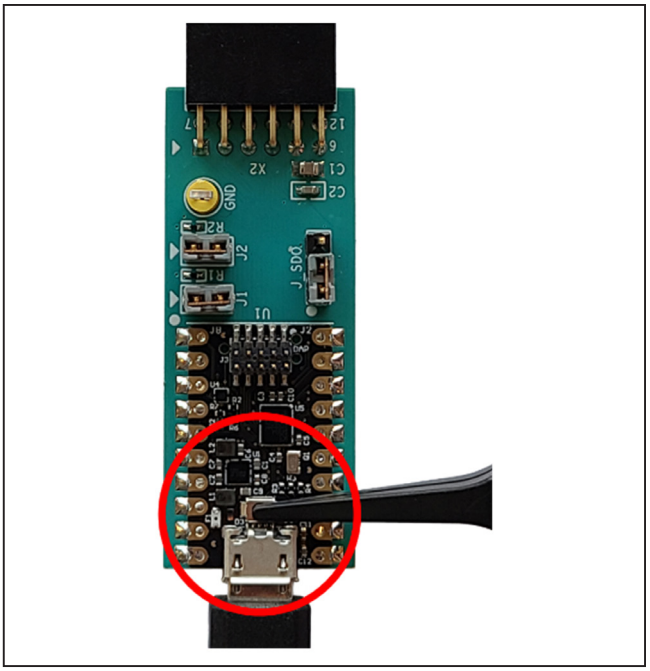


Figure 8. Enter Maintenance Mode on the MAX32625PICO.

Ordering Information

FILE	DESCRIPTION
MAX14750EVSYS#	EV Kit

#Denotes RoHS compliance.

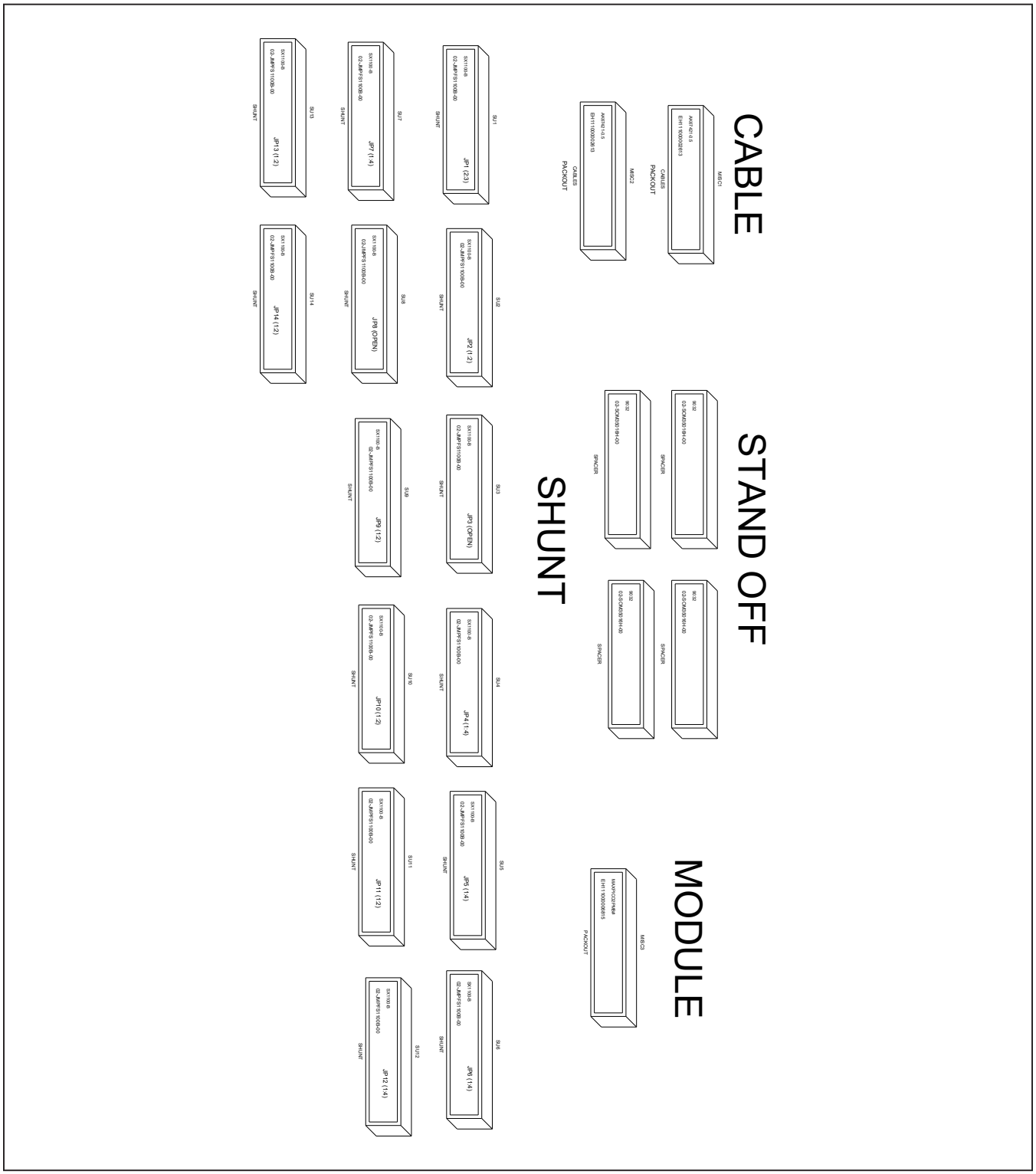
MAX14750 EV System Bill of Materials

ITEM	REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	BATSIM, TP1-TP3, VHC	-	5	5010	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; RED; PHOSPHOR BRONZE WIRE SIL;
2	BIN_S, BOUT_S, HVIN_S, HVOUT_S, TP4, TP5	-	6	5002	KEYSTONE	N/A	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; WHITE; PHOSPHOR BRONZE WIRE SILVER;
3	C1, C2, C6, C10	-	4	C1608X5R0J226M080AC; GRM188R60J226ME15	TDK;MURATA	22UF	CAP; SMT (0603); 22UF; 20%; 6.3V; X5R; CERAMIC
4	C3, C4, C7	-	3	ZRB15XR61A475ME01; CL05A475MP5NRN; GRM155R61A475MEAA; C1005X5R1A475M050BC	MURATA;SAMSUNG; MURATA;TDK	4.7UF	CAP; SMT (0402); 4.7UF; 20%; 10V; X5R; CERAMIC
5	C5, C9	-	2	C1005X7R1H104K050BB; GRM155R71H104KE14; C1005X7R1H104K050BE; UMK105B7104KV-FR	TDK;MURATA;TDK; TAIYO YUDEN	0.1UF	CAP; SMT (0402); 0.1UF; 10%; 50V; X7R; CERAMIC
6	C8	-	1	C3216X5R1A107M160AC	TDK	100UF	CAP; SMT (1206); 100UF; 20%; 10V; X5R; CERAMIC
7	C24	-	1	C1608X5R1H104K080AA	TDK	0.1UF	CAP; SMT (0603); 0.1UF; 10%; 50V; X5R; CERAMIC
8	C26	-	1	C0603C225K9PAC; GRM188R60J225KE01; C1608X5R0J225K080AB	KEMET;MURATA;TDK	2.2UF	CAP; SMT (0603); 2.2UF; 10%; 6.3V; X5R; CERAMIC;
9	C27	-	1	GRM31CR71H475KA12; GRJ31CR71H475KE11; GXM31CR71H475KA10; UMK316AB7475KL; GRM31CR71H475KA12L	MURATA;MURATA; MURATA;TAIYO YUDEN;MURATA	4.7UF	CAP; SMT (1206); 4.7UF; 10%; 50V; X7R; CERAMIC
10	C28	-	1	C0603C475K9PAC	KEMET	4.7UF	CAP; SMT (0603); 4.7UF; 10%; 6.3V; X5R; CERAMIC;
11	C29	-	1	C0402X7R500-222KNE; GRM155R71H222KA01; C1005X7R1H222K050BA	VENKEL LTD.; MURATA;TDK	2200PF	CAP; SMT (0402); 2200PF; 10%; 50V; X7R; CERAMIC
12	C30	-	1	C0603C104K8RAC	KEMET	0.1UF	CAP; SMT (0603); 0.1UF; 10%; 10V; X7R; CERAMIC
13	C31	-	1	C3216X5R1C476M160AB; GRM31CR61C476ME44	TDK;MURATA	47UF	CAP; SMT (1206); 47UF; 20%; 16V; X5R; CERAMIC
14	C32	-	1	C3216X5R1H106K160AB; GRM31CR61H106KA12	TDK;MURATA	10UF	CAP; SMT (1206); 10UF; 10%; 50V; X5R; CERAMIC
15	C34	-	1	GRM188R60J105KA01	MURATA	1UF	CAP; SMT (0603); 1UF; 10%; 6.3V; X5R; CERAMIC;
16	DS3, DS10	-	2	LG L29K-G2J1-24	OSRAM	LG L29K-G2J1-24	DIODE; LED; SMT (0603); Vf=1.7V; If(test)=0.002A; -40 DEGC TO +100 DEGC
17	J1	-	1	PBC06DBAN	SULLINS ELECTRONICS CORP.	PBC06DBAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; RIGHT ANGLE; 12PINS; 12PINS - ALTERNATE PIN NUMBERING
18	J2	-	1	ZX62D-B-5P8	HIROSE ELECTRIC CO LTD.	ZX62D-B-5P8	CONNECTOR; MALE; SMT; MICRO UNIVERSAL SERIES BUS B-TYPE CONNECTOR; RIGHT ANGLE; 5PINS
19	JP1, JP3, JP11, JP13	-	4	PBC03SAAN	SULLINS	PBC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS; -65 DEGC TO +125 DEGC
20	JP2, JP8-JP10, JP14	-	5	PBC02SAAN	SULLINS ELECTRONICS CORP.	PBC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS
21	JP4-JP7, JP12	-	5	TSW-104-07-L-S	SAMTEC	TSW-104-07-L-S	EVKIT PART-CONNECTOR; MALE; THROUGH HOLE; TSW SERIES; SINGLE ROW; STRAIGHT; 4PINS
22	L1	-	1	VLS201610ET-4R7M	TDK	4.7UH	INDUCTOR; SMT; WIREWOUND CHIP; 4.7UH; TOL=+/-20%; 0.72A
23	L2	-	1	SRP2010-2R2M	BOURNS	2.2UH	INDUCTOR; SMT; POWDERED IRON CORE; 2.2UH; TOL=+/-20%; 1.7A
24	MISC3	-	1	MAXPICO2PMB#	MAXIM	MAXPICO2PMB#	ACCESSORY; BRD; PACKOUT; MAXPICO2PMB ADAPTER BOARD
25	PB1	-	1	1825910-6	TE CONNECTIVITY	1825910-6	SWITCH; SPST; THROUGH HOLE; 24V; 0.05A; TACTILE SWITCH; RCOIL=0 OHM; RINSULATION=100M OHM; TE CONNECTIVITY
26	R1, R13, R15, R16	-	4	ERJ-2RKF1001	PANASONIC	1K	RES; SMT (0402); 1K; 1%; +/-100PPM/DEGC; 0.1000W
27	R2, R5, R10, R11, R39, R49, R53	-	7	CRCW040210K0FK; RC0402FR-0710KL	VISHAY DALE; YAGEO PHICOMP	10K	RES; SMT (0402); 10K; 1%; +/-100PPM/DEGC; 0.0630W
28	R12, R42	-	2	CRCW0402499RFK	VISHAY DALE	499	RES; SMT (0402); 499; 1%; +/-100PPM/DEGC; 0.0630W
29	R17, R18, R20, R23-R25, R34, R35, R45, R46, R48, R50, R57	-	13	ERJ-2GEJ104	PANASONIC	100K	RES; SMT (0402); 100K; 5%; +/-200PPM/DEGC; 0.1000W
30	R51	-	1	ERJ-2GE0R00	PANASONIC	0	RES; SMT (0402); 0; JUMPER; JUMPER; 0.1000W

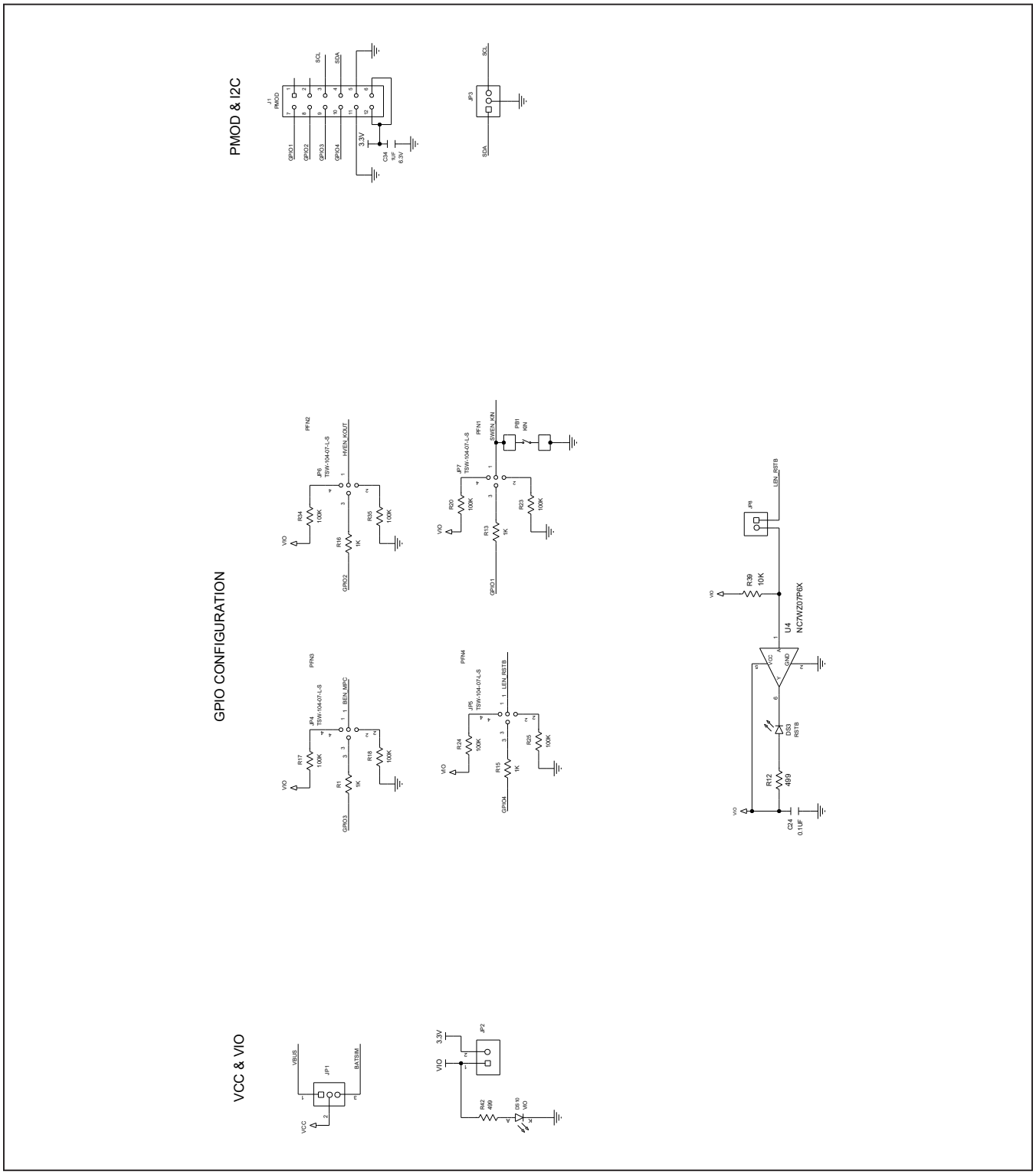
MAX14750 EV System Bill of Materials (continued)

ITEM	REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
31	R52	-	1	ERJ-2RKF5100	PANASONIC	510	RES; SMT (0402); 510; 1%; +/-100PPM/DEGC; 0.1000W
32	R54, R56	-	2	WSL0805R1000FEA18	VISHAY DALE	0.1	RES; SMT (0805); 0.1; 1%; +/-75PPM/DEGC; 0.1250W
33	R58	-	1	3296Y-1-253LF	BOURNS	25K	RESISTOR; THROUGH-HOLE-RADIAL LEAD; 3296 SERIES; 25K OHM; 10%; 100PPM; 0.5W; SQUARE TRIMMING POTENTIOMETER; 25 TURNS; MOLDER CERAMIC OVER METAL FILM
34	R59	-	1	ERJ-2RKF1152	PANASONIC	11.5K	RES; SMT (0402); 11.5K; 1%; +/-100PPM/DEGC; 0.1000W
35	SPACER1-SPACER4	-	4	9032	KEYSTONE	9032	MACHINE FABRICATED; ROUND-THRU HOLE SPACER; NO THREAD; M3.5; 5/8IN; NYLON
36	SU1-SU14	-	14	S1100-B;SX1100-B; STC02SYAN	KYCON;KYCON; SULLINS ELECTRONICS CORP.	SX1100-B	TEST POINT; JUMPER; STR; TOTAL LENGTH=0.24IN; BLACK; INSULATION=PBT;PHOSPHOR BRONZE CONTACT=GOLD PLATED
37	TP6-TP13	-	8	5003	KEYSTONE	N/A	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; ORANGE; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
38	TP14	-	1	5000	KEYSTONE	N/A	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
39	TP20-TP24	-	5	5011	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
40	TP25-TP30	-	6	5001	KEYSTONE	N/A	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
41	U1	-	1	MAX14750AEWA+	MAXIM	MAX14750AEWA+	IC; PWRM; POWER-MANAGEMENT SOLUTI0N; WLP25
42	U2	-	1	OPA569AIDWPR	TEXAS INSTRUMENTS	OPA569AIDWPR	IC; AMP; RAIL-TO-RAIL I/O; POWER AMPLIFIER; WSOIC20-EP 300MIL
43	U3	-	1	MAX8880EUT+	MAXIM	MAX8880EUT+	IC; VREG; ULTRA-LOW-IQ LOW-DROPOUT LINEAR REGULATOR WITH POK; SOT23-6
44	U4	-	1	NC7WZ07P6X	FAIRCHILD SEMICONDUCTOR	NC7WZ07P6X	IC; BUF; TINY LOGIC ULTRA-HIGH SPEED DUAL BUFFER; SC70-6
45	PCB	-	1	MAX14750SYS	MAXIM	PCB	PCB:MAX14750SYS
46	MISC1, MISC2	DNI	2	AK67421-0.5	ASSMANN	AK67421-0.5	CONNECTOR; USB CABLE; MALE-MALE; USB_2.0; 5PINS-4PINS; 500MM
TOTAL			129				

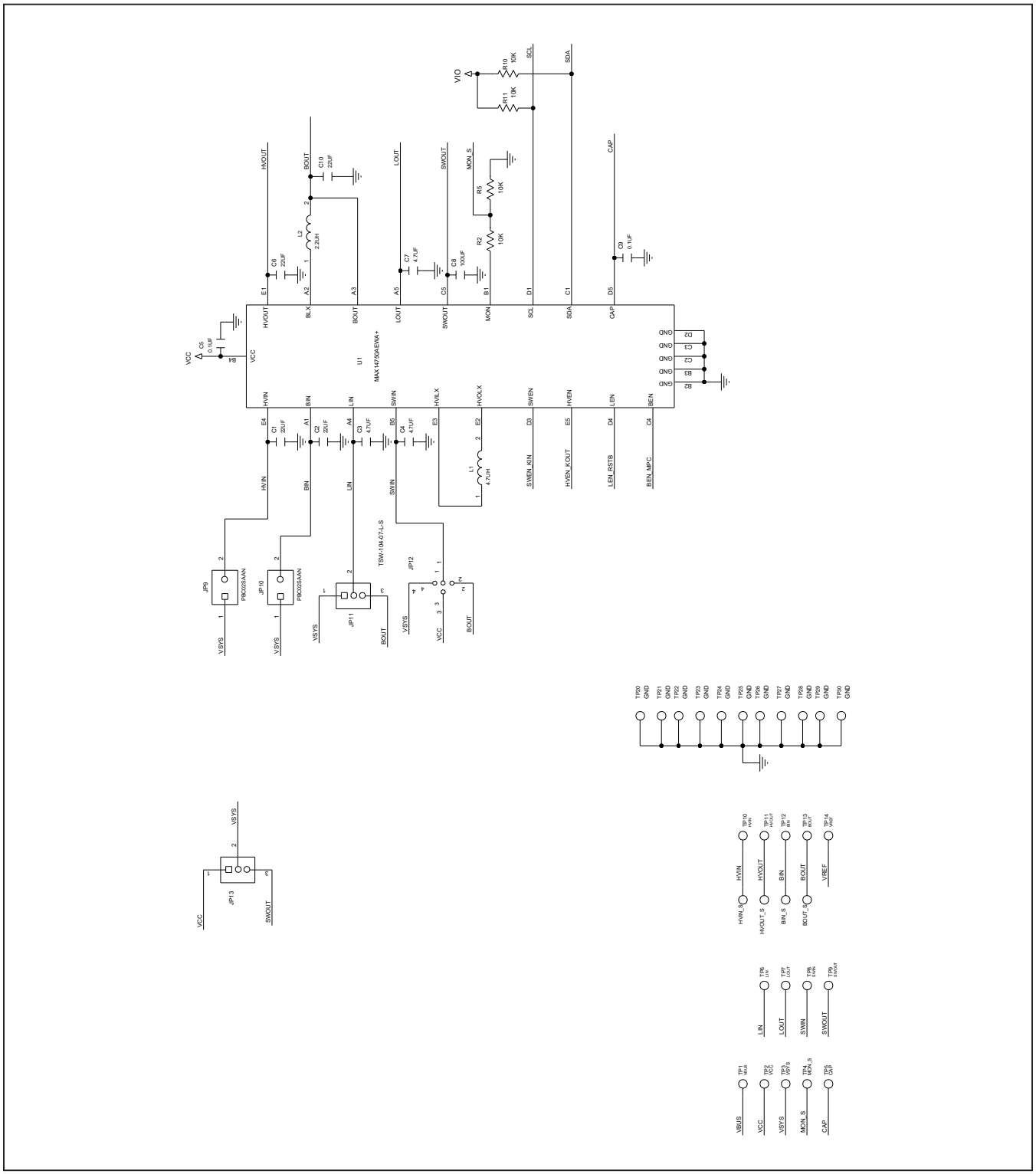
MAX14750 EV System Schematics



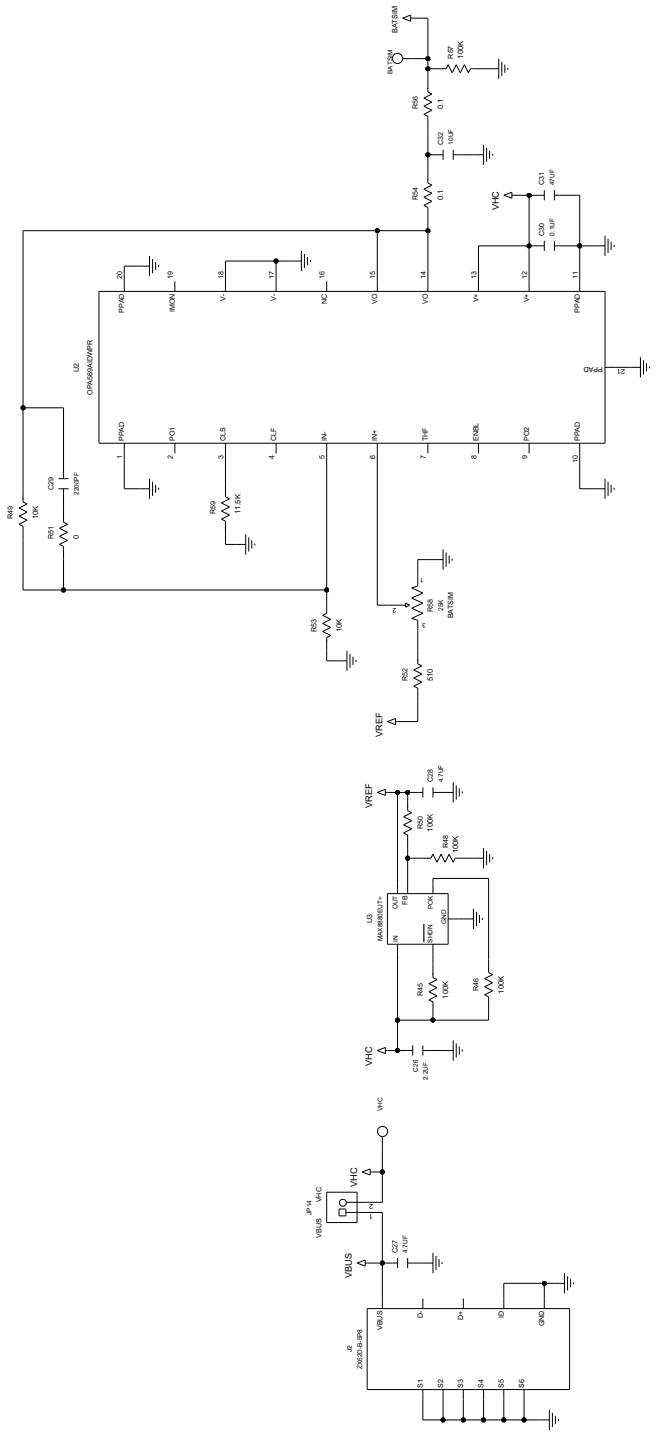
MAX14750 EV System Schematics (continued)



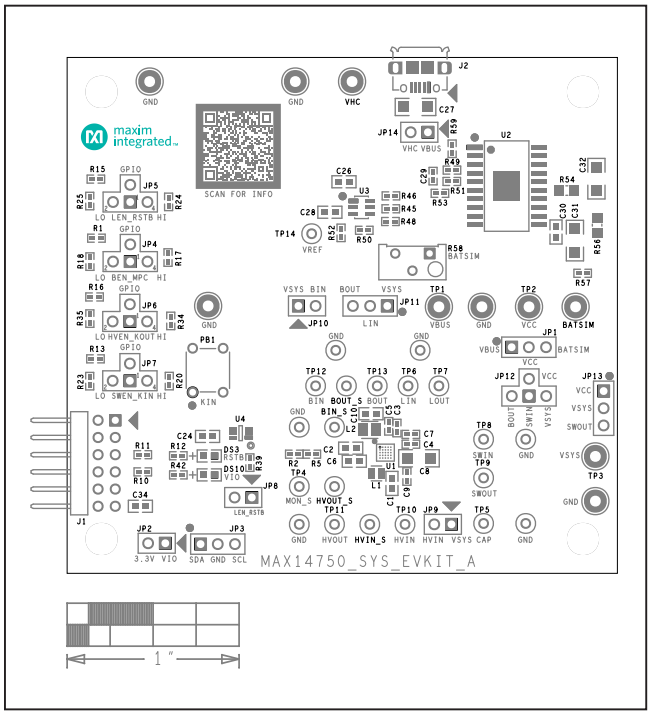
MAX14750 EV System Schematics (continued)



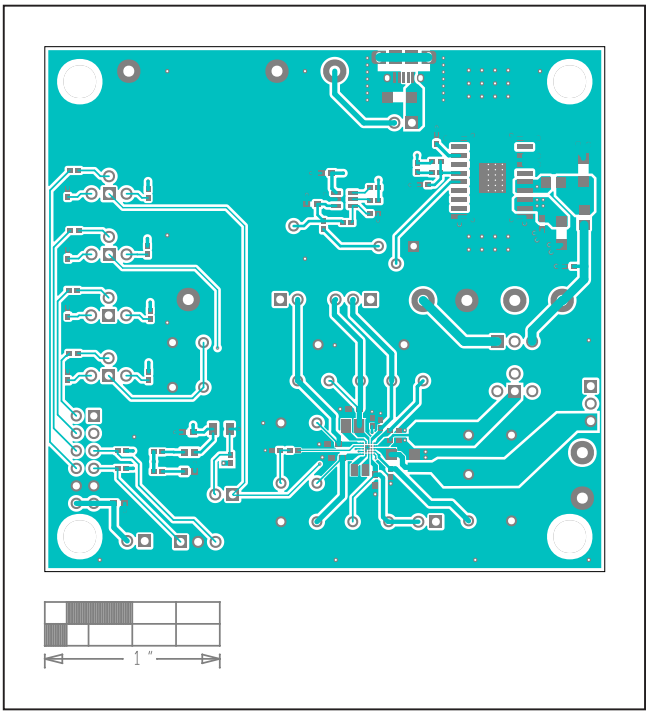
MAX14750 EV System Schematics (continued)



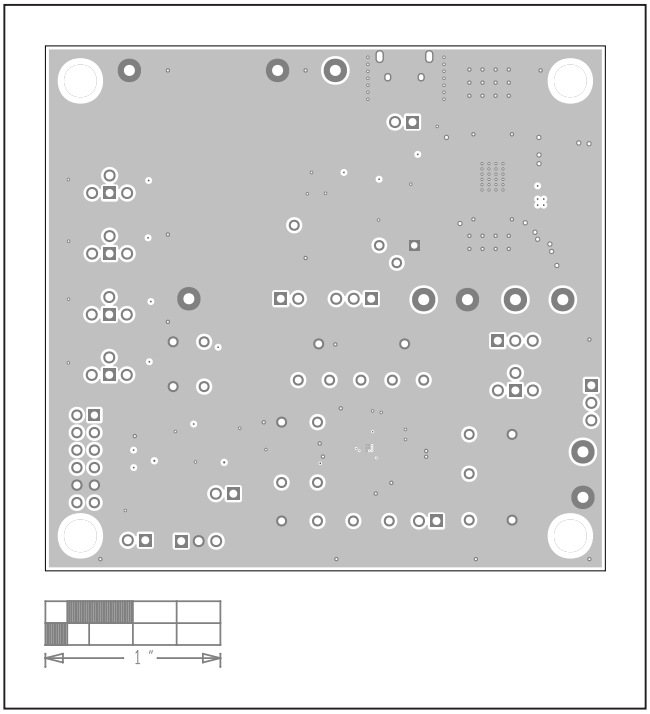
MAX14750 EV System PCB Layouts



MAX14750 EV System Component Placement Guide—Top Silkscreen

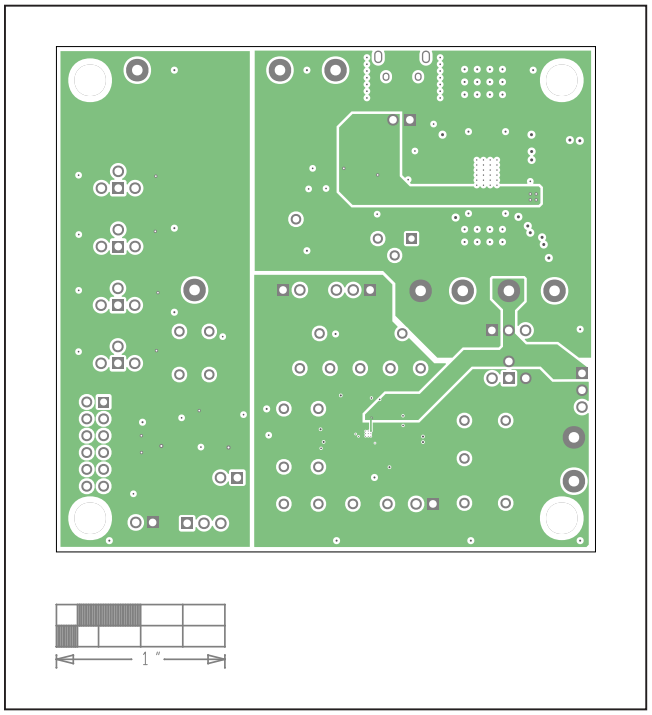


MAX14750 EV System PCB Layout—Top

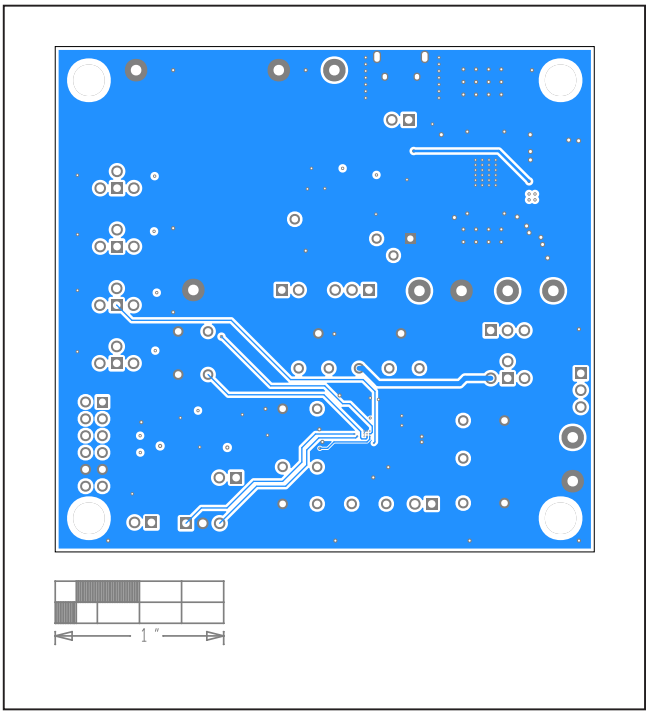


MAX14750 EV System PCB Layout—Internal2

MAX14750 EV System PCB Layouts (continued)



MAX14750 EV System PCB Layout—Internal3



MAX14750 EV System PCB Layout—Bottom

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	12/21	Initial release	—