

MAX77840 Evaluation Kit

Evaluates: MAX77840

General Description

The MAX77840 evaluation kit (EV kit) consists of a board and the Maxim MINIUSB with an extender board command module.

The MAX77840 includes a single input, 3.15A switch mode charger with reverse boost capability for one-cell Lithium-Ion (Li+) battery; USB BC1.2 adapter type detection with proprietary ModelGauge fuel-gauging technology, and a Safeout LDO.

The EV kit comes standard with the MAX77840 installed. MiniUSB board with an extender board should be used that allows a PC to use a USB port to emulate an I²C 2-wire interface. This Windows® based graphical user interface (GUI) software is available for use with the EV kit and can be downloaded from the MAX77840 product webpage at www.maximintegrated.com. Windows 7 or newer operating system is required to use the EV kit GUI software.

Ordering Information appears at end of data sheet.

MAX77840 EV Kit Files

FILE	DESCRIPTION
MAX77840GUISetupx.x.x.	Installs the EV kit files on PC
Maxim_VID_FTDI_xxx_CDM_x.x.xx.zip	Installs MINIUSB driver on PC

MAX77840 EV Kit Component List

FILE	QTY	DESCRIPTION
MAX77840EVKIT	1	MAX77840 evaluation board
MAXIM MINIUSB	1	MINIUSB interface board
USB HIGH-SPEED A-TO-B CABLE 6FT	1	MINIUSB cable

Benefits and Features

- MAX77840 EV kit Includes all Necessary Components for Device Operation in Addition to many Components for added Flexibility and Easy to Use
- Easy-to-Use Push-Button Interface for On-Off Control
- 0Ω Resistors in Series with Several Key Nodes to be able to Isolate them and for Added Flexibility
- Assembled and Tested
- Test Points Allow Convenient Access to Nodes of Interest
- Jumper Headers Acting as both Test Points and Shunts

Jumper Header Configuration

[Table 1](#) summarizes all jumper headers included in the MAX77840 EV kit and their function. Additionally, the [MAX77840 EV Kit Schematic Diagram](#) can be used as a reference.

Table 1. Jumper Header Summary

JUMPER NUMBER	NODE	DEFAULT POSITION	FUNCTION
J4	V _{IO}	2-3	1-2: Connect V _{IO} to external I ² C pullup 2-3: Connect V _{IO} to V _{SYS}
J6	SLAVE	2-3	1-2: Enable SLAVE charger 2-3: Disable SLAVE charger (or SLAVE not present)
J8	DETBATB	2-3	1-2: Connect to V _{IO} 2-3: Connect to GND
J9	V _{CC}	1-2	1-2: Connect voltage translator to V _{SYS} 2-3: Connect voltage translator to I ² C V _{DD} (+3.3V)

*Indicates default jumper position.

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Quick Start

Required Equipment

- MAX77840 EV kit
- Single-cell Lithium-ion (Li-ion) battery pack
- Charging wall adapter or DC power supply capable of supplying 15.0V/3A
- Standard USB Type A to Type B cable (included in the EV kit bundle)
- PC running Windows 7 or above

Setup Overview

A typical bench setup for the MAX77840 EV kit is shown in [Figure 1](#).

Procedure

Follow the steps to familiarize yourself with the EV kit.

Note: In the following sections, software-related items are identified by bolding. Text in **bold** refers to items directly

from the EV kit software. Text in **bold and underlined** refers to items from the Windows operating system and Do not turn on the DC power supplies until all connections are made.

- 1) Carefully connect the boards by inserting the 20-pin female connector of the EV kit with the 20-pin male header of the MINIQUSB interface board. The two boards should be flush with each other.
- 2) Use the USB cable provided in the EV kit bundle to connect the MINIQUSB interface board to the PC's USB port.
- 3) Install the MINIQUSB driver:
 - a. **Windows 32-bit**
 - b. **Windows 64-bit**
- 4) Verify whether the jumper settings follow the default configuration. See [Jumper Header Configuration](#).
- 5) Connect a Li-ion battery to the pads labeled BATT and BATTGND.

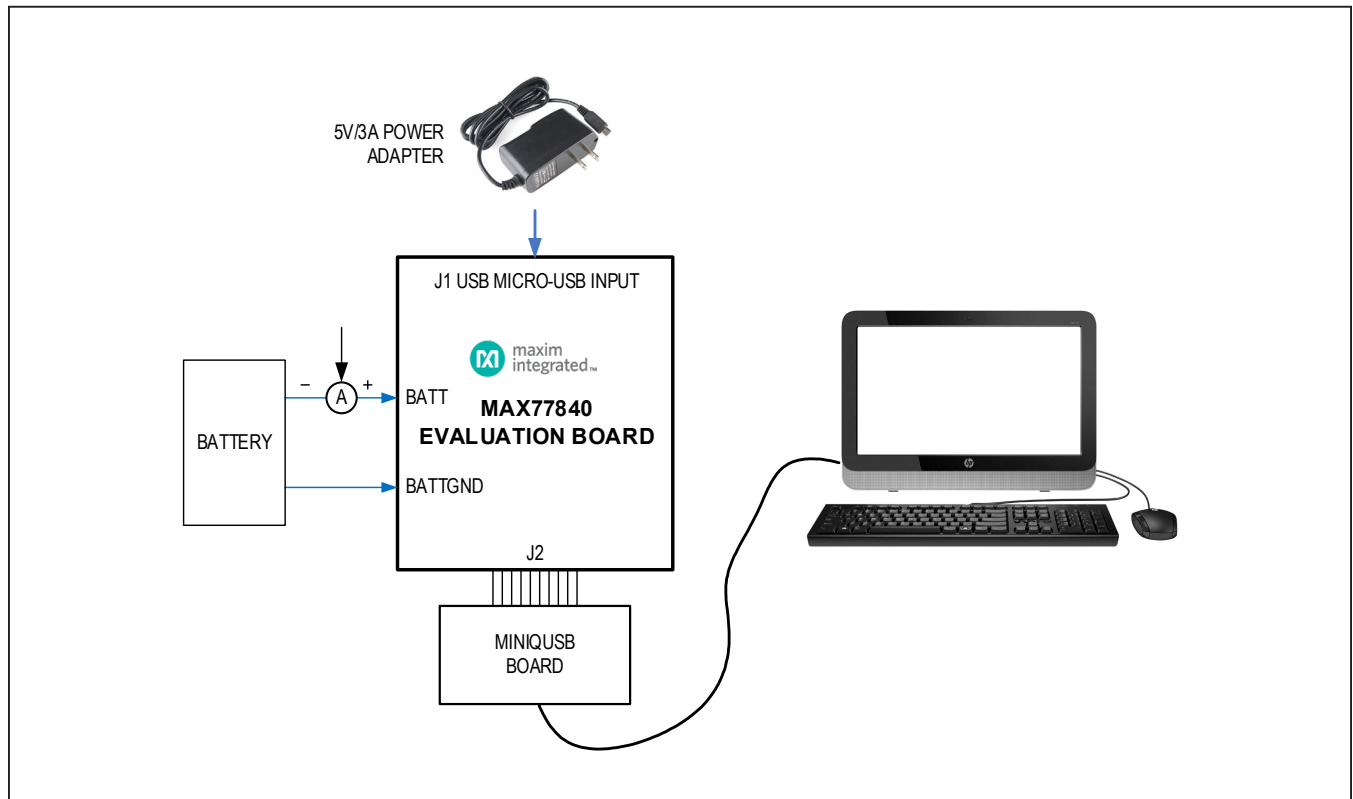


Figure 1. MAX77840 Bench Setup

- 6) Connect a USB wall adapter to the micro-USBport on the board.
- 7) Launch the MAX77840 application file.
- 8) Select **Device > Connect** from the window options to connect to the EV kit.
 - a. If a supply is chosen to power the IC instead of a battery, then preset the power supply to 5V, 1A. Do not turn on the power supply until all connections are completed.
 - b. Connect the positive and negative terminals of the supply to BATT and BATTGND, respectively.
 - c. Turn on the 5V power supply.
 - d. Charging current should be ~500mA default. Measured value varies with the EV kit configuration.

Detailed Description of Software

Graphical User Interface (GUI) Panel

The GUI is separated into several tabs that provide a convenient means to control the MAX77840 IC. Use the mouse or press the tab key to navigate through the GUI controls. Each tab is named with respect to the subsystems within the chip. The correct SMBus read and write operations are generated to update the ICs internal memory registers when any of these controls are executed.

Communication Port

The software automatically finds the EV kit board through USB identification. If the connection cannot be found, a **Not Connected** message is displayed as shown in [Figure 3](#). Once the USB cable is attached, click on the main window option, **Device > Connect**, and a synchronization window pops up. Choose **Read and Close** and the status bar displays **Connected** signifying active communication.

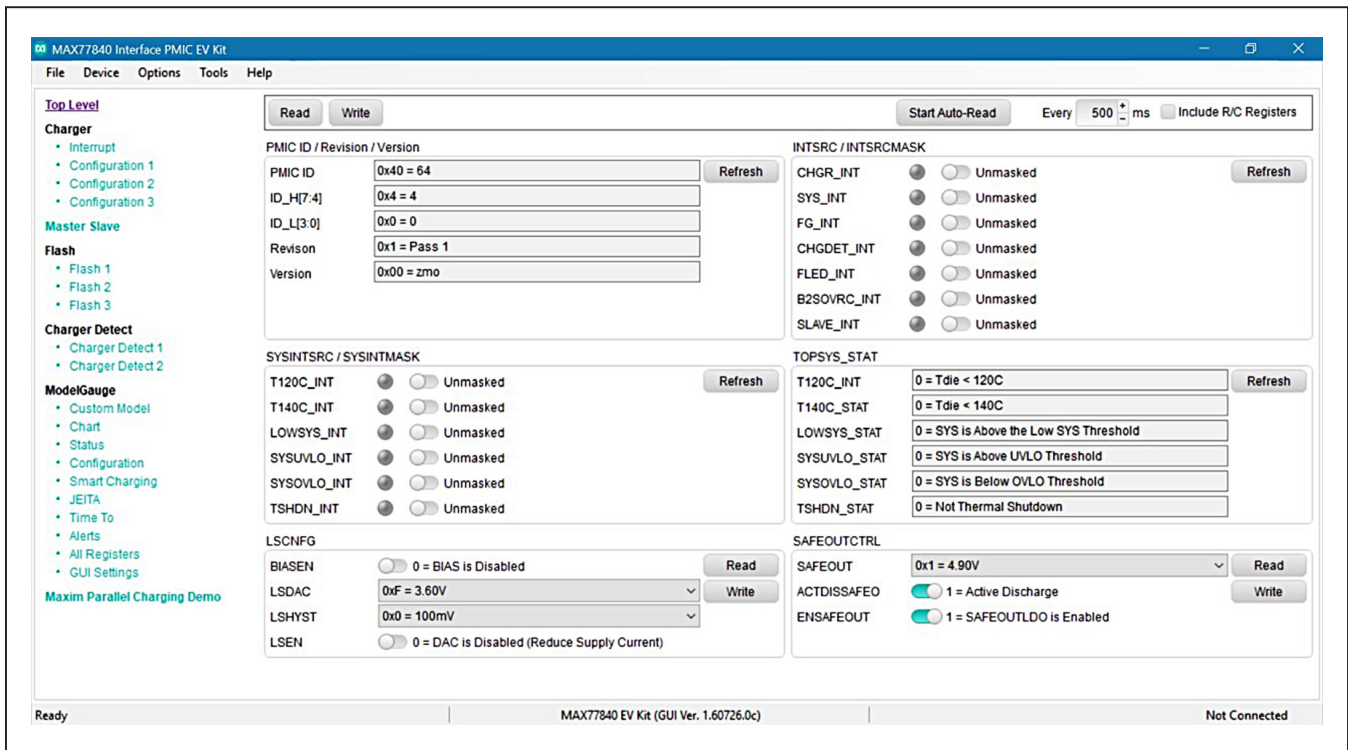


Figure 2. MAX77840 EV Kit GUI Screen

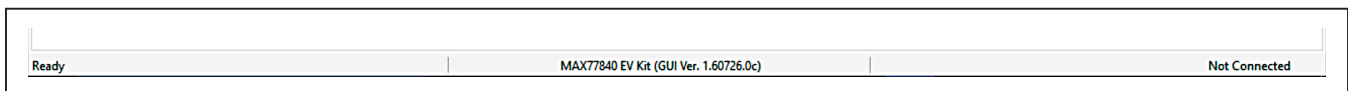


Figure 3. MAX77840 EV kit status bar

Detailed Description of Hardware

Battery Charger Test Setup

- 1) Power Source:
 - a. If the charging source is a DC power supply, then adjust its voltage and current limits to 5.0V and 3.0A, respectively. Connect the power supply between VBUS and GND on the EV kit board.
 - b. If the charging source is a wall adapter, then the micro-USB port can be used for charging. Note that high current charging (up to 3A) requires an adapter and cable capable of high-power delivery.
- 2) Connect a single-cell Li-Ion battery between BATT and BATTGND.
- 3) Open the software screen and program the charger settings adequate to your system.
- 4) In the **Charger** tab, enable the **DIS_CD_CTRL** bit in the **CHG_CNFG_00** to enable charging using a micro-USB port or power supply.
- 5) In the **Charger Detect 2** tab, enable **NoAutoIBUS** in the **CHGDET_CNTRL1** register so that the current limit setting can be manually controlled by I²C.
- 6) Set the maximum input current limit in the **CHG_CNFG_09** register, and then select the required fast charge current in the **CHG_CNFG_02** register.
- 7) Use data log equipment to log charge current and VBATT profile while charging a fully discharged single-cell Li+ battery.

Ordering Information

PART	TYPE
MAX77840EVKIT#	EV Kit

#Denotes RoHS compliant

Note: The MAX77840 EV kit software is included with the EV kit, but is designed for use with the complete EV system. The EV system includes both the Maxim MINI-Q module and the EV kit.

MAX77840 EV Kit Bill of Materials

REF_DES	QTY	MFG PART #	DESCRIPTION
AVL, PVL, SAFEOUT, VBFG, VIO	5	5010	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; RED; PHOSPHOR BRONZE WIRE SIL;
BATT, BATTGND, CHGGND, CHGIN, GND1-GND4, VBUS, VSYS	10	9020 BUSS	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG
BST, BYP, BYPS, CHGIND, CHGINS, CHGINS-, CHGLX, CSP, DETBATB, DM, DP, ENU_EN, INOKB, INTB, ONKEY, OVPENB, SCL, SCLLS, SDA, SDALS, SW1, SW2, SYSS, SYSS-, THM, THMB, VBUSDET	27	5000	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
C3	1	C0603H102J1GAC	CAPACITOR; SMT (0603); CERAMIC CHIP; 1000PF; 100V; TOL=5%; MODEL=HT SERIES; TG=-55 DEGC TO +200 DEGC; TC=C0G
C4	1	ATC520L103KT16T	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.01UF; 16V; TOL=10%; MODEL=ULTRA-BROADBAND; TG=-55 DEGC TO +125 DEGC; TC=X7R
C1, C2, C5, C21, C22	5	ANY	CAPACITOR; SMT (0402); CERAMIC CHIP; 1UF; 6.3V; TOL=10%; MODEL=; TG=-55 DEGC TO +85 DEGC; TC=X5R;
C6	1	ZRB157R61A225KE11; GRM155R61A225KE95; CL05A225KP5NSN	CAPACITOR; SMT (0402); CERAMIC CHIP; 2.2UF; 10V; TOL=10%; TG=-55 DEGC TO +85 DEGC; TC=X5R
C7	1	C1608X5R1E225K; TMK107ABJ225KA; TMK107BJ225KA; GRM188R61E225KA12	CAPACITOR; SMT (0603); CERAMIC CHIP; 2.2UF; 25V; TOL=10%; MODEL=; TG=-55 DEGC TO +85 DEGC; TC=X5R
C9	1	GRM155R61A106ME44; GRM155R61A106ME11; 0402ZD106MAT2A; CL05A106MP5NUNC	CAPACITOR; SMT (0402); CERAMIC CHIP; 10UF; 10V; TOL=20%; TG=-55 DEGC TO +85 DEGC; TC=X5R
C10	1	GRM155R61C104KA88	CAPACITOR; SMT (0402); CERAMIC; 0.1UF; 16V; TOL=10%; MODEL=GRM SERIES; TG=-55 DEGC to +85 DEGC; TC=X5R
C11, C20	2	GRM155R71E104KE14; C1005X7R1E104K050BB; TMK105B7104KVH; CGJ2B3X7R1E104K050BB	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.1UF; 25V; TOL=10%; MODEL=GRM SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7R

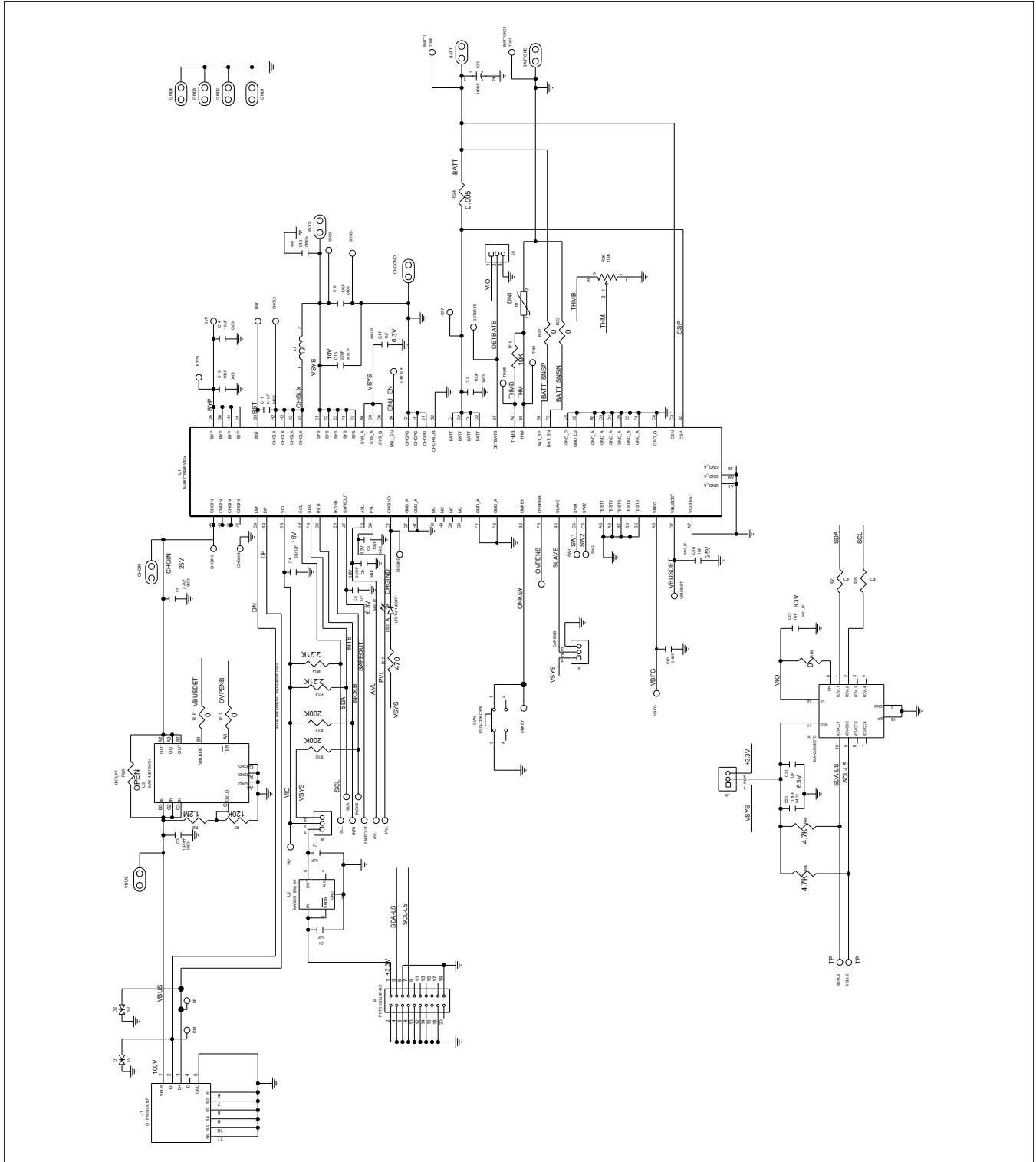
MAX77840 EV Kit Bill of Materials (continued)

REF_DES	QTY	MFG PART #	DESCRIPTION
C12	1	GRM188R61C106MA73	CAPACITOR; SMT (0603); CERAMIC CHIP; 10UF; 16V; TOL=20%; MODEL=GRM SERIES; TG=-55 DEGC TO +85 DEGC; TC=X5R
C13, C14, C16	3	C1608X5R1E106M080AC; CL10A106MA8NRNC; GRM188R61E106MA73; ZRB18AR61E106ME01; GRT188R61E106ME13	CAPACITOR; SMT (0603); CERAMIC CHIP; 10UF; 25V; TOL=20%; TG=-55 DEGC TO +85 DEGC; TC=X5R
C15	1	ANY	CAPACITOR; SMT (0603); CERAMIC CHIP; 22UF; 10V; TOL=20%; MODEL=CL SERIES; TG=-55 DEGC TO +85 DEGC; TC=X5R; FORMFACTOR
C17	1	ANY	CAPACITOR; SMT (0402); CERAMIC CHIP; 1UF; 6.3V; TOL=20%; MODEL=C SERIES; TG=-55 DEGC TO +85 DEGC; TC=X5R ; FORMFACTOR
C18	1	ANY	CAPACITOR; SMT (0402); CERAMIC CHIP; 1UF; 25V; TOL=20%; MODEL=M SERIES; TG=-55 DEGC TO +85 DEGC; TC=X5R; FORMFACTOR
C23	1	TCJB107M006R0070	CAPACITOR; SMT (3528); TANTALUM CHIP; 100UF; 6.3V; TOL=20%; MODEL=TCJ SERIES
D1, D2	2	RCLAMP0521P	DIODE; TVS; SMT (0402); PIV=5V; IF=4A
DS3	1	LTST-C190GKT	DIODE; LED; WATER CLEAR GREEN; SMT (0603); VF=2.1V; IF=0.03A; -55 DEGC TO +85 DEGC
J1	1	10118193-0001LF	CONNECTOR; FEMALE; SMT; MICRO USB B TYPE RECEPTACLE; RIGHT ANGLE; 5PINS
J2	1	PPTC102LJBN-RC	CONNECTOR; FEMALE; THROUGH HOLE; BREAKAWAY HEADER; RIGHT ANGLE; 20PINS
J4, J6, J8, J9	4	TSW-103-07-T-S	CONNECTOR; THROUGH HOLE; TSW SERIES; SINGLE ROW; STRAIGHT; 3PINS
L1	1	CIGT252010EH1R0M	INDUCTOR; SMT (1008); MAGNETICALLY SHIELDED; 1UH; TOL=+/-20%; 4.3A
R4, R8	2	ANY	RESISTOR, 0402, 4.7K OHM, 1%, 100PPM, 0.0625W, THICK FILM; FORMFACTOR
R6	1	RK73H1ETTP1204F	RESISTOR, 0402, 1.2M OHM, 1%, 100PPM, 0.0625W, THICK FILM
R7	1	CRCW0402120KFK	RESISTOR, 0402, 120K OHM, 1%, 100PPM, 0.0625W, THICK FILM
R10, R12	2	CRCW0402200KFK; RF73H1ELTP2003	RESISTOR; 0402; 200K; 1%; 100PPM; 0.0625W; THICK FILM
R13, R14	2	CRCW04022K21FK	RESISTOR; 0402; 2.21K; 1%; 100PPM; 0.0625W; THICK FILM

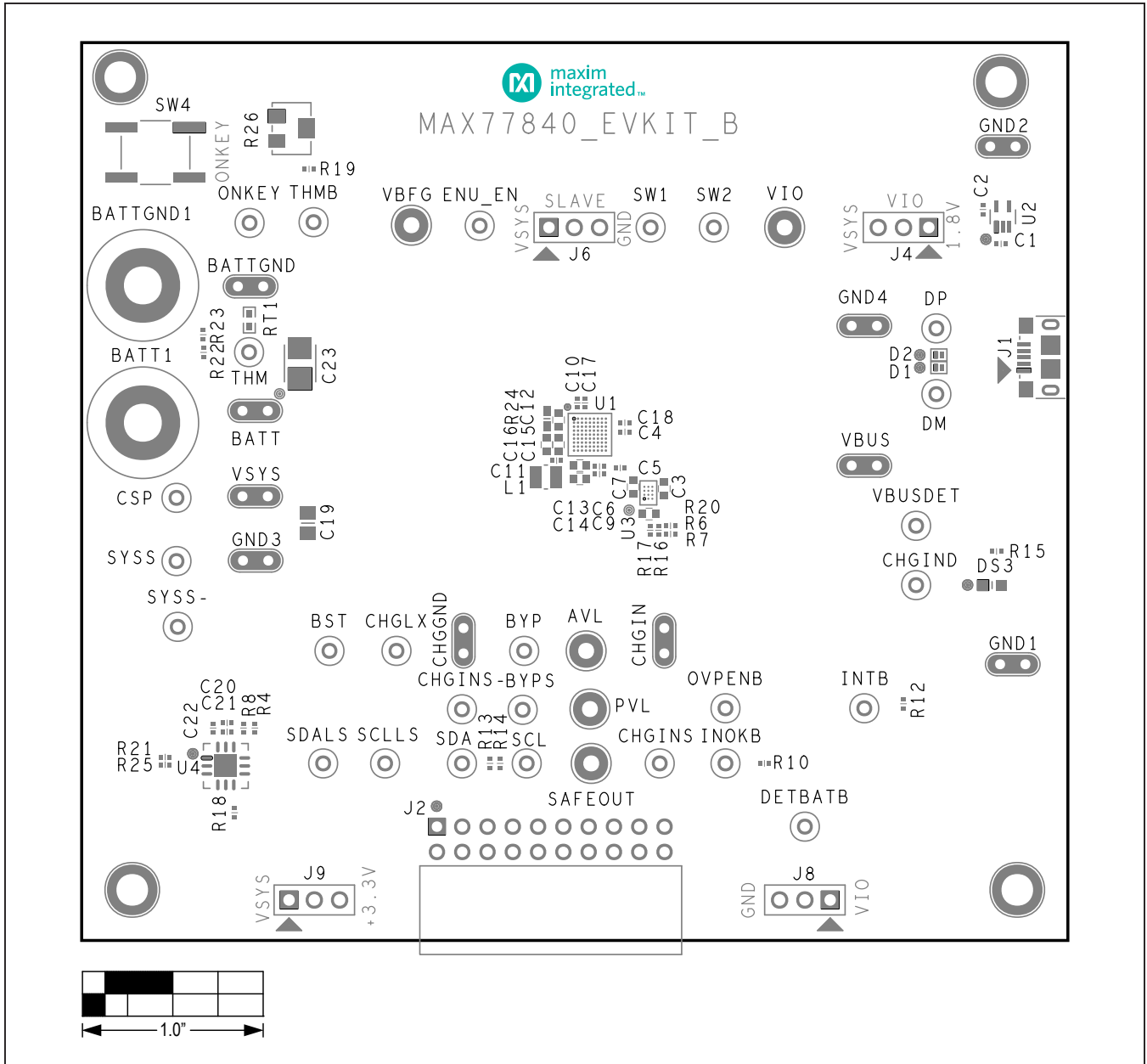
MAX77840 EV Kit Bill of Materials (continued)

REF_DES	QTY	MFG PART #	DESCRIPTION
R15	1	CRCW0402470RJN	RESISTOR; 0402; 470 OHM; 5%; 200PPM; 0.063W; METAL FILM
R16, R17, R22, R23	4	CRCW04020000Z0EDHP; RCS04020000Z0	RESISTOR; 0402; 0 OHM; 0%; JUMPER; 0.2W; THICK FILM
R18, R21, R25	3	ANY	RESISTOR; 0402; 0 OHM; 1%; 100PPM; 0.0625W; THICK FILM; FORMFACTOR
R19	1	ERJ-2GEJ103	RESISTOR; 0402; 10K OHM; 5%; 200PPM; 0.10W; THICK FILM
R24	1	RLM-0816-4F-R005-FNH	RESISTOR; 0603; 0.005 OHM; 1%; 200PPM; 0.5W; METAL FOIL
R26	1	3214W-1-104E	RESISTOR; ; 100K OHM; 10%; 100PPM; 0.25W; MOLDER CERAMIC OVER METAL FILM
SW4	1	EVQ-Q2K03W	SWITCH; SPST; SMT; 15V; 0.02A; LIGHT TOUCH SWITCH; RCOIL= OHM; RINSULATION= OHM; PANASONIC
U1	1	MAX77840EWG+	EVKIT PART - IC; CHGR; INTEGRATED CHARGER WITH FUEL GAUGE CHARGER; WLP81; PKG CODE: W813C3+1; PKG OUTLINE NO.: 21-0775
U2	1	MAX8511EXK18+	IC; VREG; ULTRA-LOW-NOISE; HIGH PSRR; LOW-DROPOUT; LINEAR REGULATOR; SC70-5
U3	1	MAX14681EWC+	IC; PROT; HIGH ACCURACY; SURGE-PROTECTED OVERVOLTAGE PROTECTOR; WLP12
U4	1	MAX3395EETC+	IC; TRANS; 15KV ESD-PROTECTED HIGH-DRIVE CURRENT QUAD-LEVEL TRANSLATOR WITH SPEED-UP CIRCUITRY; TQFN12 4X4
PACK-OUT	1	MINIUSB+	ASSEMBLED BOARD
PCB	1	MAX77840	PCB:MAX77840
BATT1	0	7006	CONNECTOR; PANELMOUNT; BINDING POST; STRAIGHT THROUGH; 1PIN; RED
BATTGND1	0	7007	CONNECTOR; PANELMOUNT; BINDING POST; STRAIGHT THROUGH; 1PIN; BLACK
RT1	0	NCP15XH103F03	THERMISTOR; SMT (0402); THICK FILM (NICKEL PLATED); 10K; TOL=+/-1%
C19	0	N/A	CAPACITOR; SMT (0805); OPEN; IPC MAXIMUM LAND PATTERN
R20	0	N/A	RESISTOR; 0603; OPEN; FORMFACTOR

MAX77840 EV Kit Schematic Diagram

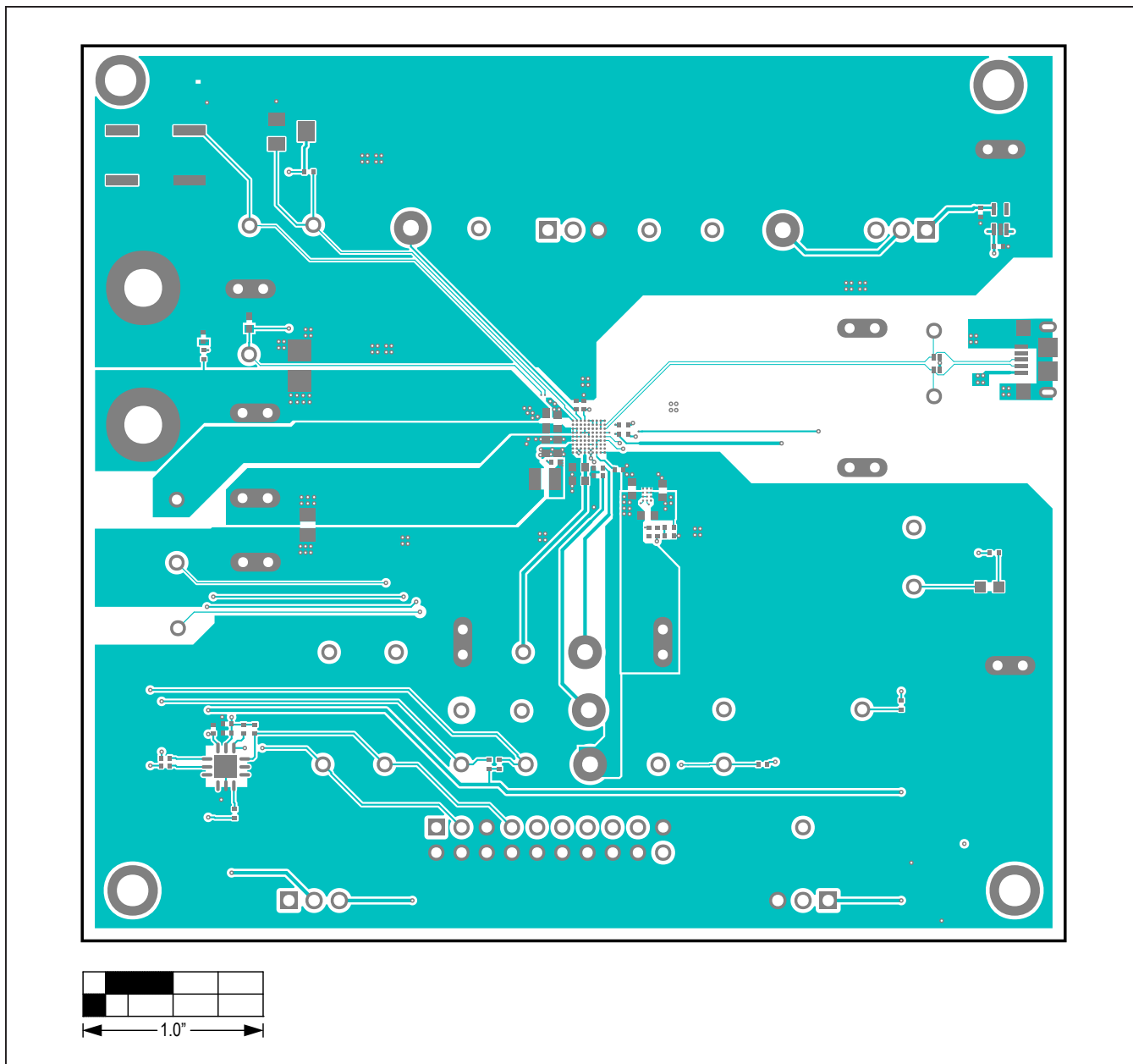


MAX77840 EV Kit PCB Layout Diagrams



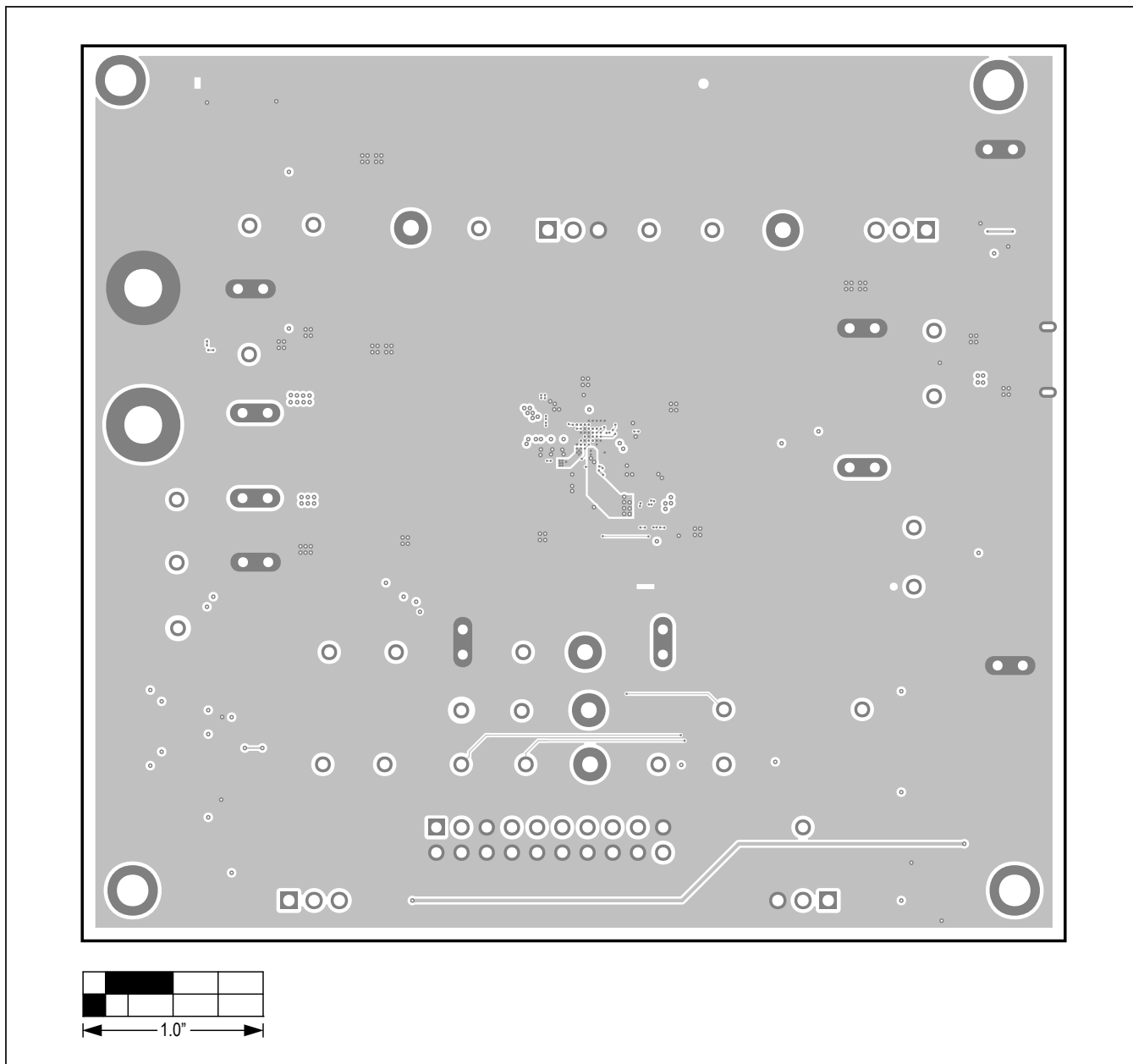
MAX77840 EV Kit Component Placement Guide—Top Silkscreen

MAX77840 EV Kit PCB Layout Diagrams (continued)



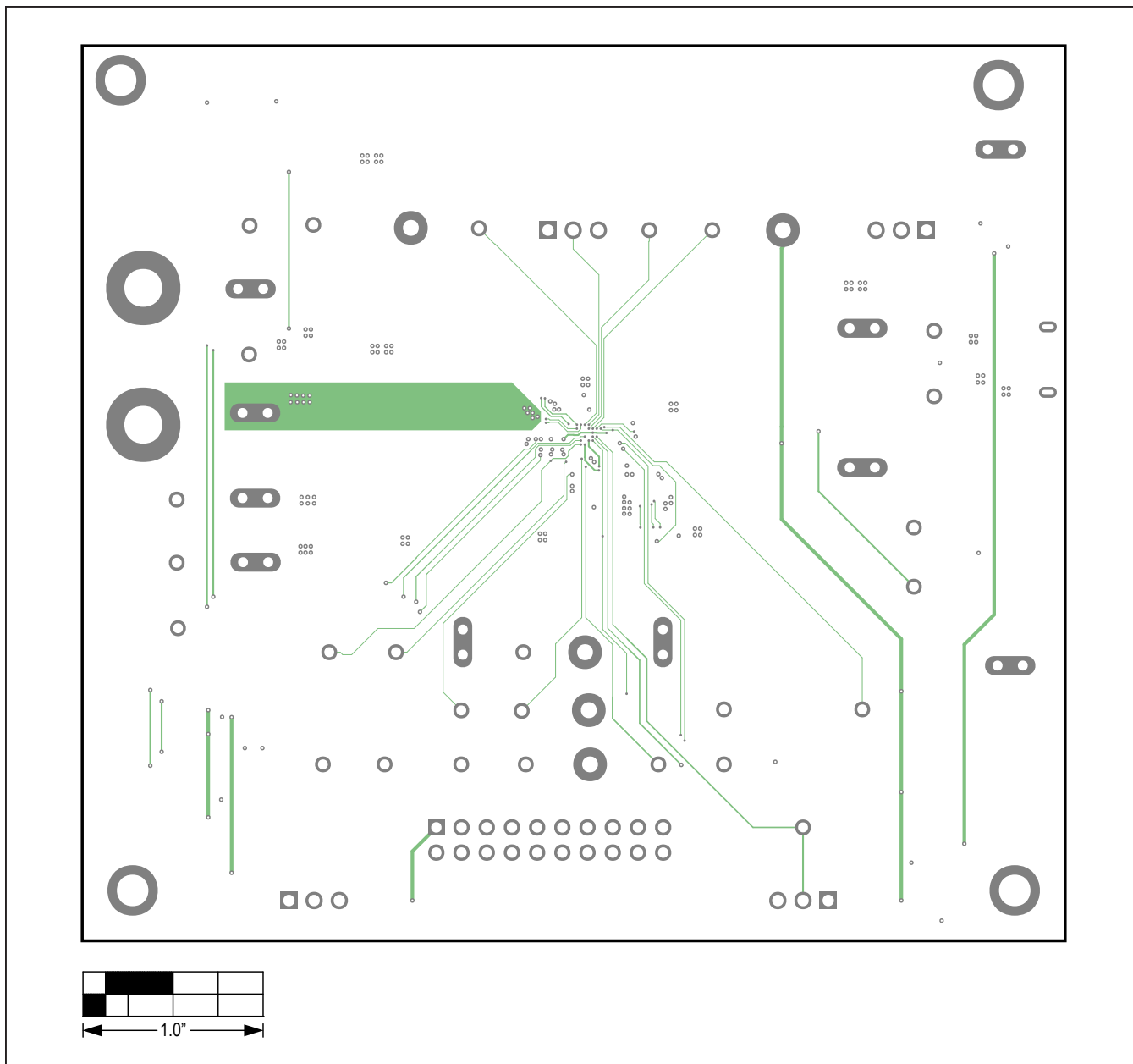
MAX77840 EV Kit PCB Layout Diagram—Top Layer

MAX77840 EV Kit PCB Layout Diagrams (continued)



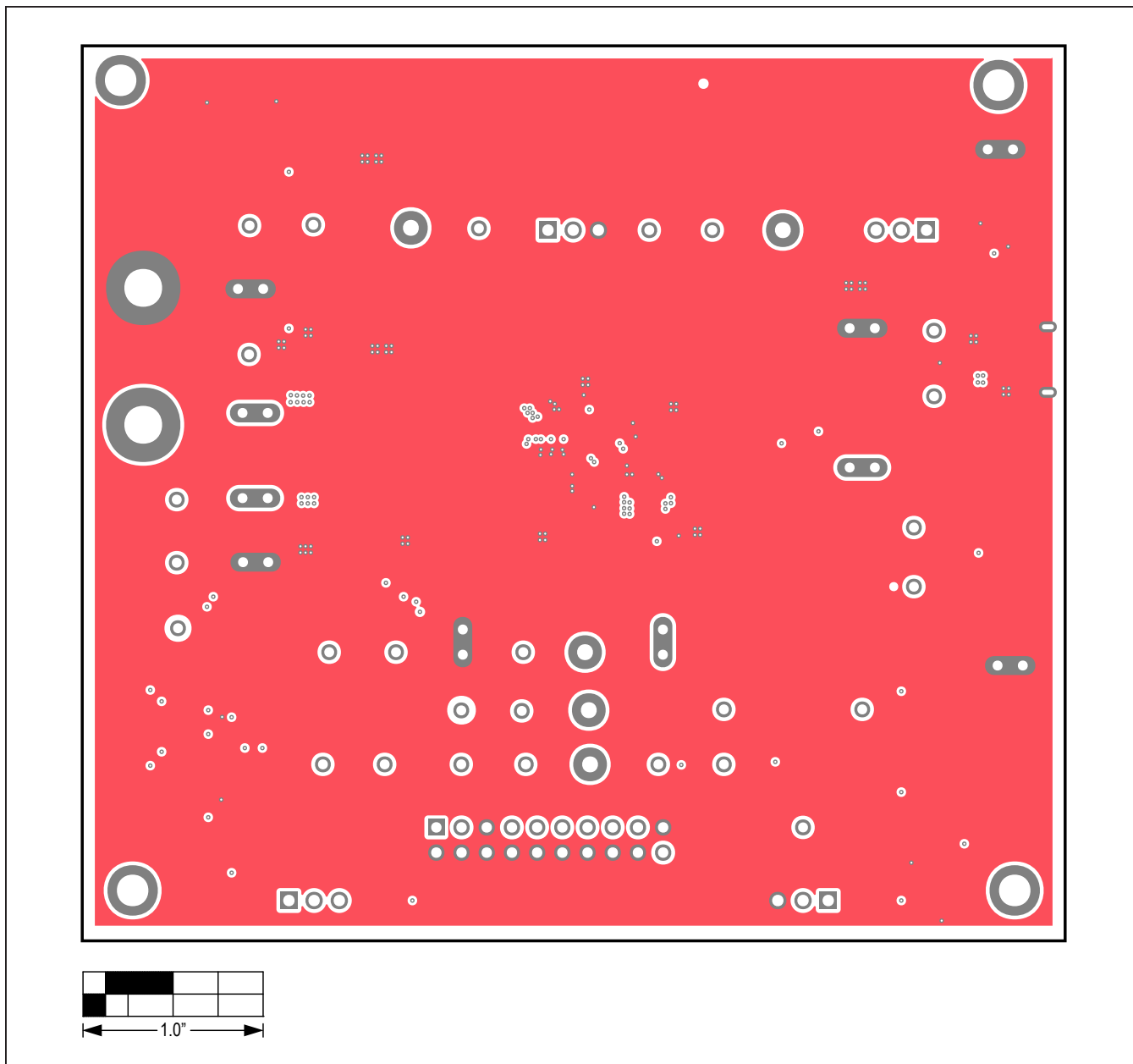
MAX77840 EV Kit PCB Layout Diagram—Internal 2

MAX77840 EV Kit PCB Layout Diagrams (continued)



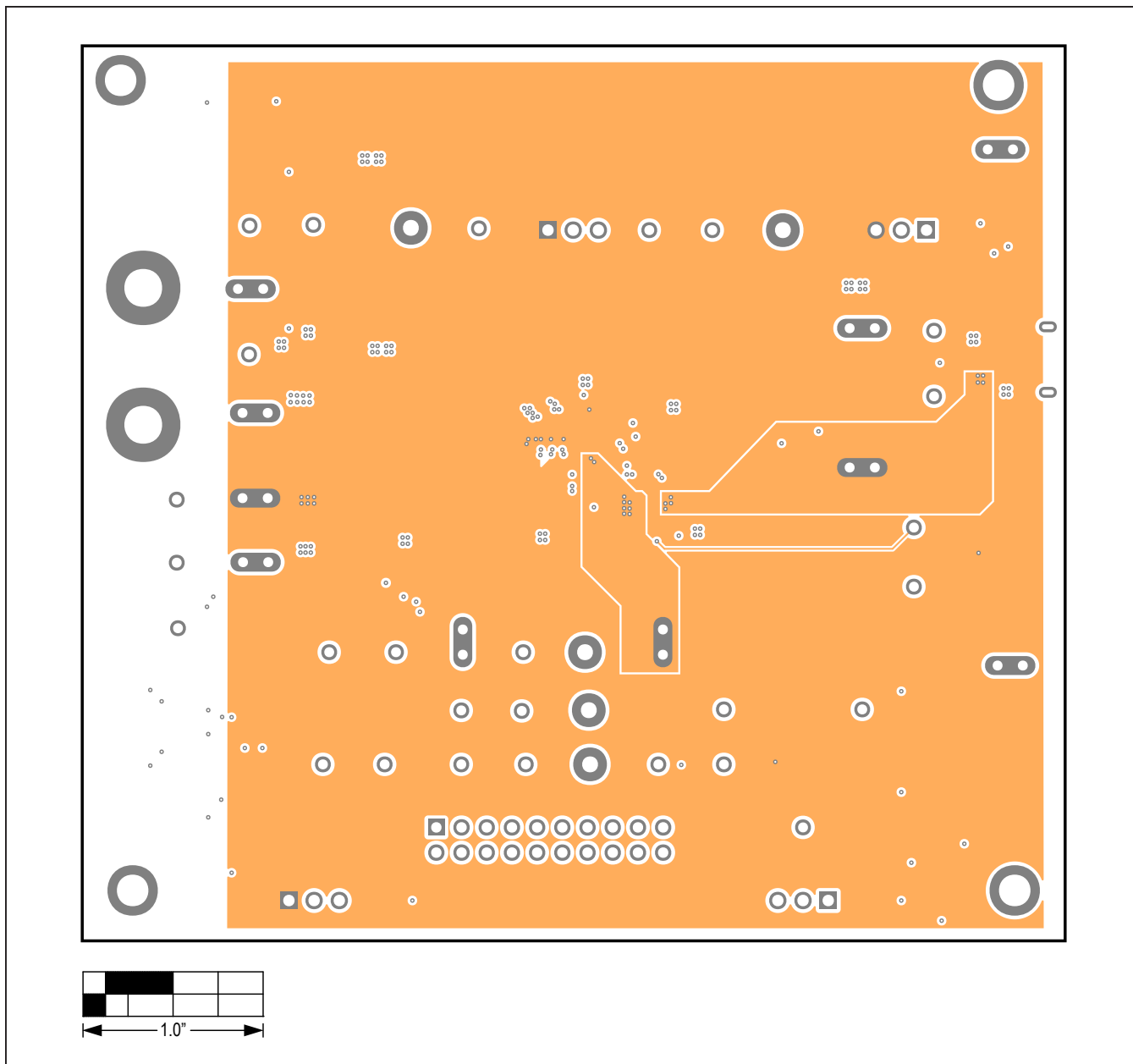
MAX77840 EV Kit PCB Layout Diagram—Internal 3

MAX77840 EV Kit PCB Layout Diagrams (continued)



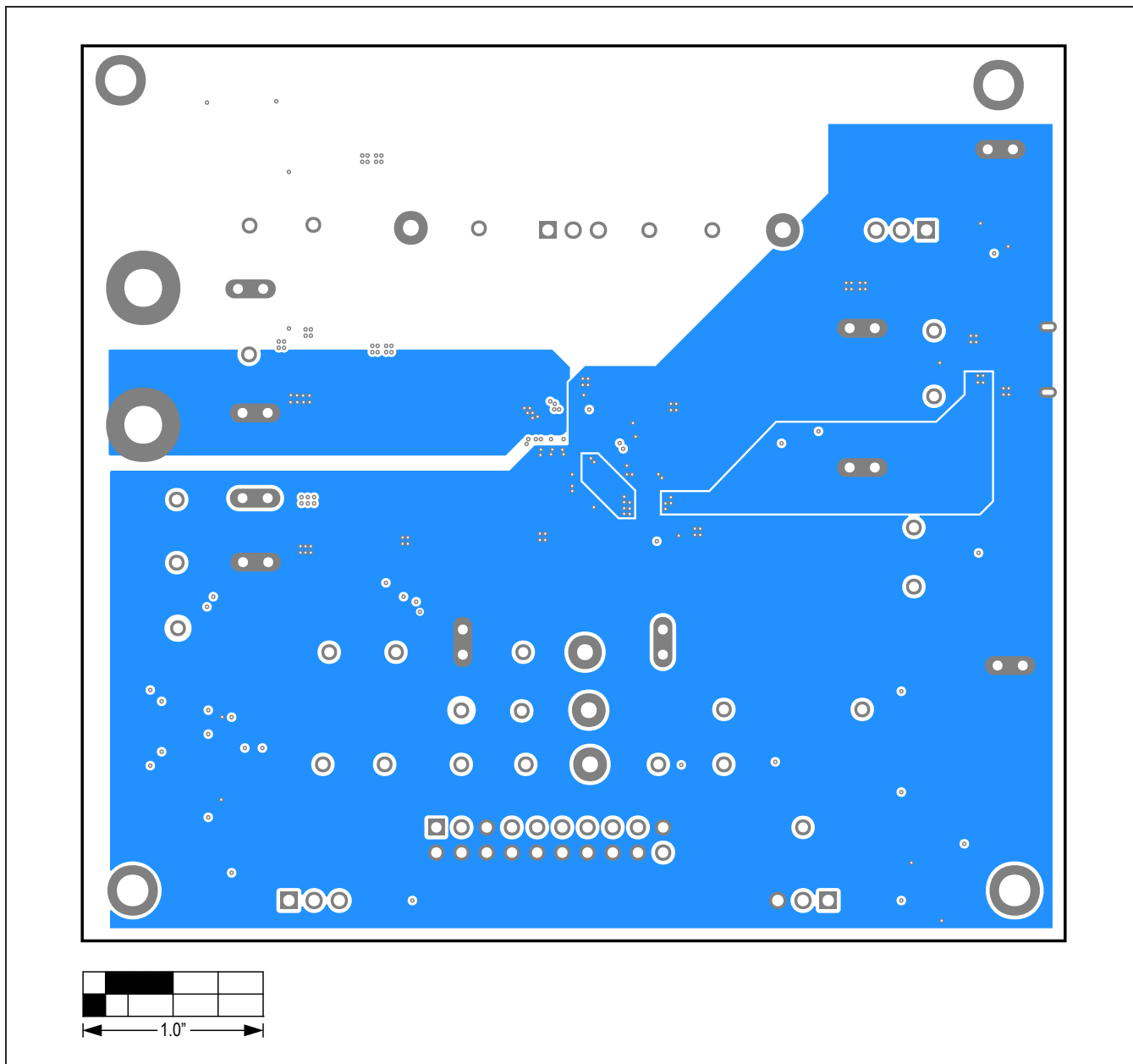
MAX77840 EV Kit PCB Layout Diagram—Internal 4

MAX77840 EV Kit PCB Layout Diagrams (continued)



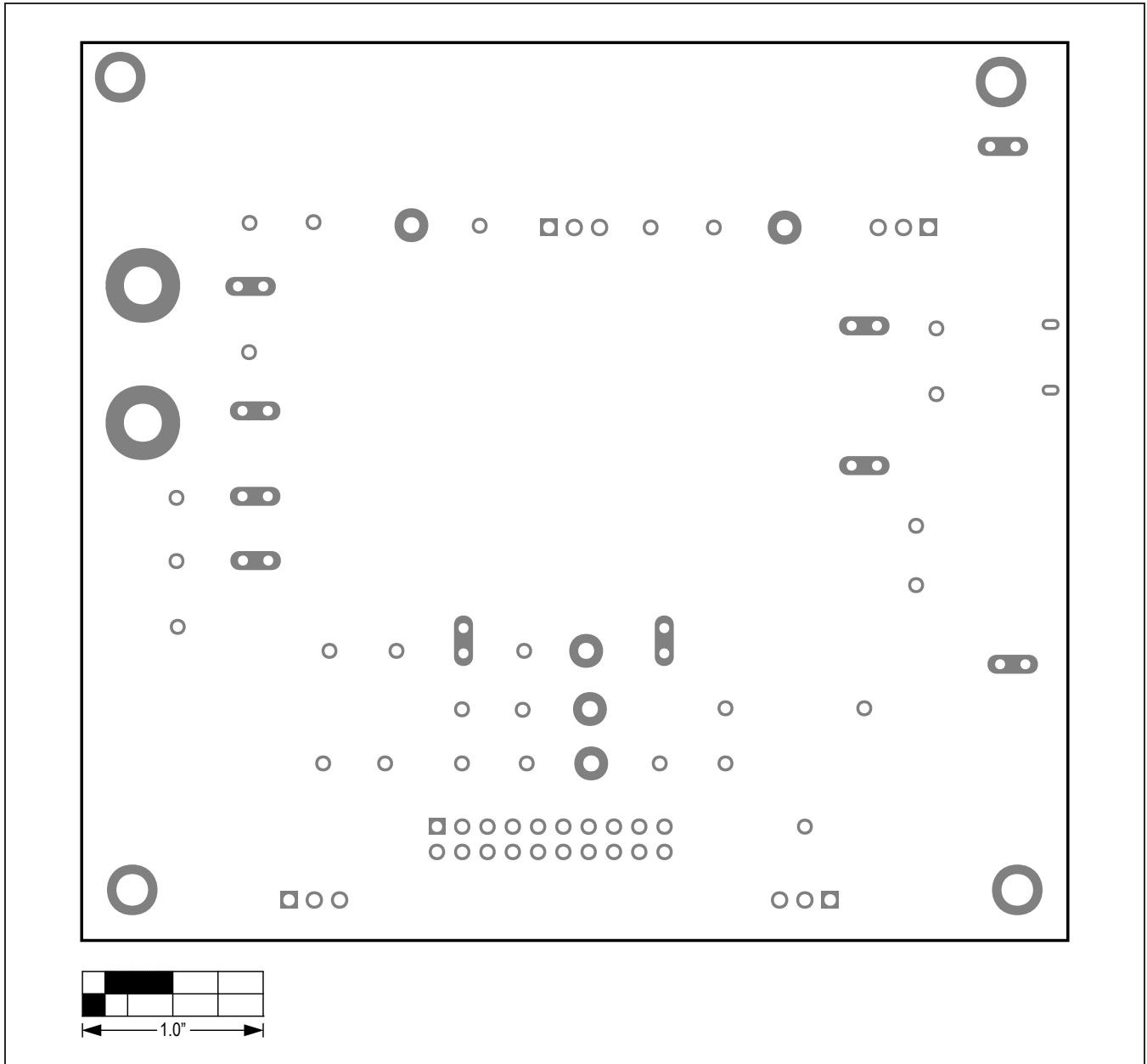
MAX77840 EV Kit PCB Layout Diagram—Internal 5

MAX77840 EV Kit PCB Layout Diagrams (continued)



MAX77840 EV Kit PCB Layout Diagram—Bottom Layer

MAX77840 EV Kit PCB Layout Diagrams (continued)



MAX77840 EV Kit PCB Layout Diagram—Bottom Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	4/21	Release for Market Intro	—

For pricing, delivery, and ordering information, please visit Maxim Integrated's online storefront at <https://www.maximintegrated.com/en/storefront/storefront.html>.

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