General Description

The MAX77874 evaluation kit (EV kit) is a fully assembled and tested printed circuit board (PCB) that demonstrates the MAX77874. The EV kit allows for easy evaluation of the MAX77874 quad-phase core buck regulator by providing access to the I²C bus and including an on-board load pulse generator circuit. The EV kit also serves as a guide for layout and design with the MAX77874.

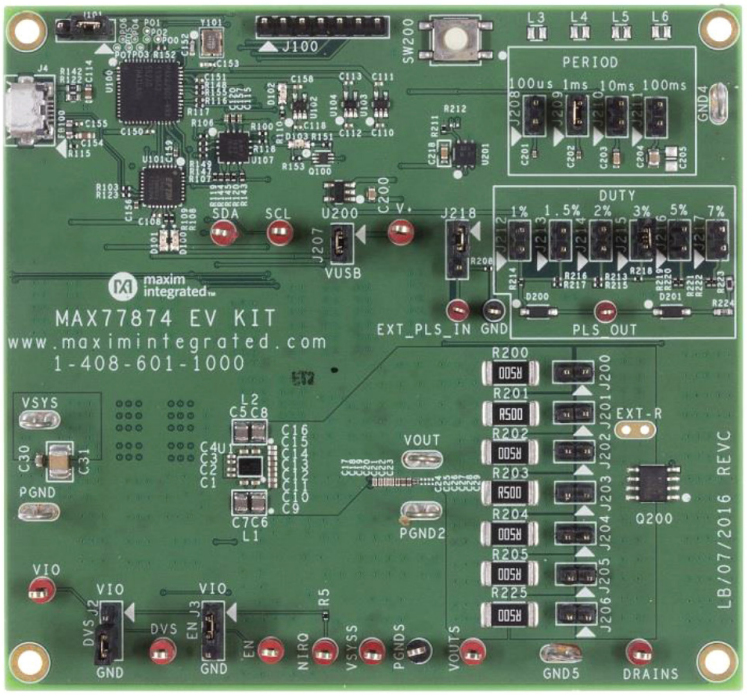
Windows®-based software provides a user-friendly graphical interface as well as a detailed register-based interface to exercise the features of the MAX77874.

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

Features

- Quad-Phase Core Buck Regulator
  - Test Points for Both Local Output and Remote Sense
  - Exercise DVS with Simple GUI Tool
- On-Board Load Pulse Generator Circuit
  - Adjust Load Current with Parallel Resistor Loads
  - Easily Perform Load Transients with the Press of a Button
- I²C Interface
  - Access Through USB Port or Directly Through SDA and SCL Test Points
- Lead-Free and RoHS Compliant
- Software GUI and Command Module
- Assembled and Tested

MAX77874 EV Kit



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maxim integrated™

EV Kit Detail

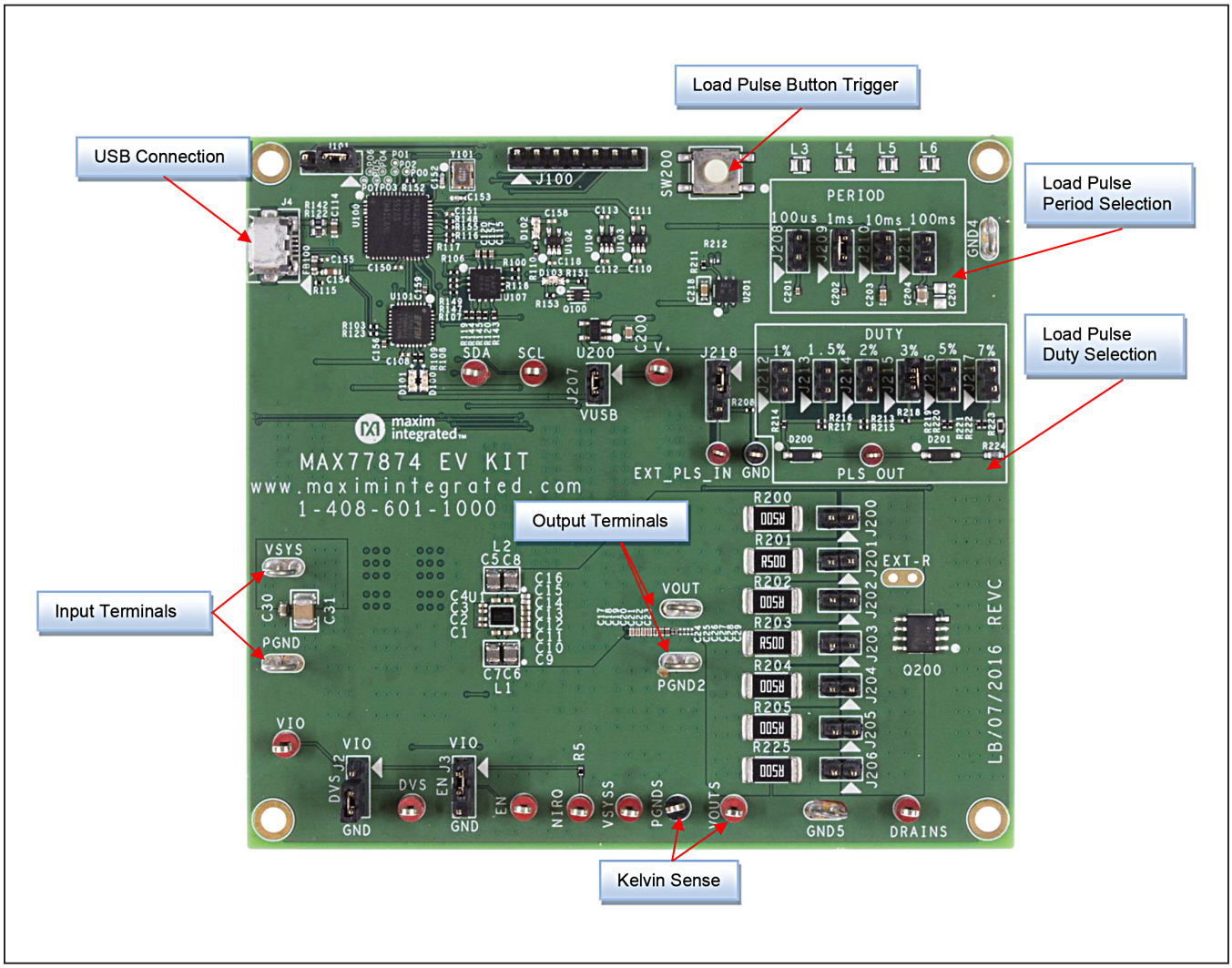


Figure 1. MAX77874 EV Kit Top View

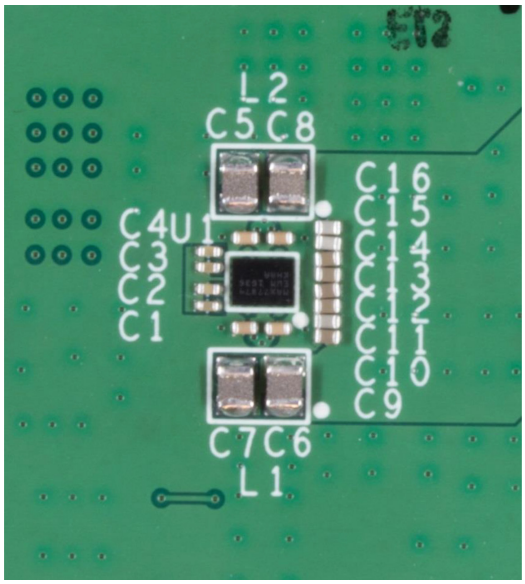


Figure 2. MAX77874 Top View Main Components

Quick Start

Follow this procedure to become familiar with the EV kit.

Required Equipment

- MAX77874 EV kit
- Windows-based PC
- Power supply
- Ammeter
- DVM
- Micro-USB cable
- GUI

Procedure

1) Install GUI software. Visit **www.maximintegrated.com/evkitsoftware** to download the latest version of the EV kit software. Save the EV kit software to a temporary folder and unzip the ZIP file.
2) Ensure that shunts are installed on the jumpers per Table 1.
3) Apply a 3.7V supply (set for 100mA current limit) through an ammeter (set for 100mA range) across the VSYS and PGND terminals of the EV kit.
4) Connect a micro-USB cable between the EV kit's J4 and your Windows-based PC.
5) Turn on the power supply.
6) Open the GUI and press the **Connect** button in the upper-left corner. If the **Connect** button does not appear, first press **File**, then click **Show Menu Shortcuts**. Wait for the device to respond, and in the **Synchronize** window, press the **Read and Close** button.
7) Measure the output voltage with the DVM. Ensure it is 0.9V.
8) Check that the quiescent current on the ammeter is approximately 400µA.
9) In the GUI, move the slider for **Output Voltage** (DVS = 0) to 1100mV and click the **Write** button. Ensure that the output now reads 1.1V.
10) Note that there is a shunt connected to J200. Press and hold SW200, and check the ammeter reads approximately 23mA. This verifies that the pulse generator is working properly.
11) This concludes the Quick Start procedure. Users are now encouraged to explore the device and its register settings with the GUI.

Table 1. Default Shunt Positions and Jumper Descriptions

REFERENCE DESIGNATOR	DEFAULT POSITION	FUNCTION
J2	2-3	1-2: Connect DVS to VIO. 2-3: Connect DVS to GND.
J3	1-2	1-2: Connect EN to VIO. 2-3: Connect EN to GND.
J100	—	Do not connect shunts to J100.
J101	1-2	1-2: Connect VIO to the 3.3V EV kit logic rail. 2-3: Connect VIO to the 1.8V EV kit logic rail.
J200	1-2	Connect a 0.5Ω resistor in the load pulse generator circuit from VOUT to Q200.
J201	—	Connect a 0.5Ω resistor in the load pulse generator circuit from VOUT to Q200.
J202	—	Connect a 0.5Ω resistor in the load pulse generator circuit from VOUT to Q200.
J203	—	Connect a 0.5Ω resistor in the load pulse generator circuit from VOUT to Q200.
J204	—	Connect a 0.5Ω resistor in the load pulse generator circuit from VOUT to Q200.
J205	—	Connect a 0.5Ω resistor in the load pulse generator circuit from VOUT to Q200.
J206	—	Connect a 0.5Ω resistor in the load pulse generator circuit from VOUT to Q200.
J207	1-2	Connect the 5V USB rail to the supply of the 555 timer of the load pulse generator circuit.
J208	—	Connect a shunt to select the 100µs period for the pulse generator.
J209	1-2	Connect a shunt to select the 1ms period for the pulse generator.
J210	—	Connect a shunt to select the 10ms period for the pulse generator.
J211	—	Connect a shunt to select the 100ms period for the pulse generator.
J212	—	Connect a shunt to select the 1% duty cycle setting for the pulse generator.
J213	—	Connect a shunt to select the 1.5% duty cycle setting for the pulse generator.
J214	—	Connect a shunt to select the 2% duty cycle setting for the pulse generator.
J215	1-2	Connect a shunt to select the 3% duty cycle setting for the pulse generator.
J216	—	Connect a shunt to select the 5% duty cycle setting for the pulse generator.
J217	—	Connect a shunt to select the 7% duty cycle setting for the pulse generator.
J218	1-2	1-2: Drive the load FET with the pulse generator circuit. 2-3: Drive the load FET externally with EXT_PLS_IN.

Software

The graphical user interface (GUI) software allows for quick, easy, and thorough evaluation of the MAX77874.

The GUI is designed to be very simple, with all necessary controls on a single page. See Figure 3 for a screenshot of the GUI upon first opening.

Installation

Visit **www.maximintegrated.com/evkitsoftware** to download the latest version of the EV kit software. Save the EV kit software to a temporary folder and decompress the ZIP file.

Windows Drivers

Upon connection of a micro-USB cable between your PC and the EV kit for the first time, wait a few minutes for Windows to automatically install the necessary drivers.

Graphical User Interface Details (GUI)

The GUI drives I2C communication with the EV kit. Every control in the GUI corresponds to a register setting within the MAX77874. Refer to the register map within the device data sheet for a complete description of the registers.

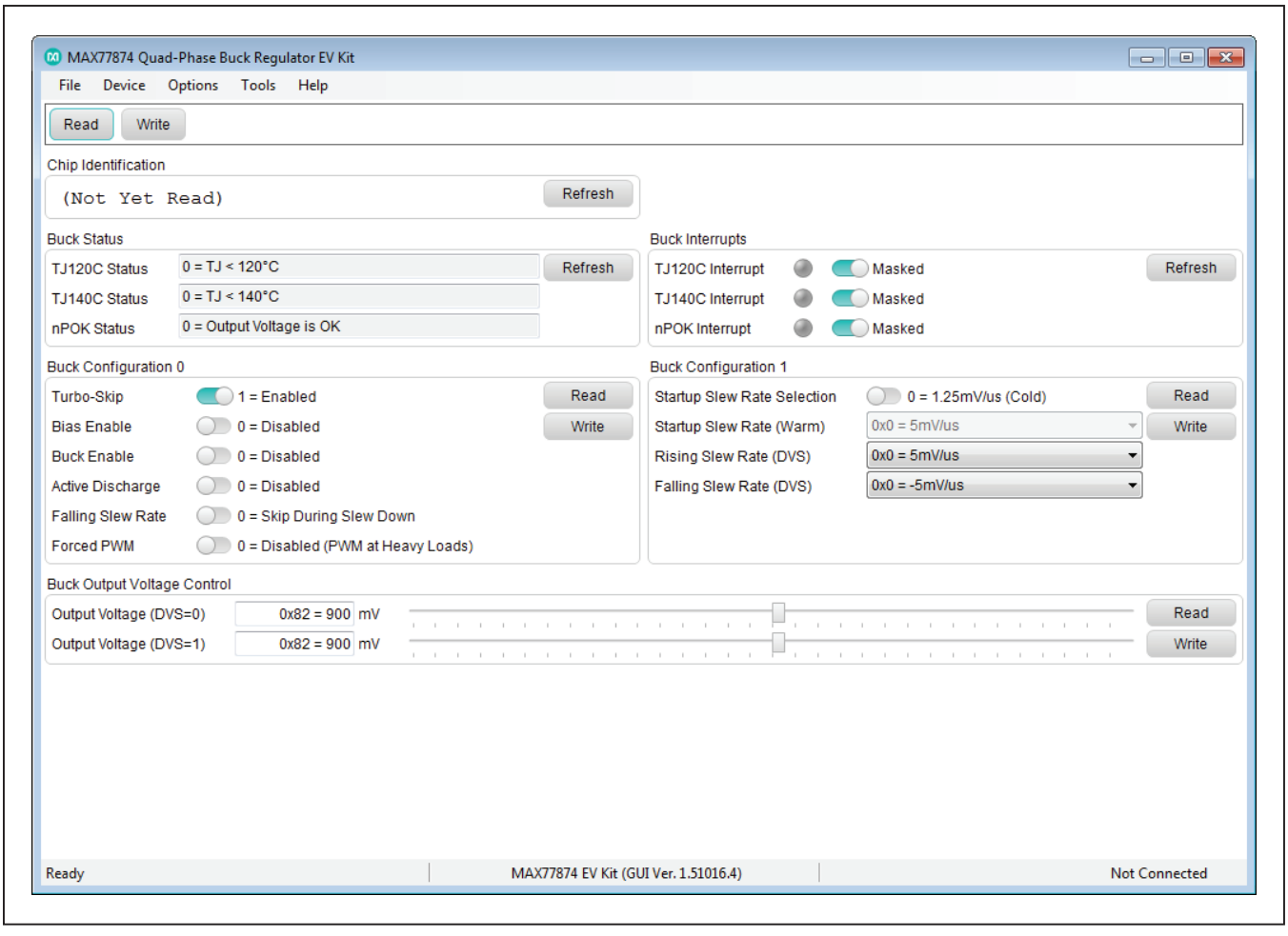


Figure 3. MAX77874 Evaluation Kit GUI Top-Level Interface

On-Board Load Pulse Generator

To facilitate quick evaluation of the load transient response of the MAX77874, the EV kit includes a pulse generator circuit that connects a parallel array of 0.5Ω resistors to the output.

To operate the load pulse circuit, attach shunts to the various jumpers to select the effective load resistance, and period/duty cycle of the pulse train. Use jumpers J200–J206 to connect a desired combination of resistors to the output, J208–211 to select a period, and J212–J217 to select a duty cycle. Note that the EV kit defaults to 3% on a 1ms period or a 30µs pulse width. Once the settings are correct, press the SW200 button to connect the resistors to the output through a FET that is switching at the specified duty cycle and period, loading the buck regulator. Since the is generating many load pulses very quickly, the button does not need to be held down for long.

If a custom load pattern is desired, simply move the shunt on J218 to position (2-3). This connects the gate of the FET to a 50Ω resistor to GND. Then, attach a function generator with 50Ω termination to EXT_PLS_IN to drive the switch.

To properly view the transient response, ensure that the scope is triggered off of the gate of the load switch (J218, pin 2), and connect another scope probe to the at the sense terminals (VOUTS and PGNDS test points on the EV kit).

Ordering Information

PART NUMBER	TYPE
MAX77874EVKIT#	EV kit

#Denotes RoHS compliant.

MAX77874 EV System Bill of Materials

REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
C1-C4, C110-C113, C115, C118, C120, C158	-	12	GRM155R60J105KE19D	MURATA	1UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 1UF; 6.3V; TOL=10%; MODEL=; TG=-55 DEGC TO +85 DEGC; TC=X5R;	
C5-C8, C17-C20	-	8	GRM155R60J106ME15	MURATA	10UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 10UF; 6.3V; TOL=20%; MODEL=; TG=-55 DEGC TO +85 DEGC; TC=X5R; FORMFACTOR	
C9-C16	-	8	GRM155R60G226ME11	MURATA	22UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 22UF; 4V; TOL=20%; TG=-55 DEGC TO +85 DEGC; TC=X5R	
C21-C23	-	3	GRM155R61A475MEAA	MURATA	4.7UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 4.7UF; 10V; TOL=20%; MODEL=C SERIES; TG=-55 DEGC TO +85 DEGC; TC=X5R; FORMFACTOR	
C24, C25	-	2	GRM033R61A105ME15D	MURATA	1UF	CAPACITOR; SMT (0201); CERAMIC CHIP; 1UF; 10V; TOL=20%; MODEL=CL SERIES; TG=-55 DEGC TO +85 DEGC; TC=X5R; FORMFACTOR	
C26-C29	-	4			OPEN	CAPACITOR; SMT (0201); OPEN; FORMFACTOR	Do not install
C30	-	1	GRM188R60J106ME47; CC0603MRX5R5BB106; C1608X5R0J106M080; CL10A106MQ8NNN	MURATA/YAGEO/TDK/ SAMSUNG ELECTRONICS	10UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 10UF; 6.3V; TOL=20%; TG=-55 DEGC TO +85 DEGC; TC=X5R	
C31	-	1	C1210C107M9PAC; C1210X5R6R3-107MNE; GRM32ER60J107ME20; C3225X5R0J107M250AC	KEMET; VENKEL LTD.; MURATA; TDK	100UF	CAPACITOR; SMT (1210); CERAMIC CHIP; 100UF; 6.3V; TOL=20%; TG=-55 DEGC TO +85 DEGC; TC=X5R	
C32-C35	-	4			OPEN	CAPACITOR; SMT (0402); OPEN; FORMFACTOR	Do not install
C36	-	1	6TPD470M	PANASONIC	470UF	CAPACITOR; SMT (CASE_D4D); TANTALUM CHIP; 470UF; 6.3V; TOL=20%	
C108, C150, C151, C155-C157, C159	-	7	GRM155R71C104KA88D	MURATA	0.1UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.1UF; 16V; TOL=10%; MODEL=; TG=-55 DEGC TO +125 DEGC; TC=X7R-	
C114	-	1	C0603C474K4RAC; GRM188R71C474K	KEMET/MURATA	0.47UF	CAPACITOR; SMT; 0603; CERAMIC; 0.47uF; 16V; 10%; X7R; -55degC to + 125degC; 0 +/- 15% degC MAX.	
C152, C153	-	2	C0402C0G500-150JNP; GRM1555C1H150JA01	VENKEL LTD./MURATA	15PF	CAPACITOR; SMT (0402); CERAMIC CHIP; 15PF; 50V; TOL=5%; TG=-55 DEGC TO +125 DEGC; TC=C0G	
C154	-	1	C1608X5R1C475K080AC	TDK/TAIYO YUDEN	4.7UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 4.7UF; 16V; TOL=10%; MODEL=; TG=-55 DEGC TO +85 DEGC; TC=X5R	
C200, C203, C218	-	3	GRM188R71E105KA12D; CGA3E1X7R1E105K; TMK107B7105KA	MURATA; TDK; TAIYO YUDEN	1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 1UF; 25V; TOL=10%; MODEL=GRM SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7R	
C201	-	1	C0402C103K3RAC; GRM155R71E103KA01D; C1005X7R1E103K	KEMET; MURATA; TDK	0.01UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.01UF; 25V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R;	
C202	-	1	GRM155R71E104KE14	MURATA	0.1UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.1UF; 25V; TOL=10%; MODEL=GRM SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7R	
C204	-	1	TMK212BBJ106KG-T; CL21A106KAFN3N	TAIYO YUDEN	10UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 10UF; 25V; TOL=10%; MODEL=; TG=-55 DEGC TO +85 DEGC; TC=X5R	
C205	-	1			OPEN	CAPACITOR; SMT (0805); OPEN; IPC MAXIMUM LAND PATTERN	Do not install
D100, D101	-	2	LTST-C190YKT	LITE-ON ELECTRONICS; INC.	LTST-C190YKT	DIODE; LED; STANDARD; YELLOW; SMT (0603); PIV=5.0V; IF=0.02A; -55 DEGC TO +85 DEGC	

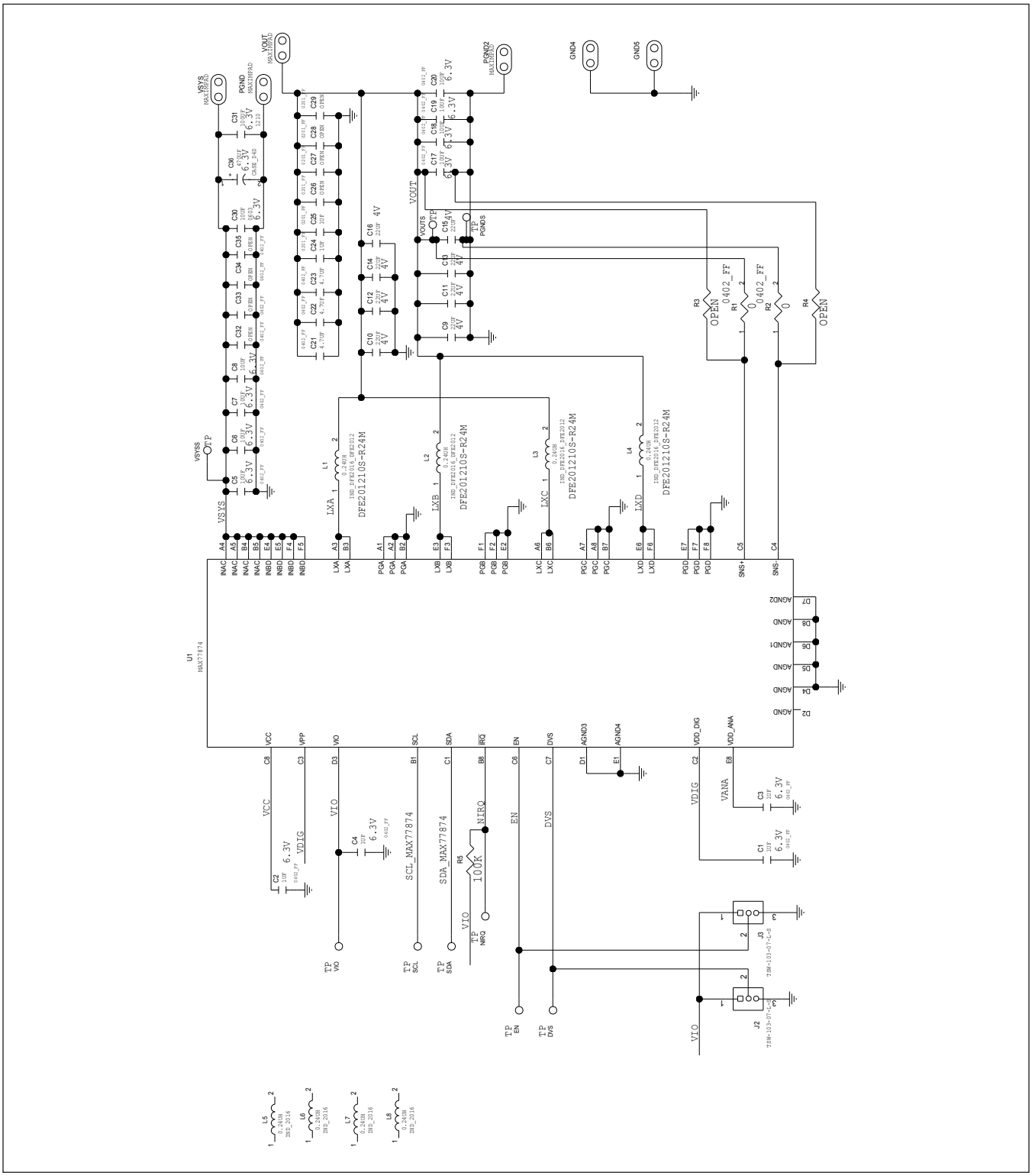
MAX77874 EV System Bill of Materials (continued)

REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
D102, D103	-	2	LTST-C190CKT	LITE-ON ELECTRONICS; INC.	LTST-C190CKT	DIODE; LED; STANDARD; RED; SMT (0603); PIV=5.0V; IF=0.04A; -55 DEGC TO +85 DEGC	
D200, D201	-	2	1N4148W-V		1N4148W-V	DIODE, SMALL SIGNAL FAST SWITCHING, SMT (SOD-123), PIV=100V, IF=0.15A	
EN, V+, DVS, SCL, SDA, VIO, NIRQ, VOUTS, VSYSS, DRAINS	-	10	5010	KEYSTONE		TESTPOINT WITH 1.80MM HOLE DIA, RED, MULTIPURPOSE;	
PLS_OUT, EXT_PLS_IN	-	2	5000	KEYSTONE		TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;	
FB100	-	1	BLM18PG221SN1	MURATA	220	INDUCTOR; SMT (0603); FERRITE-BEAD; 220; TOL=+/-25%; 1.4A; -55 DEGC TO +125 DEGC	
GND	-	1	5001	KEYSTONE		TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;	
GND4, GND5, PGND, VOUT, VSYS, PGND2	-	6	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG	
J2, J3, J101, J218	-	4	TSW-103-07-L-S	SAMTEC	TSW-103-07-L-S	CONNECTOR; THROUGH HOLE; SINGLE ROW; STRAIGHT; 3PINS	
J4	-	1	10103592-0001LF	FCI CONNECT	10103592-0001LF	CONNECTOR; FEMALE; SMT; MICRO USB B-TYPE REVERSE; RIGHT ANGLE; 5PINS	
J100	-	1	TSW-105-07-L-S	SAMTEC	TSW-105-07-L-S	CONNECTOR; THROUGH HOLE; TSW SERIES; SINGLE ROW; STRAIGHT; 5PINS	
J200-J217	-	18	TSW-102-07-T-S	SAMTEC	TSW-102-07-T-S	CONNECTOR; THROUGH HOLE; TSW SERIES; SINGLE ROW; STRAIGHT; 2PINS; -55 DEGC TO +105 DEGC	
L1-L4	-	4	DFE201210S-R24M	MURATA	0.24UH	EVKIT PART-INDUCTOR; SMT (DFE2016_DFE2012 DUAL LEAST FOOTPRINT); METAL ALLOY CHIP; 0.24UH; TOL=+/-20%; 4.9A;	
L5-L8	-	4	DFE201610E-R24M	TOKO	0.24UH	INDUCTOR; SMT (2016); METAL ALLOY CHIP; 0.24UH; TOL=+/-20%; 7A	
PGNDS	-	1	5011	KEYSTONE		TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;	
Q100	-	1	SSM6N44FE	TOSHIBA	SSM6N44FE	TRAN; SILICON DUAL N-CHANNEL MOS TYPE; FIELD EFFECT TRANSISTOR; NCH; SOT563-6; PD-(0.15W); I-(0.1A); V-(30V)	
Q200	-	1	FDS6574A	FAIRCHILD SEMICONDUCTOR	FDS6574A	TRAN; 20V N-CHANNEL POWER TRENCH MOSFET; NCH; NSOIC8; PD-(2.5W); I-(16A); V-(20V)	
R1, R2, R143, R147-R149, R152, R155	-	8	CRCW04020000Z0EDHP	VISHAY	0	RESISTOR; 0402; 0 OHM; 0%; JUMPER; 0.10W; THICK FILM; FORMFACTOR	
R3,R4,R212	-	3			OPEN	RESISTOR; 0402; OPEN; FORMFACTOR	Do not install

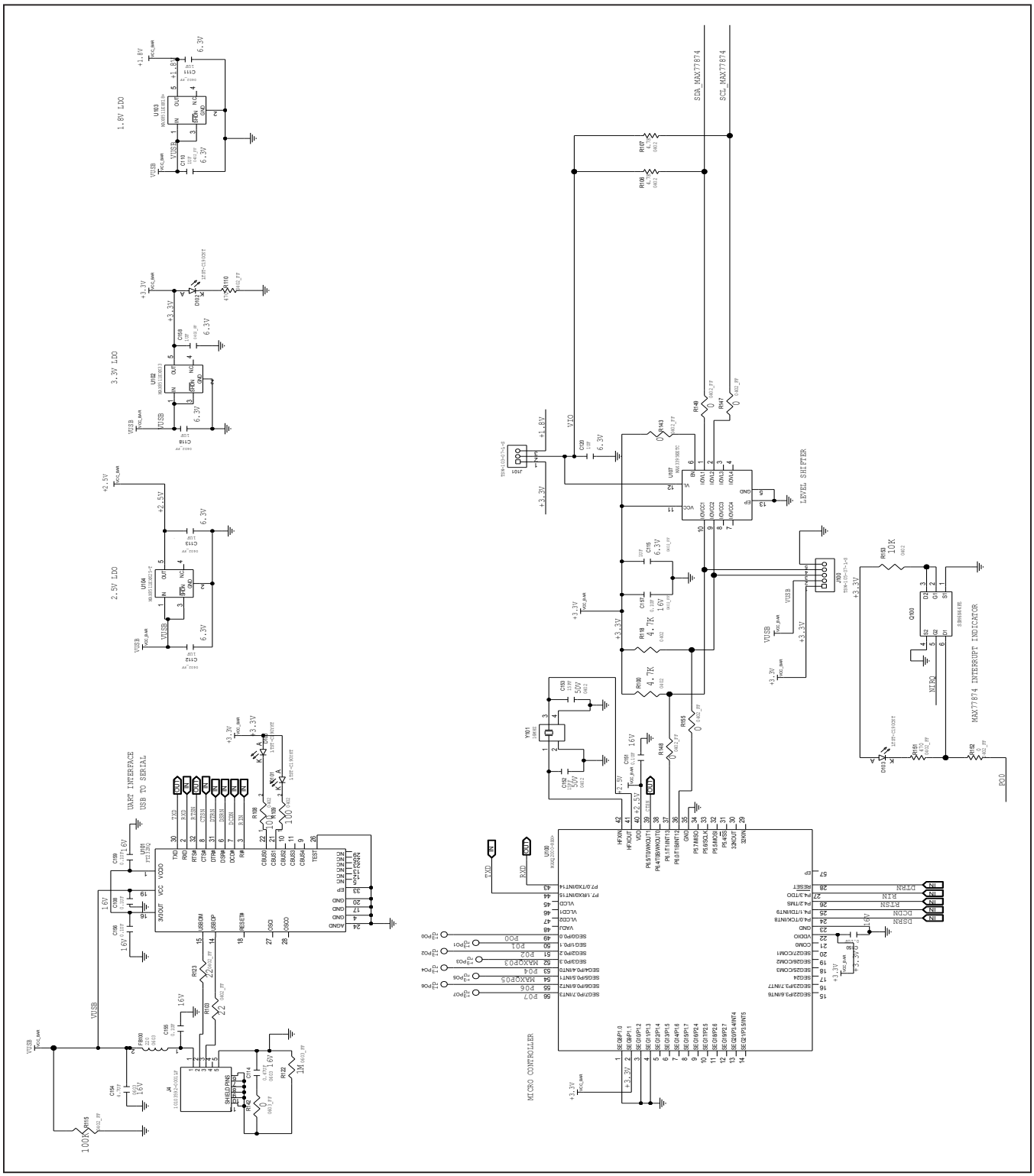
MAX77874 EV System Bill of Materials (continued)

REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
R110, R151	-	2	RC0402JR-07470RL	YAGEO	470	RESISTOR, 0402, 470 OHM, 1%, 100PPM, 0.0625W, THICK FILM; FORMFACTOR	
R122	-	1	RC0603FR-071ML	YAGEO	1M	RESISTOR; 0603; 1M; 1%; 100PPM; 0.10W; THICK FILM; FORMFACTOR	
R142	-	1	CRC06030000Z0EA	VISHAY	0	RESISTOR; 0603; 0 OHM; 0%; JUMPER; 0.10W; THICK FILM; FORMFACTOR	
R153	-	1	CRCW040210K0FK; RC0402FR-0710K	VISHAY DALE; YAGEO PHICOMP	10K	RESISTOR; 0402; 10K; 1%; 100PPM; 0.0625W; THICK FILM	
R200-R205, R225	-	7	LRC-LR2512LF-01-R500-F	TT ELECTRONICS	0.5	RESISTOR; 2512; 0.5 OHM; 1%; 100PPM; 2.0W; METAL FILM	
R208	-	1	CRCW040249R9FK; RK73H1ETTP49R9F	VISHAY DALE/KOA SPEER	49.9	RESISTOR; 0402; 49.9 OHM; 1%; 100PPM; 0.0625W; THICK FILM	
R211	-	1	CRCW0402100KFK; RC0402FR-07100KL	VISHAY DALE; YAGEO PHICOMP	100K	RESISTOR; 0402; 100K; 1%; 100PPM; 0.0625W; THICK FILM	
R213, R215-R222	-	9	RCC-0402PW1000F	INTERNATIONAL MANUFACTURING SERVICE	100	RESISTOR; 0402; 100 OHMS; 1%; 100PPM; 0.080W; THICK FILM	
R214	-	1	ERJ-2RKF68R1X	PANASONIC	68.1	RESISTOR; 0402; 68.1 OHM; 1%; 50PPM; 0.063W; THICK FILM 3-LAYER ELECTRODE	
R223	-	1	CRCW0603499RFK; RK73H1J4990FT; ERJ-3EKF4990V; RC1608F4990	KOA; VISHAY; PANASONIC; SAMSUNG	499	RESISTOR; 0603; 499 OHM; 1%; 100PPM; 0.10W; THICK FILM	
R224	-	1	CHPHT0603K1002FGT	VISHAY SFERNICE	10K	RESISTOR; 0603; 10K OHM; 1%; 100PPM; 0.0125W; THICK FILM	
SW200	-	1	EVQ-Q2K03W	PANASONIC	EVQ-Q2K03W	SWITCH; SPST; SMT; 15V; 0.02A; LIGHT TOUCH SWITCH; RCOIL= OHM; RINSULATION= OHM; PANASONIC	
U1	-	1	MAX77874	MAXIM	MAX77874	EVKIT PART-IC; REG; QUAD-PHASE CORE BUCK REGULATOR; WLP48	
U100	-	1	MAXQ2000-RBX+	MAXIM	MAXQ2000-RBX+	IC; CTRL; LOW-POWER LCD MICROCONTROLLER; TQFN56-EP 8X8	
U101	-	1	FT232RQ	FUTURE TECHNOLOGY DEVICES INTL LTD.	FT232RQ	IC; INFC; UART INTERFACE IC USB TO SERIAL; QFN32-EP 5X5	
U102	-	1	MAX8511EXK33+	MAXIM	MAX8511EXK33	IC; VREG; ULTRA-LOW-NOISE, HIGH PSRR, LOW-DROPOUT, LINEAR REGULATOR; SC70-5 ; -40 DEGC TO +85 DEGC	
U103	-	1	MAX8511EXK18+	MAXIM	MAX8511EXK18+	IC; VREG; ULTRA-LOW-NOISE; HIGH PSRR; LOW=DROPOUT; LINEAR REGULATOR; SC70-5	
U104	-	1	MAX8511EXK25+	MAXIM	MAX8511EXK25-T	IC; VREG; ULTRA-LOW-NOISE HIGH PSRR LOW-DROPOUT LINEAR REGULATOR; SC70-5 ; -40 DEGC TO +85 DEGC	
U107	-	1	MAX3395EETC	MAXIM	MAX3395EETC	IC; TRANS; 15KV ESD-PROTECTED HIGH-DRIVE CURRENT QUAD-LEVEL TRANSLATOR WITH SPEED-UP CIRCUITRY; TQFN12 4X4	
U200	-	1	MIC1555YM5	MICREL	MIC1555YM5	IC; TIMR; ITTYBITTY RC TIMER/OSCILLATOR; SOT23-5	
U201	-	1	MAX5048AATT+	MAXIM	MAX5048AATT+	IC; DRV; MOSFET DRIVER; TDFN6-EP	
Y101	-	1	CX3225SB16000D0FLJZZ	KYOCERA-KINSEKI	16MHZ	CRYSTAL; SMT (3225) 3.2X2.5; 8PF; 16MHZ; +/-10PPM; +/-15PPM	
EXT-R	DNP	0	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG	Do not install
PCB	-	1	PB11_MAX77874_SOLDERDOWN_REVD	MAXIM	PCB	PCB Board:	
		182					

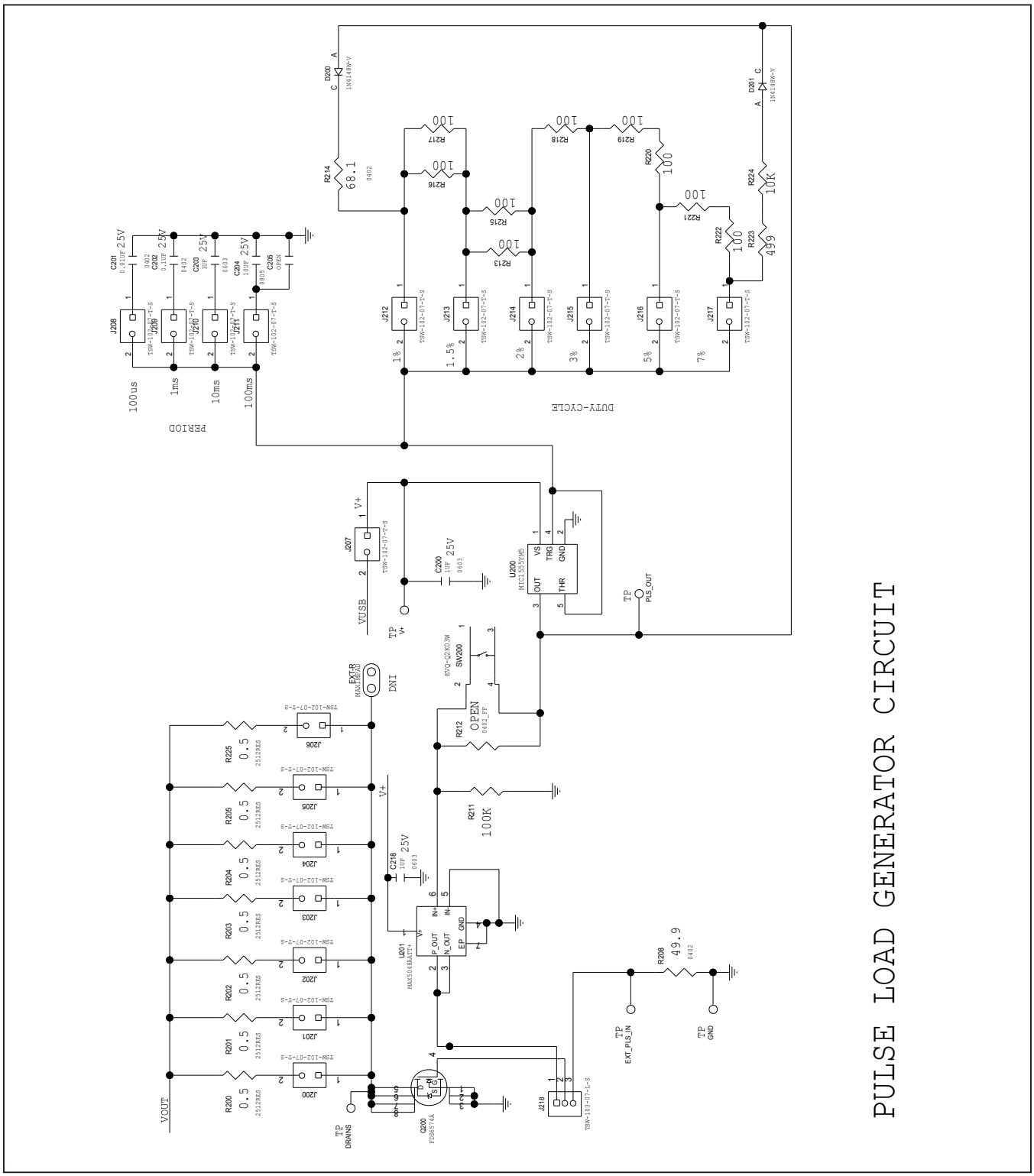
MAX77874 EV System Schematic



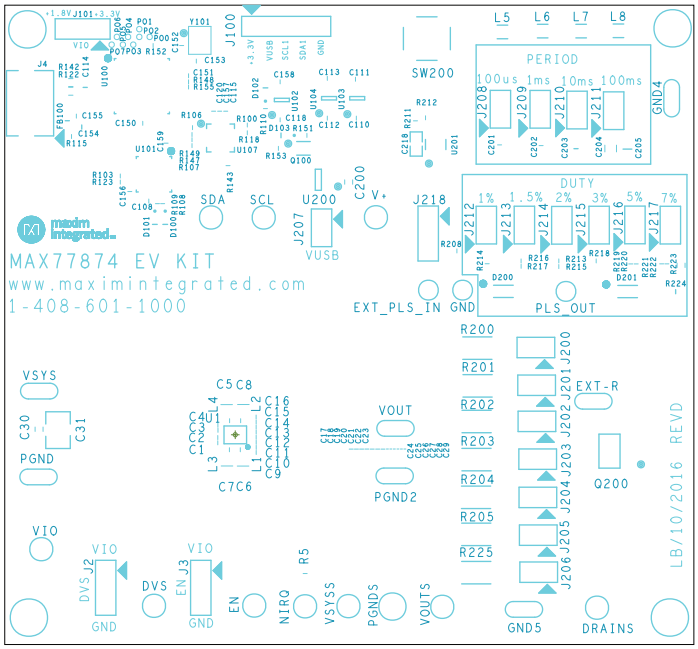
MAX77874 EV System Schematic (continued)



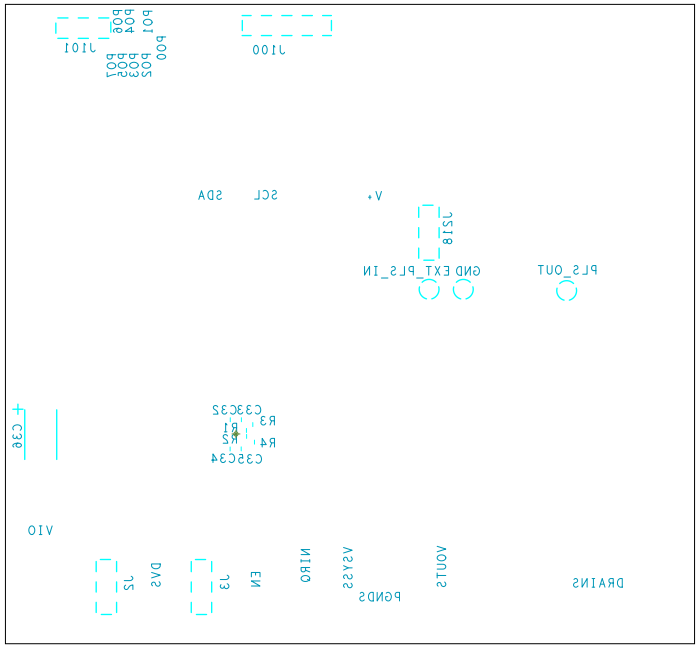
MAX77874 EV System Schematic (continued)



MAX77874 EV System PCB Layout

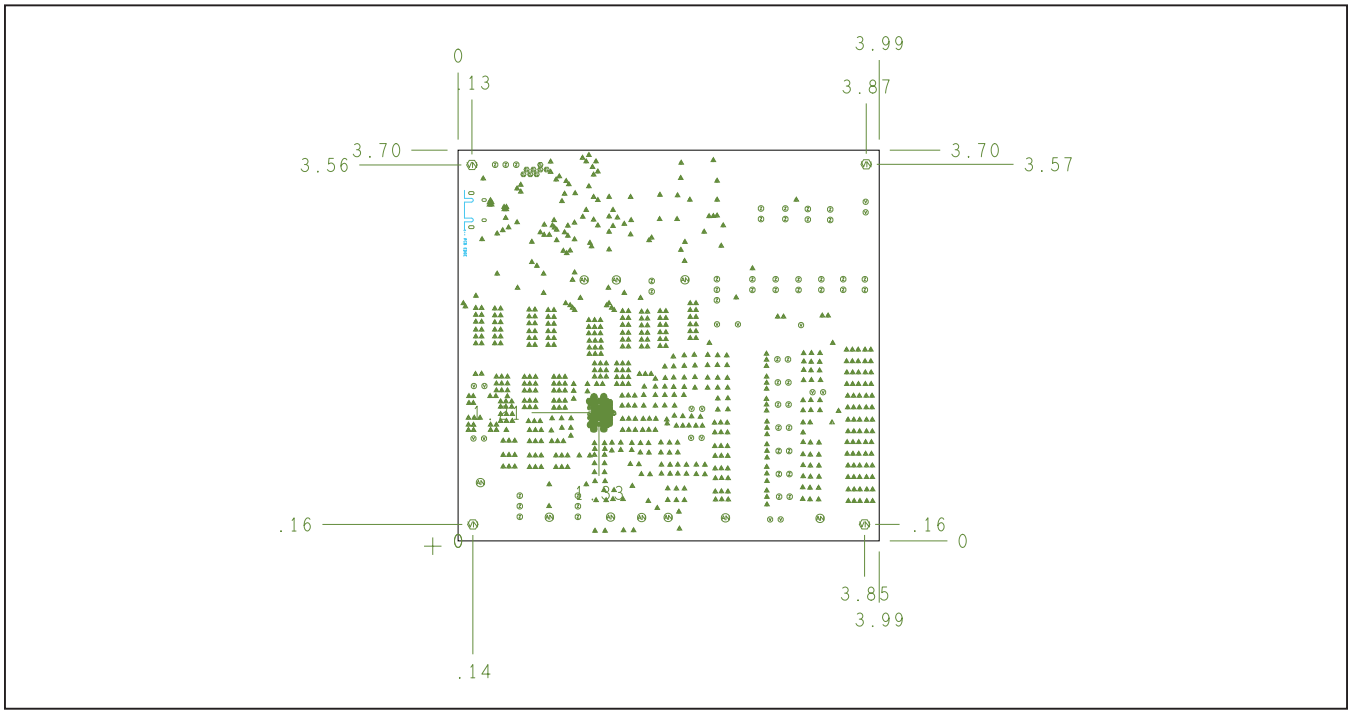


MAX77874 EV Top Silkscreen

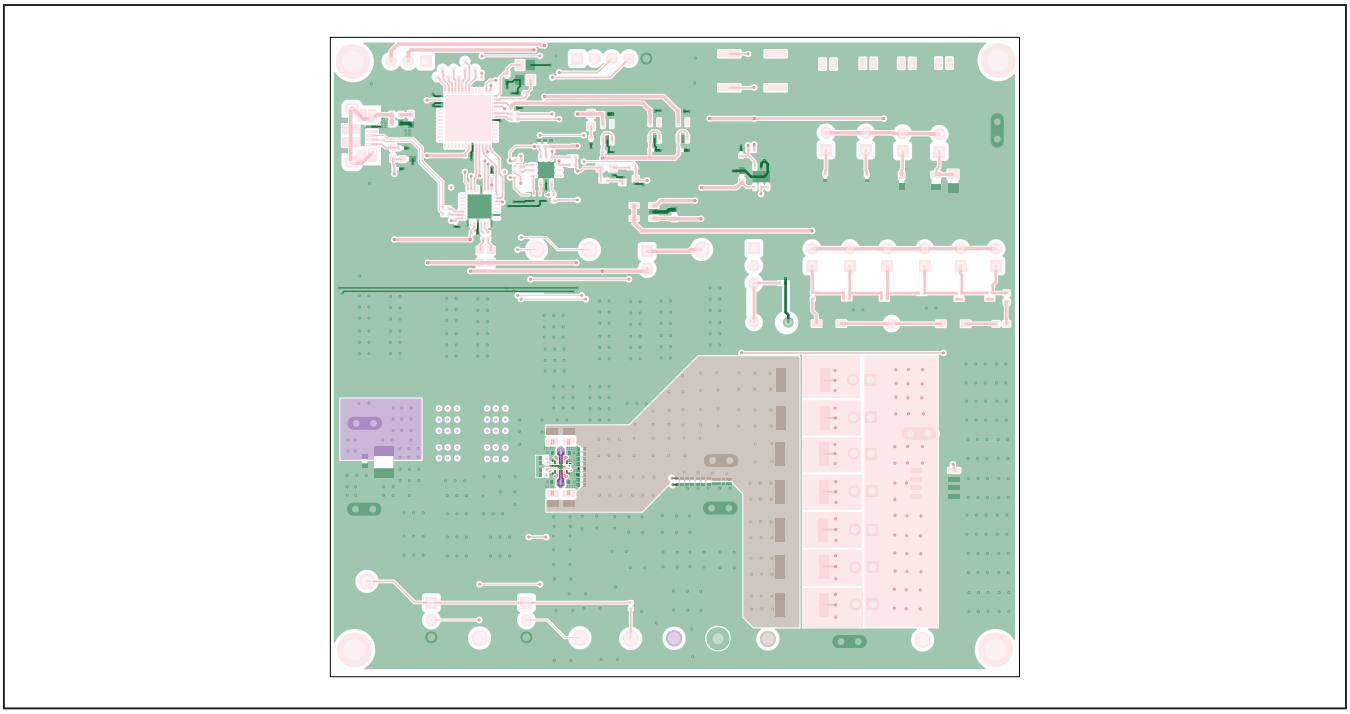


MAX77874 EV Bottom Silkscreen

MAX77874 EV System PCB Layout (continued)

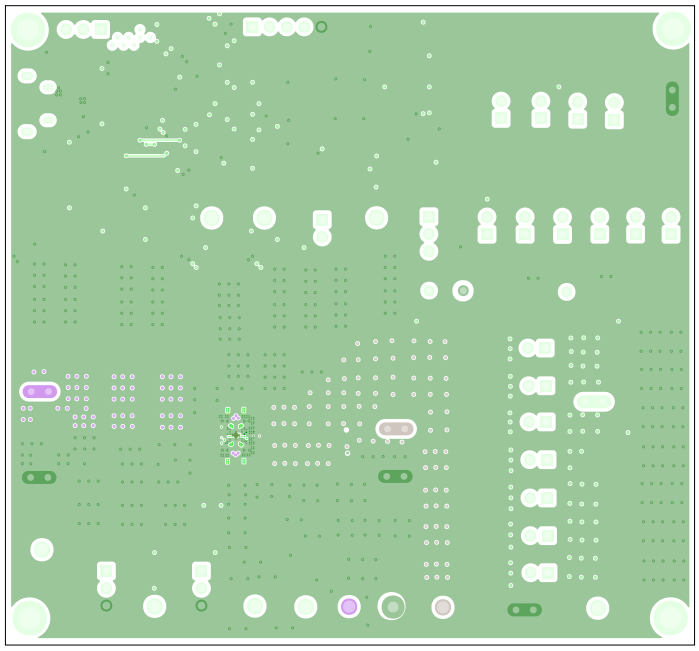


MAX77874 EV Fab Notes

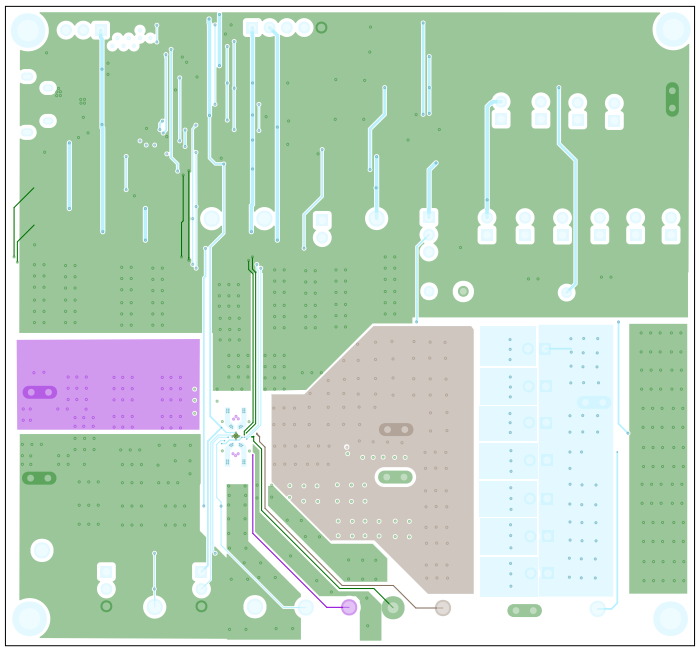


MAX77874 EV Top Layer

MAX77874 EV System PCB Layout (continued)

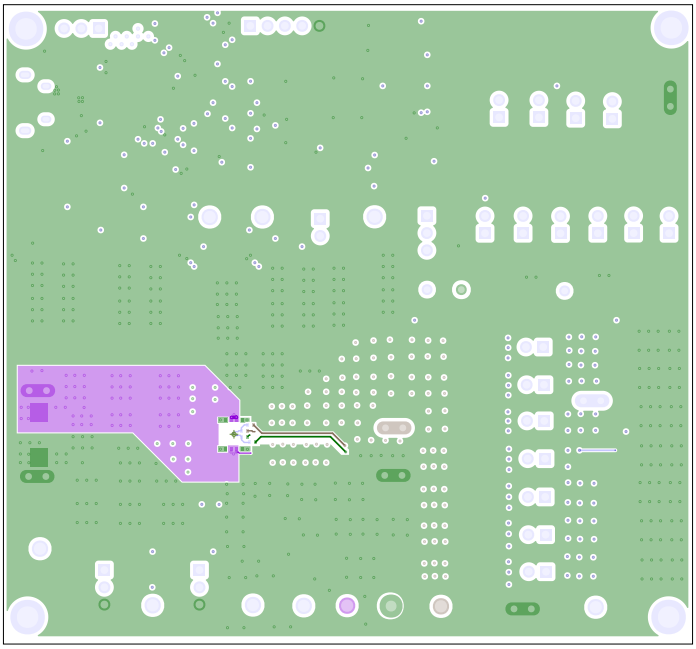


MAX77874 EV Internal Layer 2



MAX77874 EV Internal Layer 3

MAX77874 EV System PCB Layout (continued)



MAX77874 EV Bottom Layer

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	12/16	Initial release	—

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