

MAX20092 Evaluation System

Evaluates: MAX20092

General Description

The MAX20092 evaluation system is a matrix LED dimmer system featuring the MAX20092 12-switch matrix LED dimmer IC. The system includes two MAX20092 ICs that each control a string of 12 series LEDs. Each LED can be controlled individually or grouped. The user can turn the LED on and off with or without fading. The two strings of 12 series LEDs are driven by the MAX20097, a dual buck controller IC, with a current of 0.5A. The power supply for the dual buck controller is generated from the MAX16990, boost controller IC that is powered by an external 12V supply. For the detailed operation of the MAX20092 IC, refer to the MAX20092 IC data sheet.

Features

- Operating Input Supply Range: 9V to 16V
- Individual and Group Control of LEDs for Turn On, Turn Off, and PWM Dimming
- Dimming With and Without Fade
- Phase Shift Capability
- LED Slew Rate Control for Turn On/Off
- Open and Short Indication for Each Individual LED
- Adjustable for Short Thresholds
- Open Trace Detection
- Adjustable for PWM Dimming Frequency
- Thermal Warning and Thermal Shutdown Indication
- Status Reporting on SPI Errors
- Individual, Global, or Cluster Write Modes Through the SPI Interface
- Reporting of LED Binning Resistor (R_{GRADE})
- Proven PCB Layout
- Fully Assembled and Tested

MAX20092 EV Kit Files

FILE	DESCRIPTION
MAX20092EVKit.exe	Windows GUI Installer

[Ordering Information](#) appears at end of data sheet.

Quick Start

Required Equipment

- MAX20092EVSYS# (includes the MAX20092 EV kit, MAX20092LED EV kit, MINIQUSB+ interface board, and USB cable)
- A PC with the MAX20092 GUI software uploaded
- 12V, 6A DC power supply
- Two digital voltmeters
- A small flat-head screwdriver to turn the potentiometer wiper adjustment pin

Power-Up Procedure

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.

- Visit www.maximintegrated.com/evkitsoftware to download the latest version of the EV kit software, MAX20092EVKit.exe .
- Install the EV kit software (GUI) on your computer by running the MAX20092EVKit.exe program. The MAX20092 evaluation kit software app is installed together with the required MINIQUSB+ drivers.
- Verify jumper settings as in [Table 1](#) for the MAX20092 EV kit board.
- Connect the 12V power supply to the BATVIN and GND terminals of the MAX20092 EV kit.
- Connect a voltmeter across REF11 and AGND test points. Adjust the R23 potentiometer to set the voltage to 0.45V. This voltage on REF11 sets the LED current on Channel 1 of the buck controller. The equation to set LED current is: $I_{LED} = (V_{REF11} - 0.2V)/0.5$ with 0.45V the current is set to 0.5A. Connect a voltmeter between REF12 and AGND. Use the potentiometer R5 to set the voltage at REF12 test point. This sets the LED current on channel 2 of the buck controller. The equation to set LED current is: $I_{LED} = (V_{REF11} - 0.2V)/0.5$ with 0.45V the current is set to 0.5A.

- **Caution: The setting of the LED current by the above procedure is important as the LEDs in the LED board are recommended for 0.5A operation nominally. Do not connect the LED board before this step.**
- Disconnect the 12V power supply connected to BAT-VIN and GND terminals of the MAX20092 EV kit.
- Connect the MAX20092 LED EV kit board to the MAX20092 EV kit using the female header on the MAX20092 LED EV kit to the male connector in the MAX20092 EV kit board.
- Ensure the jumpers on the LED board are connected as shown in [Table 2](#).
- Connect the MINIQUSB+ board to J2 and J14 of the MAX20092 EV kit.
- Connect the MINIQUSB+ board to the computer running the software with the provided USB cable.
- Reconnect the 12V power supply to the BATVIN and GND terminals of the MAX20092 EV kit.
- Click on the MAX20092 EV kit GUI software icon installed in the PC.
- Click the Software Sync Enable Button in the GUI to enable the control of LEDs as shown in [Figure 1](#).

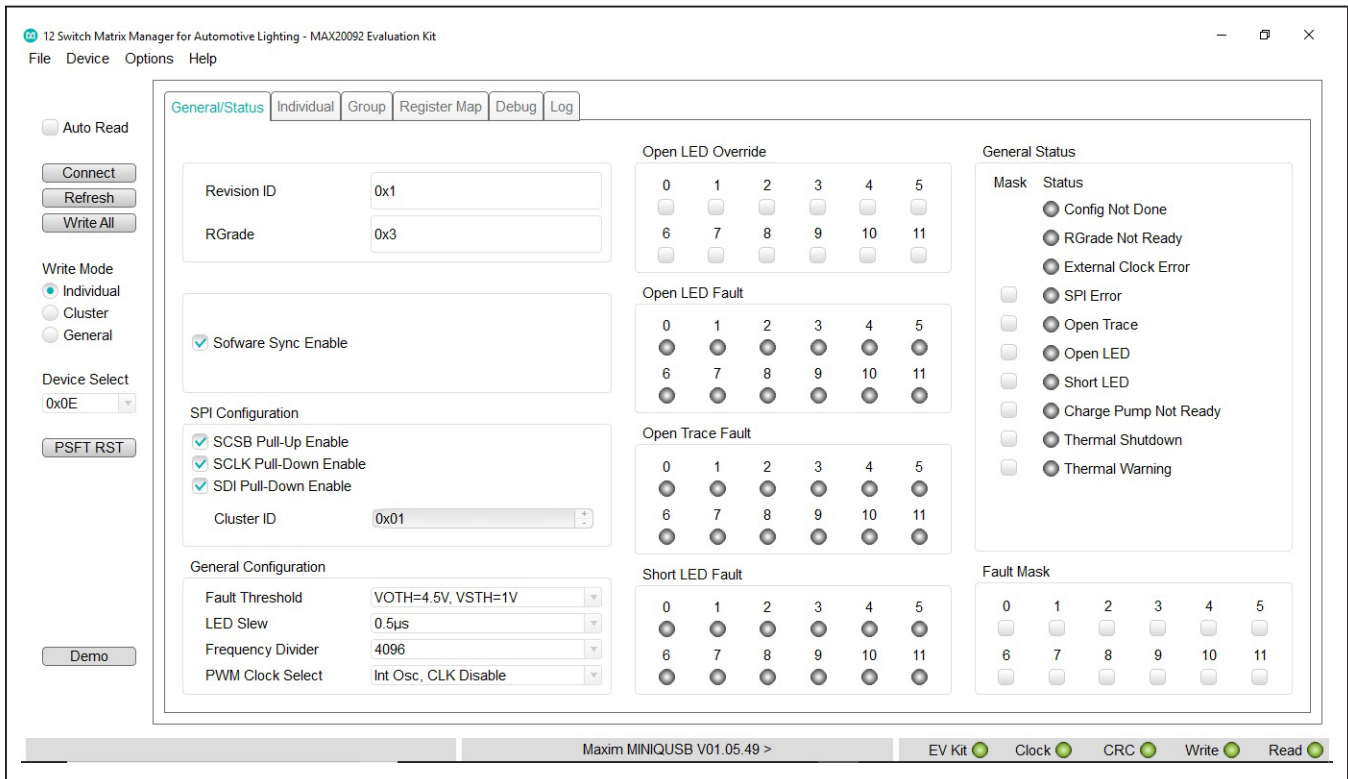


Figure 1. MAX20092 Evaluation Kit Software (GUI)

Table 1. Jumper Settings for MAX20092 EVKIT Board

JUMPER	SHUNT POSITION	DESCRIPTION
J3	1-2*	Turns on the current source in the MAX20097 for Channel 2.
	2-3	Turns off the current source in the MAX20097 for Channel 2.
J5	1-2*	Turns on the current source in the MAX20097 for Channel 2.
	2-3	Turns off the current source in the MAX20097 for Channel 2.
J6	Closed*	Sets MAX20097 Channel 1 LED current through REF11 by a resistive divider.
	Open	Allows for connecting an external power supply on REF1 test point.
J7	Closed	Connects the V _{IO} pin of the MAX20097 to VCC
	Open*	Disconnects the V _{IO} pin of the MAX20097
J8	1-2	Allows for connecting an external 5V supply between the VIN_MM and GND pads.
	2-3*	Connects the 5V output from the MAX20097 to the VIN of the MAX20092
J10	1-2	Connect VIN of the MAX20092 IC1 to GND
	2-3*	Connects VIN of the MAX20092 IC1 to supply
J11	1-2	Connect VIN of the MAX20092 IC2 to GND
	2-3*	Connects VIN of the MAX20092 IC2 to supply
J15	Closed*	Connects FLTB of the MAX20097 to the FLTB test point
J19	Closed*	Enables the MAX16990 Boost Controller IC.
J21	1-2*	Connects the V _{IO} pin of MAX20092 to 3.3V from the MINIQSB+ board
	2-3	Connects to 5V.
J23	1-2*	Connects the MAX20092 IC1 ADDR1 pin to SDI
	2-3	Connects the MAX20092 IC1 ADDR1 pin to GND
J24	1-2*	Connects the MAX20092 IC1 ADDR2 pin to SDI
	2-3	Connects the MAX20092 IC1 ADDR2 pin to VIO
J25	1-2	Connects the MAX20092 IC2 ADDR1 pin to SDI
	2-3*	Connects the MAX20092 IC2 ADDR1 pin to GND
J26	1-2	Connects the MAX20092 IC2 ADDR2 pin to SDI
	2-3*	Connects the MAX20092 IC2 ADDR2 pin to VIO

*Default position.

Table 2. Jumper Settings for MAX20092 LED BOARD

JUMPER	SHUNT POSITION	DESCRIPTION
J1	2-3*	For series connection of LEDs in Channel 1
J2	2-3*	For series connection of LEDs in Channel 1
J3	2-3*	For series connection of LEDs in Channel 1
J4	2-3*	For series connection of LEDs in Channel 2
J5	2-3*	For series connection of LEDs in Channel 2
J7	2-3*	For series connection of LEDs in Channel 2

*Default position.

Detailed Description

The MAX20092 EV system demonstrates the capabilities of the MAX20092 LED matrix manager IC. There are 2 MAX20092 ICs. Each IC controls a string of 12 series LEDs. The 2 string of 12 series LEDs are driven by a MAX20097 dual buck controller IC with 0.5A current. The MAX20097 is powered by a 52V supply that is generated from a MAX16990 boost controller IC using a 12V supply. The boost controller delivers a maximum power of approximately 50W. The EV board is shown in [Figure 2](#).

The MAX20092 IC features a serial peripheral interface (SPI) for serial communication. The MAX20092 IC is a slave device that uses the SPI to communicate with an external microcontroller that acts as the master device. The MAX20092 EV kit uses the MINIUSB board as the microcontroller to communicate with the MAX20092 IC. The included GUI software works with the MINIUSB

board and controls the MAX20092 IC. Each of the 12 switches in the MAX20092 IC can be independently programmed to bypass the LEDs in the string. Each LED can be turned fully on, fully off, or dimmed with or without fade-transition mode.

Device Select and Write Modes

The MAX20092 EV kit comes with 2 MAX20092 ICs. The ICs have ADDR0, ADDR1 and ADDR2 pins to assign different addresses to the ICs. These pins of the 2 ICs are connected such that their device addresses are 0x0E and 0x17. Select each device under the **Device Select** section and turn on the **Software Sync Enable** button to enable the LED control. There is a **Write Mode** section that has 3 buttons: **Individual**, **Cluster**, and **General**. Push the **Individual** button to select one of the ICs. Push the **Group** or **Cluster** button to write to both ICs.

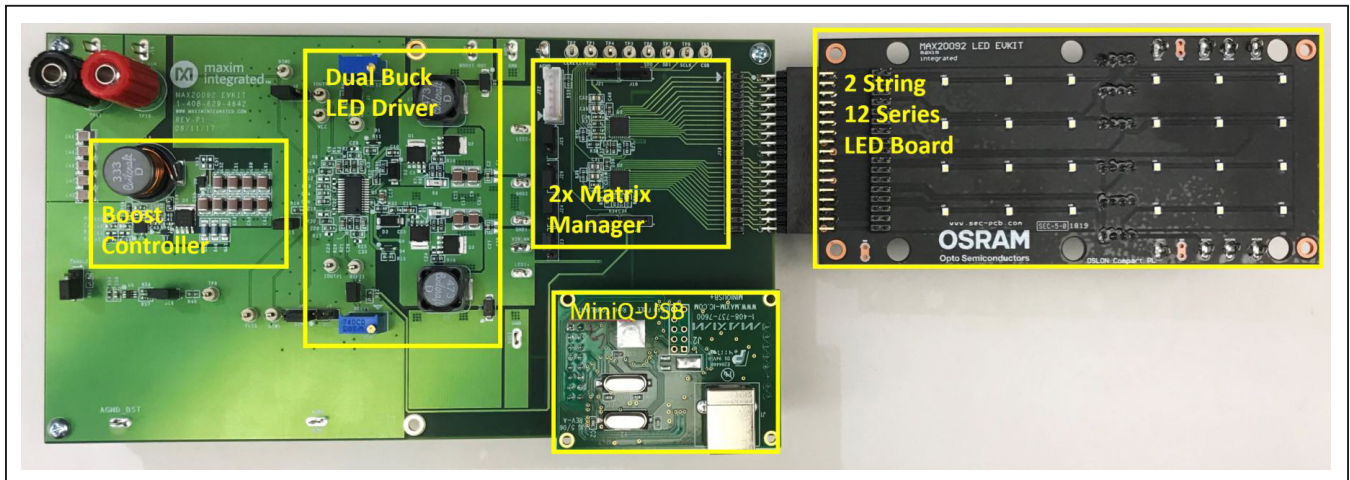


Figure 2. MAX20092 Evaluation Kit Board

Individual Control of the LEDs

Each of the individual LEDs can be turned on with the programmed duty cycle. Fade can be enable when turning on and off. The **Time Period** dimming update can be chosen from the pulldown menu in the GUI. See the **Individual** tab in the GUI (Figure 3). Each of the phases

of the LED switching can be shifted in phase by the slider in the **Phase Shift** button. Phase shift in steps of 30 degrees is possible between LED switching. The **PSFT_RST** button sets all the 12 LEDs switching shifted in phase by 30 degrees.

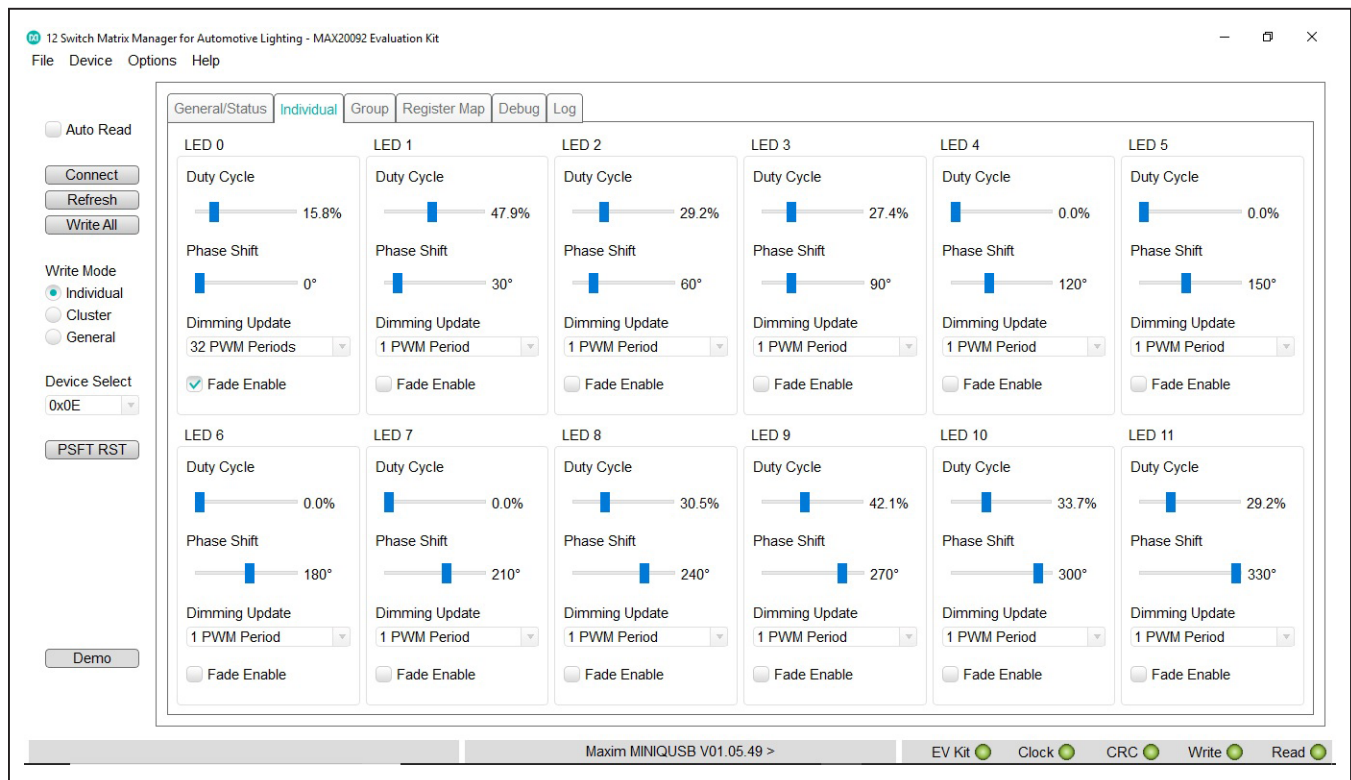


Figure 3. GUI—Individual LED Control

Group Control of LEDs

LEDs can be grouped in Group A, B, C, and D configurations as seen in the GUI. Each of the groups can be set to a different duty cycle and can be dimmed with and without fading. Figure 4 shows a GUI screenshot in which all the 12 LEDs are selected in Group A configuration and set to 30% duty cycle and fade enabled with 32 PWM time period.

Monitoring of Individual LEDs

Any fault on the LEDs can be monitored on the General/Status tab of the GUI. Open and Short faults for individual LEDs can be monitored. In addition, any open in the traces/wires running from the MAX20092 EV kit board to the LED board are also reported on the **General/Status** tab as an **Open Trace Fault**. The **Open LED Override** button disables reporting of open LED fault for the selected LED. The Fault Mask section allows which LED can be selected for whose faults can be masked.

Slew Rate, PWM Dimming Frequency, and Fault Thresholds

Turning the LED on and off at a controlled slew rate reduces EMI as well as reduces the peak voltage ringing across the switches. The MAX20092 IC has 8 settings for the slew rate. It ranges from 0.5V/μs to 10V/μs. These options are there in the pulldown menu in the **General Configuration** section. The PWM dimming frequency has 4 options: 250Hz, 500Hz, 1kHz, and 2kHz for frequency divider settings 4096, 8192, 16384, and 32768, respectively. If an external PWM dimming clock is used, the final PWM dimming frequency for the LEDs is the external clock frequency divided by the frequency divider number selected in the pulldown menu. For example, if an external clock frequency of 819.2kHz is used with the frequency divider selected as 4096, the LED PWM dimming frequency is 200Hz. The LED short can be detected with 2 short thresholds from which to choose.

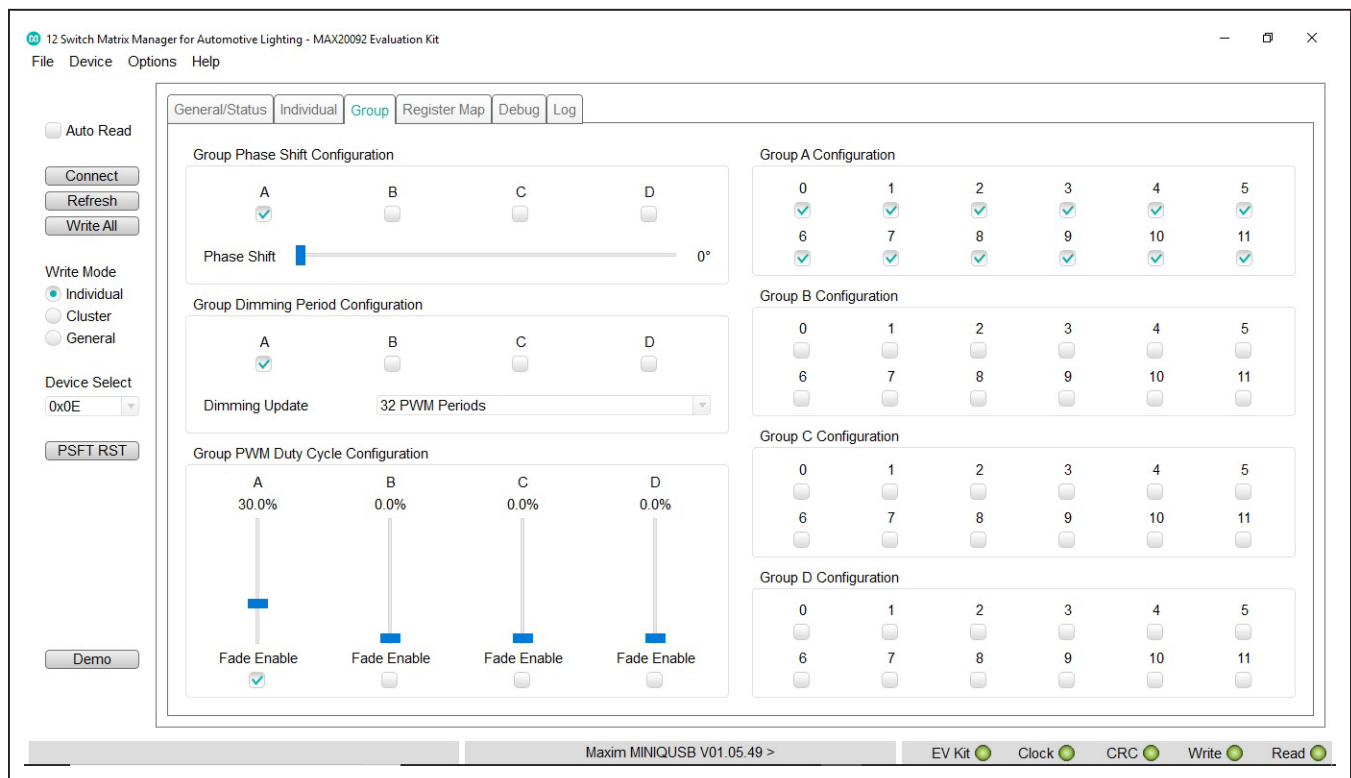


Figure 4. GUI—Group LED Control

Ordering Information

PART	TYPE
MAX20092EVSYS#	EV KIT

+Denotes lead(Pb)-free and RoHS-compliant.

MAX20092 EV Kit Bill of Materials

ITEM	QTY	REF DES	VAR STATUS	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
1	7	AGND, GND1-GND4, LED1+, LED2+	Pref	01-9020BUSS20AWG-00	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE: NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG	
2	2	C1, C28	Pref	20-0001U-CA96	CGA4J3X7R1H105M125AB	TDK	1UF	CAPACITOR: SMT (0805); CERAMIC CHIP; 1UF; 50V; TOL=20%; TG=-55 DEGC TO +125 DEGC; TC=X7R; AUTO	
3	6	C2, C6, C14, C16, C23, C27	Pref	20-000U1-DA52	CGA3E2X7R1H104K080AE	TDK	0.1UF	CAPACITOR: SMT (0603); CERAMIC CHIP; 0.1UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R; AUTO; SOFT TERMINATION	
4	2	C3, C26	Pref	20-1000P-CA80	CGA3E2C0G2A102J080AA	TDK	1000PF	CAPACITOR: SMT (0603); CERAMIC CHIP; 1000PF; 100V; TOL=5%; TG=-55 DEGC TO +125 DEGC; TC=C0G; AUTO	
5	2	C4, C20	Pref	20-0001U-CA22	CGA3E1X7R1V105K	TDK	1UF	CAPACITOR: SMT (0603); CERAMIC CHIP; 1UF; 35V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R; AUTO	
6	4	C9, C11, C17, C21	Pref	20-004U7-CA59	CGA6M3X7S2A475K200AE; CGA6M3X7S2A475K200AB	TDK;TDK	4.7UF	CAPACITOR: SMT (1210); CERAMIC CHIP; 4.7UF; 100V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7S; AUTO	
7	2	C10, C19	Pref	20-00U22-BA63	CGA3E3X7R1H224K080AB; GCM188R71H224KA49	TDK;MURATA	0.22UF	CAPACITOR: SMT (0603); CERAMIC CHIP; 0.22UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R; AUTO	
8	1	C13	Pref	20-002U2-CA73	CGA3E1X7R0J225K080AC	TDK	2.2UF	CAPACITOR: SMT (0603); CERAMIC; 2.2UF; 6.3V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R; AUTO	
9	1	C15	Pref	20-000U1-CA82	CGA4J2X7R2A104K125AA	TDK	0.1UF	CAPACITOR: SMT (0805); CERAMIC CHIP; 0.1UF; 100V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R; AUTO	
10	4	C31-C33, C35	Pref	20-0010U-A20	GRM21BR7J106K; C2012X7R0J106K125AB	MURATA;TDK	10UF	CAPACITOR: SMT (0805); CERAMIC CHIP; 10UF; 6.3V; TOL=10%; MODEL=GRM SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7R	
11	7	C34, C36-C40, C56	Pref	20-000U1-BA63	GJ188R71H104KA12; GCM188R71H104K; CGA3E2X7R1H104K080AA	MURATA; MURATA;TDK	0.1UF	CAPACITOR: SMT (0603); CERAMIC CHIP; 0.1UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R; AUTO	
12	1	C41	Pref	20-000U1-P6B	C1608X7R1E104K080AA	TDK	0.1UF	CAPACITOR: SMT (0603); CERAMIC CHIP; 0.1UF; 25V; TOL=10%; MODEL=C SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7R	
13	14	C42, C44-C47, C51-C55, C59-C62	Pref	20-004U7-BA52	C3225X7S2A475M200AB	TDK	4.7UF	CAPACITOR: SMT (1210); CERAMIC CHIP; 4.7UF; 100V; TOL=20%; TG=-55 DEGC TO +125 DEGC; TC=X7S	
14	1	C43	Pref	20-002U2-BA97	GRM188C71E225KE11	MURATA	2.2UF	CAPACITOR: SMT (0603); CERAMIC CHIP; 2.2UF; 25V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7S	
15	1	C48	Pref	20-0100P-77H	C0603H101J5GAC	KEMET	100PF	CAPACITOR: SMT (0603); CERAMIC CHIP; 100PF; 50V; TOL=5%; MODEL=HT SERIES; TG=-55 DEGC TO +200 DEGC; TC=C0G	
16	1	C49	Pref	20-0100P-B69	C0603C101J1GAC; GRM1885C2A101JA01	KEMET;MURATA	100PF	CAPACITOR: SMT (0603); CERAMIC CHIP; 100PF; 100V; TOL=5%; MODEL=M SERIES; TG=-55 DEGC TO +125 DEGC; TC=C0G	
17	1	C50	Pref	20-0U022-03	C0603C223K3RAC	KEMET	22000PF	CAPACITOR: SMT; 0603; CERAMIC; 22000pF; 25V; 10%; X7R; -55degC to +125degC; +/-15% from -55degC to +125degC	
18	1	C58	Pref	20-0001U-A54	EMK107B7105MA	TAIYO YUDEN	1UF	CAPACITOR: SMT (0603); CERAMIC CHIP; 1UF; 16V; TOL=20%; MODEL=M SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7R	
19	1	C64	Pref	20-000U1-DA84	CGA3E3X7S2A104K080AB	TDK	0.1UF	CAPACITOR: SMT (0603); CERAMIC CHIP; 0.1UF; 100V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7S	
20	3	D1, D4, D7	Pref	30-1N4448WS7F-00	1N4448WS-7-F	DIODES INCORPORATED	1N4448WS-7-F	DIODE: SWT; SOD-323; PIV=75V; IF=0.5A	

MAX20092 EV Kit Bill of Materials (continued)

ITEM	QTY	REF DES	VAR STATUS	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
21	4	D2, D3, D5, D6	Pref	30-B18013F-00	B180-13-F	DIODES INCORPORATED	B180-13-F	DIODE; SCH; SCHOTTKY BARRIER RECTIFIER; SMA; PIV=80V; IF=1A	
22	1	D8	Pref	30-DFLS2100-00	DFLS2100	DIODES INCORPORATED	DFLS2100	DIODE; SCH; SMT (POWERDI-123); PIV=100V; IF=2A	
23	17	DIM1, DIM2, FLT8, IOUTV1, IOUTV2, REF11, REF12, TP1-TP9, VCC	Pref	02-TPCOMP5007-00	5007	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.35IN; BOARD HOLE=0.063IN; WHITE; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN; NOT FOR COLD TEST	
24	5	J1, J6, J7, J15, J18	Pref	01-PCC02SAAN2P-21	PCC02SAAN	SULLINS	PCC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT THROUGH; 2PINS; -65 DEGC TO +125 DEGC	
25	1	J2	Pref	01-SSQ10823GS8P-17	SSQ-108-23-G-S	SAMTEC	SSQ-108-23-G-S	CONNECTOR; FEMALE; THROUGH HOLE; SSQ SERIES; STRAIGHT; 8PINS	
26	11	J3, J5, J8, J10, J11, J19, J21, J23-J26	Pref	01-PCC03SAAN3P-21	PCC03SAAN	SULLINS	PCC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT THROUGH; 3PINS; -65 DEGC TO +125 DEGC	
27	1	J12	Pref	01-PEC17DBAN34P-21	PEC17DBAN	SULLINS ELECTRONICS CORP.	PEC17DBAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; RIGHT ANGLE; 34PINS; -65 DEGC TO +125 DEGC	
28	1	J13	Pref	01-1089734234P-21	10-89-7342	MOLEX	10-89-7342	CONNECTOR; TH. MALE; SALES ASSY-HIGH TEMP DUAL ROW WAFER WITH BREAK-OFF OPTION. 34PINS. STR	
29	1	J14	Pref	01-PEC08DAAN16P-21	PEC08DAAN	SULLINS ELECTRONICS CORP.	PEC08DAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 16PINS; -65 DEGC TO +125 DEGC	
30	1	J22	Pref	01-B6BPHK6P-19	B6B-PH-K-S(LF)(SN)	JST MANUFACTURING	B6B-PH-K-S(LF)(SN)	CONNECTOR; MALE; THROUGH HOLE; PH SERIES; STRAIGHT; 6PINS	
31	2	L1, L2	Pref	50-0047U-S44A	MSS1278T-473ML	COILCRAFT	47UH	INDUCTOR; SMT; FERRITE BOBBIN CORE; 47UH; TOL=+/-20%; 5.4A	
32	1	L3	Pref	50-0033U-0ST	D05040H-333ML	COILCRAFT	33UH	INDUCTOR; SMT; FERRITE; 33UH; 20%; 4.50A	
33	4	Q1-Q4	Pref	90-BUK9Y10780E-21	BUK9Y107-80E	NXP	BUK9Y107-80E	TRAN; N-CHANNEL 80V; 107MOHM LOGIC LEVEL MOSFET; NCH; LFPK; PD-(37W); I-(11.8A); V-(80V)	
34	1	Q5	Pref	90-SQJA82EPT1GE3-23	SQJA82EP-T1-GE3	VISHAY SILICONIX	SQJA82EP-T1-GE3	TRAN; AUTOMOTIVE N-CHANNEL MOSFET; NCH; SO-8L; PD-(68W); I-(60A); V-(80V)	
35	2	R1, R24	Pref	80-0453K-24	ERJ-3EKF4533V	PANASONIC	453K	RESISTOR; 0603; 453K OHM; 1%; 100PPM; 0.10W; THICK FILM	
36	4	R2, R3, R21, R25	Pref	80-024K9-24	CRCW060324K9FK	VISHAY DALE	24.9K	RESISTOR; 0603; 24.9K OHM; 1%; 100PPM; 0.10W; THICK FILM	
37	5	R4, R14, R22, R29, R30	Pref	80-0010K-24	CRCW060310K0FK; ERJ-3EKF1002	VISHAY DALE; PANASONIC	10K	RESISTOR; 0603; 10K; 1%; 100PPM; 0.10W; THICK FILM	
38	2	R5, R23	Pref	80-0010K-39A	3296W-1-103LF	BOURNS	10K	RESISTOR; THROUGH-HOLE-RADIAL LEAD; 3296 SERIES; 10K OHM; 10%; 100PPM; 0.5W; SQUARE TRIMMING POTENTIOMETER; 25 TURNS; MOLDED CERAMIC OVER METAL FILM	
39	2	R6, R20	Pref	80-000R1-CA25	RUW3216FR100	SAMSUNG ELECTRONICS	0.1	RESISTOR; 1206; 0.1 OHM; 1%; 150PPM; 1W; THICK FILM	
40	8	R7, R8, R10, R16, R18, R19, R31, R32	Pref	80-0000R-27	CRCW06030000ZS; MCR03EZPJ000; ERJ-3GEY0R00	VISHAY DALE; ROHM; PANASONIC	0	RESISTOR; 0603; 0 OHM; 0%; JUMPER; 0.10W; THICK FILM	
41	4	R11-R13, R15	Pref	80-004R7-19	CRCW06034R70FN	VISHAY DALE	4.7	RESISTOR; 0603; 4.7 OHM; 1%; 100PPM; 0.10W; THICK FILM	
42	7	R26, R27, R40, R44, R56, R57, R59	Pref	80-0000R-AA6	CRCW06030000Z0	VISHAY DALE	0	RESISTOR; 0603; 0 OHM; 0%; JUMPER; 0.1W; THICK FILM	
43	2	R28, R33	Pref	80-0100K-H9A	TNPW0603100KAZEN00	VISHAY DRALORIC	100K	RESISTOR; 0603; 100K OHM; 0.05%; 5PPM; 0.10W; THIN FILM	
44	2	R34, R35	Pref	80-0020K-24	MCR03EZPFX2002; ERJ-3EKF2002; CR0603-FX-2002ELF	ROHM; PANASONIC; BOURNS	20K	RESISTOR; 0603; 20K OHM; 1%; 100PPM; 0.10W; THICK FILM	
45	4	R36, R46, R52, R58	Pref	80-0010K-A4	301-10K-RC	XICON	10K	RESISTOR; 0603; 10K OHM; 5%; 200PPM; 1/16W; THICK FILM	
46	3	R37-R39	Pref	80-04K75-24	CRCW06034K75FK; ERJ-3EKF4751	VISHAY DALE; PANASONIC	4.75K	RESISTOR; 0603; 4.75K; 1%; 100PPM; 0.10W; THICK FILM	
47	1	R41	Pref	80-0140K-24	ERJ-3EKF1403V	PANASONIC	140K	RESISTOR; 0603; 140K OHM; 1%; 100PPM; 0.10W; THICK FILM	
48	1	R43	Pref	80-07K15-24	ERJ-3EKF7151V	PANASONIC	7.15K	RESISTOR; 0603; 7.15K OHM; 1%; 100PPM; 0.10W; THICK FILM	
49	1	R45	Pref	80-001K5-71	TNPW06031K50BE; ERA-3YEB152V	VISHAY DALE; PANASONIC	1.5K	RESISTOR; 0603; 1.5K OHM; 0.1%; 25PPM; 0.10W; THICK FILM	
50	3	R47-R49	Pref	80-00R05-26	LRC-LR1206LF-01-R050-F	TT ELECTRONICS	0.05	RESISTOR; 1206; 0.05 OHM; 1%; 100PPM; 0.5W; THICK FILM	

MAX20092 EV Kit Bill of Materials (continued)

ITEM	QTY	REF DES	VAR STATUS	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
51	1	R50	Pref	80-0510K-24	CRCW0603510KFK	VISHAY DALE	510K	RESISTOR; 0603; 510K; 1%; 100PPM; 0.10W; THICK FILM	
52	1	R51	Pref	80-0010K-77	TNPW060310K0BE; RN731JTTD1002B	VISHAY DALE; KOA SPEER ELECTRONICS	10K	RESISTOR; 0603; 10K OHM; 0.1%; 25PPM; 0.1W; THICK FILM	
53	1	R54	Pref	80-0020R-24	CRCW060320R0FK; ERJ-3EKF20R0V	VISHAY DALE; PANASONIC	20	RESISTOR; 0603; 20 OHM; 1%; 100PPM; 0.10W; THICK FILM	
54	1	TP10	Pref	01-70061P-80		7006 KEYSTONE	7006	CONNECTOR; PANELMOUNT; BINDING POST; STRAIGHT THROUGH; 1PIN; RED	
55	1	TP11	Pref	01-70071P-80		7007 KEYSTONE	7007	CONNECTOR; PANELMOUNT; BINDING POST; STRAIGHT THROUGH; 1PIN; BLACK	
56	1	U1	Pref	00-SAMPLE-01	MAX20096AHI+	MAXIM	MAX20096AHI+	EVKIT PART-IC; DRV: DUAL CHANNEL HIGH VOLTAGE BUCK LED DRIVER WITH SPI INTERFACE; PACKAGE OUTLINE: 21-0066; PACKAGE CODE: U28-1; TSSOP28	
57	2	U2, U3	Pref	00-SAMPLE-02	MAX20092	MAXIM	MAX20092	EVKIT PART-IC; 12 SWITCH MATRIX MANAGER FOR AUTOMOTIVE LIGHTING; PACKAGE OUTLINE: 21-100210; TQFN32-EP	
58	1	U4	Pref	10-MAX16990ATCEV-T	MAX16990ATCEV+	MAXIM	MAX16990ATCEV+	IC; CTRL; 220KHZ TO 1MHZ AUTOMOTIVE BOOST/SEPIC CONTROLLER; TQFN12-EP	
59	1	U5	Pref	10-NC7WZ07P6X-X	NC7WZ07P6X	FAIRCHILD SEMICONDUCTOR	NC7WZ07P6X	IC; BUF; TINY LOGIC ULTRA-HIGH SPEED DUAL BUFFER; SCT0-6	
60	1	PCB	-	EPCB20092	MAX20092	MAXIM	PCB	PCB:MAX20092	-
TOTAL	175								

MAX20092 EV Kit LED Bill of Materials

ITEM	QTY	REF DES	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	24	D1-D24	None	OSRAM COMPACT PL KW CELNM1.TG	OSRAM Opto Semiconductor	None	Osram Compact PL, KW CELNM1.TG, LED components
2	6	J1-J5, J7	01-222320414P-22	22-23-2041	MOLEX	22-23-2041	CONNECTOR; MALE; THROUGH HOLE; FRICTION LOCK SOLID BODY; STRAIGHT THROUGH; 4PINS
3	1	J6	01-PPTC172LJBNRC34P-21	PPTC172LJBN-RC	SULLINS ELECTRONICS CORP.	PPTC172LJBN-RC	CONNECTOR; FEMALE; THROUGH HOLE; HEADER; RIGHT ANGLE; 34PINS; -40 DEGC TO +105 DEGC
4	1	J12	01-1089734234P-21	10-89-7342	MOLEX	10-89-7342	CONNECTOR, TH, MALE, SALES ASSY-HIGH TEMP DUAL ROW WAFER WITH BREAK-OFF OPTION, 34PINS, STR
5	8	LED1+, LED2+, OUTLED2-OUTLED7	01-90208USS20AWG-00	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG
6	24	R1-R24	80-0100K-AA4	ERJ3KF1003	PANASONIC	100K	RESISTOR; 0603; 100K OHM; 1%; 100PPM; 0.1W; THICK FILM
7	1	PCB	EPCB	MAX	MAXIM	PCB	PCB:MAX

MAX20092 EV Schematic (continued)

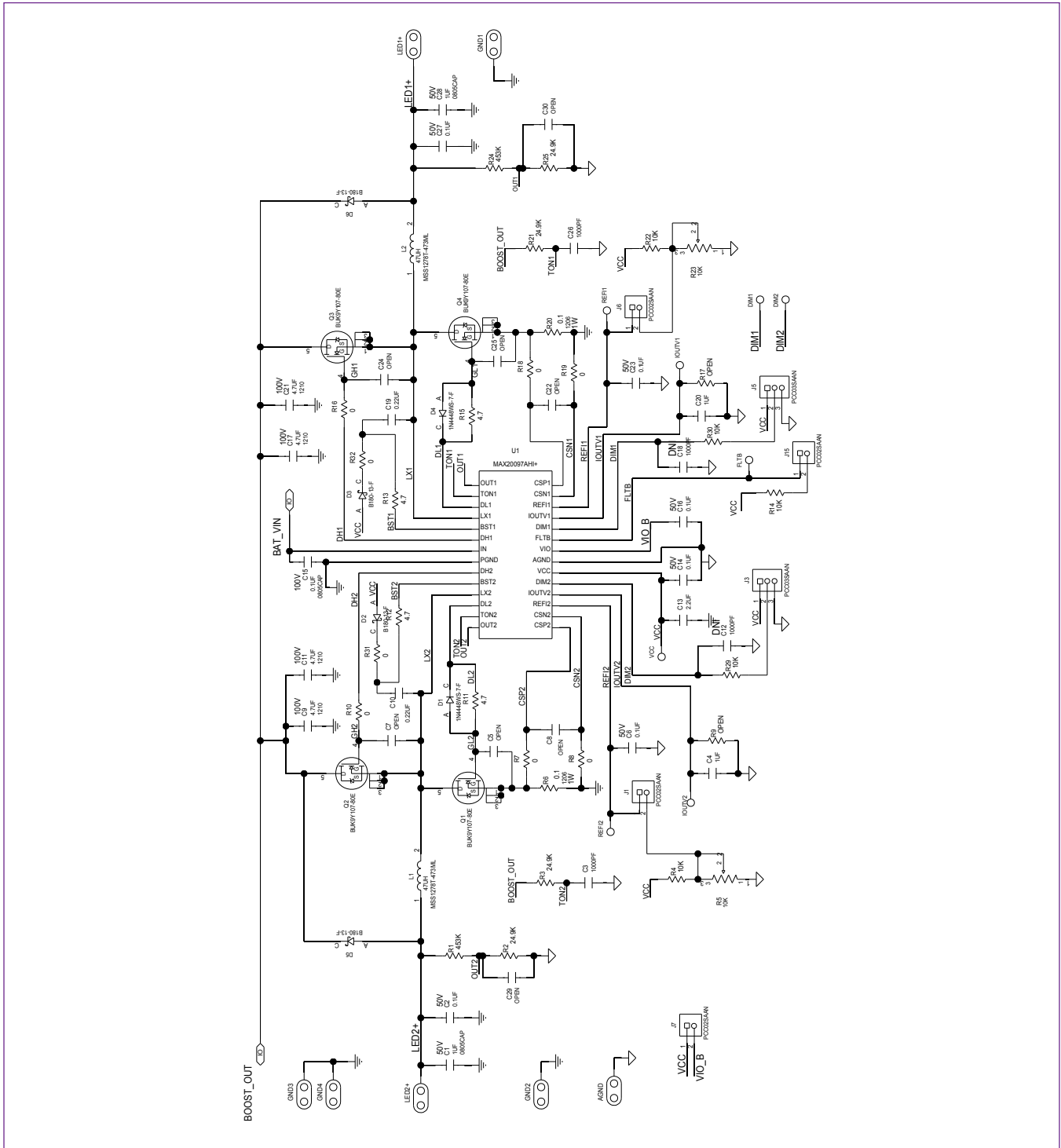


Figure 6. MAX20092 EV Kit Schematic (2 of 3)

MAX20092 EV Schematic (continued)

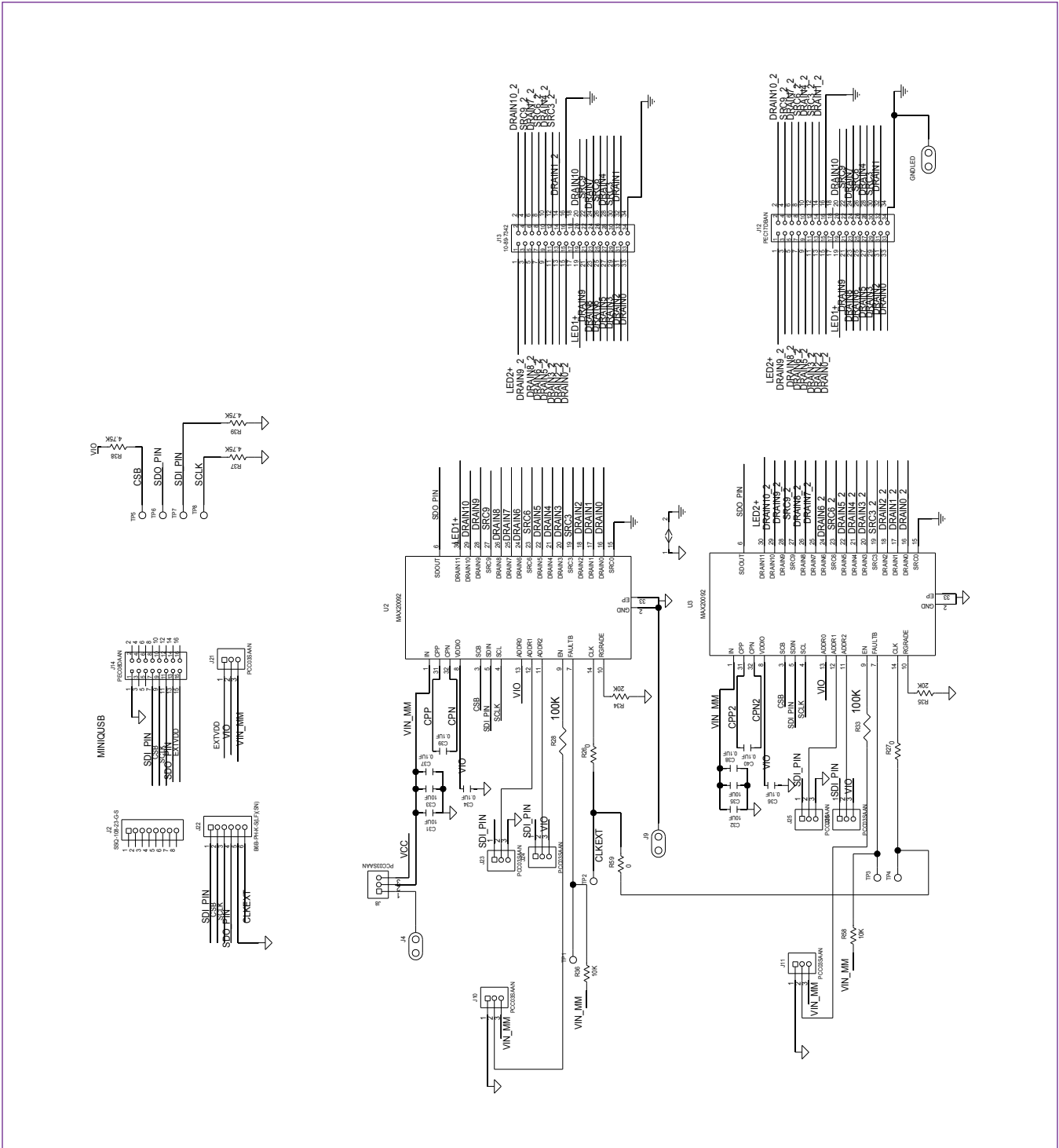


Figure 7. MAX20092 EV Kit Schematic (3 of 3)

MAX20092 EV LED Schematic

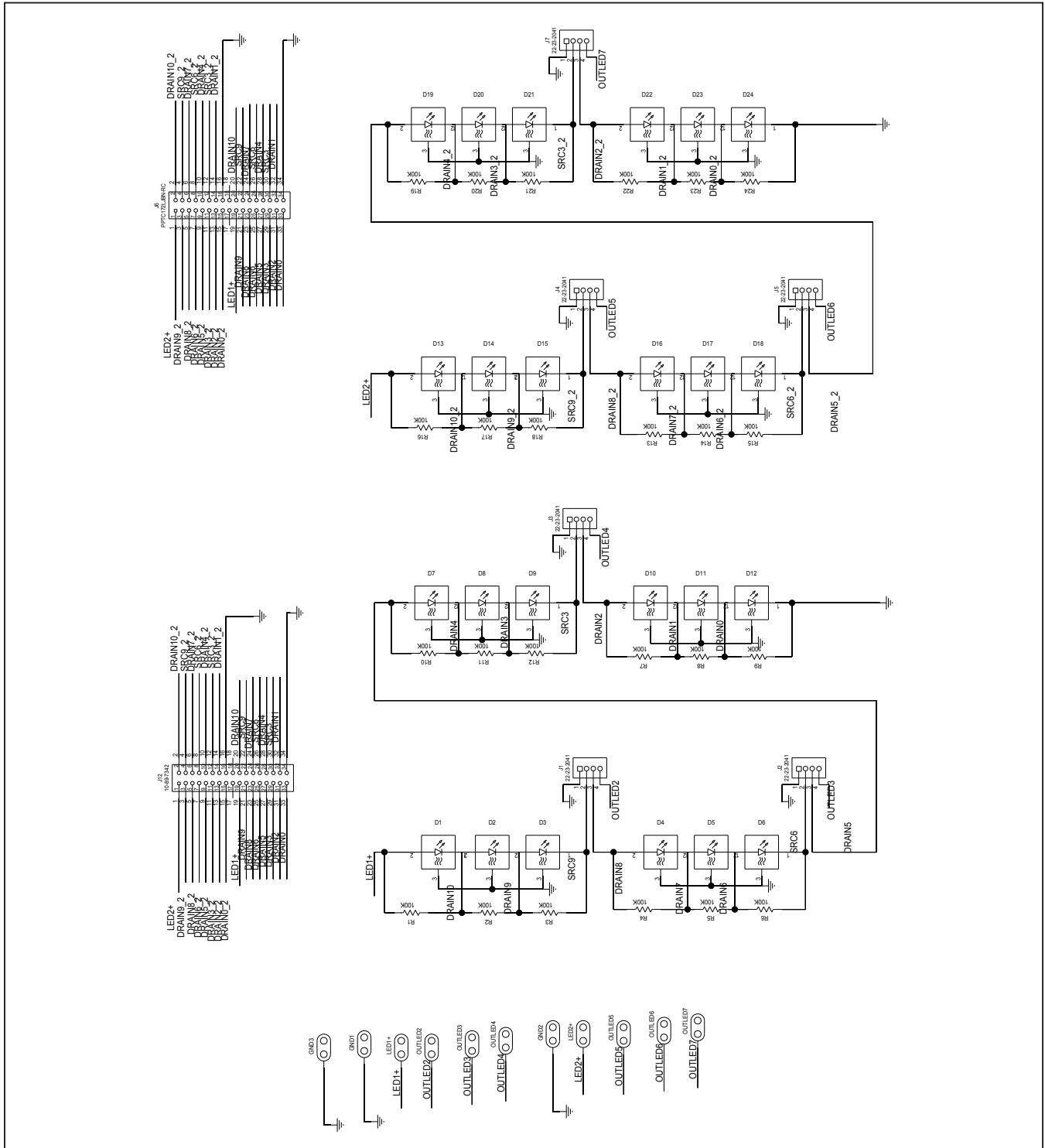


Figure 8. MAX20092 EV Kit Schematic

MAX20092 EV PCB Layouts

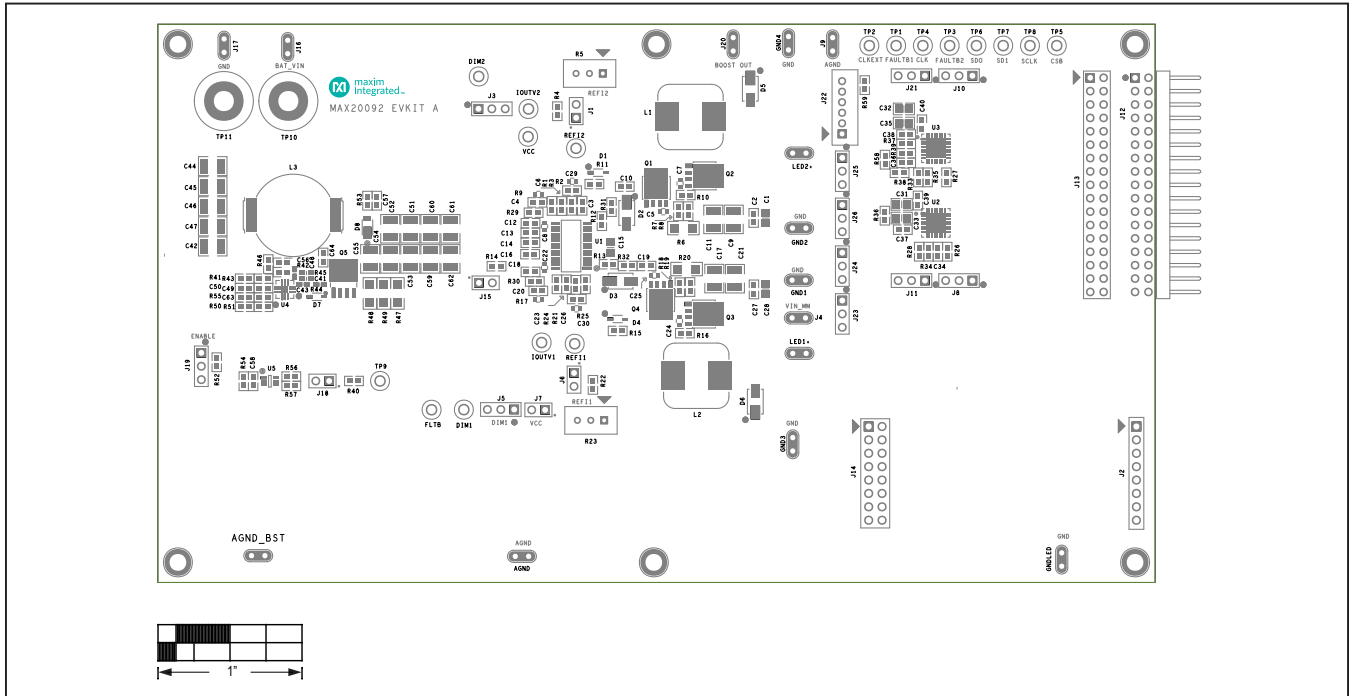


Figure 9. MAX20092 EV Kit Component PCB Layout—Component Side

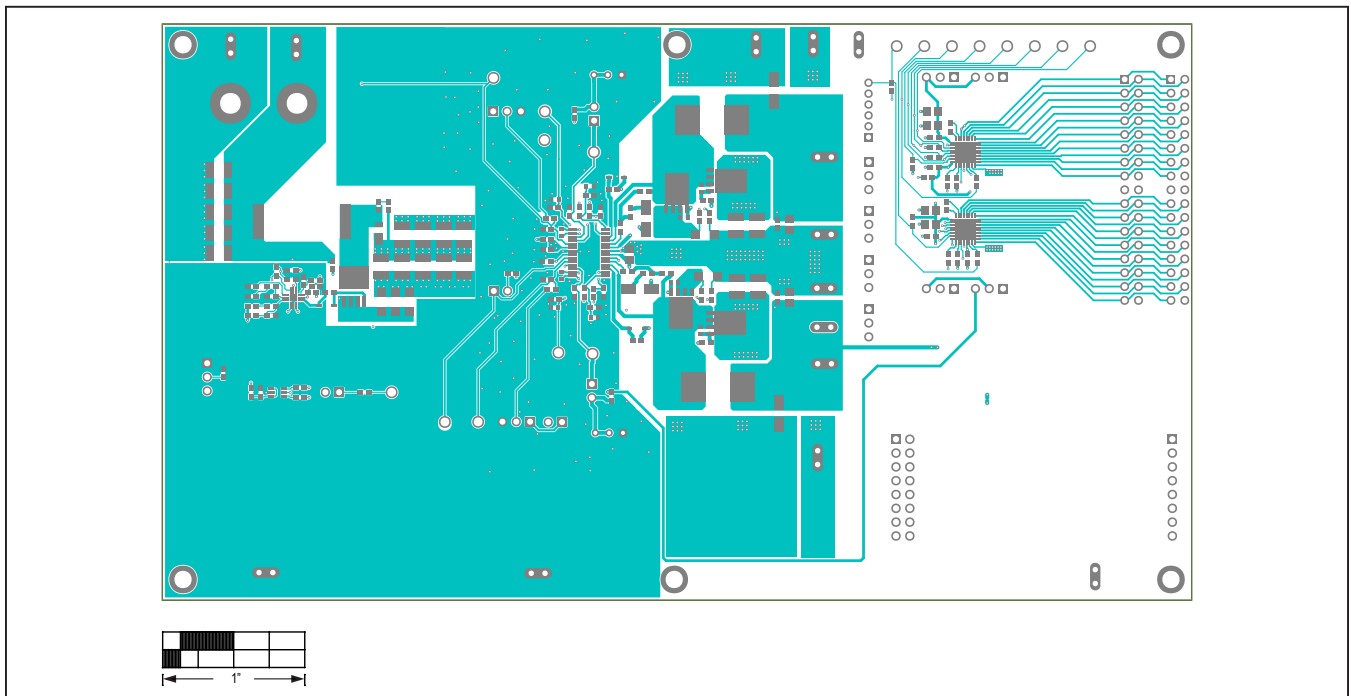


Figure 10. MAX20092 EV Kit PCB Layout—Top Layer

MAX20092 EV PCB Layouts (continued)

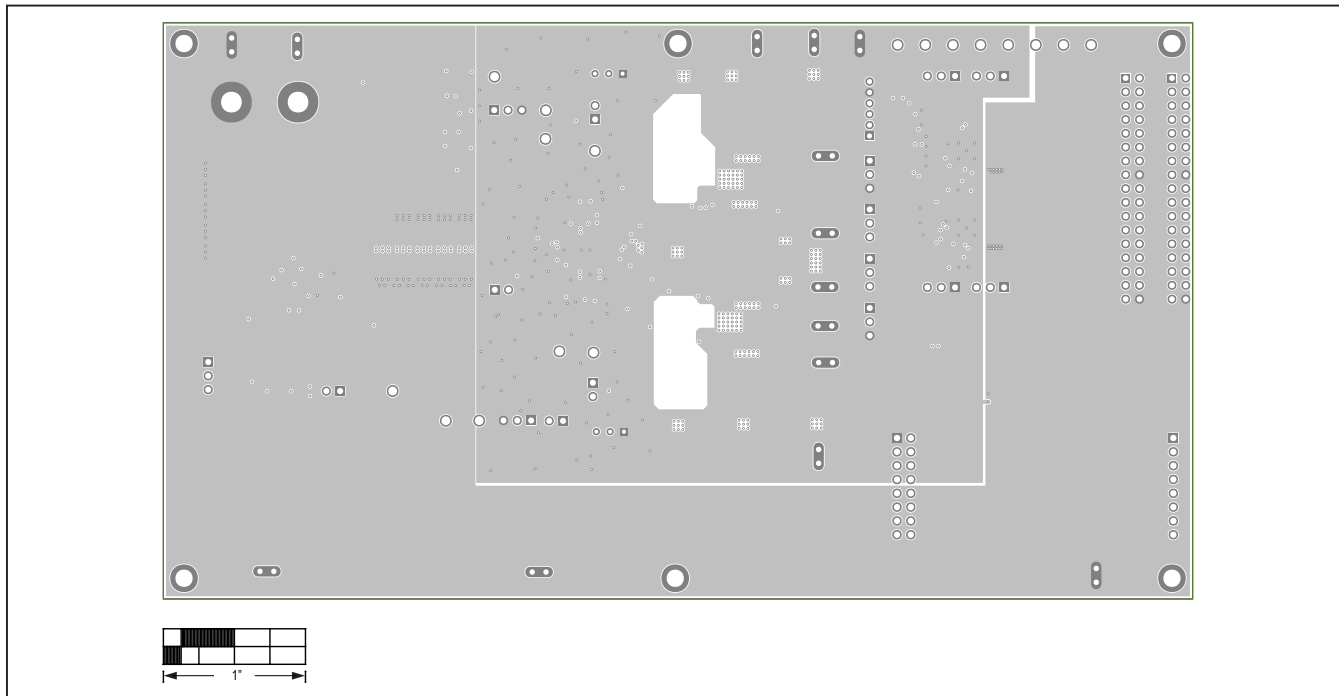


Figure 11. MAX20092 EV Kit PCB Layout—Inner Layer 1

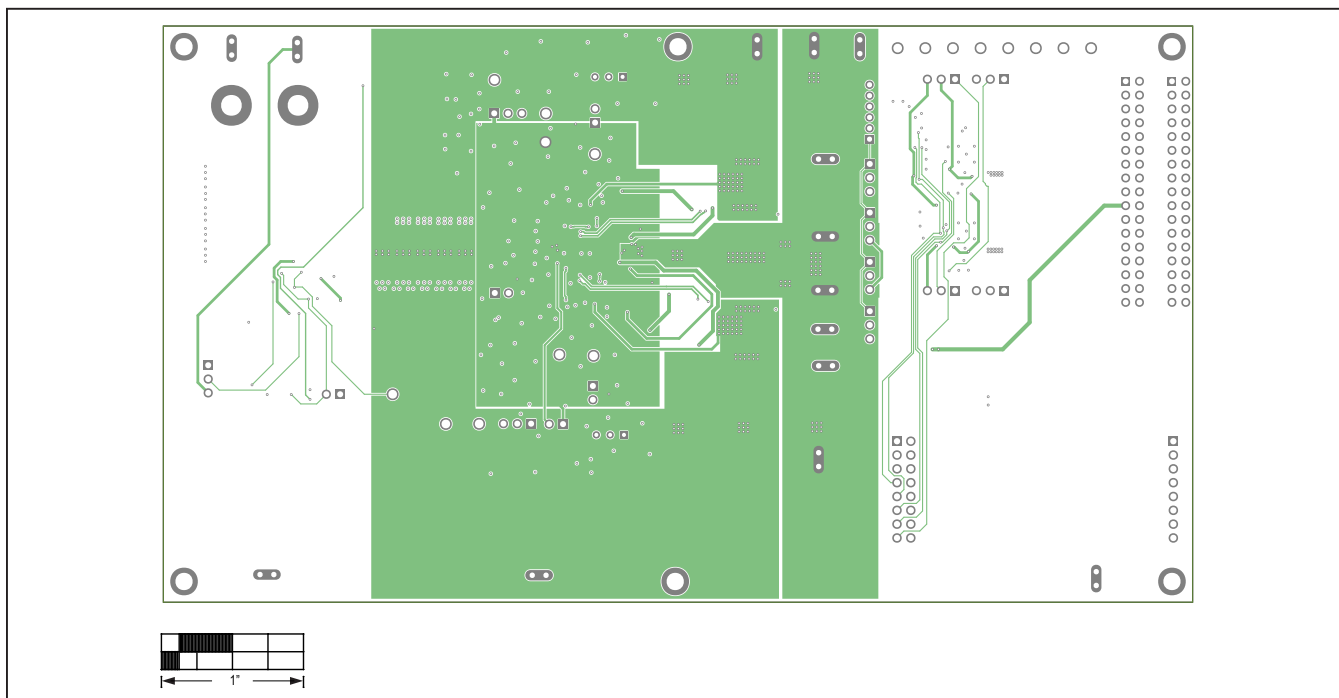


Figure 12. MAX20092 EV Kit PCB Layout—Inner Layer 2

MAX20092 EV PCB Layouts (continued)

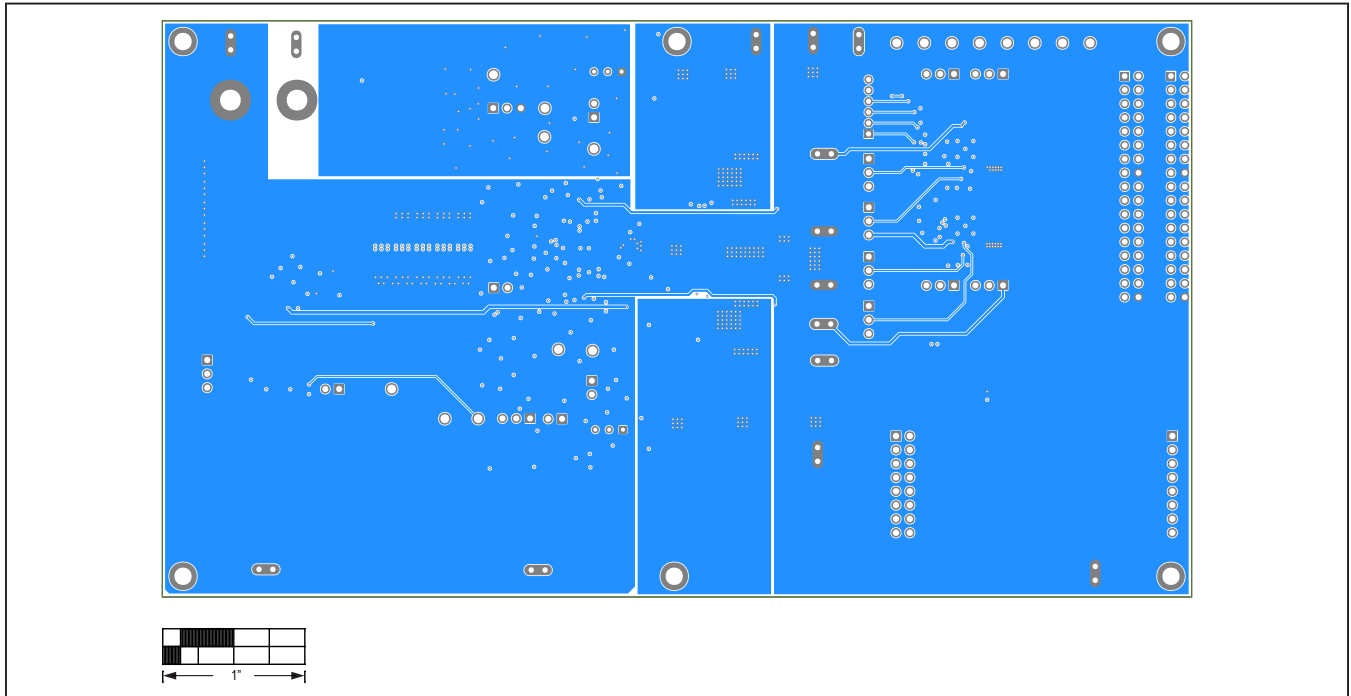


Figure 13. MAX20092 EV Kit PCB Layout—Bottom Layer

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	9/18	Initial release	—

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[390](#) [1216.1013](#) [TPS61176EVM-566](#) [TPS92001EVM-628](#) [1270](#) [1271.2004](#) [1272.1030](#) [1273.1010](#) [1278.1010](#) [1279.1002](#) [1279.1001](#)
[1282.1000](#) [1293.1900](#) [1293.1800](#) [1293.1700](#) [1293.1500](#) [1293.1100](#) [1282.1400](#) [1282.1100](#) [1293.1200](#) [1282.1200](#) [1293.1000](#) [1282.6000](#)
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