

# MAX20084 Evaluation Kit/ MAX20084 Evaluation System

Evaluates: MAX20084

## General Description

The MAX20084 evaluation kit (EV kit) is a fully assembled and tested surface-mount PCB used to evaluate MAX20084 automotive dual-antenna power supply with I<sup>2</sup>C interface. Each channel can be independently configured to operate either as a switch or as an LDO with regulated adjustable output voltage using I<sup>2</sup>C. The EV kit demonstrates the device's features: adjustable current limit, adjustable overcurrent detection, adjustable open-load detection, and adjustable warning-current detection. The output current of each channel can be monitored using I<sup>2</sup>C or by measuring an analog output voltage. The EV kit exposes an I<sup>2</sup>C interface that can operate in conjunction with either the MINIQUSB+ adapter or a third-party I<sup>2</sup>C master, such as a general-purpose microcontroller. The EV kit also includes Windows-compatible software that provides a simple graphical user interface (GUI) for exercising the features of the IC. The EV system includes both the EV kit and the MINIQUSB+ adapter board.

## Benefits and Features

- 4.5V to 28V Wide Input Voltage Range (40V Load-Dump Tolerant)
- 2-Channel LDO/Switch
  - Adjustable Output Voltage using I<sup>2</sup>C
- Output Current Monitoring
  - Analog Output
  - I<sup>2</sup>C ADC
- Open-Drain Fault Indicator
- High-Voltage Enable Control Input (EN)
- Proven PCB Layout
- Fully Assembled and Tested

## MAX20084 EV Kit Files

FILE	DESCRIPTION
MAX20084GUISetupVxx.exe	Windows GUI Installer

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

## Quick Start

### Required Equipment

- MAX20084 EV kit
- 12V, 1A power supply
- Voltmeter
- MINIQUSB+ interface board with USB cable
- User-supplied Windows-compatible PC with spare USB port

**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.

### Procedure

The EV kit is fully assembled and tested. Perform the following steps to verify board operation:

- 1) Install the EV kit software (GUI) on your PC by running the MAX20084GUISetupVxx.exe program. The EV kit software application is installed complete with the required MINIQUSB+ drivers.
- 2) Verify that shunts are installed across pins 1 and 2 on jumpers J2–J5.
- 3) Connect the MINIQUSB+ interface board's P3 header to the J1 header on the EV kit.
- 4) Connect the positive terminal of the power supply to the VIN PCB pad and the negative terminal to the GND3 PCB pad.
- 5) Set the power supply  $V_{IN}$  at 12V.
- 6) Turn on the power supply.
- 7) Verify that the green LED (DS2) is on.
- 8) Launch the EV kit software application.
- 9) From the EV kit software toolbar, select **Device → Scan for Address**. The GUI scans the I<sup>2</sup>C bus for available slave addresses on the bus and selects the first one (in this case, the MAX20084 I<sup>2</sup>C address). Press **OK** once the MAX20084 I<sup>2</sup>C address has been found.

- 10) Verify that the status bar in the bottom-right corner of the GUI displays **EV Kit: Connected**, as shown in [Figure 1](#).
- 11) In the **GENERAL SETTINGS** group box, check **MASKOL** and then press the **EN\_ALL** button.
- 12) Both channels should be turned on and outputting 5V; **FAULT PIN** status should be green.
- 13) For more details on how to use the GUI and all available features, click on the GUI Help menu item.

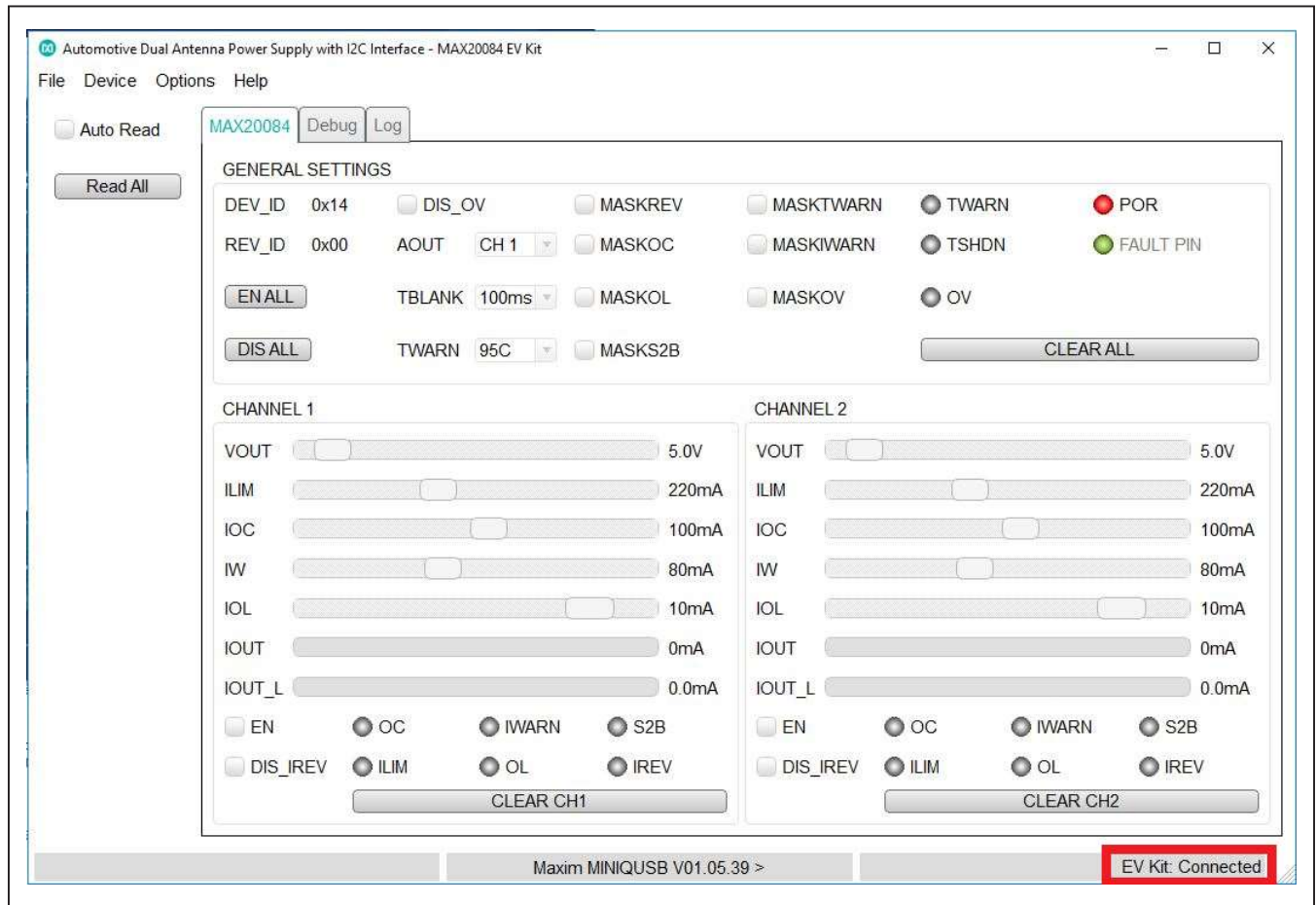


Figure 1. MAX20084 Evaluation Kit Software (GUI)

## Detailed Description of Hardware

Example jumper settings in the following tables illustrate features of the MAX20084 EV kit.

### Digital Domain Voltage (J2)

The EV kit exposes open-drain digital signals (FLT, SDA, and SCL) that are pulled up to what is referred to as the digital domain voltage.

Digital domain voltage can be selected between the MAX20084 internal-regulator voltage (PVL) and the fixed 3.3V provided by the MINIUSB+. Alternatively, you can force an external voltage as digital reference (see [Table 1](#)).

### Enable (J3)

The MAX20084 IC can be disabled by connecting the EN pin to ground, reducing the current consumption to its minimum value. Furthermore, an external digital signal can be used to enable/disable the IC (see [Table 2](#)).

**Table 1. Jumper Functions (J2)**

SHUNT POSITION	DIGITAL DOMAIN
1-2*	PVL
2-3	3.3V (with MINIUSB+ connected)
Open	Externally provided (J2, pin 2)

\*Default Position

**Table 2. Jumper Functions (J3)**

SHUNT POSITION	MAX20084
1-2*	Enabled
2-3	Disabled
Open	Externally controlled through digital signal (J3, pin 2)

\*Default Position

### I<sup>2</sup>C Slave Address (J4)

The IC's 7-bit I<sup>2</sup>C slave address can be selected between four options through the J4 jumper setting (see [Table 3](#)).

**Note:** Do not leave J4 open.

### Power LED Enable (J5)

A green LED (DS2) is used to indicate that the EV kit is powered on. The LED can be disconnected from the power supply, allowing precise current-consumption evaluation. See [Table 4](#) for shunt positions.

**Table 3. Jumper Functions (J4)**

SHUNT POSITION	7-BIT I <sup>2</sup> C SLAVE ADDRESS
1-2*	0x3C
1-3	0x3D
1-4	0x3B
1-5	0x3A

\*Default Position

**Table 4. Jumper Functions (J5)**

SHUNT POSITION	DS2 POWER LED
1-2*	Connected
Open	Disconnected

\*Default Position

## Ordering Information

PART	TYPE
MAX20084EVKIT#	EV Kit
MAX20084EVSYS#	EV System

#Denotes RoHS compliant.

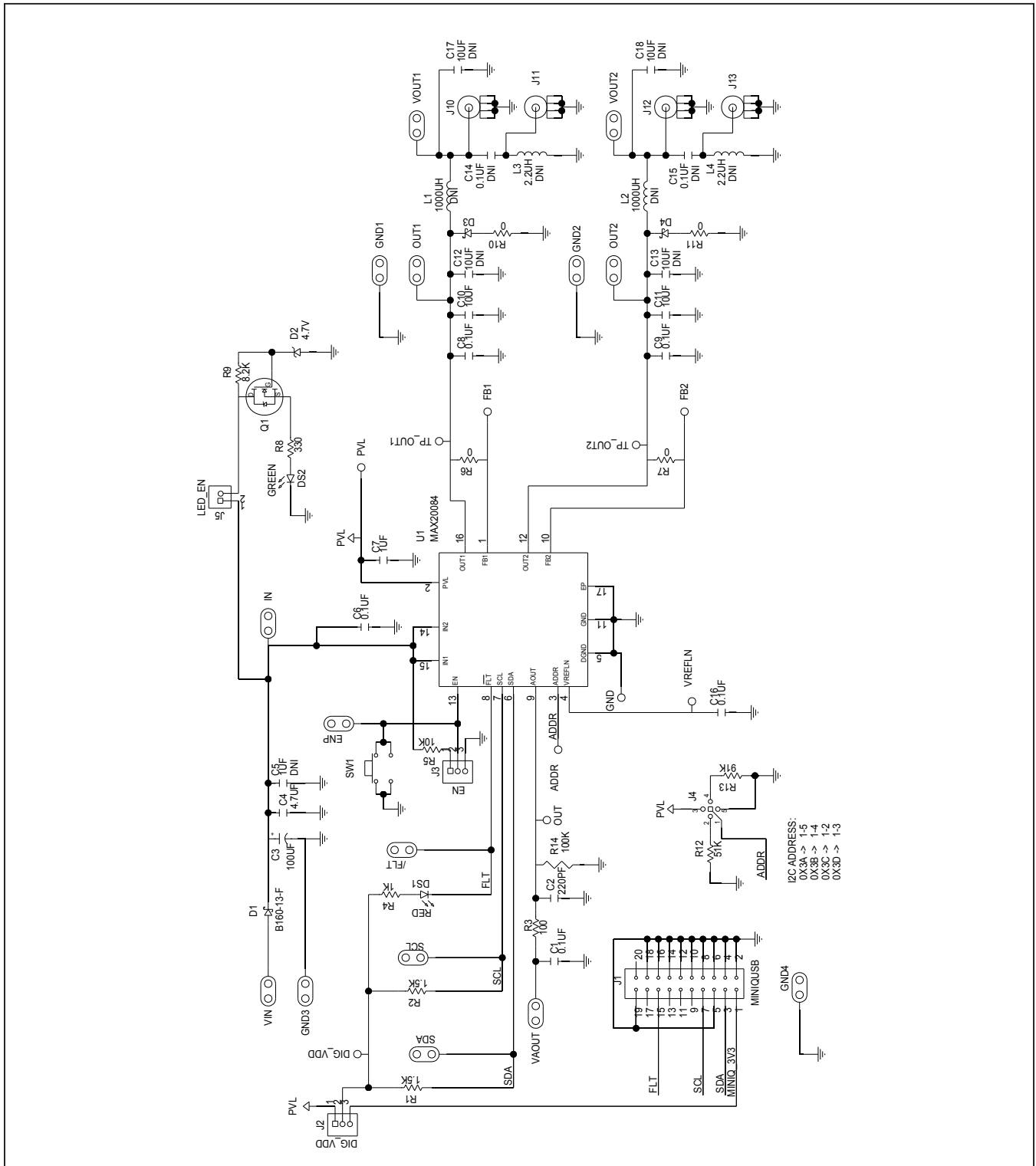
MAX20084 Evaluation Kit/  
MAX20084 Evaluation System

Evaluates: MAX20084

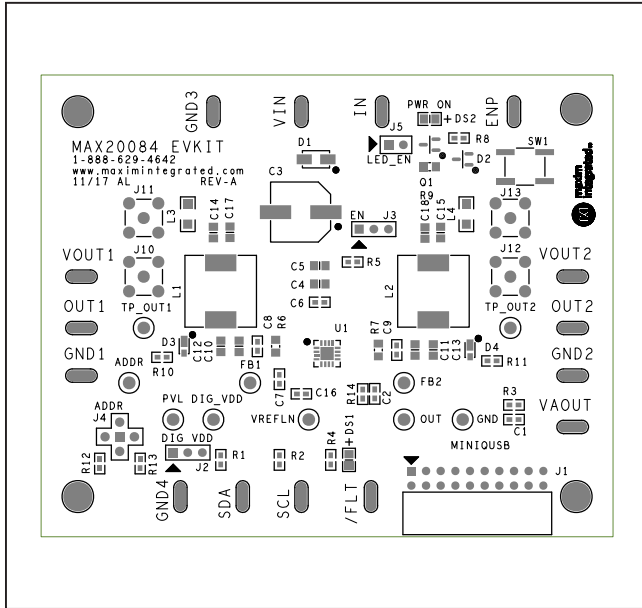
MAX20084 EV Kit Bill of Materials

ITEM	REF DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
1	IN, ENP, SCL, SDA, VIN, /FLT, GND1-GND4, OUT1, OUT2, VAOUT, VOUT1, VOUT2	-	15	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE, NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG	
2	FB1, FB2, OUT, PVL, ADDR, VREFLN, DIG_VDD, TP_OUT1, TP_OUT2	-	9	5005	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.35IN; BOARD HOLE=0.063IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;	
3	C1, C6, C8, C9, C16	-	5	CGA3E3X752A104K080AB	TDK	0.1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 0.1UF; 100V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7S	
4	C2	-	1	GRM188R71H221KA01	MURATA	220PF	CAPACITOR; SMT (0603); CERAMIC CHIP; 220PF; 50V; TOL=10%; MODEL=GRM SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7R	
5	C3	-	1	MAL214699103E3	VISHAY BCCOMPONENTS	100UF	CAPACITOR; SMT; ALUMINUM-ELECTROLYTIC; 100UF; 50V; TOL=20%	
6	C4	-	1	C2012X5R1H475K125AB	TDK	4.7UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 4.7UF; 50V; TOL=10%; MODEL=; TG=-55 DEGC TO +85 DEGC; TC=X5R	
7	C7	-	1	GRM188R71E105KA12D; CGA3E1X7R1E105K; TMK107B7105KA; 0603C105KAT2A	MURATA;TDK; TAIYO YUDEN; AVX	1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 1UF; 25V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
8	C10, C11	-	2	GRM21B271E106KE15	MURATA	10UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 10UF; 25V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
9	D1	-	1	B160-13-F	DIODES INCORPORATED	B160-13-F	DIODE; SCH; SMA; PIV=60V; IF=1A	
10	D2	-	1	BZX84C 4V7	FAIRCHILD SEMICONDUCTOR	4.7V	DIODE; ZNR; SMT (SOT-23); PIV=4.7V; IF=0.25A	
11	D3, D4	-	2	MSS1P2L-M3/89A	VISHAY GENERAL SEMICONDUCTOR	MSS1P2L-M3/89A	DIODE; SCH; SMT (MICROSPM); PIV=20V; IF=1A	
12	DS1	-	1	LTST-C170EKT	LITE-ON ELECTRONICS INC	LTST-C170EKT	DIODE; LED; STANDARD; RED; SMT (0805); PIV=2.0V; IF=0.02A	RED
13	DS2	-	1	LTST-C170GKT	LITE-ON ELECTRONICS INC	LTST-C170GKT	DIODE; LED; STANDARD; GREEN; SMT (0805); PIV=2.1V; IF=0.01A	GREEN
14	GND	-	1	5006	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.35IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;	
15	J1	-	1	803-87-020-20-001101	PRECI-DIP SA	803-87-020-20-001101	EVKIT PART-CONNECTOR; FEMALE; TH; DOUBLE ROW; 2.54MM; RIGHT ANGLE SOLDER TAIL; MATING PIN DIA 0.76MM; RIGHT ANGLE; 20PINS;	
16	J2, J3	-	2	PEC035AAN	SULLINS ELECTRONICS CORP.	PEC035AAN	EVKIT PART-CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS; -65 DEGC TO +125 DEGC;	
17	J4	-	1	PBC055AAN	SULLINS ELECTRONICS CORP.	PBC055AAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 5PINS; -65 DEGC TO +125 DEGC	
18	J5	-	1	PBC025AAN	SULLINS ELECTRONICS CORP.	PBC025AAN	EVKIT PART-CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS; -65 DEGC TO +125 DEGC;	
19	J10-J13	-	4	73391-0060	MOLEX	73391-0060	CONNECTOR; FEMALE; THROUGH HOLE; SMA JACK CONNECTOR; STRAIGHT; 5PINS	
20	Q1	-	1	B5S138LT1G	ON SEMICONDUCTOR	B5S138LT1G	TRAN; POWER MOSFET; N-CHANNEL; NCH; SOT-23; PD-(0.225W); I-(0.2A); V-(50V)	
21	R1, R2	-	2	CRCW06031K50JN	VISHAY DALE	1.5K	RESISTOR; 0603; 1.5K OHM; 5%; 200PPM; 0.10W; METAL FILM	
22	R3	-	1	CRCW0603100RFKEAHP	VISHAY DRALORIC	100	RESISTOR; 0603; 100 OHM; 1%; 100PPM; 0.25W; THICK FILM	
23	R4	-	1	ERJ-3GEY102V	PANASONIC	1K	RESISTOR; 0603; 1K OHM; 5%; 200PPM; 0.10W; THICK FILM	
24	R5	-	1	RC0603FR-0710KL	YAGEO	10K	RESISTOR; 0603; 10K OHM; 1%; 100PPM; 0.1W; THICK FILM	
25	R6, R7	-	2	CR0805-10W-000	VENKEL LTD.	0	RESISTOR; 0805; 0 OHM; 0.1W; THIN FILM	
26	R8	-	1	CRCW0603330RFK	VISHAY DALE	330	RESISTOR; 0603; 330 OHM; 1%; 100PPM; 0.10W; THICK FILM	
27	R9	-	1	CRCW08058K20FK	VISHAY DALE	8.2K	RESISTOR; 0805; 8.2K OHM; 1%; 100PPM; 0.125W; THICK FILM	
28	R10, R11	-	2	CRCW0603000020EAHP	VISHAY DRALORIC	0	RESISTOR; 0603; 0 OHM; 0%; JUMPER; 0.25W; THICK FILM	
29	R12	-	1	ERJ-3EKF5102	PANASONIC	51K	RESISTOR; 0603; 51K OHM; 1%; 100PPM; 0.1W; THICK FILM	
30	R13	-	1	ERJ-3EKF9102	PANASONIC	91K	RESISTOR; 0603; 91K OHM; 1%; 100PPM; 0.1W; THICK FILM	
31	R14	-	1	ERJ-3EKF1003	PANASONIC	100K	RESISTOR; 0603; 100K OHM; 1%; 100PPM; 0.1W; THICK FILM	
32	SW1	-	1	EVQ-Q2K03W	PANASONIC	EVQ-Q2K03W	SWITCH; SPST; SMT; 15V; 0.02A; LIGHT TOUCH SWITCH; RCOL= OHM; RINSULATION= OHM; PANASONIC	
33	U1	-	1	MAX20084ATEA/VV+	MAXIM	MAX20084ATEA/VV+	EVKIT PART-IC; INFC; AUTOMOTIVE DUAL ANTENNA POWER SUPPLY WITH SERIAL INTERFACE; PACKAGE CODE: T1644Y-4C; PACKAGE LAND PATTERN: 90-0070; TQFN16-EP	
34	PCB	-	1	MAX20084	MAXIM	PCB	PCB;MAX20084	
35	C5	DNP	0	CGA4J3X752A105K125AB	TDK	1UF	CAPACITOR; SMT (0805); CERAMIC; 1UF; 100V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7S; AUTO	
36	C12, C13, C17, C18	DNP	0	GRM21B271E106KE15	MURATA	10UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 10UF; 25V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
37	C14, C15	DNP	0	CGJ4J3X772D104K125	TDK	0.1UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 0.1UF; 200V; TOL=10%; MODEL=CGJ SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7T	
38	L1, L2	DNP	0	74477130	WURTH ELECTRONICS INC.	1000UH	INDUCTOR; SMT; SHIELDED; 1000UH; 20%; 0.43A	
39	L3, L4	DNP	0	AIML-1206HC-2R2M	ABRACON	2.2UH	INDUCTOR; SMT (1206); FERRITE CHIP; 2.2UH; TOL=+-20%; 1.3A	
TOTAL			69					

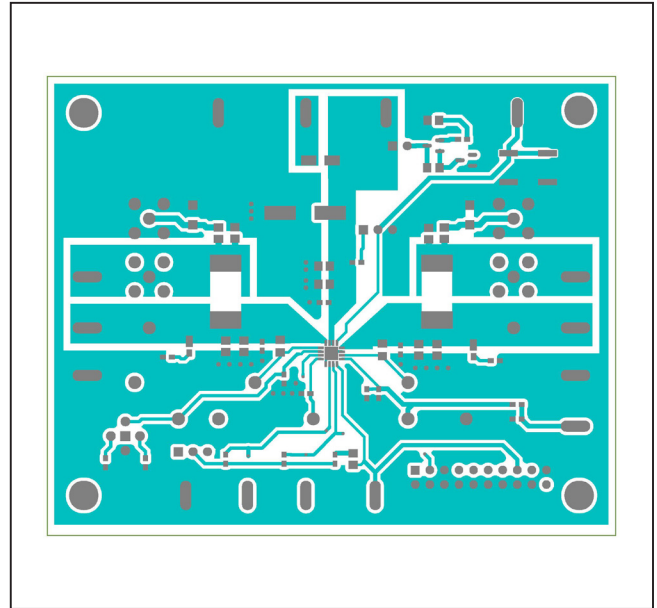
MAX20084 EV Kit Schematic



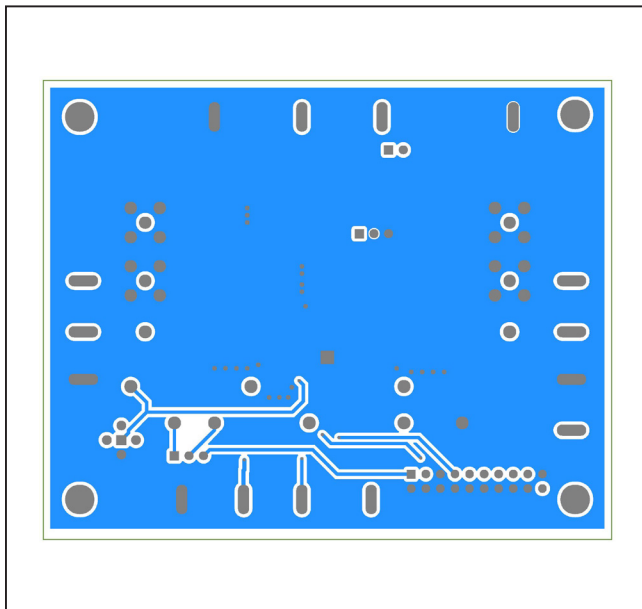
MAX20084 EV PCB Layouts



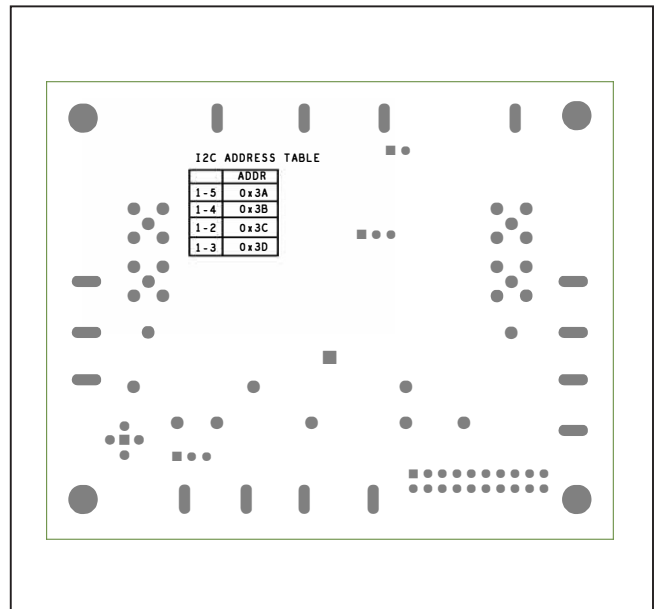
Silk\_Top



Top



Bottom



Silk\_Bottom

## Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	8/18	Initial release	—
1	9/18	Updated part number, <i>Ordering Information</i> , and <i>MAX20084 EV Kit Bill of Materials</i>	1–7

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim's website at [www.maximintegrated.com](http://www.maximintegrated.com).

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