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Evaluates: MAX20084/ MAX20084B

MAX20084 Evaluation Kit/ MAX20084 Evaluation System

General Description

The MAX20084 evaluation kit (EV kit) is a fully assembled and tested surface-mount PCB used to evaluate the MAX20084/MAX20084B automotive dual-antenna power supply with I²C interface. Each channel can be independently configured to operate either as a switch or as an LDO with regulated adjustable output voltage using I²C. 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 I²C or by measuring an analog output voltage. The EV kit exposes an I²C interface that can operate in conjunction with either the MINIQUSB+ adapter or a third-party I²C 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 I²C
- Output Current Monitoring
  - Analog Output
  - I²C ADC
- Open-Drain Fault Indicator
- High-Voltage Enable Control Input (EN)
- Proven PCB Layout
- Fully Assembled and Tested

MAX20084 EV Kit Files

FILE	DECRIPTION
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 I²C bus for available slave addresses on the bus and selects the first one (in this case, the MAX20084 I²C address). Press **OK** once the MAX20084 I²C address has been found.

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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.

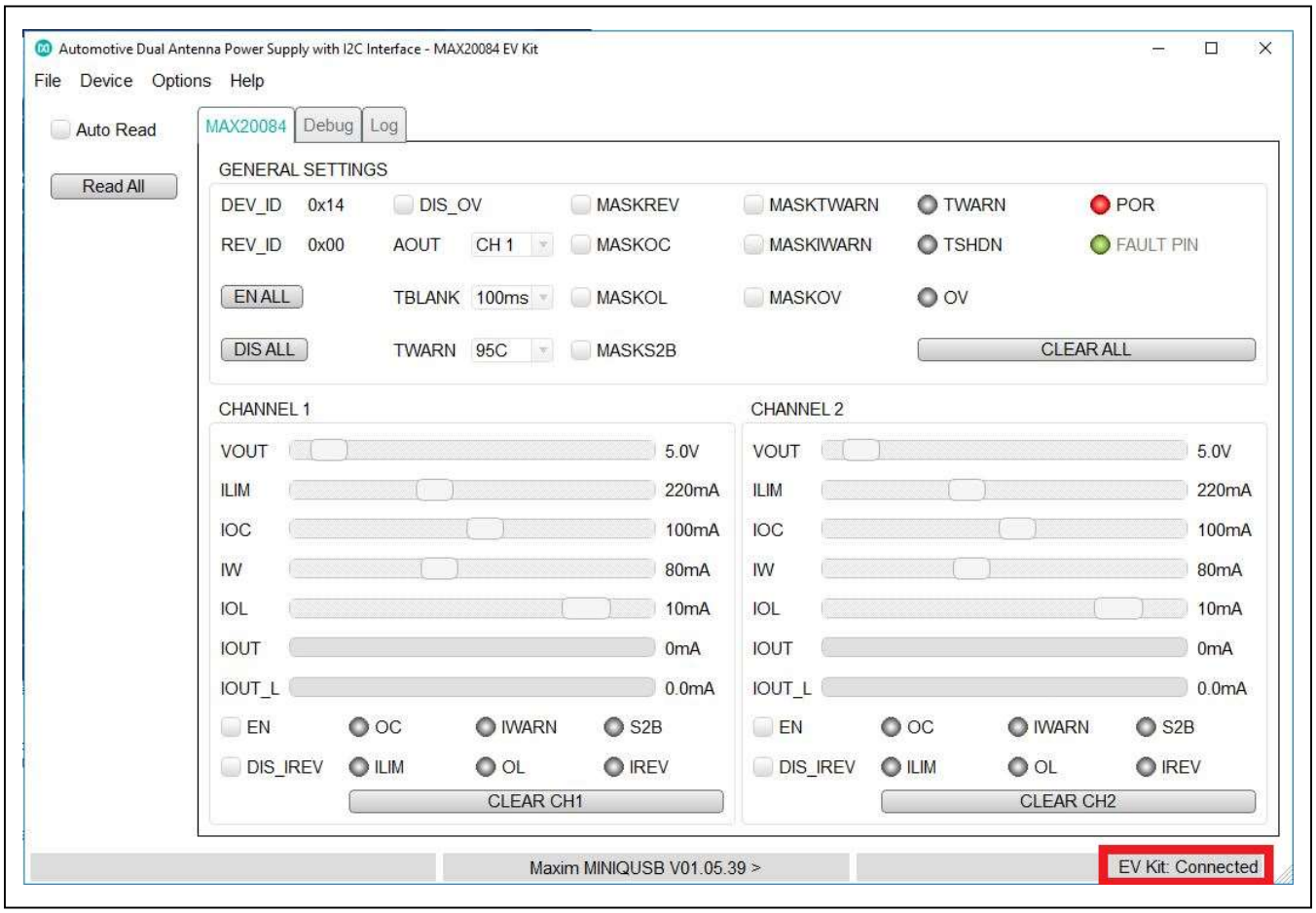


Figure 1. MAX20084 Evaluation Kit Software (GUI)

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/MAX20084B internal-regulator voltage (PVL) and the fixed 3.3V provided by the MINQUSB+. Alternatively, you can force an external voltage as digital reference (see *Table 1)*.

Enable (J3)

The MAX20084/MAX20084B 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*).

I²C Slave Address (J4)

The IC's 7-bit I²C 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 1. Jumper Functions (J2)

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

**Default Position*

Table 2. Jumper Functions (J3)

SHUNT POSITION	MAX20084/MAX20084B
1-2*	Enabled
2-3	Disabled
Open	Externally controlled through digital signal (J3, pin 2)

**Default Position*

Table 3. Jumper Functions (J4)

SHUNT POSITION	7-BIT I²C 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

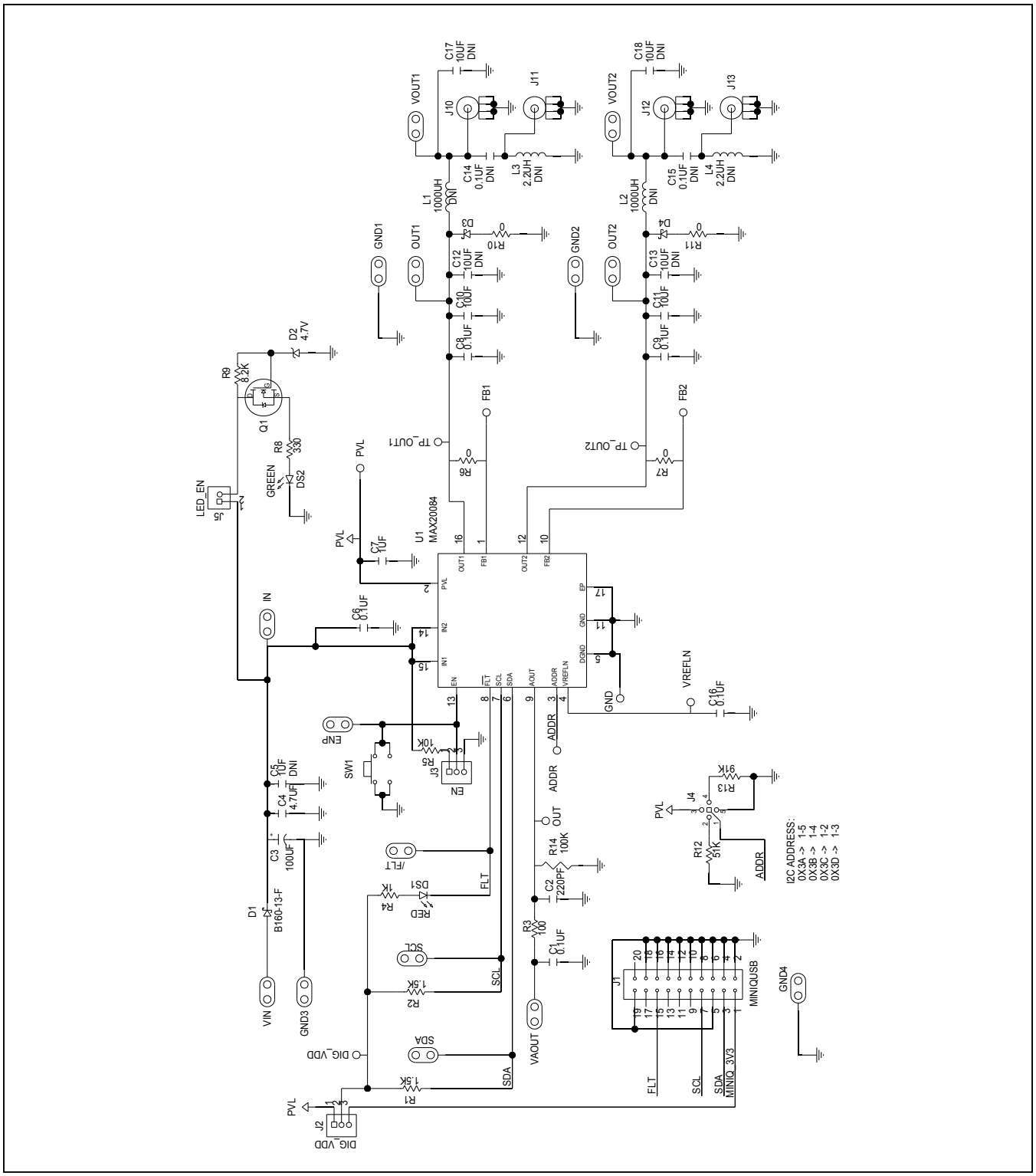
PART	TYPE
MAX20084EVKIT#	EV Kit
MAX20084EVSYS#	EV System

#Denotes RoHS compliant.

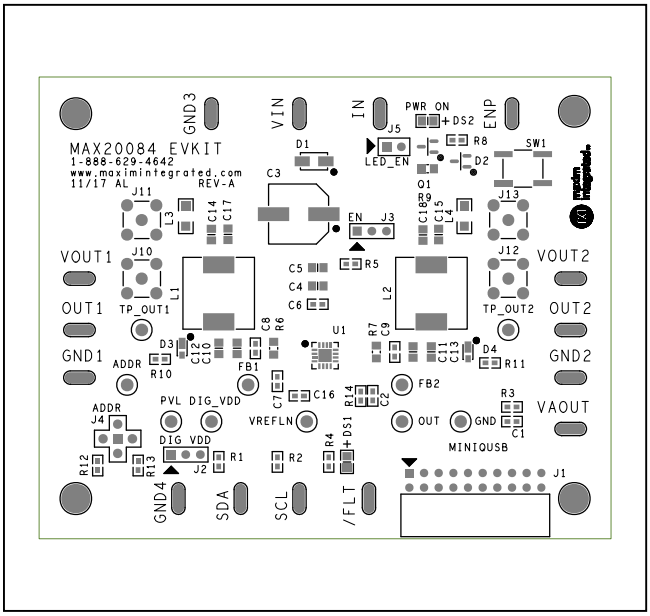
MAX20084 EV Kit Bill of Materials

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	CGA3E3X7S2A104K080AB	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; 06033C105KAT2A	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	GRM21BZ71E106KE15	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 (MICROSMP); 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	PEC03SAAN	SULLINS ELECTRONICS CORP.	PEC03SAAN	EVKIT PART-CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS; -65 DEGC TO +125 DEGC;	
17	J4	-	1	PBC05SAAN	SULLINS ELECTRONICS CORP.	PBC05SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 5PINS; -65 DEGC TO +125 DEGC	
18	J5	-	1	PBC02SAAN	SULLINS ELECTRONICS CORP.	PBC02SAAN	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	BSS138LT1G	ON SEMICONDUCTOR	BSS138LT1G	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-3GEYJ102V	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	CRCW06030000Z0EAHP	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; RCOIL= OHM; RINSULATION= OHM; PANASONIC	
33	U1	-	1	MAX20084BATEA/VY+	MAXIM	MAX20084BATEA/VY+	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	CGA4J3X7S2A105K125AB	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	GRM21BZ71E106KE15	MURATA	10UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 10UF; 25V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	
37	C14, C15	DNP	0	CGJ4J3X7T2D104K125	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



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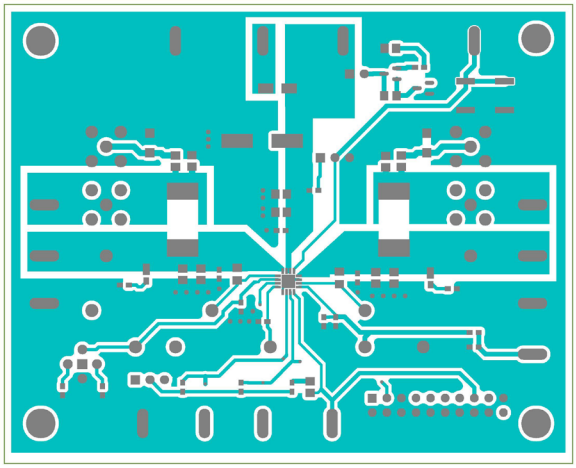

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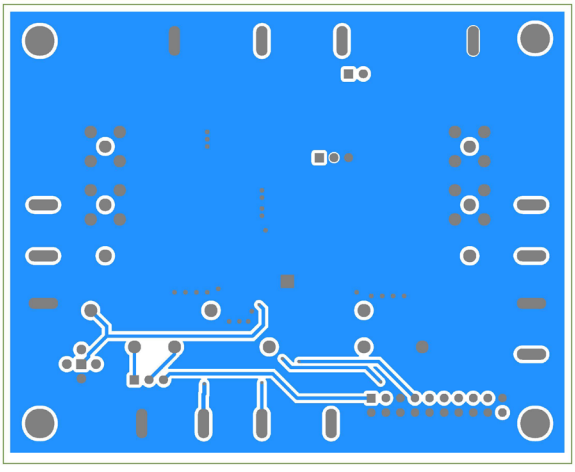

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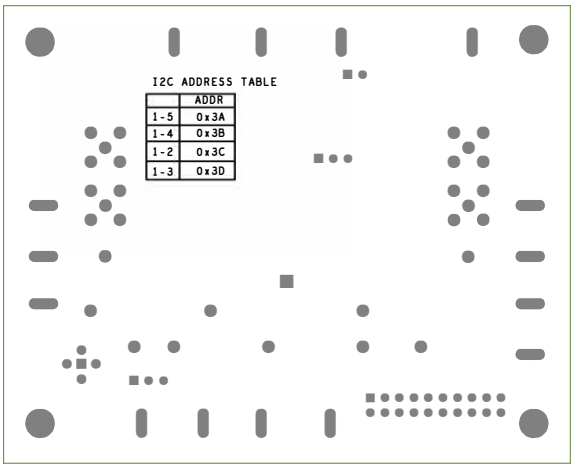

Silk_Bottom

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	8/18	Initial release	—
1	9/18	Updated part number, *Ordering Information*, and *MAX20084 EV Kit Bill of Materials*	1–7
2	9/21	Added reference to MAX20084B; updated title, *General Description*, *Detailed Description of Hardware*, and *MAX20084 EV Kit Bill of Materials*	1–7

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