

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 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 | 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 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.

- 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.

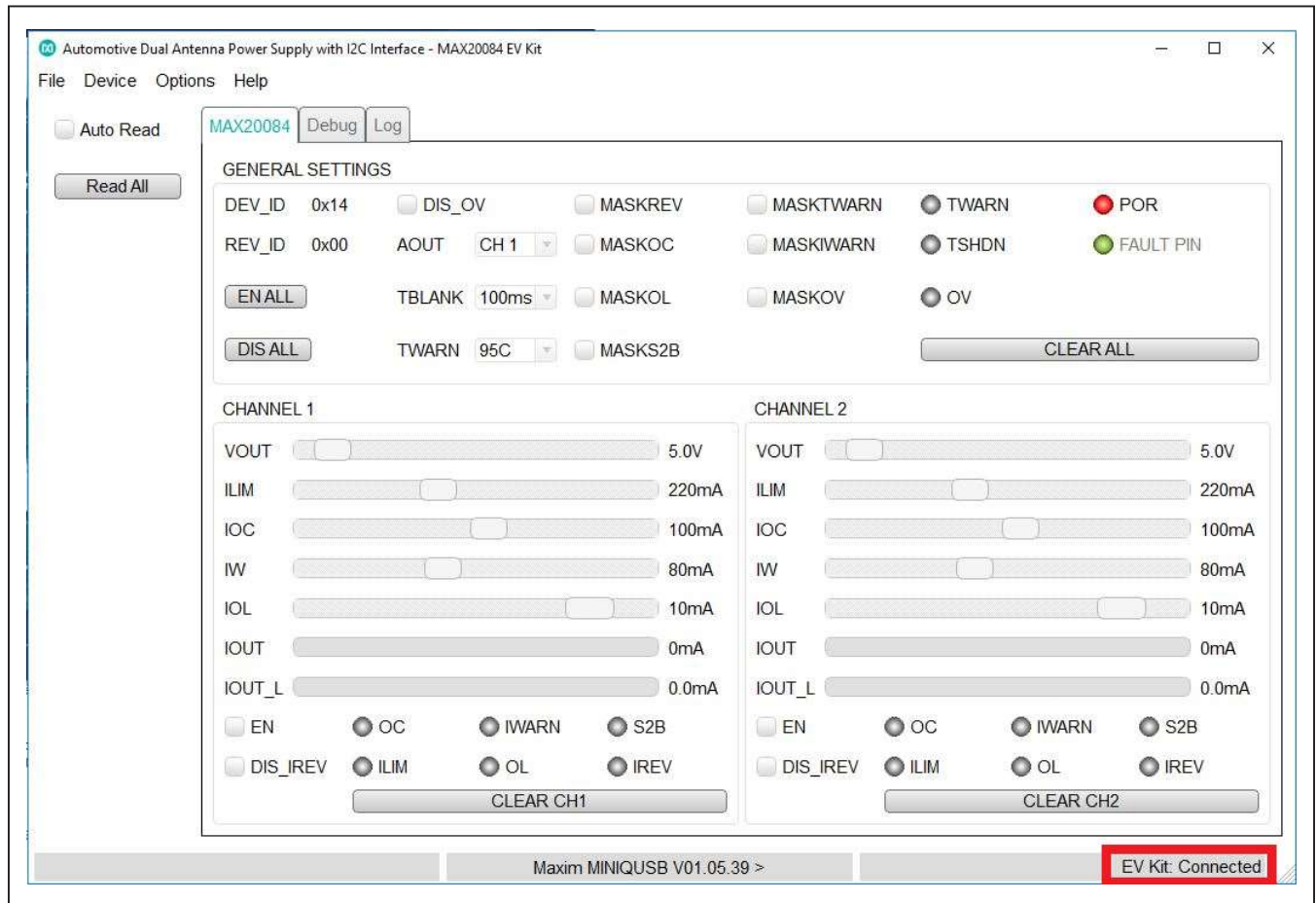


Figure 1. MAX20084 Evaluation Kit Software (GUI)

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 MINQUSB+. 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 MINQUSB+ 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

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 3. Jumper Functions (J4)

| SHUNT POSITION | 7-BIT I ² 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.

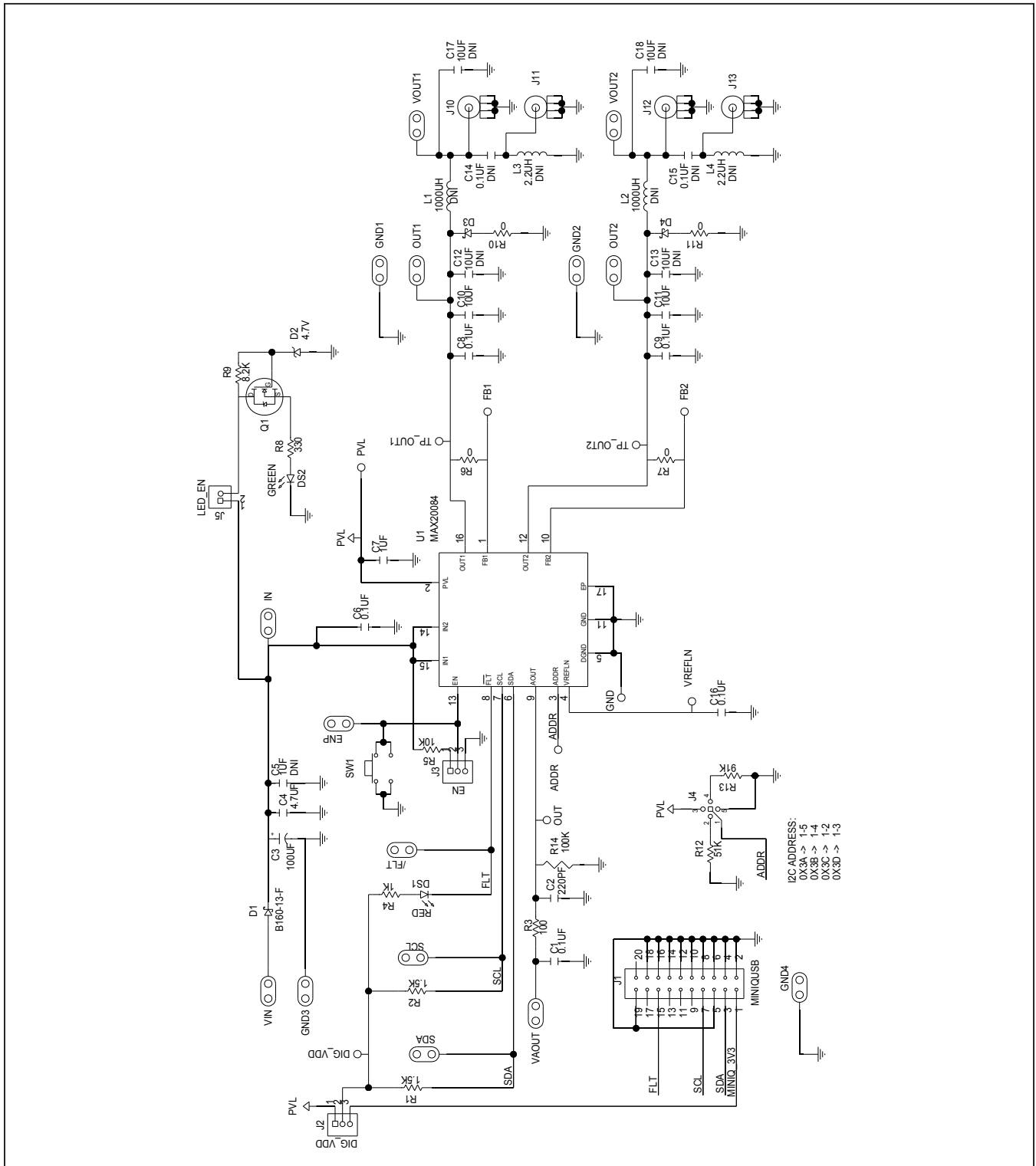
MAX20084 Evaluation Kit/
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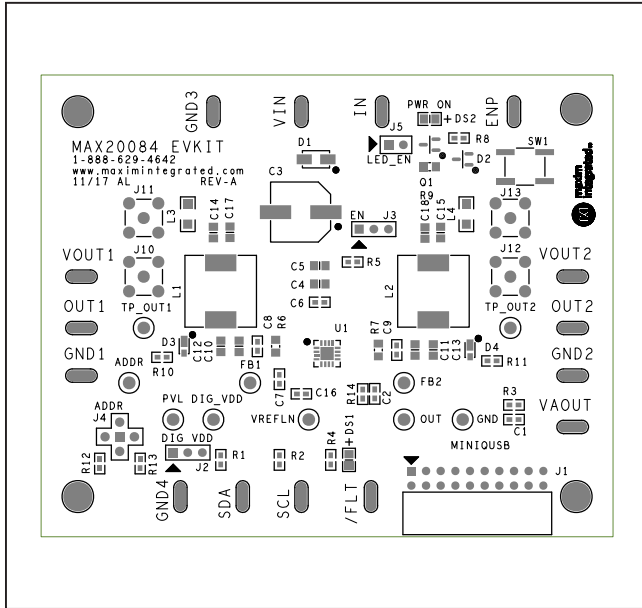
MAX20084 EV Kit Bill of Materials

| 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 | 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; 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 | | | | | |

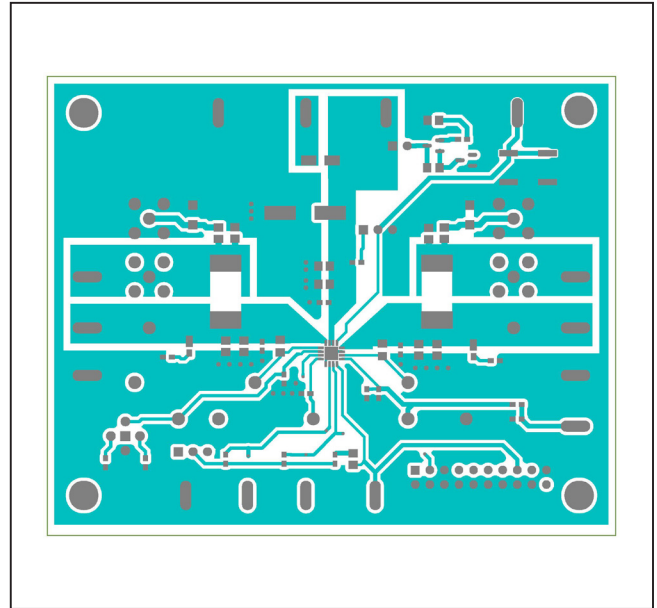
MAX20084 EV Kit Schematic



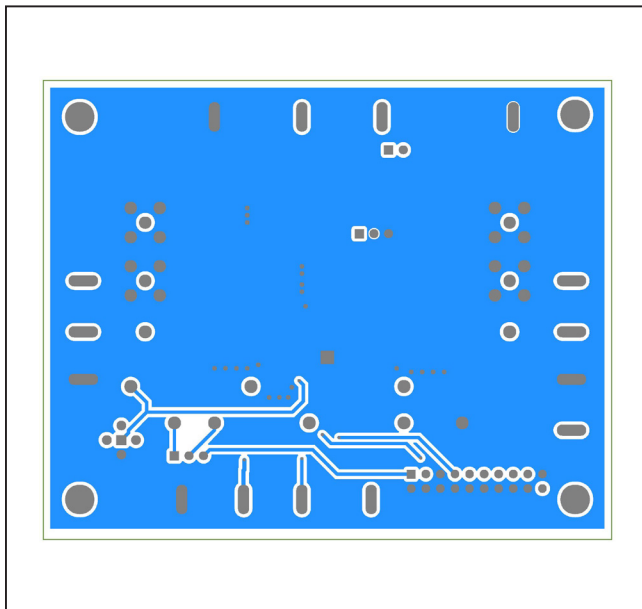
MAX20084 EV PCB Layouts



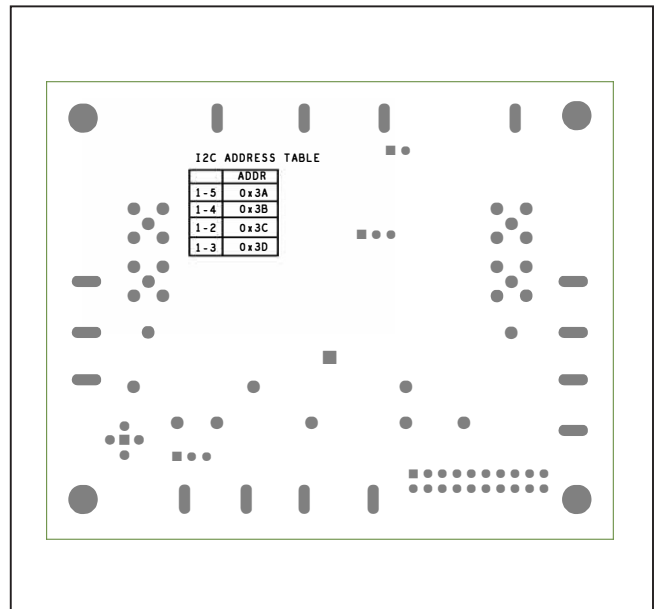
Silk_Top



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 |

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