

## General Description

The MAX2831 evaluation kit (EV kit) simplifies testing of the MAX2831 receive and transmit performance in 802.11g/b applications operating in the 2.4GHz to 2.5GHz ISM band. The EV kit provides 50Ω SMA connectors for all RF and baseband inputs and outputs. Differential-to-single-ended and single-ended-to-differential line drivers are provided to convert the differential I/Q baseband inputs and outputs to single ended.

## Component List

| DESIGNATION                                                                                                                               | QTY | DESCRIPTION                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------|
| C1                                                                                                                                        | 1   | 33pF ±5% capacitor (0402)<br>Murata GRM1555C1H330J           |
| C3, C16, C70,<br>C79, C81, C89                                                                                                            | 6   | 100pF ±5% capacitors (0402)<br>Murata GRM1555C1H101J         |
| C4                                                                                                                                        | 1   | 18pF ±5% capacitor (0402)<br>Murata GRM1555C1H180J           |
| C5, C7, C10,<br>C11, C13, C17,<br>C18, C21, C22,<br>C29, C40, C42,<br>C43, C45, C46,<br>C50, C52, C54,<br>C59, C60, C64,<br>C67, C83, C86 | 24  | 100nF ±10% capacitors (0402)<br>Murata GRM155R61A104K        |
| C6, C9, C30,<br>C41, C62, C73,<br>C74, C75, C87,<br>C88                                                                                   | 10  | 0.01μF ±10% capacitors (0402)<br>Murata GRM155R71C103K       |
| C8, C44, C48,<br>C49, C71, C72,<br>C77                                                                                                    | 0   | Not installed, capacitors                                    |
| C12, C51, C53,<br>C55, C63, C65,<br>C66                                                                                                   | 7   | 10μF ±20% tantalum capacitors<br>(R-case)<br>AVX TAJR106M006 |
| C61                                                                                                                                       | 1   | 10μF ±10% capacitor (1206)<br>Murata GRM31CR60J106K          |
| C68, C69                                                                                                                                  | 2   | 1.5pF ±0.25pF capacitors (0402)<br>Murata GRM1555C1H1R5C     |
| C76                                                                                                                                       | 1   | 1000pF ±10% capacitor (0402)<br>Murata GRM155R71H102K        |
| C78                                                                                                                                       | 1   | 2200pF ±10% capacitor (0402)<br>Murata GRM155R71H222K        |

## Features

- On-Board Line Driver and Voltage Reference
- 50Ω SMA Connectors on All RF and Baseband Ports
- PC Control Software Available at [www.maximintegrated.com](http://www.maximintegrated.com)

## Ordering Information

| PART          | TYPE   |
|---------------|--------|
| MAX2831EVKIT+ | EV Kit |

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

| DESIGNATION                                                                         | QTY | DESCRIPTION                                         |
|-------------------------------------------------------------------------------------|-----|-----------------------------------------------------|
| C80                                                                                 | 1   | 68pF ±5% capacitor (0402)<br>Murata GRM1555C1H680J  |
| C82                                                                                 | 1   | 10μF ±10% capacitor (0805)<br>Murata GRM21BR60J106K |
| J17                                                                                 | 0   | Not installed                                       |
| J18                                                                                 | 1   | DB25 right-angle male connector<br>AMP 5747238-4    |
| JPB1–JPB4,<br>JPB6, JPB7,<br>JPCSB, JPDIN,<br>JPLD, JPRXHP,<br>JPSCCLK,<br>JP SHDNB | 0   | Not installed                                       |
| L1, L2, L7                                                                          | 0   | Not installed                                       |
| LDO_IN, VREG                                                                        | 2   | 1 x 2 headers<br>Sullins PEC36SAAN                  |
| R1, R2, R6, R10,<br>R16, R17, R22,<br>R27                                           | 8   | 75Ω ±1% resistors (0402)                            |
| R3, R7, R18,<br>R23                                                                 | 4   | 3.3kΩ ±5% resistors (0402)                          |
| R4, R5, R21,<br>R26                                                                 | 4   | 49.9Ω ±1% resistors (0402)                          |
| R8, R9, R12,<br>R13, R28, R29,<br>R31, R32                                          | 8   | 0Ω ±1% resistors (0402)                             |
| R11, R30, R38,<br>R46, R50                                                          | 0   | Not installed, resistors                            |
| R14                                                                                 | 1   | 270Ω ±5% resistor (0402)                            |
| R39, R45                                                                            | 2   | 100Ω ±1% resistors (0402)                           |
| R43                                                                                 | 1   | 1kΩ ±1% resistor (0402)                             |
| R51                                                                                 | 1   | 1.2kΩ ±5% resistor (0402)                           |

## Component List (continued)

| DESIGNATION                                                                                                                                                                                                                                   | QTY | DESCRIPTION                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------------------------------|
| R52                                                                                                                                                                                                                                           | 1   | 750Ω ±5% resistor (0402)                            |
| R53                                                                                                                                                                                                                                           | 1   | 10kΩ ±5% resistor (0402)                            |
| T1                                                                                                                                                                                                                                            | 0   | Not installed                                       |
| T2, T3                                                                                                                                                                                                                                        | 2   | 2.4GHz RF baluns<br>Murata LDB212G4010C-001         |
| U1, U5                                                                                                                                                                                                                                        | 2   | Line drivers (16 SO)<br>Maxim MAX4447ESE+           |
| U2, U6                                                                                                                                                                                                                                        | 2   | Line receivers (16 SO)<br>Maxim MAX4444ESE+         |
| U3                                                                                                                                                                                                                                            | 1   | Low-dropout reference (3 SOT)<br>Maxim MAX6061BEUR+ |
| U4                                                                                                                                                                                                                                            | 1   | Transceiver (48 TQFN)<br>Maxim MAX2831ETM+          |
| U8, U9                                                                                                                                                                                                                                        | 2   | SN74LVTH244ADB<br>TI SN74LVTH244ADBR                |
| U10                                                                                                                                                                                                                                           | 0   | Not installed (optional)<br>Maxim MAX8882EUTJJ+     |
| Y1                                                                                                                                                                                                                                            | 1   | 40MHz crystal<br>Kyocera CX3225SB40000H0WZK21       |
| +5V, -5V, B1–B7,<br>CSB, DIN,<br>GND1, GND2,<br>LD, RSSI,<br>RXBBI+, RXBBI-,<br>RXBBQ+,<br>RXBBQ-, RXHP,<br>SCLK, SHDNB,<br>TPANTSEL,<br>TPCLKOUT,<br>TPRXTX,<br>TPTUNE,<br>TPTXCMIN,<br>TXBBI+ TXBBI-,<br>TXBBQ+,<br>TXBBQ-, VBAT,<br>VCCAUX | 33  | Test points<br>Keystone 5000                        |

| DESIGNATION                                                                                                                           | QTY | DESCRIPTION                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------|
| CLKOUT, FREF,<br>RXBBI, RXBBQ,<br>RXRF, TXBBI,<br>TXBBQ, TXRF                                                                         | 8   | SMA edge-mount connectors, round<br>Johnson 142-0701-801                           |
| VCCLNA,<br>VCCPA1,<br>VCCPA2,<br>VCCPLL,<br>VCCRBB1,<br>VCCRBB2,<br>VCCRXXMX,<br>VCCTXXMX,<br>VCCXTAL,<br>VCC_DB,<br>VCC_REF,<br>VREG | 0   | Not installed                                                                      |
| —                                                                                                                                     | 6   | Shunts (ANTSEL, LDO_IN,<br>RXBBBUF, RXTX, TXBBBUF,<br>VCCVCO)<br>Sullins SSC02SYAN |
| —                                                                                                                                     |     | PCB: MAX2830/1/2 EVALUATION<br>KIT                                                 |

## Component Suppliers

| SUPPLIER               | WEBSITE                                                                  |
|------------------------|--------------------------------------------------------------------------|
| AVX Corp.              | <a href="http://www.avx.com">www.avx.com</a>                             |
| Digi-Key Corp.         | <a href="http://www.digikey.com">www.digikey.com</a>                     |
| Johnson Components     | <a href="http://www.johnsoncomponents.com">www.johnsoncomponents.com</a> |
| Murata Americas        | <a href="http://www.murataamericas.com">www.murataamericas.com</a>       |
| Texas Instruments Inc. | <a href="http://www.ti.com">www.ti.com</a>                               |

**Note:** Indicate that you are using the MAX2831 when contacting these component suppliers.

## Quick Start

The MAX2831 EV kit is fully assembled and factory tested. Follow the instructions in the *Connections and Setup* section to test the devices.

## Test Equipment Required

This section lists the recommended test equipment to verify the operation of the MAX2831. It is intended as a guide only and substitutions may be possible:

- MAX2831 EV kit
- DC supply capable of delivering +5V and 200mA of continuous current
- DC supply capable of delivering -5V and 200mA of continuous current
- DC supply capable of delivering +3.3V and 300mA of continuous current
- DC supply capable of delivering +2.85V and 200mA of continuous current
- Two HP8648s or equivalent signal sources capable of generating 0dBm up to 3GHz
- 802.11b/g OFDM I/Q waveform generator
- HP8561E or equivalent RF spectrum analyzer with a minimum 100kHz to 3GHz frequency range
- TDS3012 or equivalent oscilloscope with 200MHz bandwidth
- HP437B power meter and power head
- PC laptop or tablet with Microsoft Windows XP®, Windows® 7, 8 OS and a USB port
- USB-A male to USB-B male cable
- US keyboard
- RF coupler

## Connections and Setup

This section provides step-by-step instructions for getting the EV kit up and running in all modes:

- 1) Install and run the MAX2831 control software, available for download at [www.maximintegrated.com/evkitsoftware](http://www.maximintegrated.com/evkitsoftware).
- 2) Connect the PC to the INTF3000 interface board using the USB-A male to USB-B male cable. On INTF3000, place a jumper between pins 1-2 on JU1 (VBUS Pos). Connect the 25-pin connector of the INTF3000 (J4) directly to the 25-pin connector on the EV kit (J18).

*Windows and Windows XP are registered trademarks and registered service marks of Microsoft Corporation.*

- 3) With the power supply turned off, connect a +2.85V power supply to VREG (pin 1, ■), VCCVCO (pins 2-3, ●●), and VCCAUX, and a +3.3V power supply to VBAT. Connect the power-supply ground to the header labeled GND1 or GND2.
- 4) With the power supply turned off, connect a +5V power supply to the +5V pin and a -5V power supply to the -5V pin. Connect the power-supply ground to the header labeled GND1 or GND2. Connect all the power-supply grounds together.
- 5) Turn on the +3.3V power supply, followed by the +2.85V power supply, +5V power supply, and -5V power supply.

## Receive Mode

- 1) Set the RXTX jumper across pins 2-3 (RX) to enable the receiver and disable the transmitter.
- 2) Use the power meter to calibrate the RF signal generator to deliver -100dBm at 2438MHz. After calibration, turn the RF signal generator off, disconnect it from the power meter, and connect it to the receive port of the MAX2831 EV kit.
- 3) On the register-setting page of the EV kit software, set the register setting to the recommended setting in the MAX2831 data sheet by clicking the “send all” button. On the entry page, confirm that the receive mode is set to “normal,” baseband filter is set to “RX,” and the RF frequency is tuned to 2437MHz. Maximize the LNA gain and adjust the baseband gain using the RX VGA gain setting to achieve 98dB of gain.
- 4) Connect the spectrum analyzer to either RXBBI or RXBBQ. Set the center frequency to 1MHz with a span of 500kHz.
- 5) Turn on the RF signal source. The output CW tone at 1MHz should be approximately -2dBm.

## Transmit Mode

- 1) Set the RXTX jumper across pins 1-2 (TX) to enable the transmitter and disable the receiver.
- 2) Connect a decoupler and a 10dB attenuator to the TXRF. Connect the spectrum analyzer and the power meter to the outputs of the decoupler.
- 3) Connect a 1MHz I/Q signal to TXBBI and TXBBQ. Set the input amplitude of each channel to 100mV<sub>RMS</sub>.

**Table 1. Jumper Functions**

| JUMPER          | SETTING  | FUNCTION                                                                           |
|-----------------|----------|------------------------------------------------------------------------------------|
| RXTX            | Pins 2-3 | Enable receive mode                                                                |
|                 | Pins 1-2 | Enable transmit mode                                                               |
| ANTSEL          | Pins 2-3 | Default                                                                            |
| TXBBBUF/RXBBBUF | Pins 1-2 | Enables the buffers                                                                |
|                 | Pins 2-3 | Disables the buffers                                                               |
| VREG            | Pins 1-2 | Short the jumper to provide voltage to the MAX2831 from the linear regulator (U10) |
| VCCVCO          | Pins 2-3 | Supply the VCCVCO from VREG                                                        |
|                 | Pins 1-2 | Supply the VCCVCO from the linear regulator (U10)                                  |

**Note:** A square symbol (■) on top-layer silkscreen indicates pin 1.

- 4) On the register-setting page of the EV kit software, set the register setting to the recommended register setting listed in the MAX2831 data sheet. Make sure that the transmitter mode is set to “normal,” baseband filter is set to “TX,” and the RF frequency is tuned to 2437MHz.
- 5) Enable the output of the baseband signal sources. The sideband, LO leakage, and the carrier appear at 2436MHz, 2437MHz, and 2438MHz, respectively. Adjust the TX gain sliding bar to observe the power level in the power meter reading.

### Power-Supply Layout

To minimize coupling between different sections of the IC, use a star power-supply routing configuration with a large decoupling capacitor at a central V<sub>CC</sub> node. The V<sub>CC</sub> traces branch out from this node, each going to a separate V<sub>CC</sub> node in the circuit. Place a bypass capacitor as close as possible to each supply pin. This arrangement provides local decoupling at each V<sub>CC</sub> pin. Use at least one via per bypass capacitor for a low-inductance ground connection. Do not share the capacitor ground vias with any other branch.

### Layout Considerations

The MAX2831 EV kit can serve as a guide for board layout. Keep PCB trace lengths as short as possible to minimize parasitic inductance. Also, keep decoupling capacitors as close to the IC as possible with a direct connection to the ground plane.

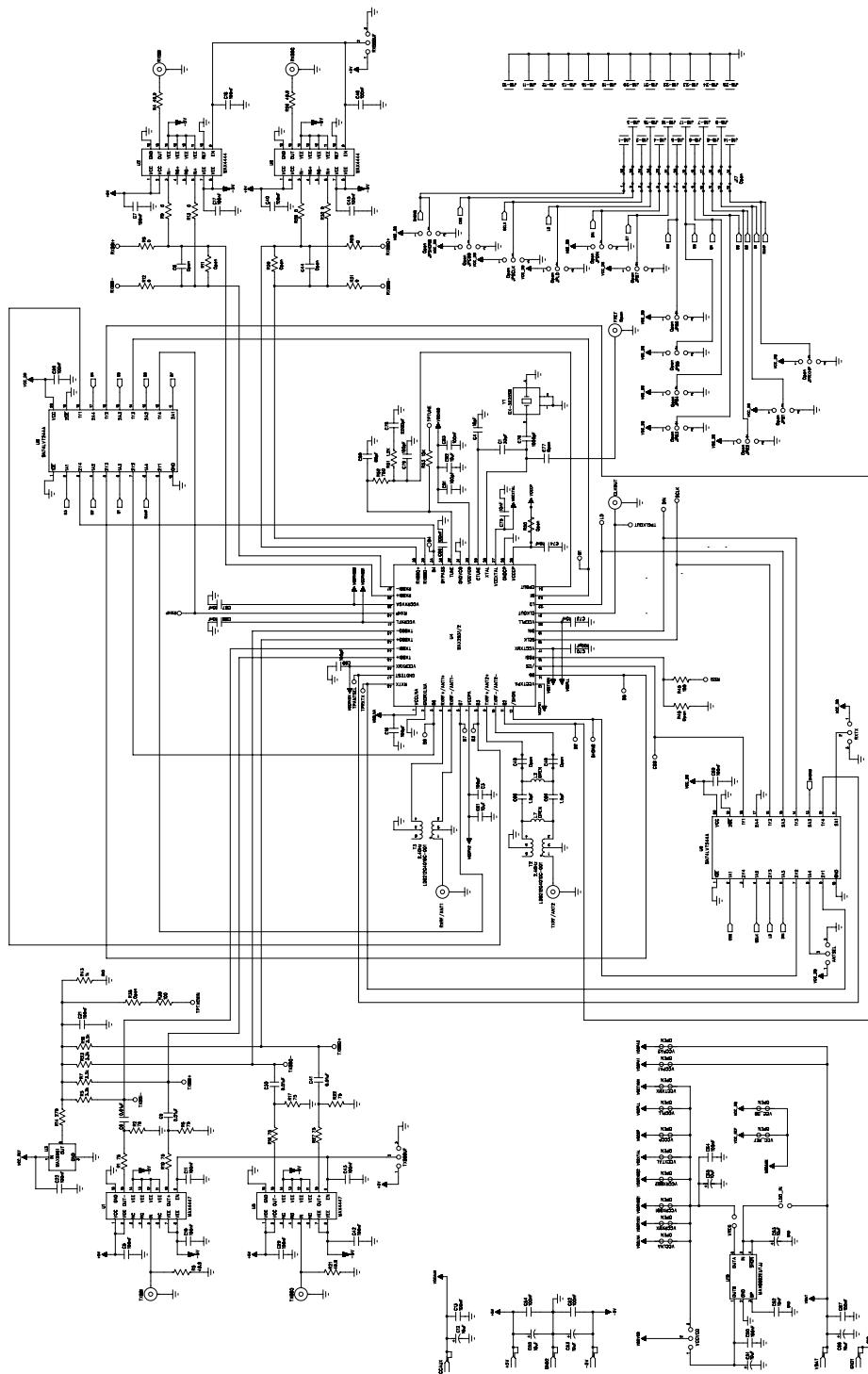


Figure 1. MAX2831 EV Kit Schematic

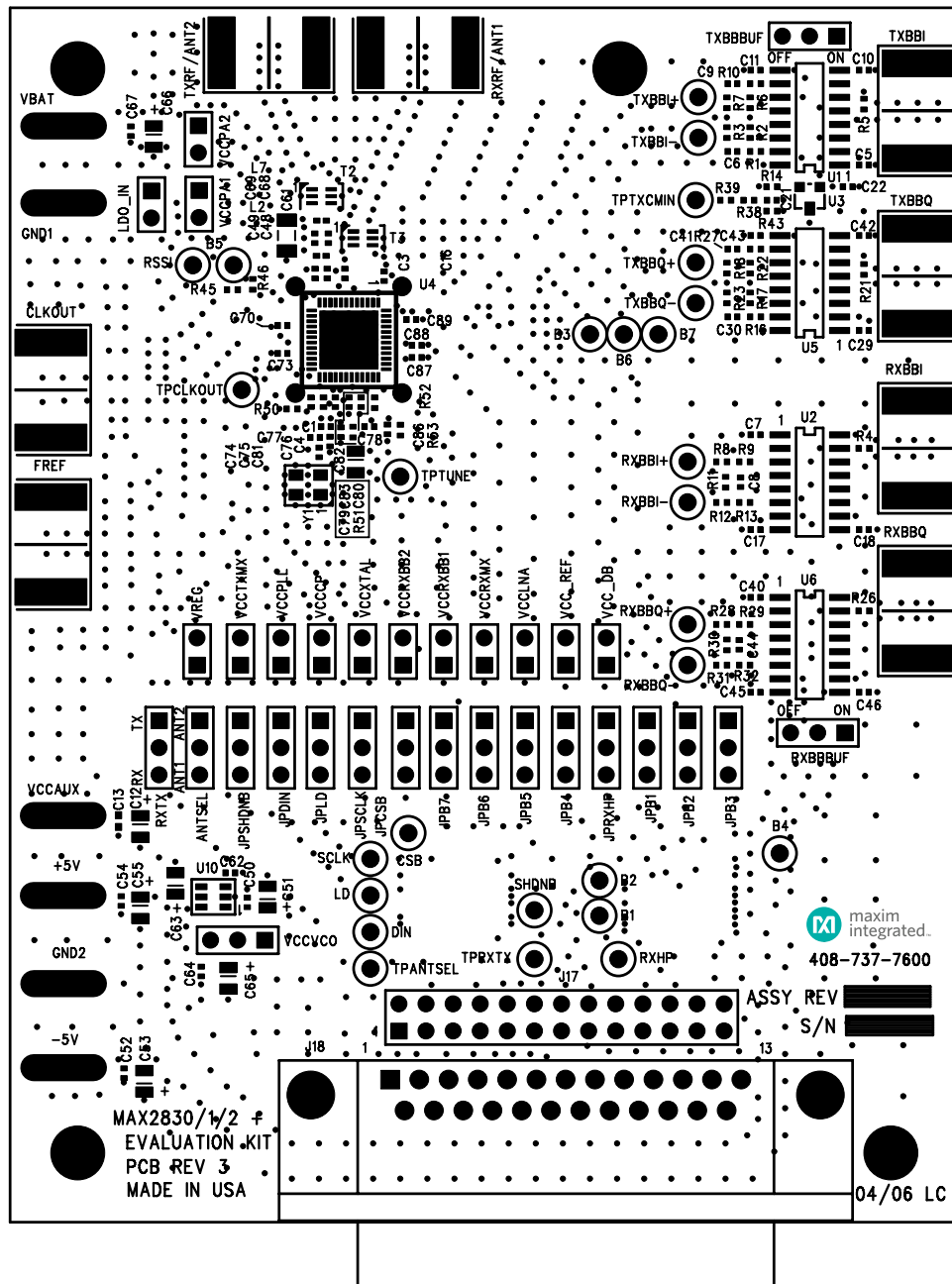


Figure 2. MAX2831 EV Kit PCB Layout—Top Silkscreen

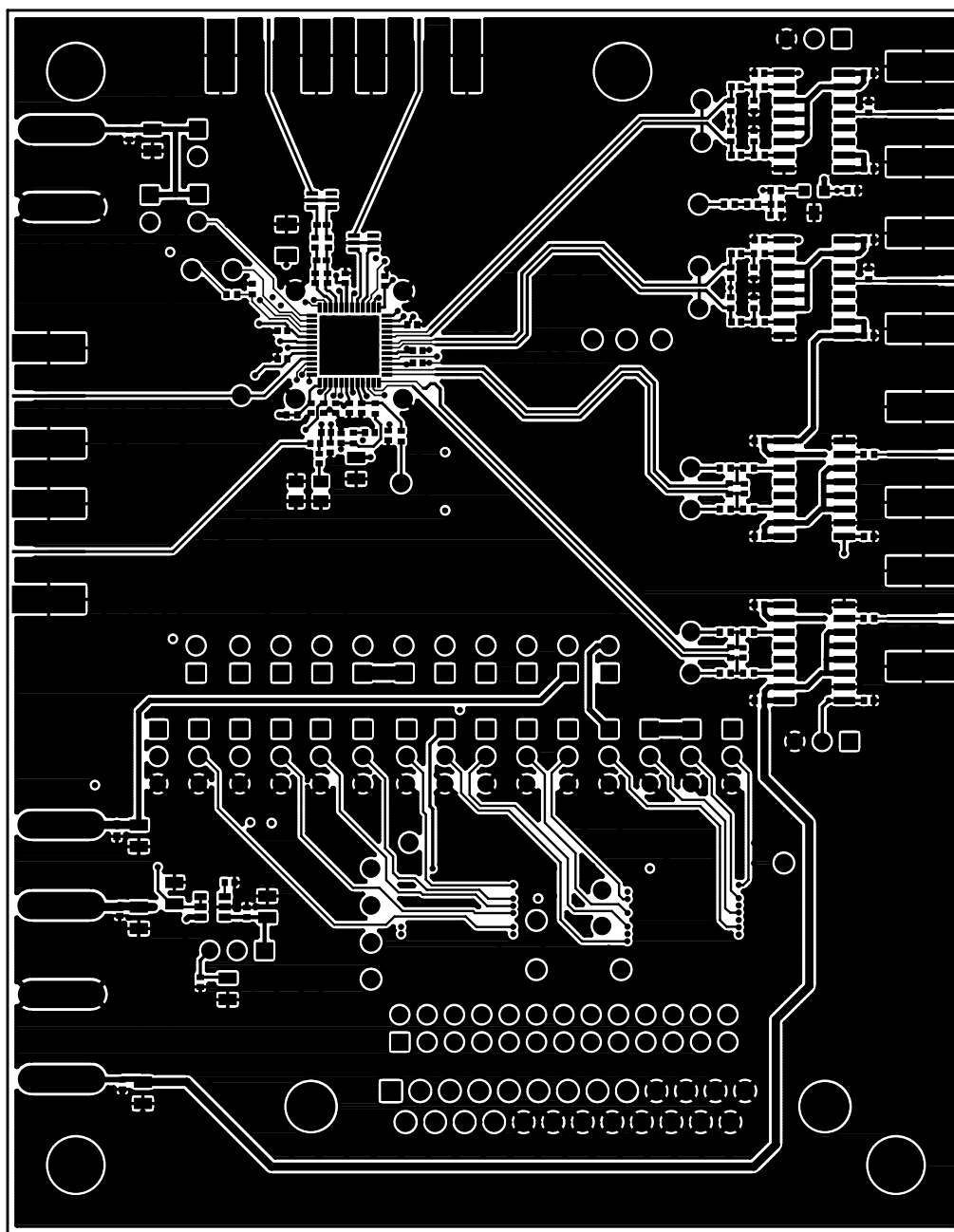


Figure 3. MAX2831 EV Kit PCB Layout—Component Side

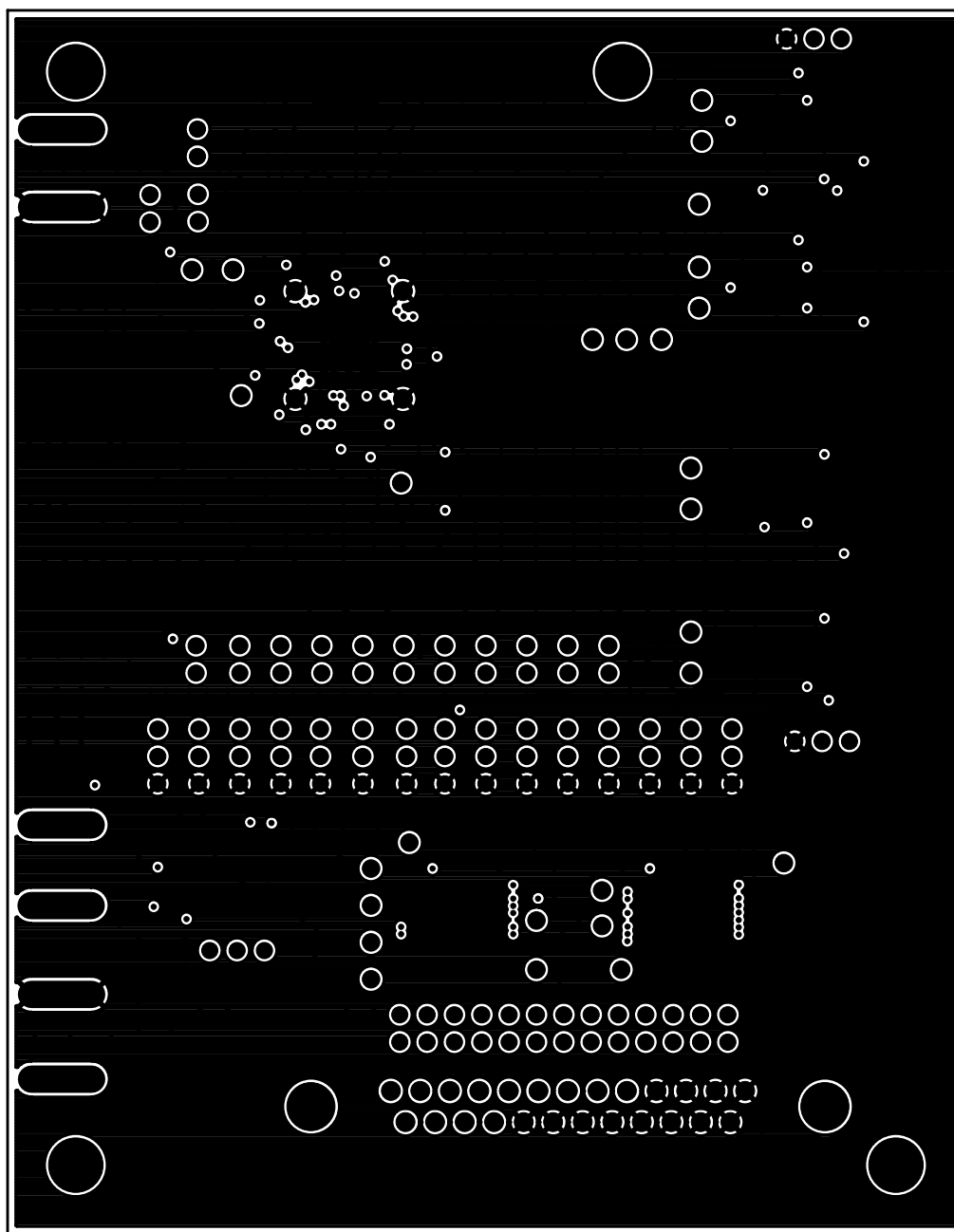


Figure 4. MAX2831 EV Kit PCB Layout—Inner Layer 2 (Ground Layer)

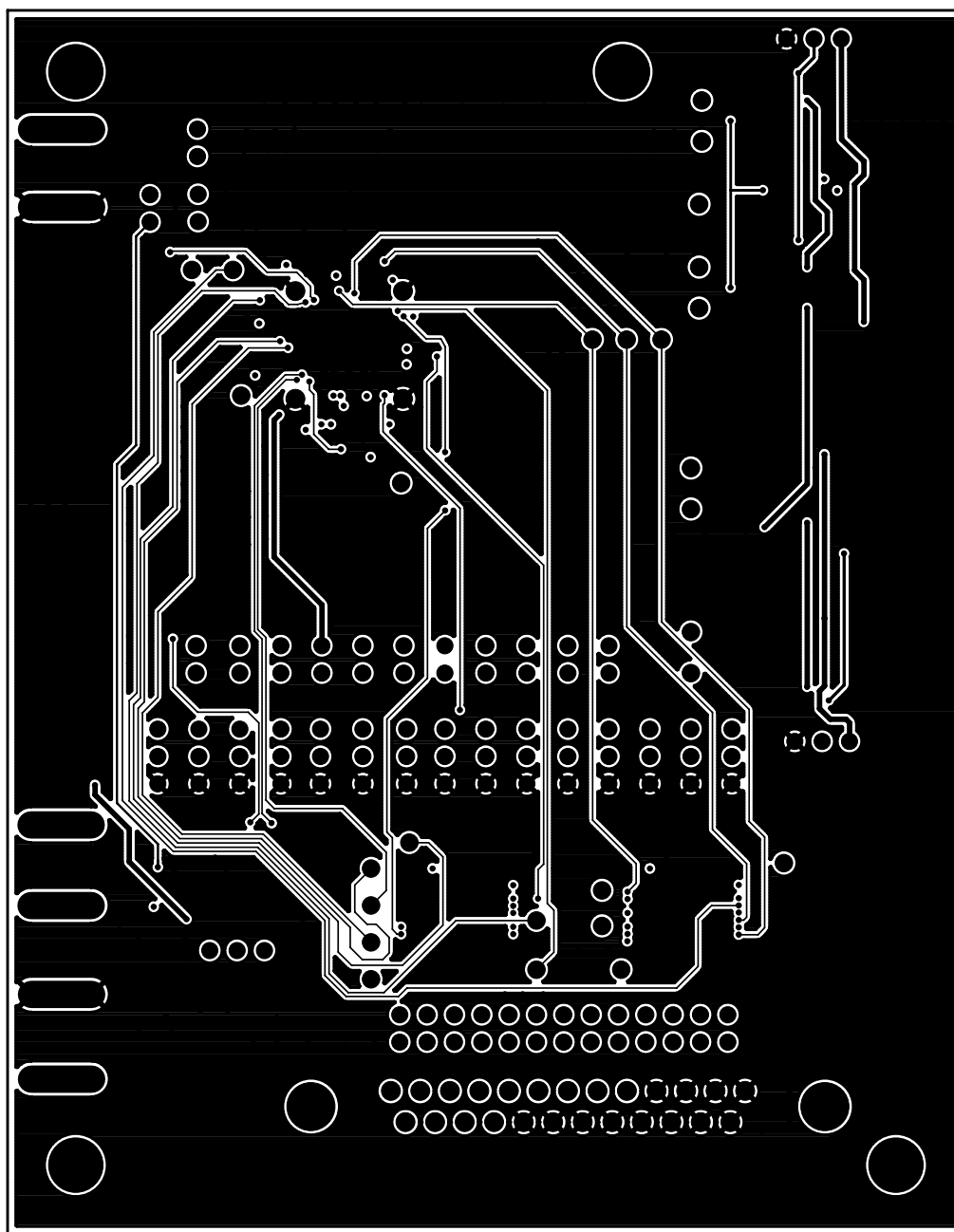


Figure 5. MAX2831 EV Kit PCB Layout—Inner Layer 3 (Routes)

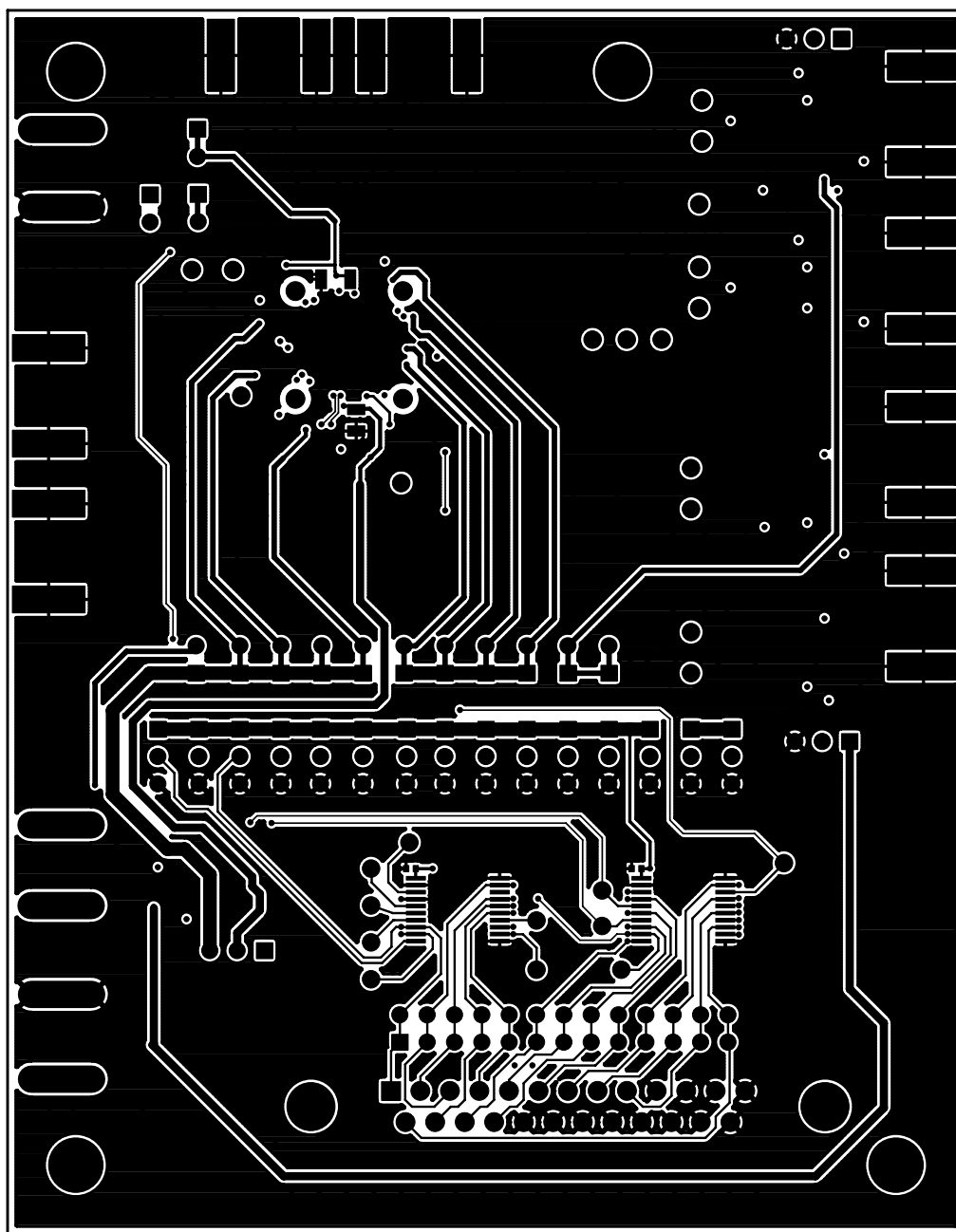


Figure 6. MAX2831 EV Kit PCB Layout—Solder Side

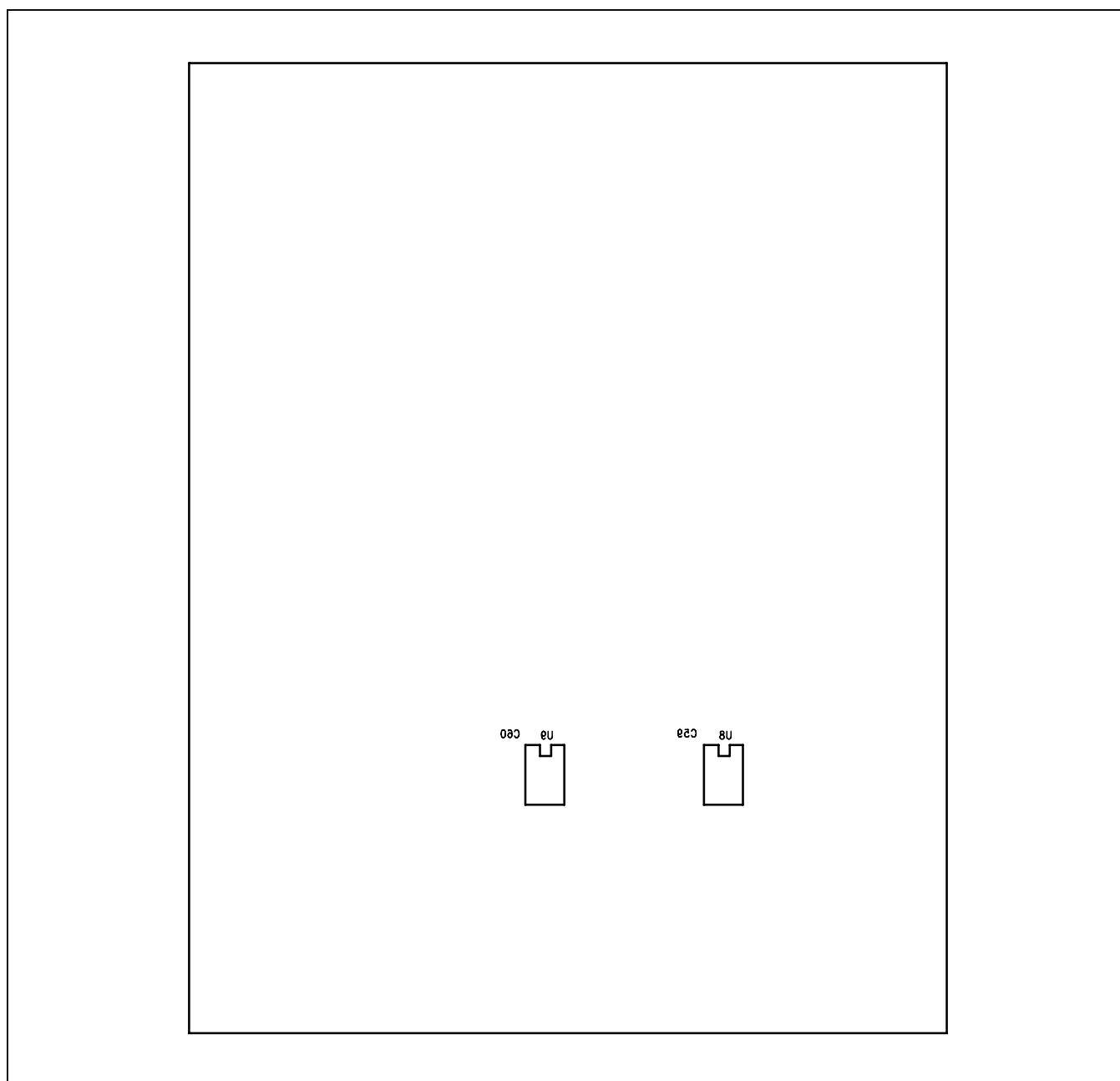


Figure 7. MAX2831 EV Kit PCB Layout—Bottom Silkscreen

## Revision History

| REVISION<br>NUMBER | REVISION<br>DATE | DESCRIPTION                        | PAGES<br>CHANGED |
|--------------------|------------------|------------------------------------|------------------|
| 0                  | 5/07             | Initial release                    | —                |
| 1                  | 11/14            | Updated <i>Quick Start</i> section | 3                |

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

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#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.