**MAXIM**

# MAX11850/MAX11851 Evaluation Systems

*Evaluate: MAX11850/MAX11851*

## General Description

The MAX11850/MAX11851 evaluation systems (EV systems) demonstrate the low-power projected capacitance touch-sensor controller, which targets power-sensitive applications such as handheld devices. The EV systems include built-in control firmware and a Windows® graphical user interface (GUI) to exercise some of the features of the MAX11850/MAX11851.

Each EV system is a multiboard system offered with or without haptics and consists of a MAXQ2000 USB touch interface board (UTIB2), a MAX11850 or MAX11851 daughter board, and a MAX11835 daughter board (haptic versions only).

## Features

♦ **Convenient USB Interface**

♦ **USB Power and On-Board LDOs Eliminate Need for External Power Supply**

♦ **JTAG Ports Included for Programming/Debugging of the MAXQ2000 and MAX11850/MAX11851**

♦ **Densitron Touch Screen (Included with EV System)**

♦ **All Components Mounted on a Plexiglas Base for Ease of Handling**

♦ **Allows Evaluation of Single-Touch and Dual-Touch Modes**

♦ **Can Be Adapted to Work with Other Touch Panels (Not Included with EV System)**

♦ **Demonstrates Single-Layer Piezo Haptics Using MAX11835 Daughter Board (Optional)**

## Ordering Information/Selector Guide

| PART | TYPE | PC INTERFACE | INTERFACE TYPE |
|------|------|--------------|----------------|
| **MAX11850**HTEVS+ | EV System (with haptics) | USB | Windows |
| MAX11850TEVS+ | EV System (without haptics) | USB | Windows |
| **MAX11851**HTEVS+ | EV System (with haptics) | USB | Windows |
| MAX11851TEVS+ | EV System (without haptics) | USB | Windows |

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

## EV System Contents List

| QTY | DESCRIPTION |
|-----|-------------|
| 1 | CD-ROM containing USB driver, quick guide, GUI software for Windows, and PCB schematic and layout files |
| 1 | USB touch interface board (MAXQ2000 UTIB2 board) |
| 1 | Touch-screen driver daughter board (MAX11850 or MAX11851) with a connector to plug in to the UTIB2 board |
| 1 | Piezo driver MAX11835 daughter board with a connector to plug in to the UTIB2 board (included with haptic versions only) |
| 1 | Densitron 4.3in touch panel (Densitron DTS413-0430-1FX-000; Densitron Corporation, 951-284-7600) and a flex cable to connect to the MAX11850 or MAX11851 daughter board |
| 1 | Coaxial cable to connect the MAX11835 daughter board to the piezo drivers (included with haptic versions only) |
| 1 | Mini USB cable |

*Windows is a registered trademark of Microsoft Corp.*

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# MAX11850/MAX11851 Evaluation Systems

MAXQ2000 UTIB2 BOARD

MAX11850 DAUGHTER BOARD OR
MAX11851 DAUGHTER BOARD

MAX11835 DAUGHTER BOARD
(HAPTIC VERSIONS ONLY)

COAXIAL CABLE
(HAPTIC VERSIONS ONLY)

DENSITRON TOUCH PANEL
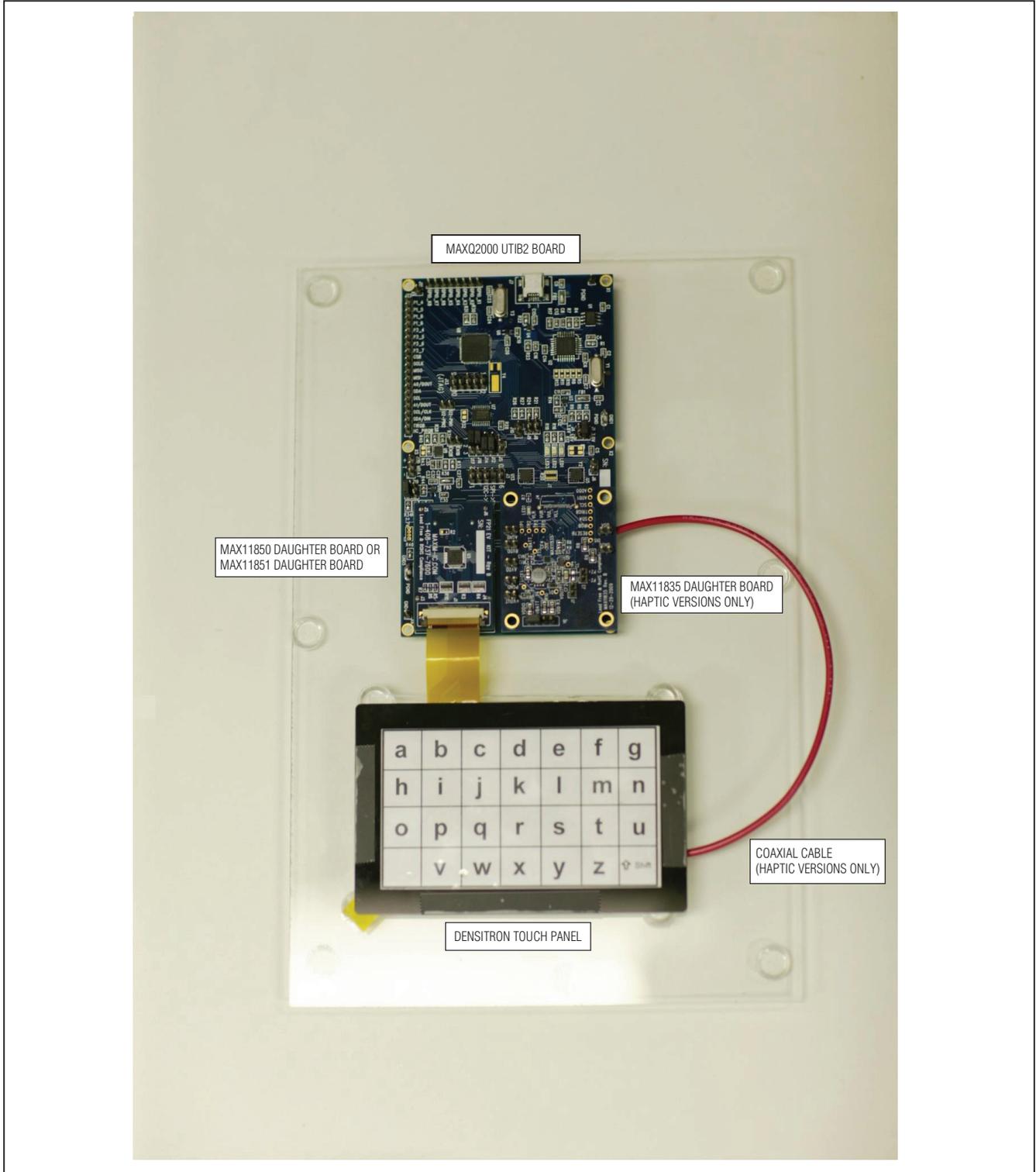
Figure 1. MAX11850/MAX11851 Evaluation System (Shown with Haptics)

# MAX11850/MAX11851 Evaluation Systems

*Evaluate: MAX11850/MAX11851*

*MAXQ2000 UTIB2 Board*

| DESIGNATION | QTY | DESCRIPTION |
|---|---|---|
| C1, C4, C5, C6, C8, C10, C14, C17, C18, C21, C22, C25, C26, C36, C37 | 15 | 0.1µF -20/+80%, 16V ceramic capacitors (0603) Murata GRM188F51C104ZA01D |
| C2, C7 | 2 | 22pF ±5%, 50V ceramic capacitors (0603) Murata GRM1885C1H220JA01D |
| C3, C11, C15, C19, C27, C28, C33, C34 | 8 | 1µF -20/+80%, 16V ceramic capacitors (0603) Murata GRM188F51C105ZA01D |
| C9, C12, C16, C20, C30, C31 | 6 | 10µF ±20%, 6.3V ceramic capacitors (0603) Murata GRM188R60J106ME47D |
| C13 | 1 | 33nF ±10%, 16V ceramic capacitor (0603) Murata GRM188R71C333KA01D |
| C23, C24 | 2 | 10pF ±5%, 50V ceramic capacitors (0603) Murata GRM1885C1H100JA01D |
| EN1B, EN2B, U2-PIN1, U2-PIN2 | 4 | 2-pin headers, 100 mil |
| FB1, FB3, FB4 | 3 | 100µH ±10% ferrite beads (1206) TDK FL3215T-101K |
| FB2 | 1 | 0Ω resistor (1206) Vishay CRCW12060000Z0EA |
| GND1, GND5 | 2 | Pad loops, #20 wire |
| GND2, GND3, GND4 | 3 | Single-pin test points |
| J1, J4, J6, J8, J9, J10, J18, J19, J25, J26 | 10 | 2-pin headers, 100 mil Sullins PBC02SABN |
| J2, J5, J11, J12, J14, J16, J17 | 7 | 3-pin headers, 100 mil Sullins PBC03SABN |
| J3, J13 | 2 | 10-pin headers, 100 mil Sullins PBC05DAAN |

| DESIGNATION | QTY | DESCRIPTION |
|---|---|---|
| J7 | 1 | USB-Mini-5P receptacle Hirose UX60-MB-5ST |
| J15 | 1 | 8-pin header, 100 mil Sullins PBC08SABN |
| J22 | 1 | 20-pin header, 100 mil |
| J23, J24 | 2 | 21-pin female connectors Hirose DF9-21S-1V(32) |
| LED1, LED2, LED3 | 3 | SMD RGB LEDs (0805) Lite-On LTST-C171KYKT |
| R1 | 1 | 470Ω resistor (0805) Vishay CRCW0805470RJNEA |
| R2, R37 | 2 | 590kΩ ±5% resistors (0805) Vishay CRCW0805590KJNEA |
| R3, R25 | 2 | 51kΩ ±5% resistors (0805) Vishay CRCW080551KJNEA |
| R4 | 1 | 2.2kΩ ±5% resistor (0805) Vishay CRCW08052K20JNEA |
| R5, R8, R10, R11, R13 | 0 | Not installed, 0Ω resistors (0603) |
| R6 | 1 | 61.9kΩ ±1% resistor (0805) Vishay CRCW080561K9FKEA |
| R7 | 1 | 10kΩ ±5% resistor (0805) Vishay CRCW080510K0JNEA |
| R9, R39 | 2 | 196kΩ ±5% resistors (0805) Vishay CRCW0805196KJNEA |
| R12, R16, R18 | 3 | 215Ω resistors (0805) Vishay CRCW0805215RJNEA |
| R14, R15, R22, R42, R44, R45, R46 | 7 | 100kΩ ±5% resistors (0805) Vishay CRCW0805100KJNEA |
| R17 | 1 | 1.5kΩ ±5% resistor (0805) Vishay CRCW08051K50JNEA |
| R19, R20, R21, R24, R26, R27, R47, R51 | 8 | 4.7kΩ ±5% resistors (0805) Vishay CRCW08054K70JNEA |

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## Component Lists (continued)

### MAXQ2000 UTIB2 Board (continued)

| DESIGNATION | QTY | DESCRIPTION |
|---|---|---|
| R23 | 1 | 169kΩ ±5% resistor (0805) Vishay CRCW0805169KJNEA |
| R28 | 1 | 10kΩ ±5% resistor (0603) Vishay CRCW080510K0FKEA |
| R30, R31 | 2 | 3.3kΩ ±5% resistors (0805) Vishay CRCW08053K30JNEA |
| R32 | 0 | Not installed, resistor (0805) |
| R34 | 1 | 316kΩ ±5% resistor (0805) Vishay CRCW0805316KJNEA |
| R41 | 1 | 47kΩ ±5% resistor (0805) Vishay CRCW080547K0JNEA |
| U1 | 1 | 2kB EEPROM (8 SO) Atmel AT93C56A |
| U2 | 1 | UART, 7mm x 7mm (32 TQFP) FTDI FT232BL |
| U3, U4, U10, U11 | 4 | Adjustable LDO linear regulators (5 SC70) Maxim MAX8512EXK-T+ |
| U5, U13 | 2 | Quad-level translators (12 TQFN-EP*) Maxim MAX3395EETC+ |

| DESIGNATION | QTY | DESCRIPTION |
|---|---|---|
| U6 | 1 | Fixed 2.5V LDO linear regulator (5 SC70) Maxim MAX8511EXK25-T+ |
| U7 | 1 | Octal-level translator (20 TSSOP) Maxim MAX3001EEUP+ |
| U8 | 1 | 16-bit microcontroller (68 QFN-EP*) Maxim MAXQ2000-RAX+ |
| Y1 | 1 | 6MHz crystal (HCM49) ECS ECS-60-20-5G3XDS-TR |
| Y2 | 0 | Not installed, oscillator |
| Y3 | 1 | 16MHz crystal (HCM49) ECS Inc. ECS-160-20-5PDN-TR |
| Y4 | 0 | Not installed, crystal Citizen CMR200T |
| — | 1 | PCB: USB Touch Interface Board 2 |

*EP = Exposed pad.

| DESIGNATION | QTY | DESCRIPTION |
|---|---|---|
| C1, C2, C4, C6 | 4 | 1µF ±10% ceramic capacitors (0603) |
| J1 | 1 | 36-position Molex connector Molex 0541043631 |
| J2 | 1 | 21-position male connector Hirose DF9-21P-1V(32)-Male |

### MAX11851 Daughter Board

| DESIGNATION | QTY | DESCRIPTION |
|---|---|---|
| J3–J6 | 4 | Through hole for legs, stuff with 0.025in square header post |
| U1 | 1 | Low-power touch-sensor controller (40 TQFN) Maxim MAX11851ETL+ |
| — | 1 | PCB: FP21 EVALUATION KIT |

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## Component Lists (continued)

### MAX11850 Daughter Board

| DESIGNATION | QTY | DESCRIPTION |
|---|---|---|
| C1, C2, C4, C6 | 4 | 1µF ±10% ceramic capacitors (0603) |
| J1 | 1 | 36-position Molex connector Molex 0541043631 |
| J2 | 1 | 21-position male connector Hirose DF9-21P-1V(32)-Male |

| DESIGNATION | QTY | DESCRIPTION |
|---|---|---|
| J3–J6 | 4 | Through hole for legs, stuff with 0.025in square header post |
| U1 | 1 | Low-power touch-sensor controller (48 TQFN) Maxim MAX11850ETM+ |
| — | 1 | PCB: MAX11850 EVALUATION KIT |

### MAX11835 Daughter Board

| DESIGNATION | QTY | DESCRIPTION |
|---|---|---|
| ADD0, ADD1, DIS, IRQB, RESETB, SCL, SDA, TRIGB | 0 | Not installed, test points |
| CF1 | 1 | 10µF X54 ceramic capacitor (0805) Murata GRM21BF50J106ZE01L |
| CF2 | 1 | 47nF, 200V ceramic capacitor (0805) KEMET C0805C473K2RACTU |
| CF3, CF4 | 2 | 4.7µF, 10V X5R ceramic capacitors (0402) KEMET C0402C475MPACTU |
| CL | 0 | Not installed, SMD ceramic capacitor (0805) |
| C1 | 0 | Not installed, SMD ceramic capacitor (0603) |
| D1 | 1 | 200V diode |
| FP03 | 1 | Haptic piezo controller (25 WLP) Maxim MAX11835 |
| J1 | 1 | 2-pin header, 0.1in pitch |
| J2 | 1 | 21-position connector Hirose DF9-21P-1V(32) |
| J3, J5, J7 | 3 | 3-pin headers, 0.1in pitch |
| J4 | 0 | Not installed, 20-position connector |
| J6 | 1 | 4-pin header, 0.1in pitch |

| DESIGNATION | QTY | DESCRIPTION |
|---|---|---|
| LED1 | 1 | Red SMD LED, 1.6mm x 0.8mm |
| Q1 | 1 | n-channel MOSFET (Hex DIP) PD = 1W, ID = 0.6A, VDSS = 200V, VGS = ±20V, VSD = 2V, RDS(ON) = 1Ω |
| R1 | 1 | 2MΩ ±1%, 250V resistor (0805) |
| R2 | 1 | 27kΩ SMD resistor (0402) |
| R3, R8, R9, R11 | 4 | 0Ω SMD resistors (0805) |
| R4, R6 | 2 | 4.7kΩ SMD resistors (0402) |
| R5 | 1 | 20Ω SMD resistor (0603) |
| R7 | 1 | 220Ω SMD resistor (0402) |
| R10 | 1 | 1Ω SMD resistor (0805) |
| R12 | 0 | Not installed, SMD resistor (0402) |
| R13 | 1 | 0Ω SMD resistor (0402) |
| R14 | 1 | 5kΩ resistor (0603) |
| R17, R18 | 2 | 49.9Ω SMD resistors (0603) |
| R19, R20 | 0 | Not installed, SMD resistors (0603) |
| T1 | 1 | Boost transformer |
| T4, TP1–TP5, TT1, TT5, VBATT_, VOUT | 0 | Not installed, test points |
| U1 | 1 | 3.5mm stereo audio jack |
| X1–X4 | 4 | Empty holes, leave open |
| — | 1 | PCB: MAX11835 EVALUATION KIT |

## Table 1. UTIB2 Ports

| PORT | DESCRIPTION |
|------|-------------|
| J3 | JTAG port for programming of the J24 daughter card |
| J7 | USB port provides power to the EV systems and communication to a PC |
| J13 | JTAG port for programming the MAXQ2000 |
| J15 | Access to the MAXQ2000 GPIOs |
| J22 | Access to the MAXQ2000 ports |
| J23 | Connector to plug in the MAX11835 daughter board (includes 3V supply pin and independent reset line) |
| J24 | Connector to plug in the MAX11850 daughter board (includes 3V and 1.8V supplies and independent reset line) |

## Table 2. UTIB2 Default Jumper Settings

| JUMPER | SHUNT POSITION | STATUS |
|--------|----------------|--------|
| J1 | 1-2 | Closed |
| J3 | — | JTAG connector for the MAX11850 |
| J4 | 1-2 | Open |
| J5 | 1-2 | Open |
| J6 | 1-2 | Open |
| J8 | 1-2 | Open |
| J9 | 1-2 | Open |
| J10 | 1-2 | Open |
| J12 | 2-3 | Closed |
| J13 | — | JTAG connector for the MAXQ2000 |
| J14 | 2-3 | Closed |

| JUMPER | SHUNT POSITION | STATUS |
|--------|----------------|--------|
| J15 | — | MAXQ2000 GPIO pins |
| J16 | 1-2 | Closed |
| J17 | 1-2 | Closed |
| J18 | 1-2 | — |
| J19 | 1-2 | Closed |
| J20 | — | Open |
| J21 | Open | Open |
| J22 | Open | Open |
| J23 | — | Connector to plug in the MAX11835 daughter board |
| J24 | — | Connector to plug in the MAX11850 daughter board |

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**Evaluate: MAX11850/MAX11851**
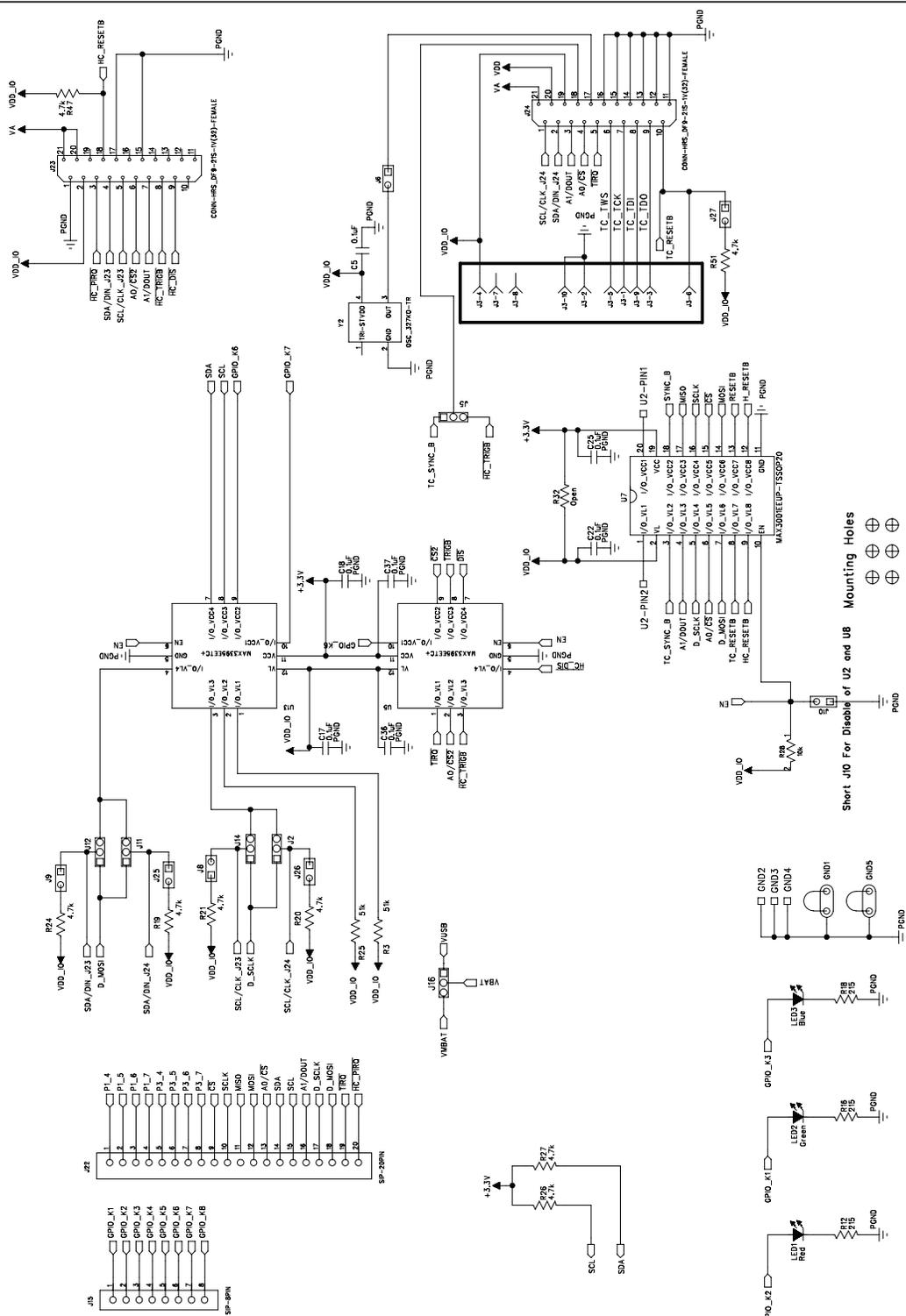


Figure 2a. UTIB2 Schematic—Main (Sheet 1 of 3)

# MAX11850/MAX11851 Evaluation Systems

Evaluate: MAX11850/MAX11851
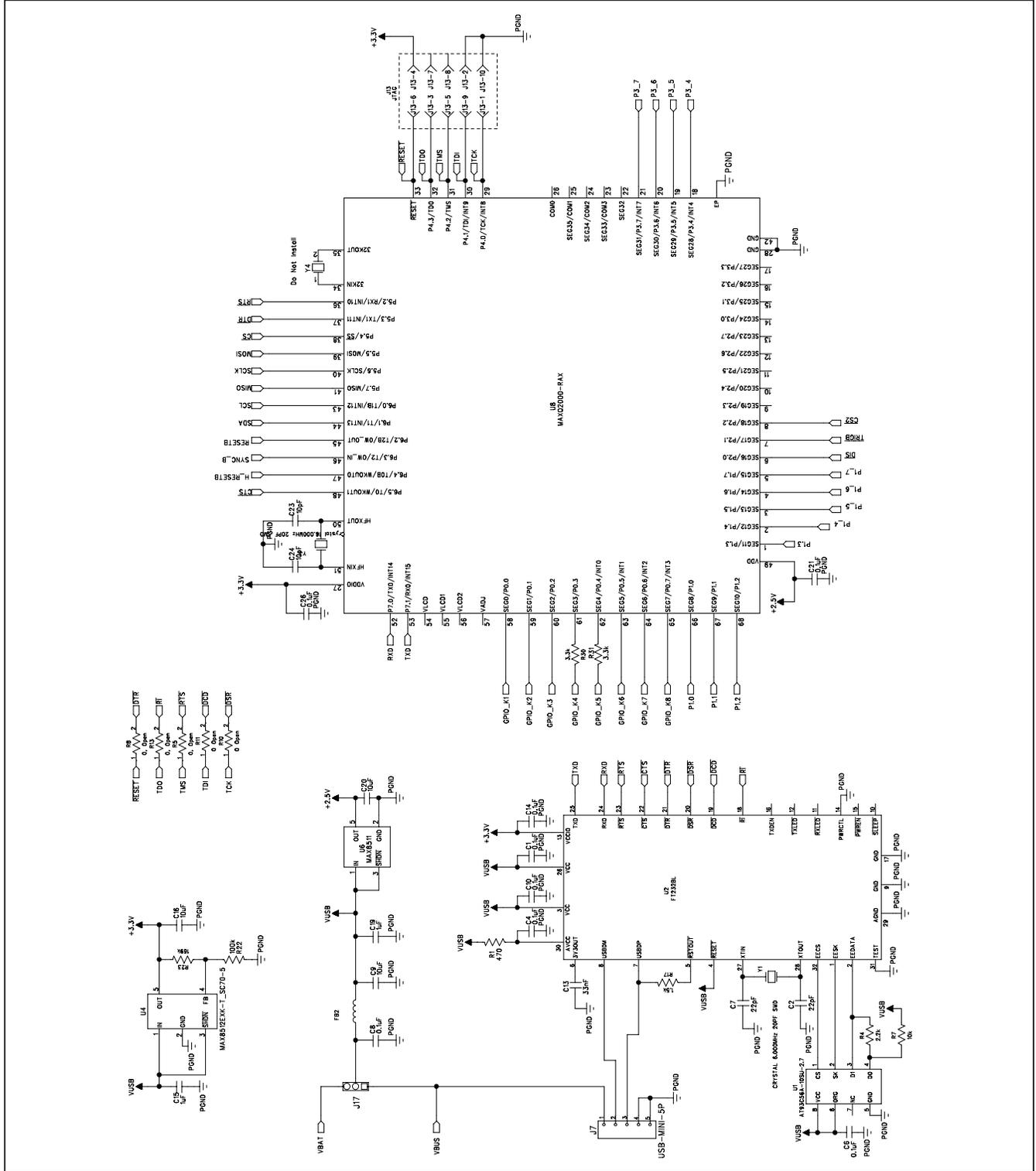


Figure 2b. UTIB2 Schematic—Mini USB (Sheet 2 of 3)

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# MAX11850/MAX11851 Evaluation Systems
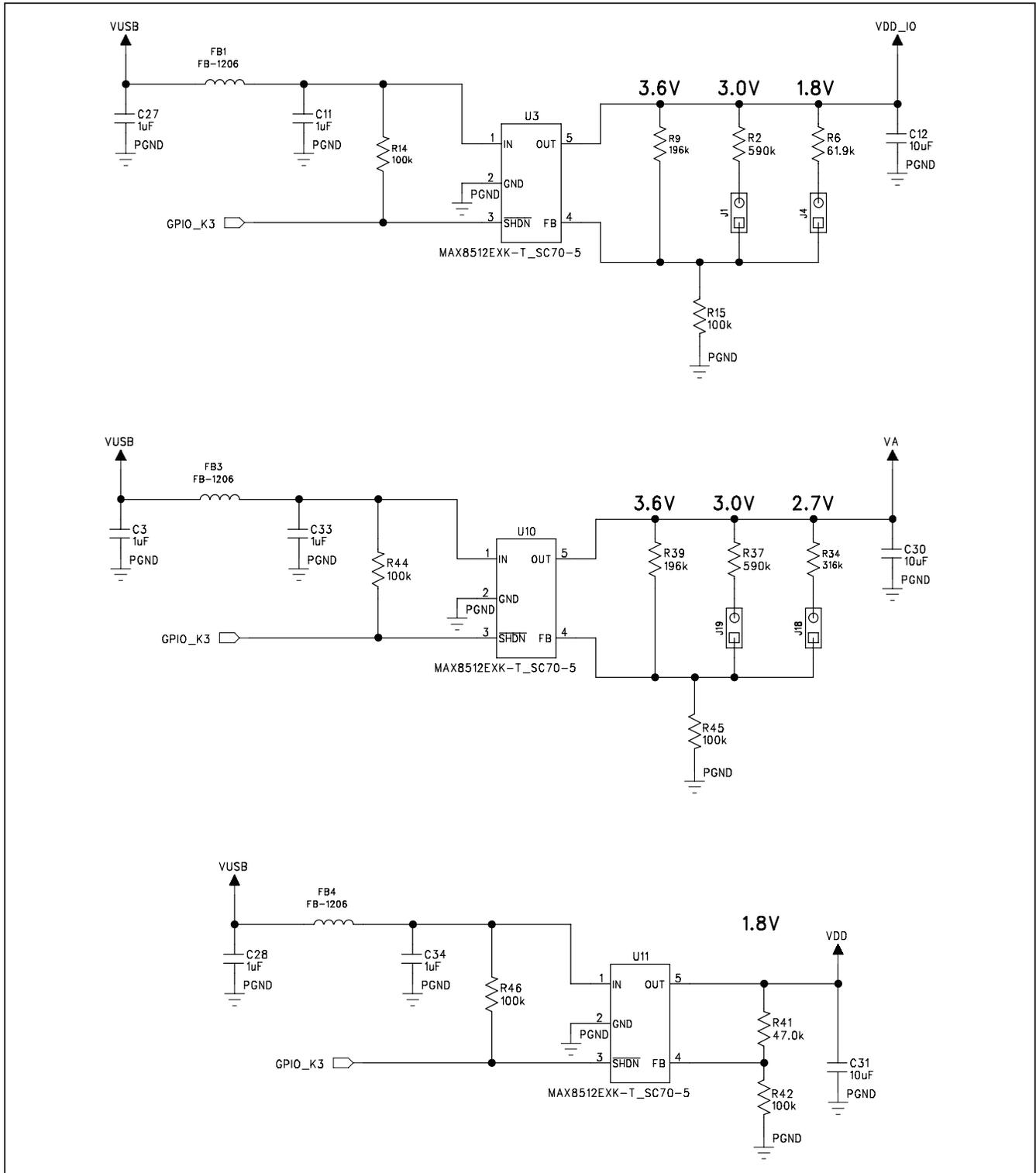
Figure 2c. UTIB2 Schematic—Supply (Sheet 3 of 3)
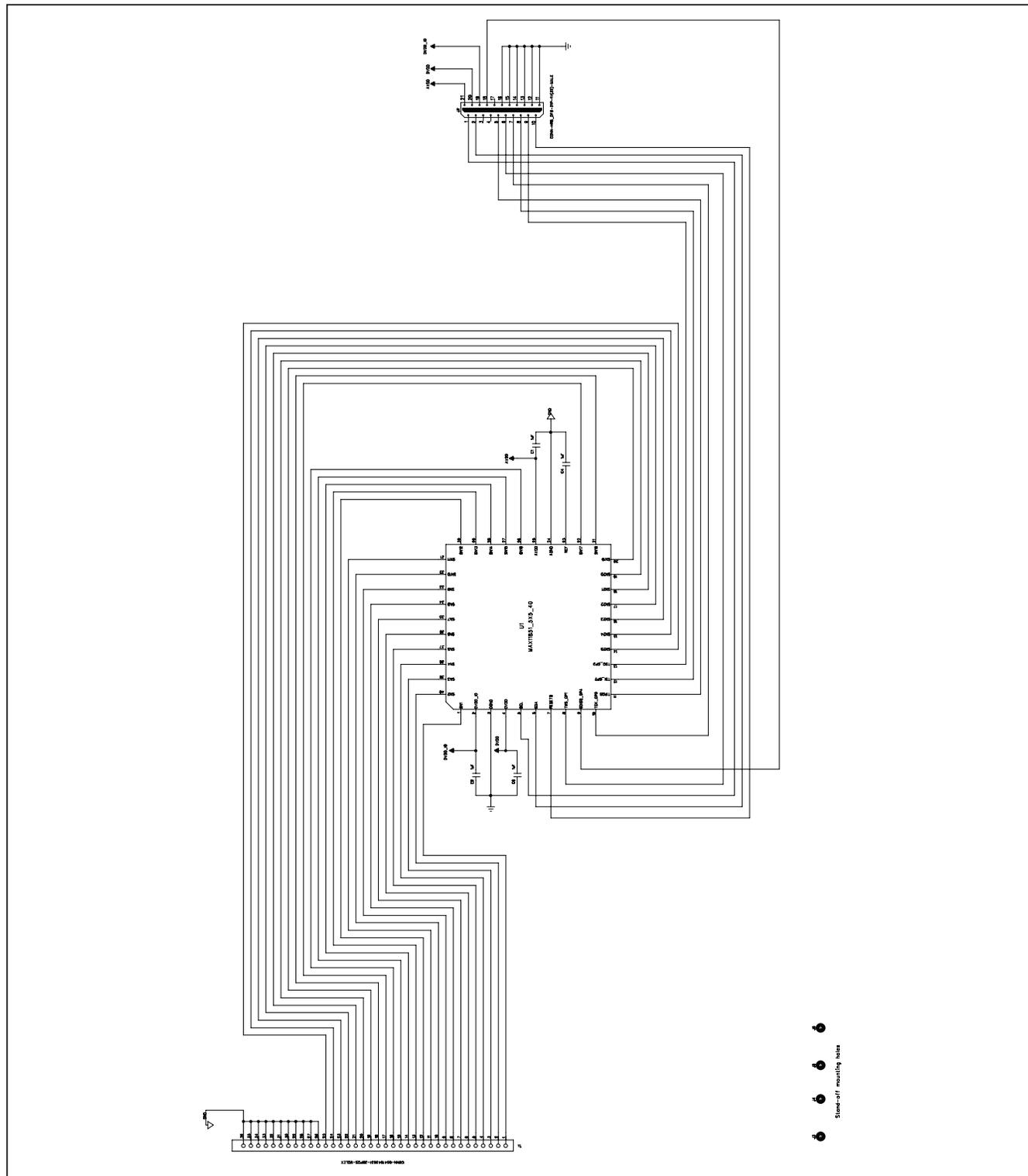
*Figure 3. MAX11851 Daughter Board Schematic*
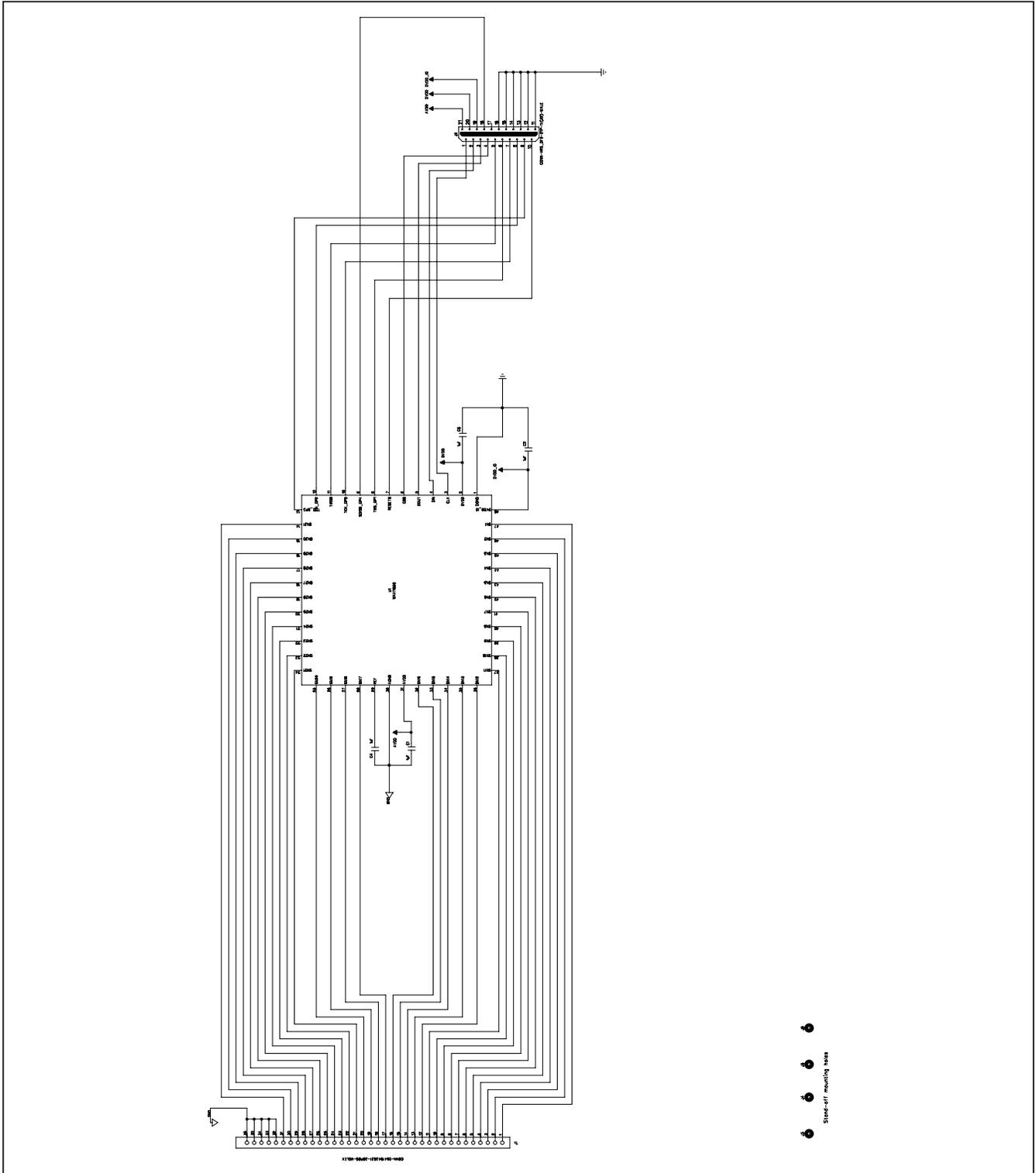
Figure 4. MAX11850 Daughter Board Schematic
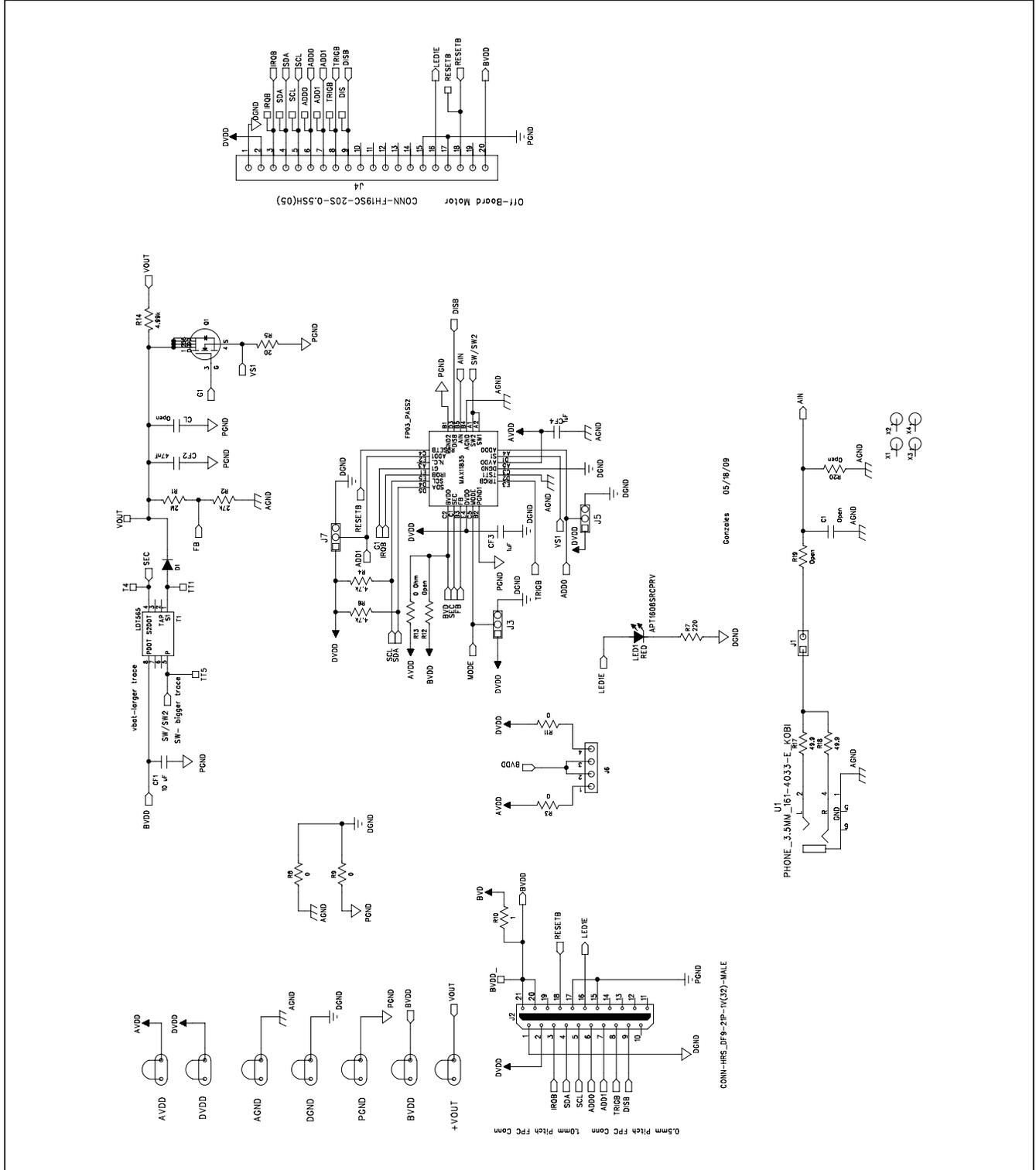
Figure 5. MAX11835 Daughter Board Schematic
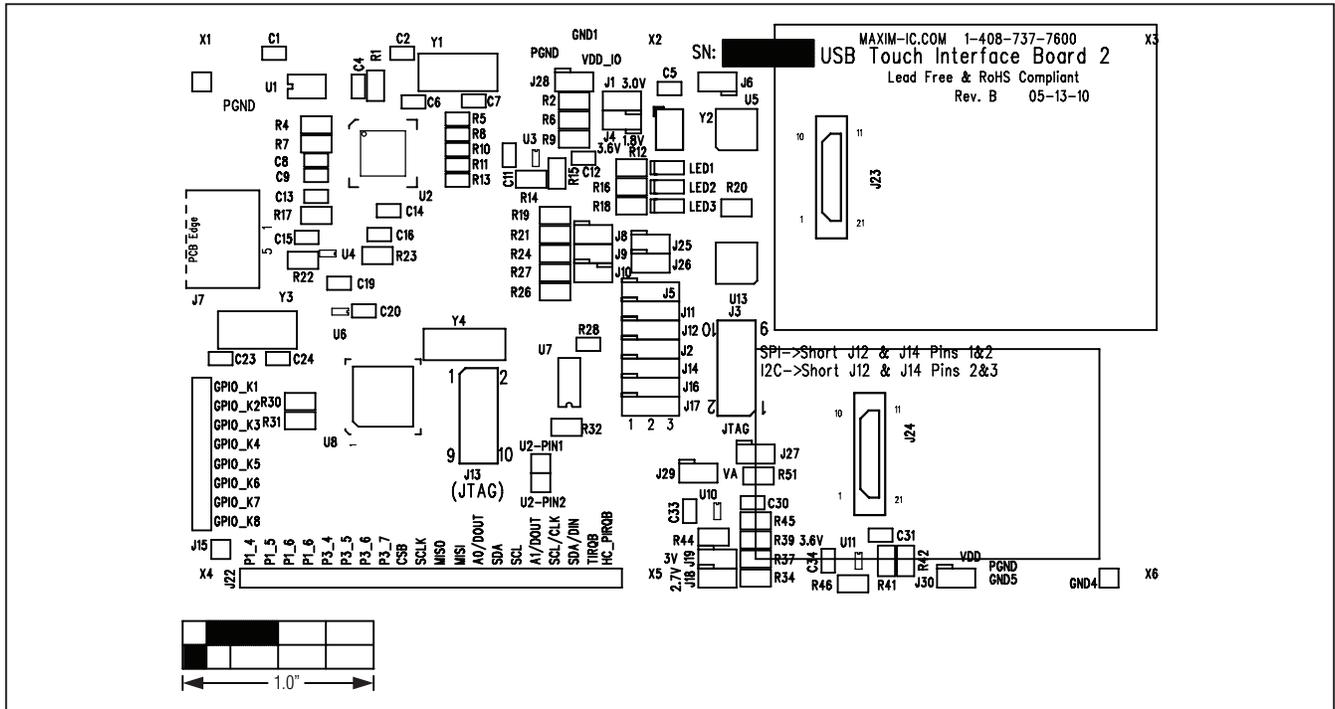
Figure 6. UTIB2 Component Placement Guide—Silkscreen
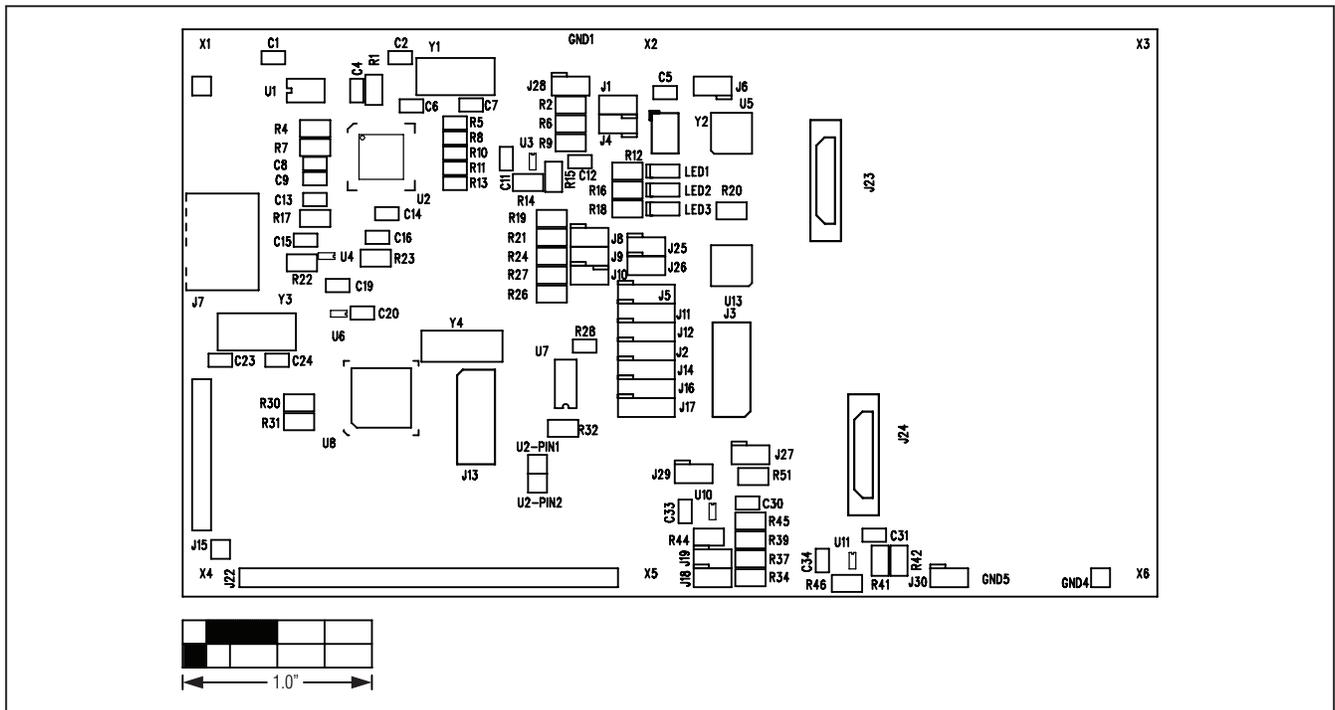


Figure 7. UTIB2 Component Placement Guide—Top Assembly

**Evaluate: MAX11850/MAX11851**
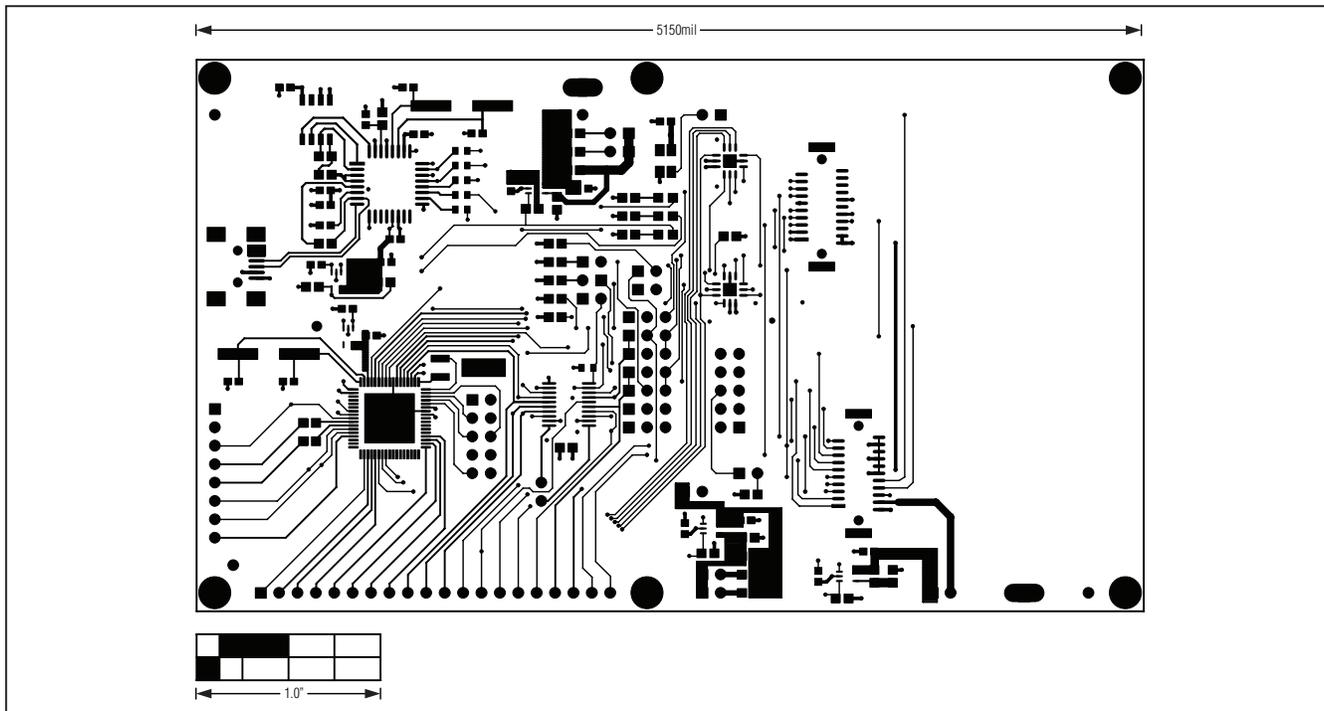
Figure 8. UTIB2 PCB Layout—Top Layer
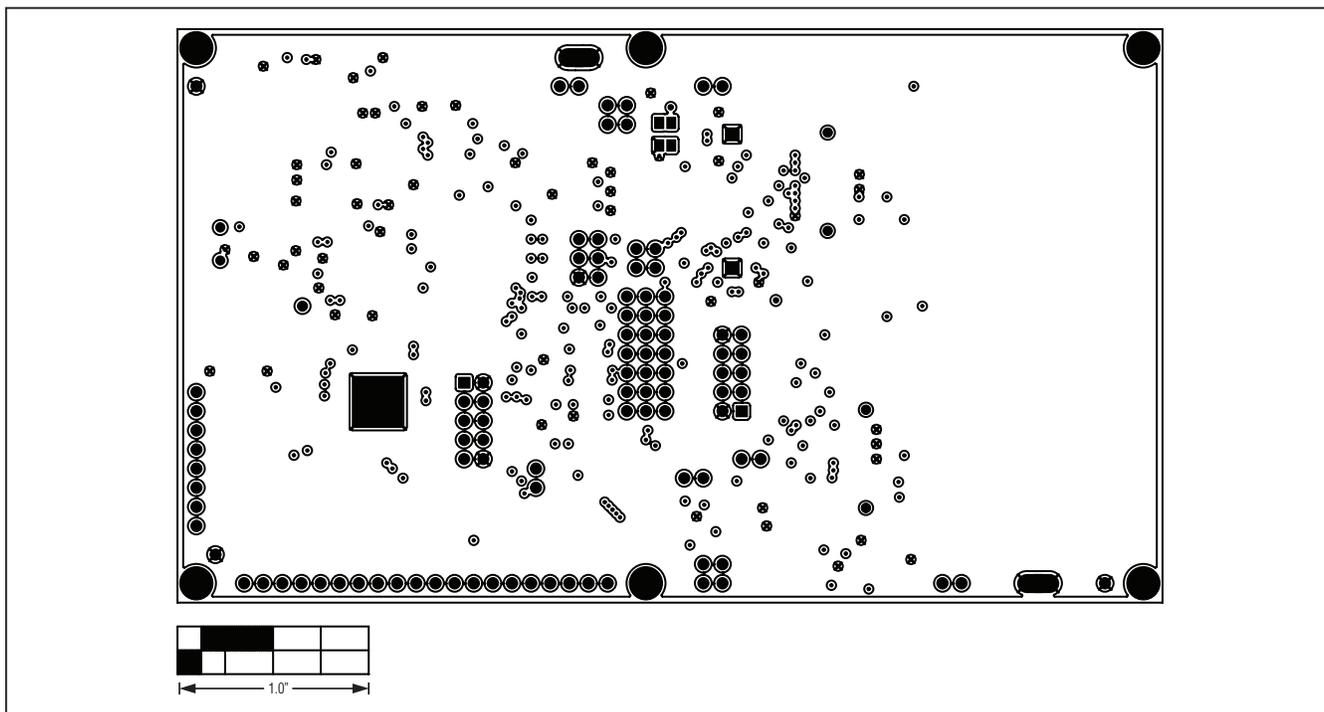
Figure 9. UTIB2 PCB Layout—Layer 2
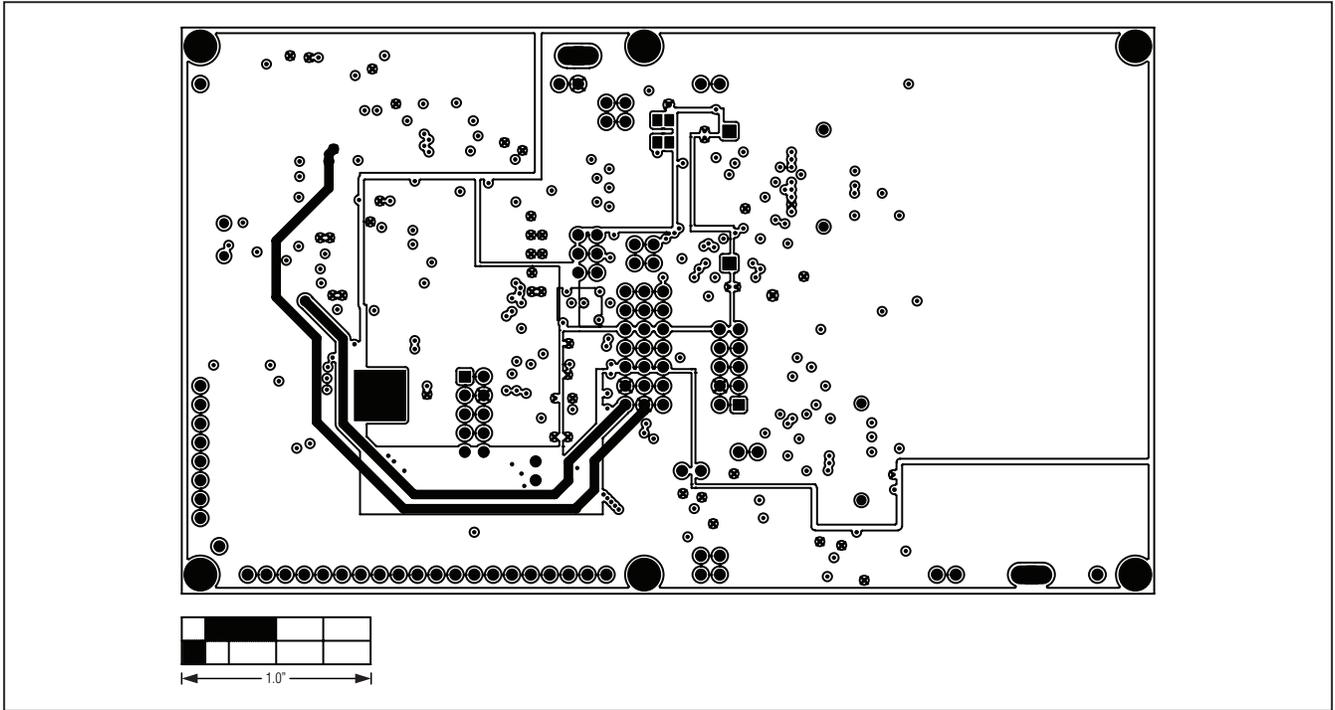
*Figure 10. UTIB2 PCB Layout—Layer 3*
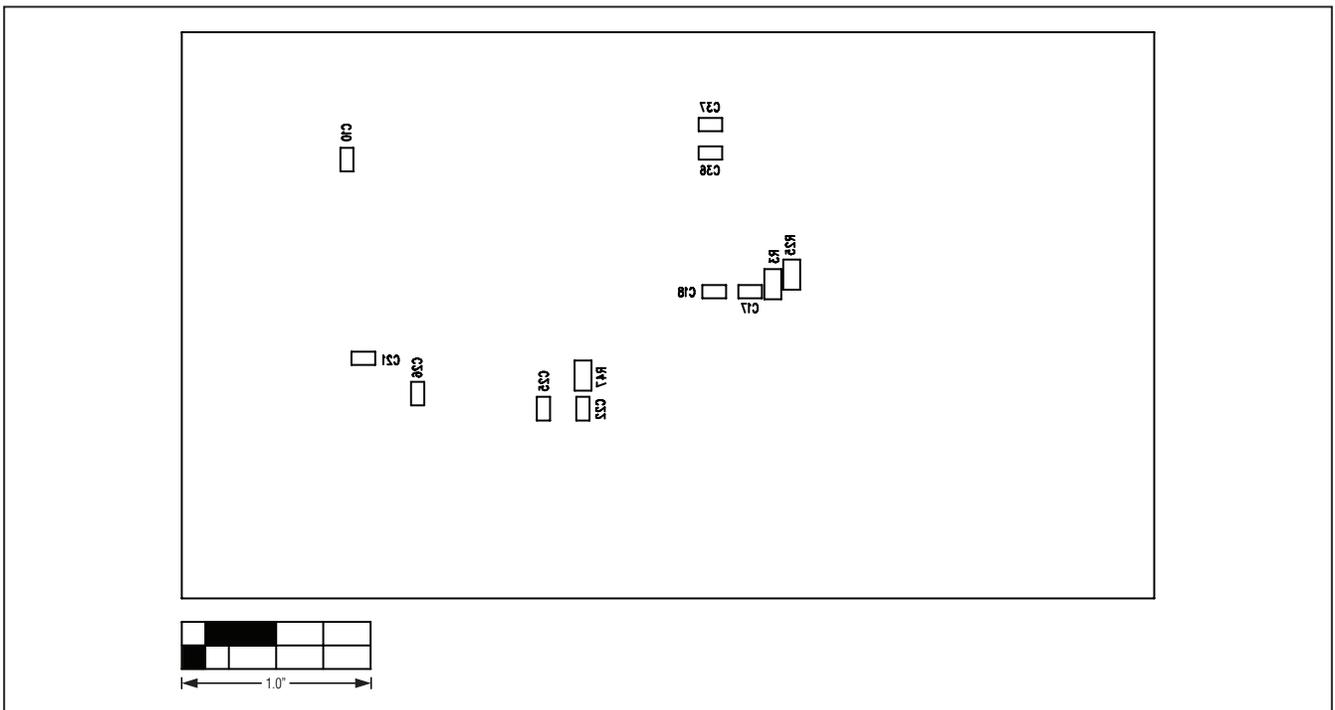


*Figure 11. UTIB2 Component Placement Guide—Bottom Assembly*

**Evaluate: MAX11850/MAX11851**

FP21 EV  KIT – Rev C
SN:

U1

J1

MAXIM-IC.COM
1-408-737-7600
Lead Free & ROHS Compliant

1. Board Material, FR4

2. Board Thickness, 0.062"

3. Gold Imersion

4. Soldermask Color, Blue

5. Silkscreen Color, White
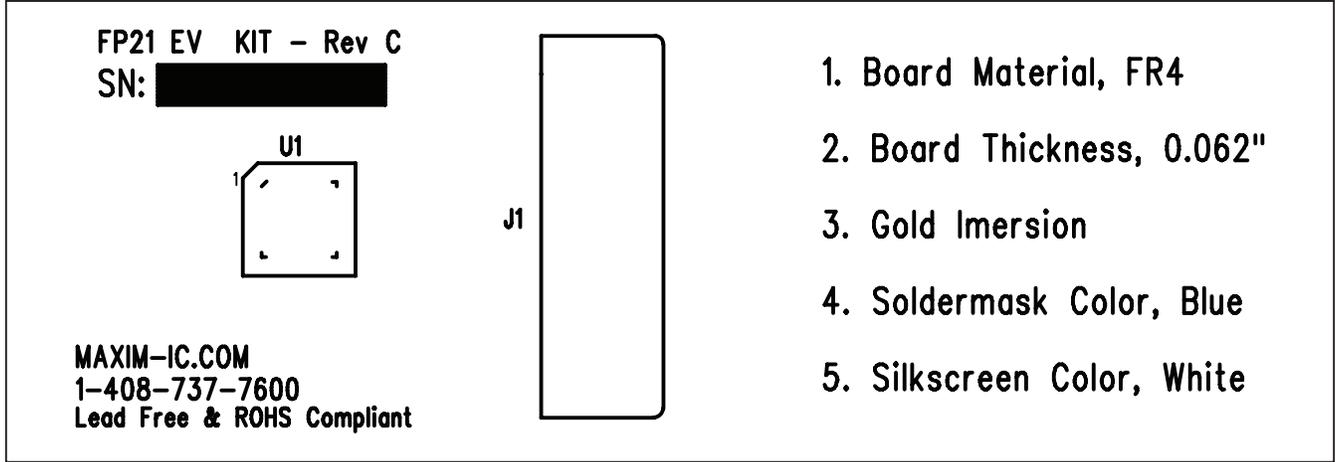
*Figure 12. MAX11851 Component Placement Guide—Silkscreen*

U1

J1

1. Board Material, FR4

2. Board Thickness, 0.062"

3. Gold Imersion

4. Soldermask Color, Blue

5. Silkscreen Color, White
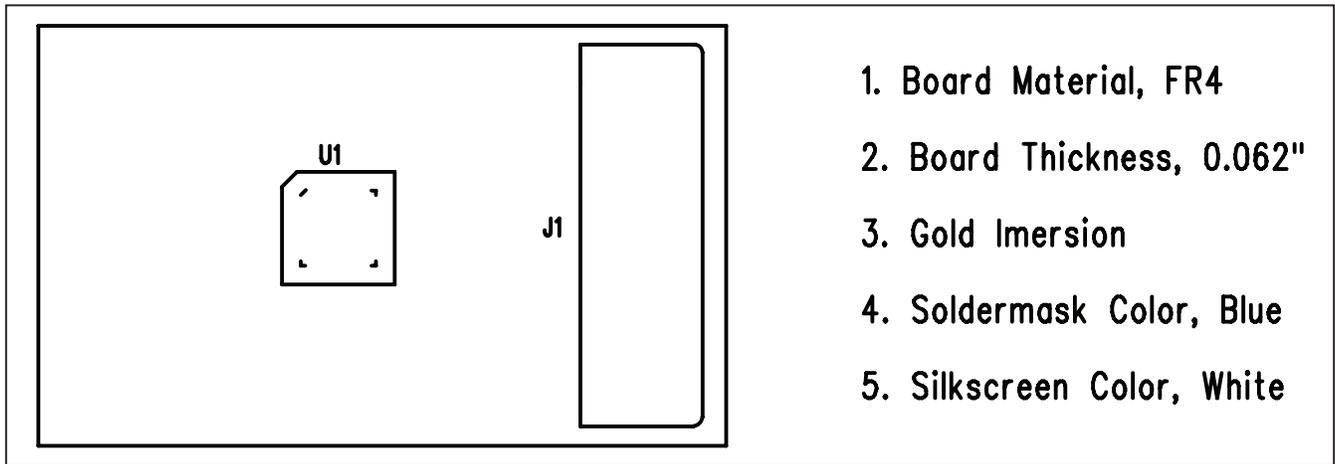
*Figure 13. MAX11851 Component Placement Guide—Top Assembly*

1. Board Material, FR4

2. Board Thickness, 0.062"

3. Gold Imersion

4. Soldermask Color, Blue

5. Silkscreen Color, White
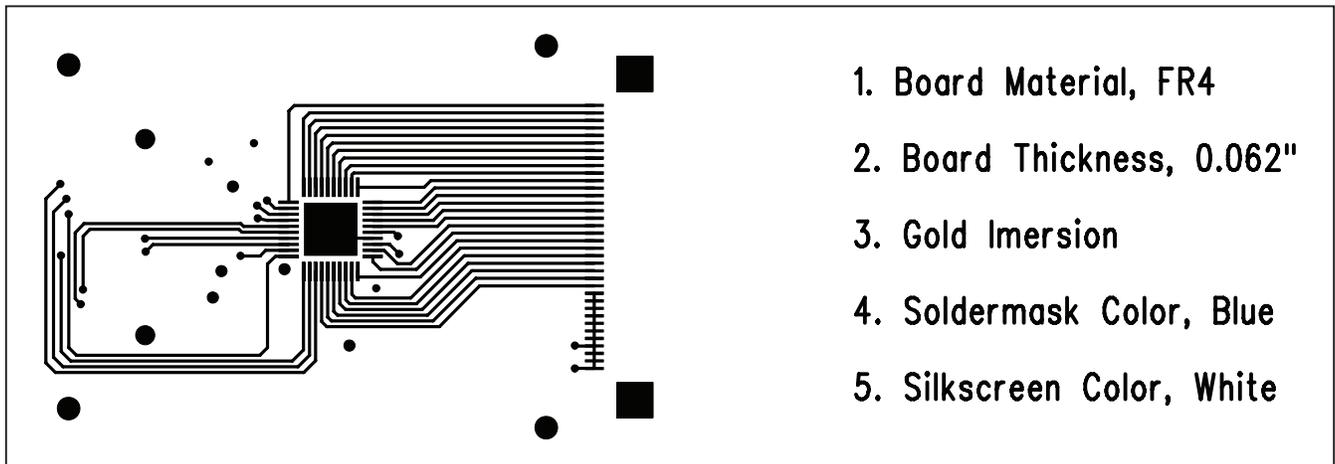
*Figure 14. MAX11851 PCB Layout—Top Layer*

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1. Board Material, FR4

2. Board Thickness, 0.062"

3. Gold Imersion

4. Soldermask Color, Blue

5. Silkscreen Color, White
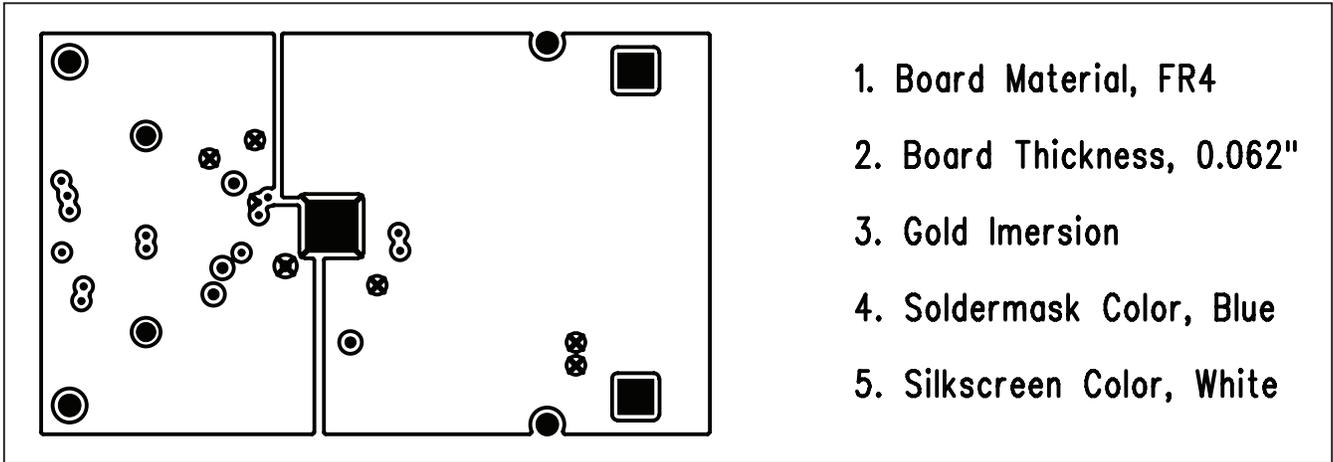
*Figure 15. MAX11851 PCB Layout—Layer 2*



1. Board Material, FR4

2. Board Thickness, 0.062"

3. Gold Imersion

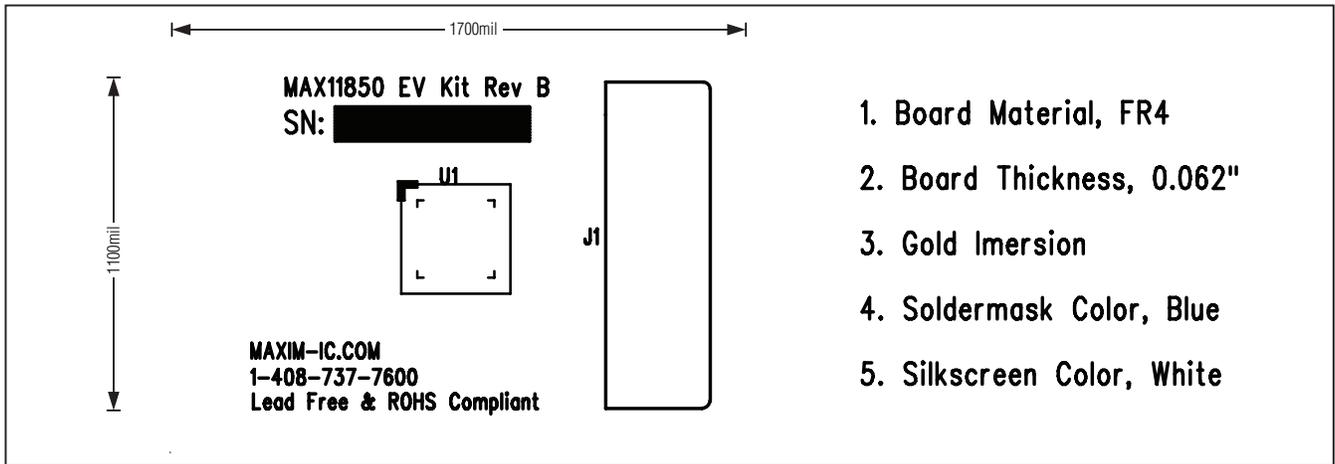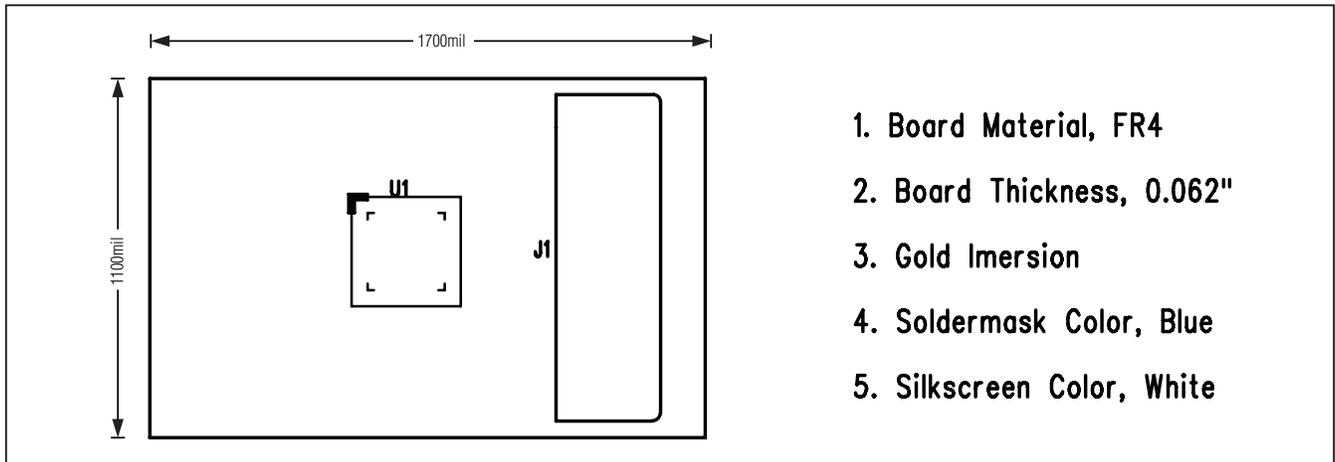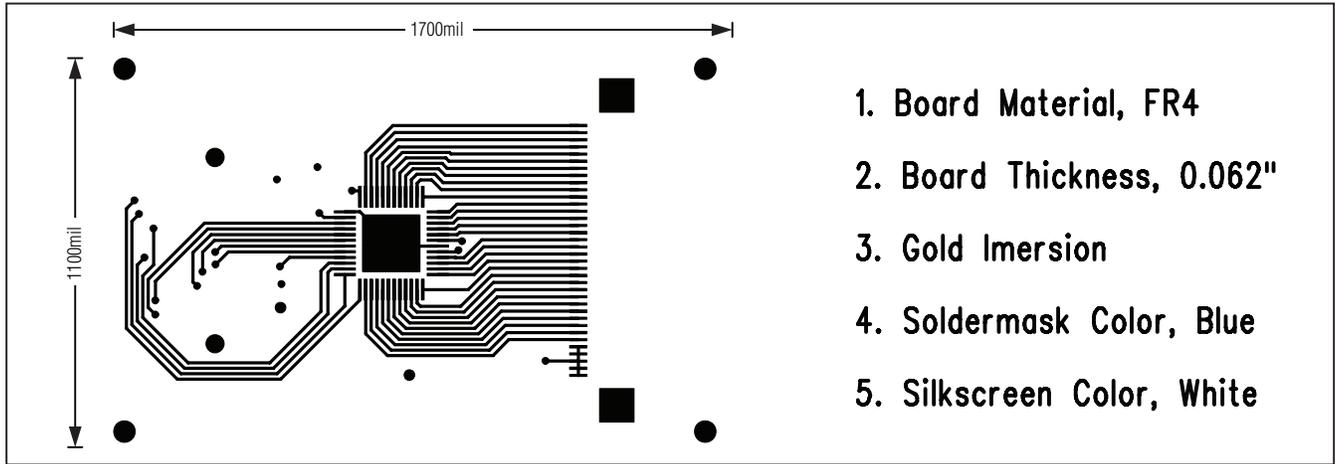4. Soldermask Color, Blue

5. Silkscreen Color, White
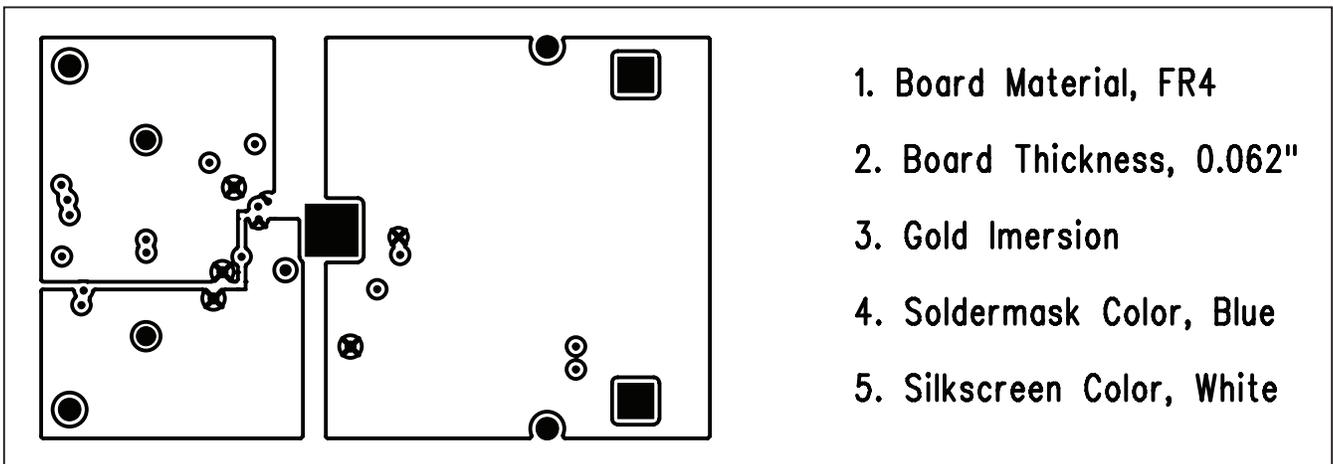
*Figure 16. MAX11851 PCB Layout—Layer 3*



1. Board Material, FR4

2. Board Thickness, 0.062"

3. Gold Imersion

4. Soldermask Color, Blue

5. Silkscreen Color, White
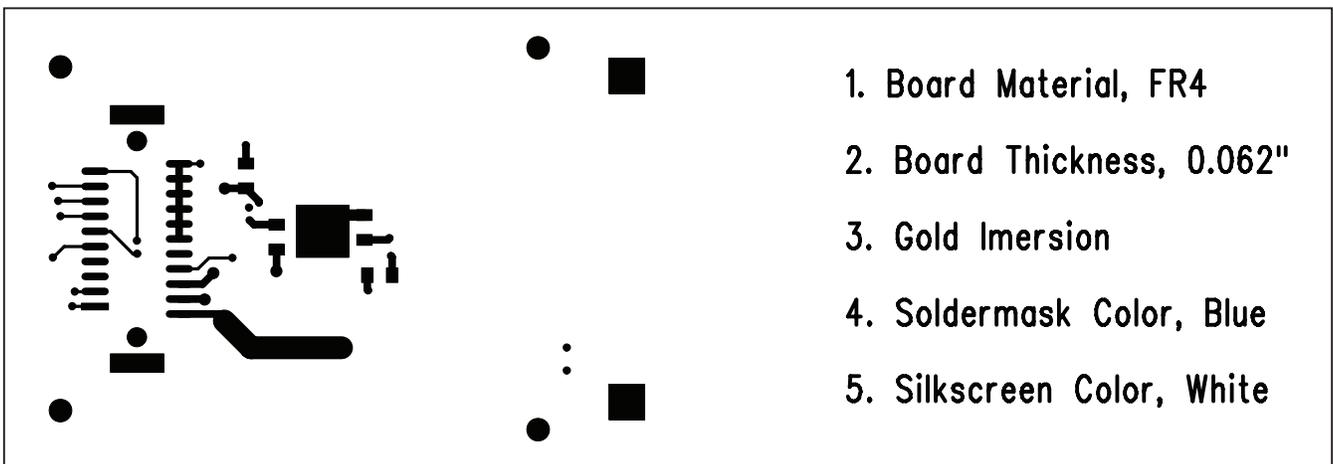
*Figure 17. MAX11851 PCB Layout—Bottom Layer*
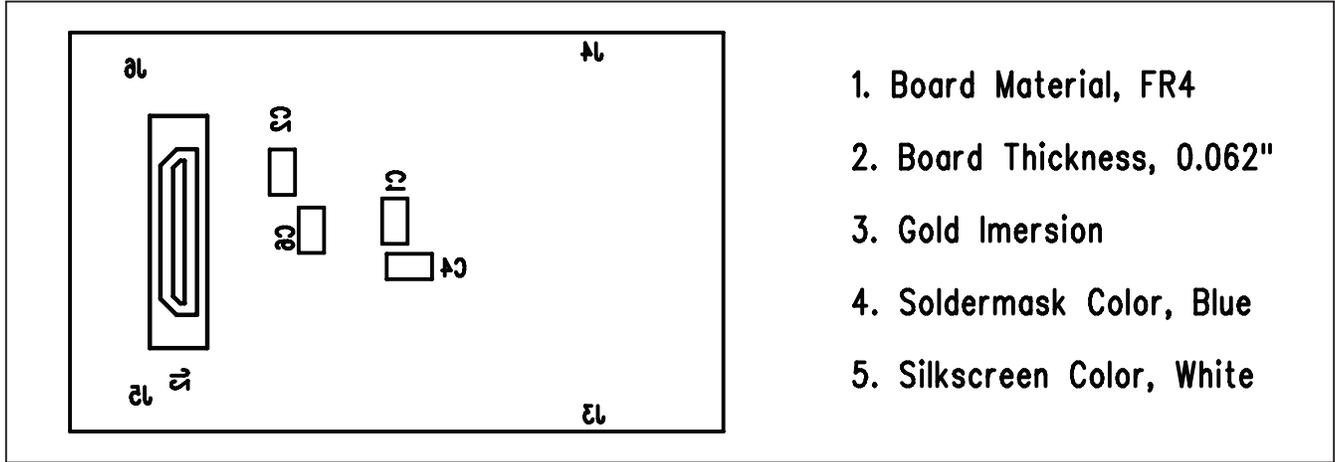
**/N/XI/N**

# MAX11850/MAX11851 Evaluation Systems

1. Board Material, FR4

2. Board Thickness, 0.062"

3. Gold Imersion

4. Soldermask Color, Blue

5. Silkscreen Color, White

*Figure 18. MAX11851 Component Placement Guide—Bottom Assembly*



MAX11850 EV Kit Rev B
SN:

MAXIM-IC.COM
1-408-737-7600
Lead Free & ROHS Compliant

1. Board Material, FR4

2. Board Thickness, 0.062"

3. Gold Imersion

4. Soldermask Color, Blue

5. Silkscreen Color, White

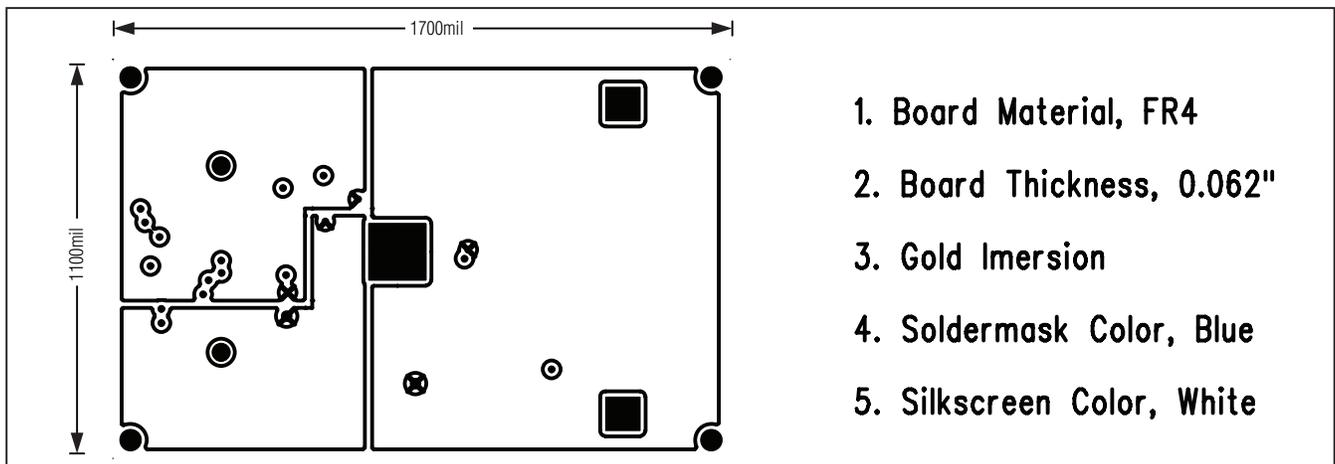*Figure 19. MAX11850 Component Placement Guide—Silkscreen*



1. Board Material, FR4

2. Board Thickness, 0.062"

3. Gold Imersion

4. Soldermask Color, Blue

5. Silkscreen Color, White

*Figure 20. MAX11850 Component Placement Guide—Top Assembly*

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# MAX11850/MAX11851 Evaluation Systems

1. Board Material, FR4

2. Board Thickness, 0.062"

3. Gold Imersion

4. Soldermask Color, Blue

5. Silkscreen Color, White

*Figure 21. MAX11850 PCB Layout—Top Layer*
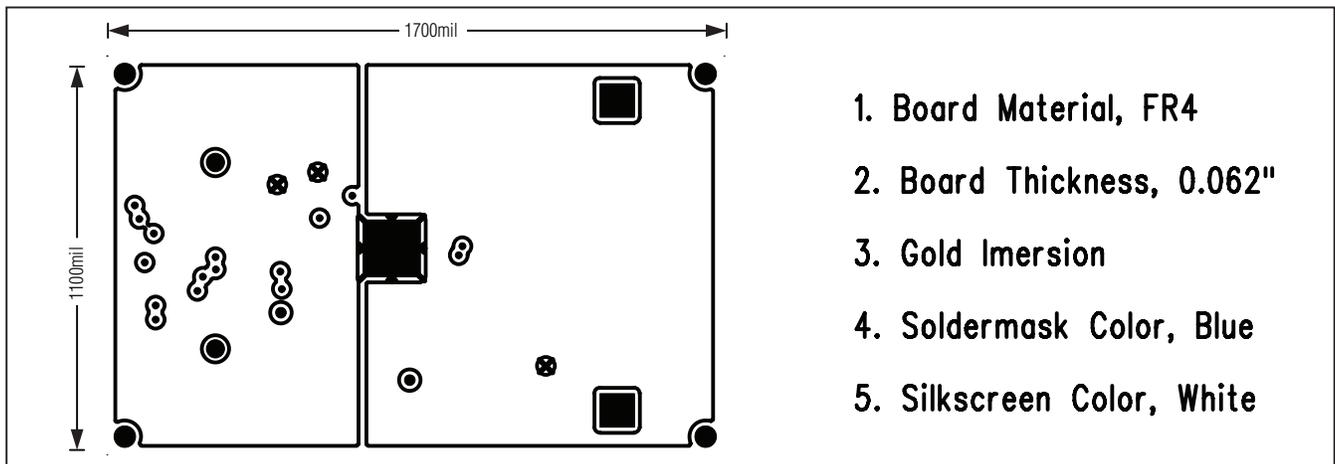


1. Board Material, FR4

2. Board Thickness, 0.062"

3. Gold Imersion

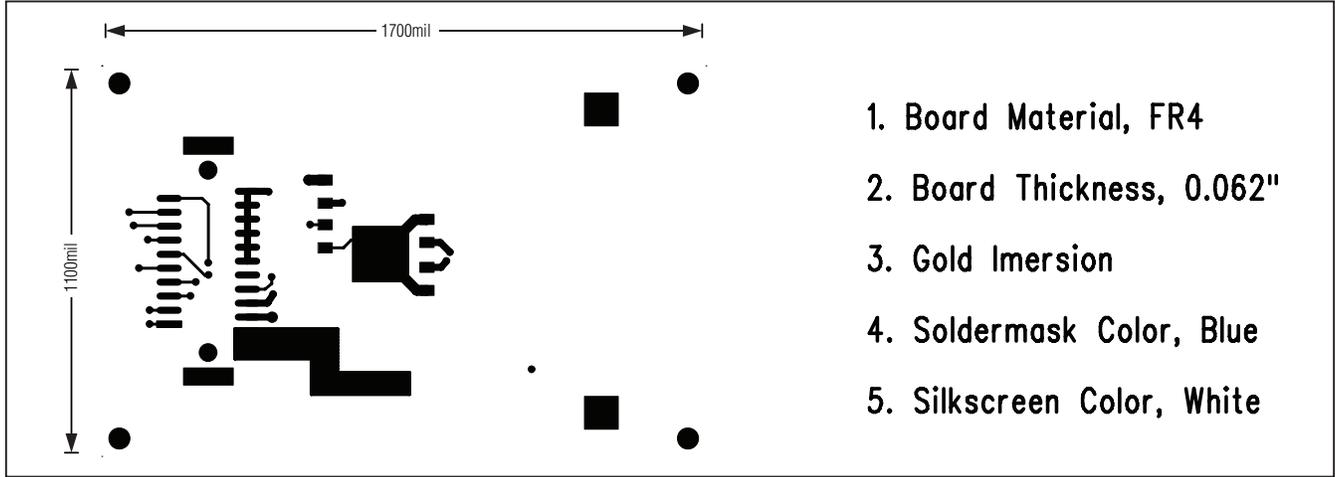4. Soldermask Color, Blue

5. Silkscreen Color, White

*Figure 22. MAX11850 PCB Layout—Layer 2*



1. Board Material, FR4

2. Board Thickness, 0.062"

3. Gold Imersion

4. Soldermask Color, Blue
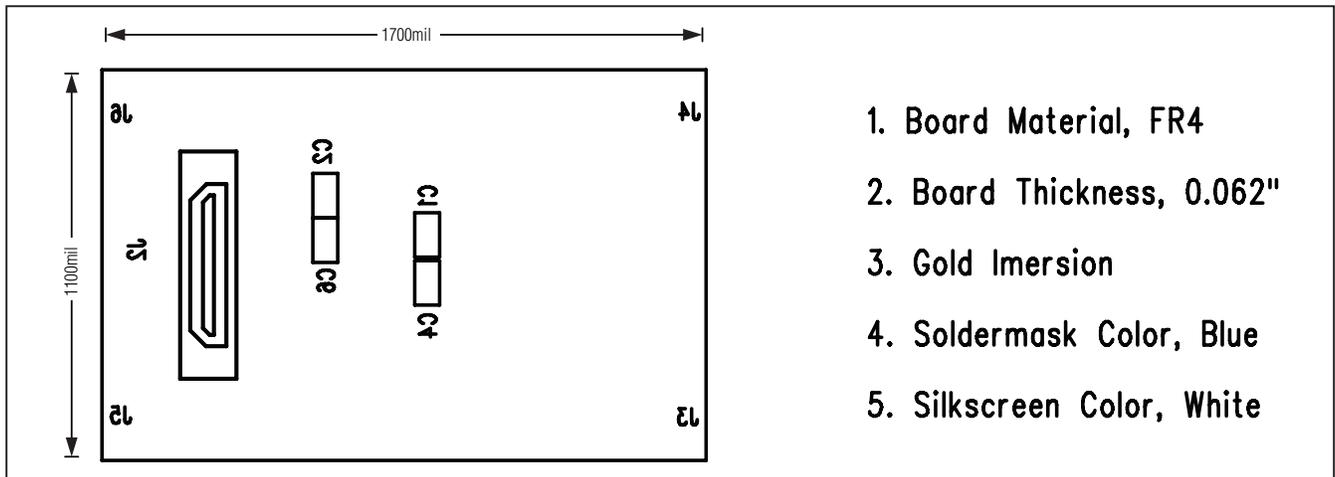
5. Silkscreen Color, White

*Figure 23. MAX11850 PCB Layout—Layer 3*
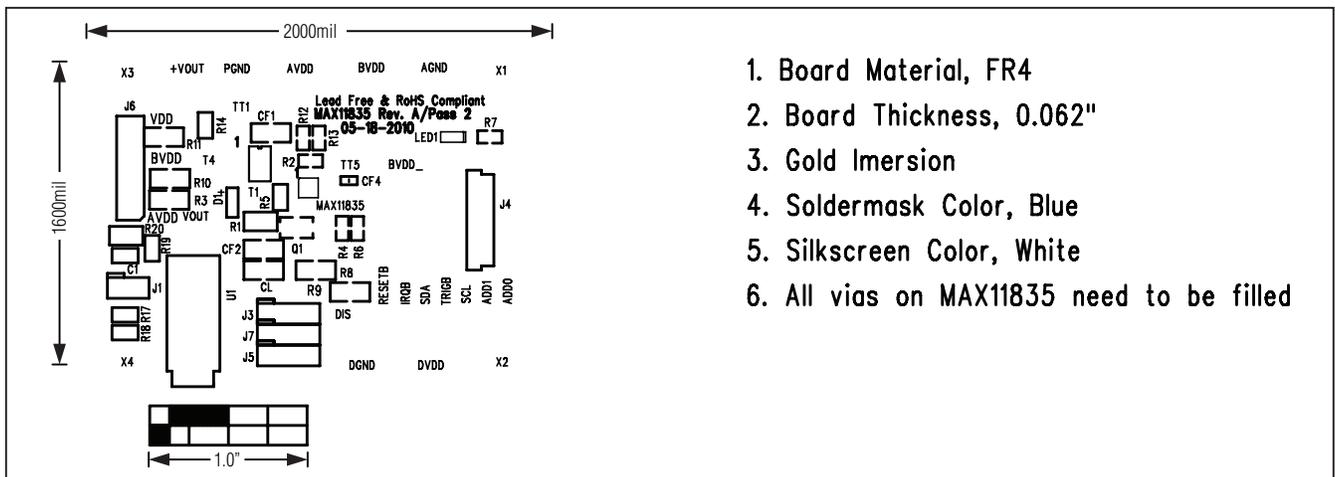
**Evaluate: MAX11850/MAX11851**



1. Board Material, FR4

2. Board Thickness, 0.062"

3. Gold Imersion

4. Soldermask Color, Blue

5. Silkscreen Color, White

Figure 24. MAX11850 PCB Layout—Bottom Layer



1. Board Material, FR4

2. Board Thickness, 0.062"

3. Gold Imersion

4. Soldermask Color, Blue

5. Silkscreen Color, White

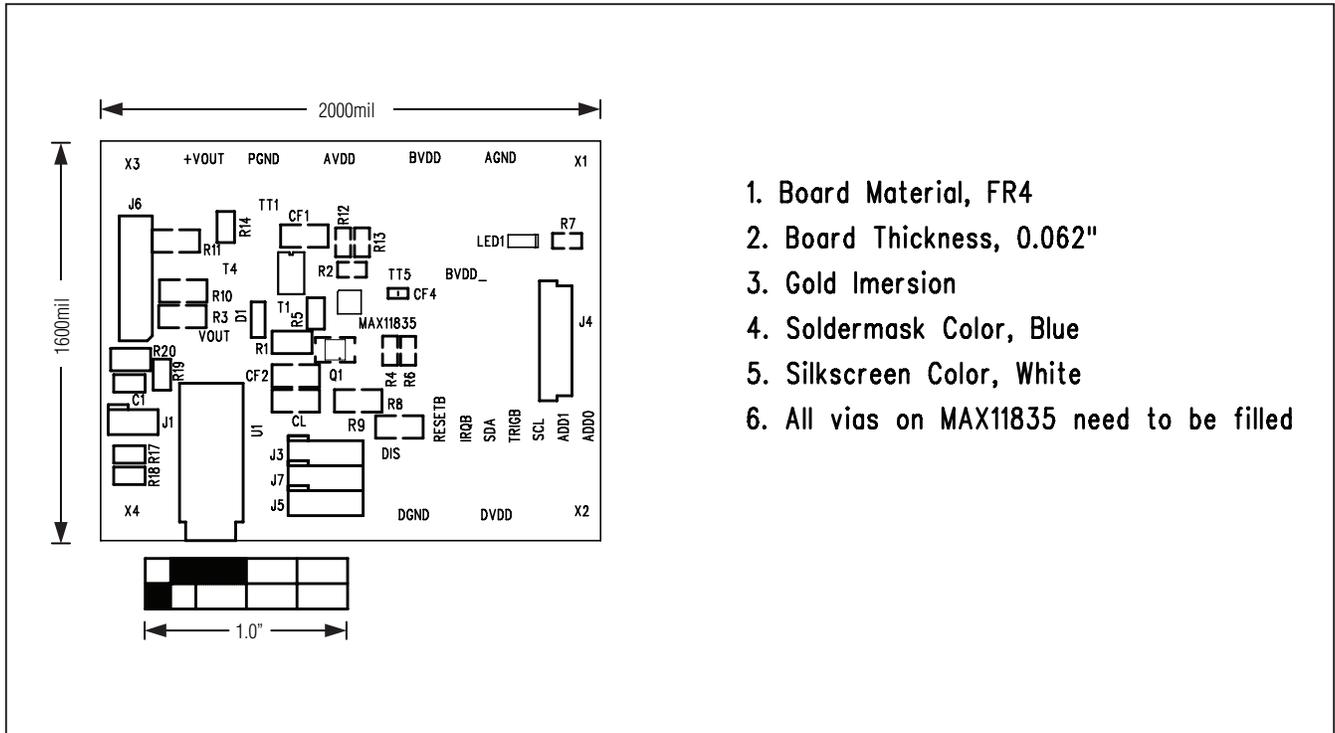Figure 25. MAX11850 Component Placement Guide—Bottom Assembly



1. Board Material, FR4
2. Board Thickness, 0.062"
3. Gold Imersion
4. Soldermask Color, Blue
5. Silkscreen Color, White
6. All vias on MAX11835 need to be filled
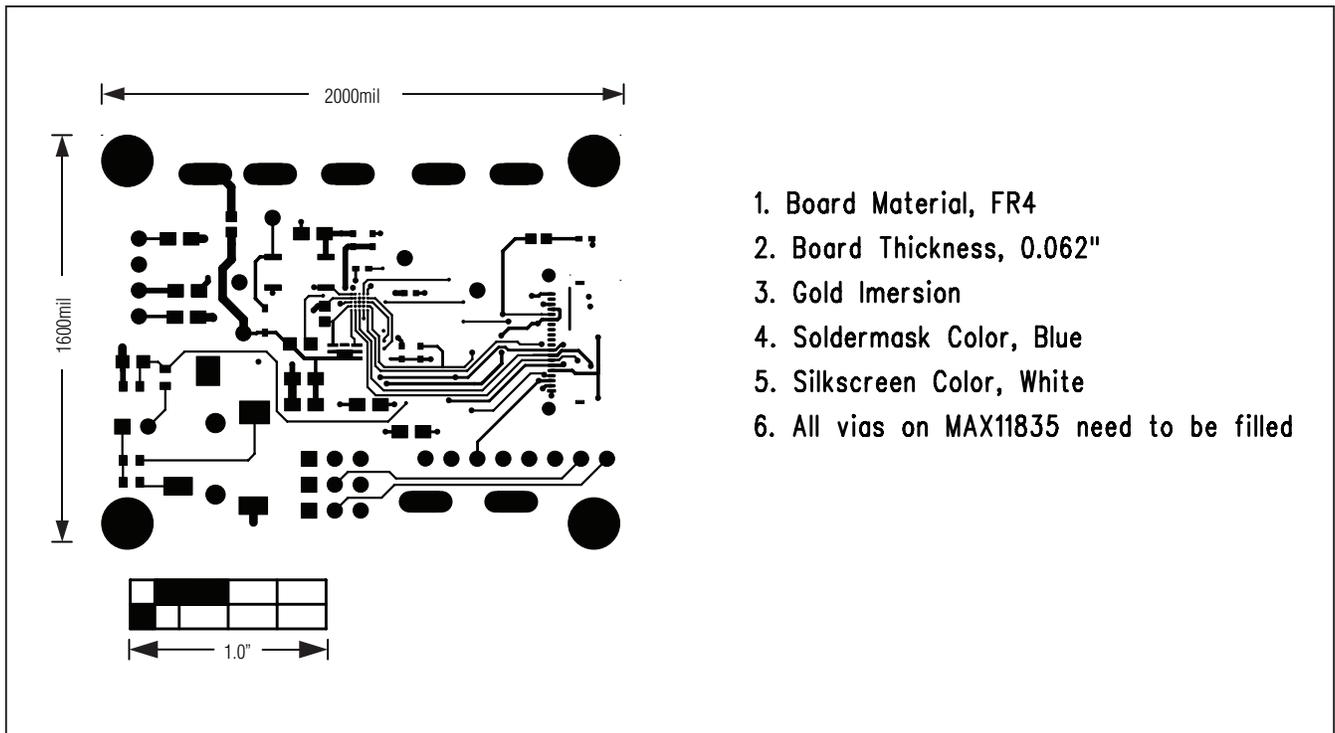
Figure 26. MAX11835 Component Placement Guide—Silkscreen

*МАХIМ*

1. Board Material, FR4
2. Board Thickness, 0.062"
3. Gold Imersion
4. Soldermask Color, Blue
5. Silkscreen Color, White
6. All vias on MAX11835 need to be filled

*Figure 27. MAX11835 Component Placement Guide—Top Assembly*



1. Board Material, FR4
2. Board Thickness, 0.062"
3. Gold Imersion
4. Soldermask Color, Blue
5. Silkscreen Color, White
6. All vias on MAX11835 need to be filled

*Figure 28. MAX11835 PCB Layout—Top Layer*

**Evaluate: MAX11850/MAX11851**



1. Board Material, FR4
2. Board Thickness, 0.062"
3. Gold Imersion
4. Soldermask Color, Blue
5. Silkscreen Color, White
6. All vias on MAX11835 need to be filled

*Figure 29. MAX11835 PCB Layout—Layer 2*



1. Board Material, FR4
2. Board Thickness, 0.062"
3. Gold Imersion
4. Soldermask Color, Blue
5. Silkscreen Color, White
6. All vias on MAX11835 need to be filled
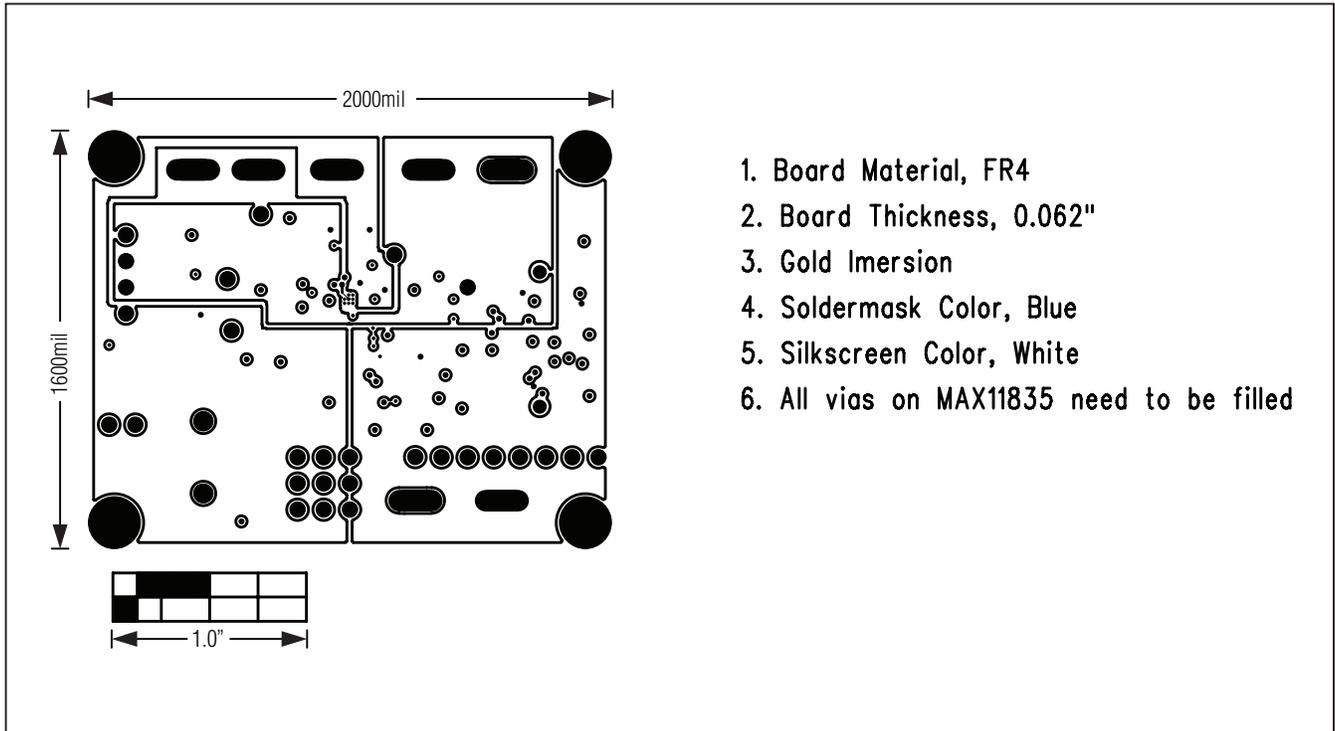
*Figure 30. MAX11835 PCB Layout—Layer 3*
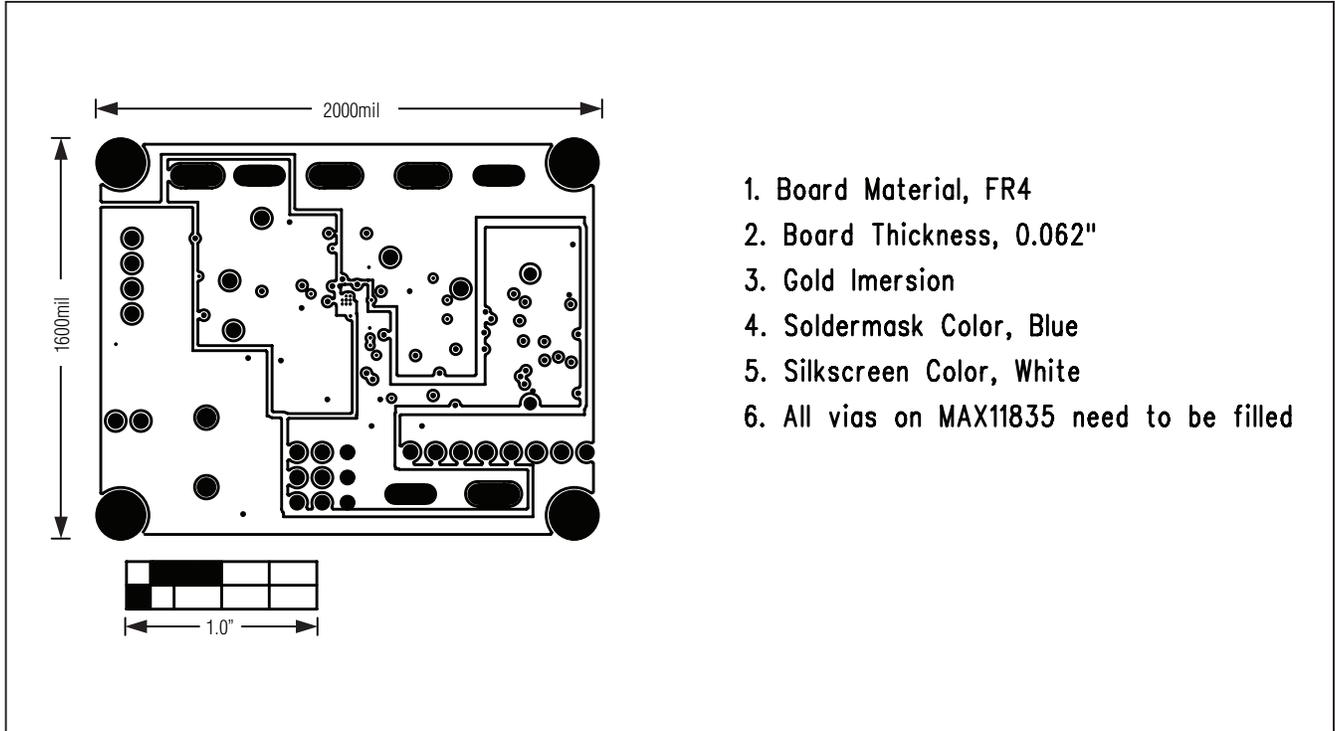
***MAXIM***

# MAX11850/MAX11851 Evaluation Systems

1. Board Material, FR4
2. Board Thickness, 0.062"
3. Gold Imersion
4. Soldermask Color, Blue
5. Silkscreen Color, White
6. All vias on MAX11835 need to be filled
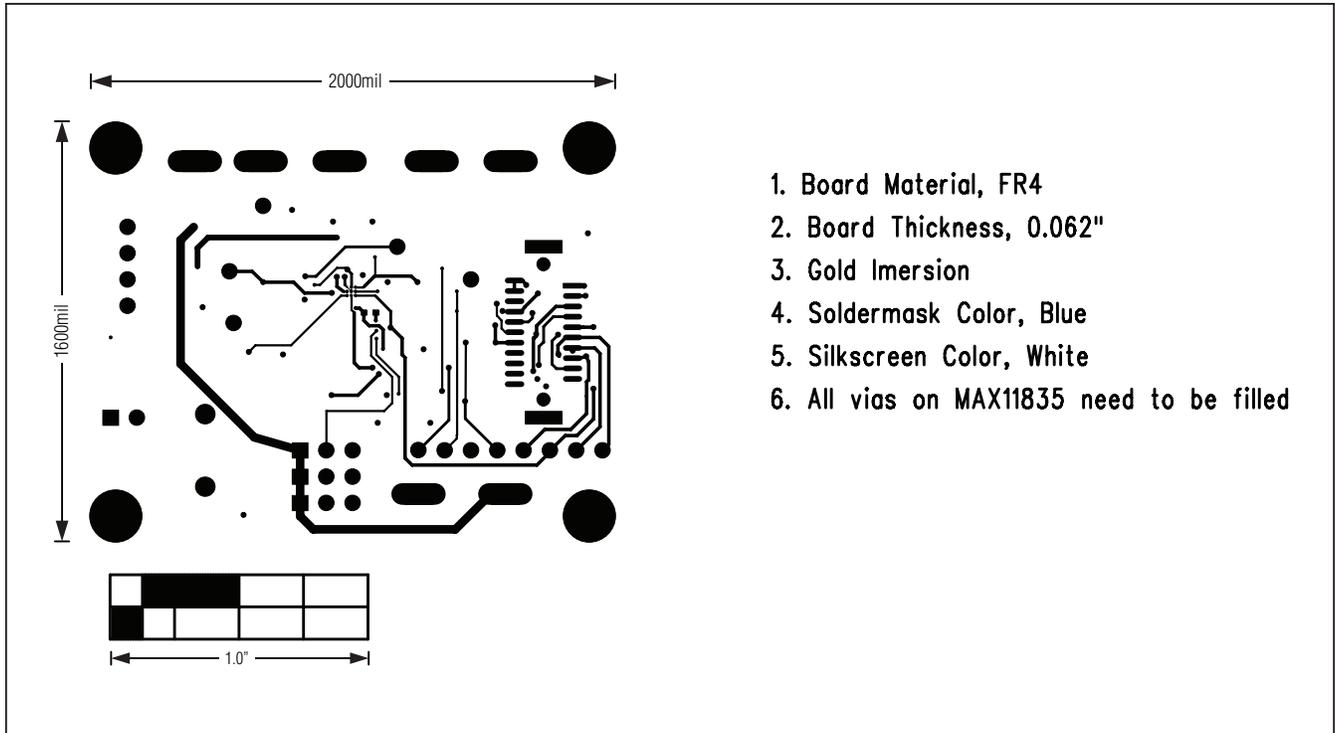
*Figure 31. MAX11835 PCB Layout—Bottom Layer*

1. Board Material, FR4
2. Board Thickness, 0.062"
3. Gold Imersion
4. Soldermask Color, Blue
5. Silkscreen Color, White
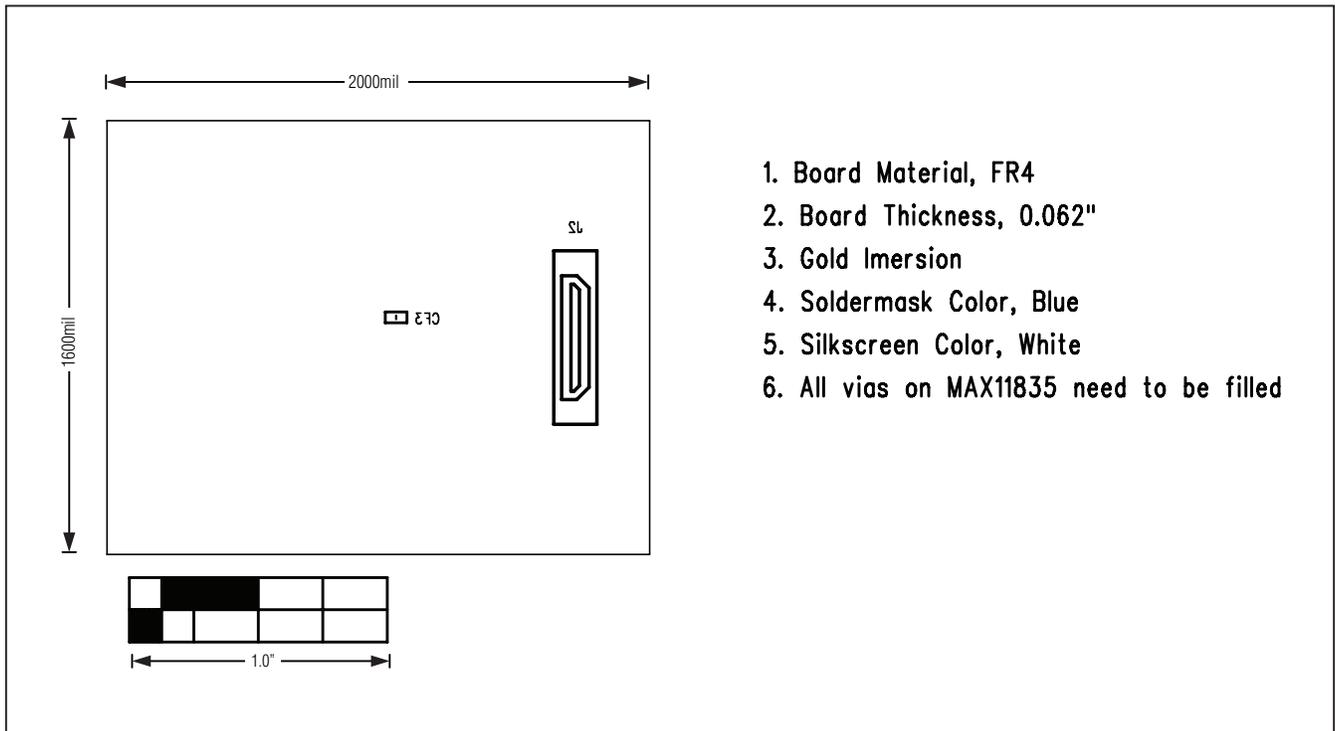6. All vias on MAX11835 need to be filled

*Figure 32. MAX11835 Component Placement Guide—Bottom Assembly*

# MAX11850/MAX11851 Evaluation Kit

**Revision History**

| REVISION NUMBER | REVISION DATE | DESCRIPTION | PAGES CHANGED |
|---|---|---|---|
| 0 | 6/10 | Initial release | — |

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**Maxim Integrated Products, 120 San Gabriel Drive, Sunnyvale, CA 94086 408-737-7600**