



# MAX11835 Evaluation System

Evaluates: MAX11835

## General Description

The MAX11835 evaluation system (EV system) demonstrates a complete solution to drive single and multilayer piezo actuators to create haptic feedback for products featuring touch interfaces. The MAX11835 efficiently generates any type of user-programmable waveforms including sine, trapezoidal, square, and pulse to drive the piezo loads to create custom haptic sensation. The low-power device directly interfaces with an application processor/host controller through an I<sup>2</sup>C interface and integrates various blocks including a boost regulator, pattern storage memory, and waveform generator in one package, thus providing a complete haptic feedback controller solution.

The EV system is a multiboard system that includes a MAXQ2000 USB touch interface board (UTIB) and a MAX11835 daughter board.

**Note:** The CD-ROM included with the EV kit contains a User's Guide that provides information about the graphical user interface (GUI).

**Note:** The MAX11835 is not a touch-screen controller and the touch panel is only provided for haptic feedback purposes, with the 4-wire flex connector left unconnected.

## Features

- ◆ Convenient USB Interface
- ◆ Touch Panel with Piezo Actuator Mounted for Haptic Feedback
- ◆ Analog Tracking-Mode Capability
- ◆ Easy-to-Use Windows® Graphical User Interface (GUI) Allows Register Programming for Various Haptic Waveforms
- ◆ All Components Mounted on a Plexiglass Base for Ease of Handling
- ◆ Single-Supply Operation through the USB
- ◆ Option for External Power Supply for the Boost Regulator
- ◆ Separate User's Guide Available for the Graphical User Interface

## Ordering Information

PART	TYPE	PC INTERFACE	INTERFACE TYPE
MAX11835TEVS+	EV System	USB	Windows

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

## EV System Contents List

QTY	DESCRIPTION
1	CD-ROM containing a USB driver, quick guide, GUI software for Windows XP®, and PCB schematic and layout files
1	USB touch interface board (MAXQ2000 UTIB board)
1	Haptic actuator controller daughter board (MAX11835) with a connector to plug in to the UTIB board
1	Piezo driver MAX11835 daughter board with a connector to plug in to the UTIB2 board (included with the haptic versions only)
1	Fujitsu 3.5in touch panel (Fujitsu 817-T010-1401-T670) with piezos mounted under them for haptic feedback purpose only
2	CUI piezos (Cui Inc. CFT-44TW100-0.6A1-70C) for haptic feedback
1	Mini USB cable

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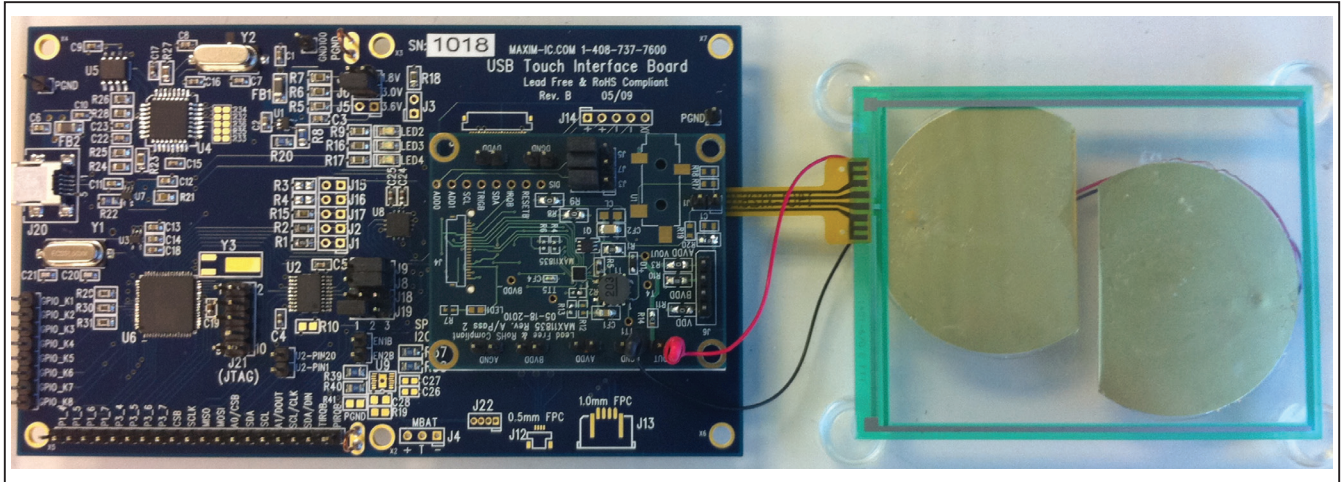


Figure 1. MAX11835 EV System

## Component Lists

### MAXQ2000 UTIB Board

DESIGNATION	QTY	DESCRIPTION
C1, C2, C11, C13	4	1 $\mu$ F -20/+80%, 16V ceramic capacitors (0603) Murata GRM188F51C105ZA01D
C3, C6, C12, C14	4	10 $\mu$ F $\pm$ 20%, 6.3V ceramic capacitors (0603) Murata GRM188R60J106ME47D
C4, C5, C9, C10, C15–C19, C23, C24, C25, C27	13	0.1 $\mu$ F -20/+80%, 16V ceramic capacitors (0603) Murata GRM188F51C104ZA01D
C7, C8	2	22pF $\pm$ 5%, 50V ceramic capacitors (0603) Murata GRM1885C1H220JA01D
C20, C21	2	10pF $\pm$ 5%, 50V ceramic capacitors (0603) Murata GRM1885C1H100JA01D
C22	1	33nF $\pm$ 10%, 16V ceramic capacitor (0603) Murata GRM188R71C333KA01D
C26	1	4.7 $\mu$ F -20/+80%, 10V ceramic capacitor (0603) Murata GRM188F51A475ZE20D

DESIGNATION	QTY	DESCRIPTION
C28	1	10 $\mu$ F $\pm$ 20%, 10V ceramic capacitor (0805) Murata GRM219R61A106KE44D
EN1B, EN2B, U2-PIN1, U2-PIN20	4	2-pin headers, 100 mil
FB1, FB2	2	100 $\mu$ H $\pm$ 10% ferrite beads (1206) TDK FL3215T-101K
J1, J2, J3, J5, J6, J7, J15, J16, J17	9	2-pin headers, 100 mil Sullins PBC02SABN
J4, J8, J9, J18, J19	5	3-pin headers, 100 mil Sullins PBC03SABN
J10	1	21-pin female connector Hirose DF9-21S-1V(32)
J20	1	5-position USB-mini connector Hirose UX60-MB-5ST
J21	1	10-pin JTAG header, 100 mil Sullins PBC05DAAN
LED2, LED3, LED4	3	RGB SMD LEDs (0805) Lite-On LTST-C171KYKT
R1–R4	4	4.7k $\Omega$ $\pm$ 5% resistors (0805) Vishay CRCW08054K70JNEA

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## Component Lists (continued)

DESIGNATION	QTY	DESCRIPTION
R5	1	196k $\Omega$ $\pm$ 5% resistor (0805) Vishay CRCW0805196KJNEA
R6	1	590k $\Omega$ $\pm$ 5% resistor (0805) Vishay CRCW0805590KJNEA
R7	1	61.9k $\Omega$ $\pm$ 1% resistor (0805) Vishay CRCW080561K9FKEA
R8, R20, R22, R37–R40	7	100k $\Omega$ $\pm$ 5% resistors (0805) Vishay CRCW0805100KJNEA
R9, R16, R17	3	215 $\Omega$ resistors (0805) Vishay CRCW0805215RJNEA
R10, R19, R32–R36	0	Not installed, resistors
R11–R14	4	0 $\Omega$ SMD resistors (0805)
R15, R18	2	51k $\Omega$ $\pm$ 5% resistors (0805) Vishay CRCW080551KJNEA
R21	1	169k $\Omega$ $\pm$ 5% resistor (0805) Vishay CRCW0805169KJNEA
R23, R24	2	27 $\Omega$ $\pm$ 5% resistors (0805) Vishay CRCW080527R0JNEA
R25	1	1.5k $\Omega$ $\pm$ 5% resistor (0805) Vishay CRCW08051K50JNEA
R26	1	2.2k $\Omega$ $\pm$ 5% resistor (0805) Vishay CRCW08052K20JNEA
R27	1	470 $\Omega$ resistor (0805) Vishay CRCW0805470RJNEA
R28	1	10k $\Omega$ $\pm$ 5% resistor (0805) Vishay CRCW080510K0JNEA
R29, R30, R31	3	3.3k $\Omega$ $\pm$ 5% resistors (0805) Panasonic ERA-S27J332V
R41	1	23.7k $\Omega$ $\pm$ 1% resistor (0805) Vishay CRCW080523K2FKEA

DESIGNATION	QTY	DESCRIPTION
U1, U7	2	Adjustable LDO linear regulators (5 SC70) Maxim MAX8512EXK-T
U2	1	Octal-level translator (20 TSSOP) Maxim MAX3001EEUP
U3	1	Fixed 2.5V LDO linear regulator (5 SC70) Maxim MAX8511EXK25-T
U4	1	UART, 7mm x 7mm (32 TQFP) FTDI FT232BL
U5	1	2kB EEPROM (8 SO) Atmel AT93C46A
U6	1	16-bit microcontroller (68 QFN-EP*) Maxim MAXQ2000-RAX
U8	1	Quad-level translators (12 TQFN-EP*) Maxim MAX3395EETC+
U9	1	Li+ linear battery charger (14 TDFN) Maxim MAX8856ETD+
Y1	1	16MHz crystal (HCM49) ECS ECS-160-20-5PDN-TR
Y2	1	6MHz crystal (HCM49) ECS ECS-60-20-5G3XDS-TR
Y3	0	Not installed, crystal
—	1	PCB: USB Touch Interface Board

\*EP = Exposed pad.

DESIGNATION	QTY	DESCRIPTION
ADD0, ADD1, DIS, IRQB, RESETB, SCL, SDA, TRIGB	0	Not installed, test points
CF1	1	10 $\mu$ F X54 ceramic capacitor (0805) Murata GRM21BF50J106ZE01L

### MAX11835 Daughter Board

DESIGNATION	QTY	DESCRIPTION
CF2	1	47nF, 200V ceramic capacitor (0805) KEMET C0805C473K2RACTU
CF3, CF4	2	1 $\mu$ F, 10V X5R ceramic capacitors (0402) KEMET C0402C475MPACTU

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## Component Lists (continued)

DESIGNATION	QTY	DESCRIPTION
CL	0	Not installed, SMD ceramic capacitor (0805)
C1	0	Not installed, capacitor
D1	1	200V diode
J1	1	2-pin headers, 0.1in pitch
J2	1	21-position male connector Hirose DF9-21P-1V(32)
J3, J5, J7	3	3-pin headers, 100 mil Sullins PBC03SABN
J4	0	Not installed, 20-position connector
J6	1	4-pin header, 0.1in pitch
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 = Q20V, VSD = 2V, RDS(ON) = 1 $\Omega$
R1	1	2M $\Omega$ $\pm$ 1%, 250V resistor (0805)
R2	1	27k $\Omega$ SMD resistor (0402)

DESIGNATION	QTY	DESCRIPTION
R3, R8, R9, R11, R20	5	0 $\Omega$ SMD resistors (0805)
R4, R6	2	4.7k $\Omega$ SMD resistors (0402)
R5	1	20 $\Omega$ SMD resistor (0603)
R7	1	220 $\Omega$ SMD resistor (0402)
R10	1	1 $\Omega$ SMD resistor (0805)
R12	0	Not installed, SMD resistor (0402)
R13	1	0 $\Omega$ SMD resistor (0402)
R14	1	4.99k $\Omega$ resistor (0603)
R17, R18	2	49.9 $\Omega$ SMD resistors (0402)
R19	0	Not installed, resistor
T1	1	Boost transformer
T4, TT1, TT5, VOUT	0	Not installed, test points
U1	0	Not installed, haptic piezo controller (25 WLP) Maxim MAX11835EWA+
X1–X4	4	Empty holes
—	1	PCB: MAX11835

**Table 1. UTIB Ports**

PORT	DESCRIPTION
J10	Daughter card connector for I <sup>2</sup> C-controlled devices (includes 1.8V/3.3V/3.6V supplies and reset line)
J20	USB port provides power to the EV system and communication to a PC
J21	JTAG port for programming the MAXQ2000

**Table 2. UTIB Default Jumper Settings**

JUMPER	SHUNT POSITION	STATUS	DESCRIPTION
J5	1-2	Short	If J5 and J6 are open, 3.6V supply to the daughter board
J6	1-2	Closed	3V supply to the daughter board
J7	1-2	User's preference	If closed, 1.8V supply to the daughter board
J8	2-3	Closed	I <sup>2</sup> C communication
J9	2-3	Closed	I <sup>2</sup> C communication
J18	—	Open	—
J19	1-2	Closed	USB power

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**Table 3. Jumper Settings for the MAX11835 Daughter Board**

JUMPER	SHUNT POSITION	STATUS	DESCRIPTION
J1	—	Open	Pin 2: AIN to MAX11835
J3	2-3	Closed	Pins 2-3: Default to playback from the device memory Pins 1-2: Analog tracking mode
J5	2-3	Closed	ADD0 slave address pin (pin 1, DVDD; pin 3, GND)
J7	2-3	Closed	ADD1 slave address pin (pin 1, DVDD; pin 3, GND)
J6	BVDD-VDD	Closed	Power supply to BVDD and AVDD; if needed to provide power from external voltage source, leave the jumper open and apply voltage to BVDD

**Evaluates: MAX11835**

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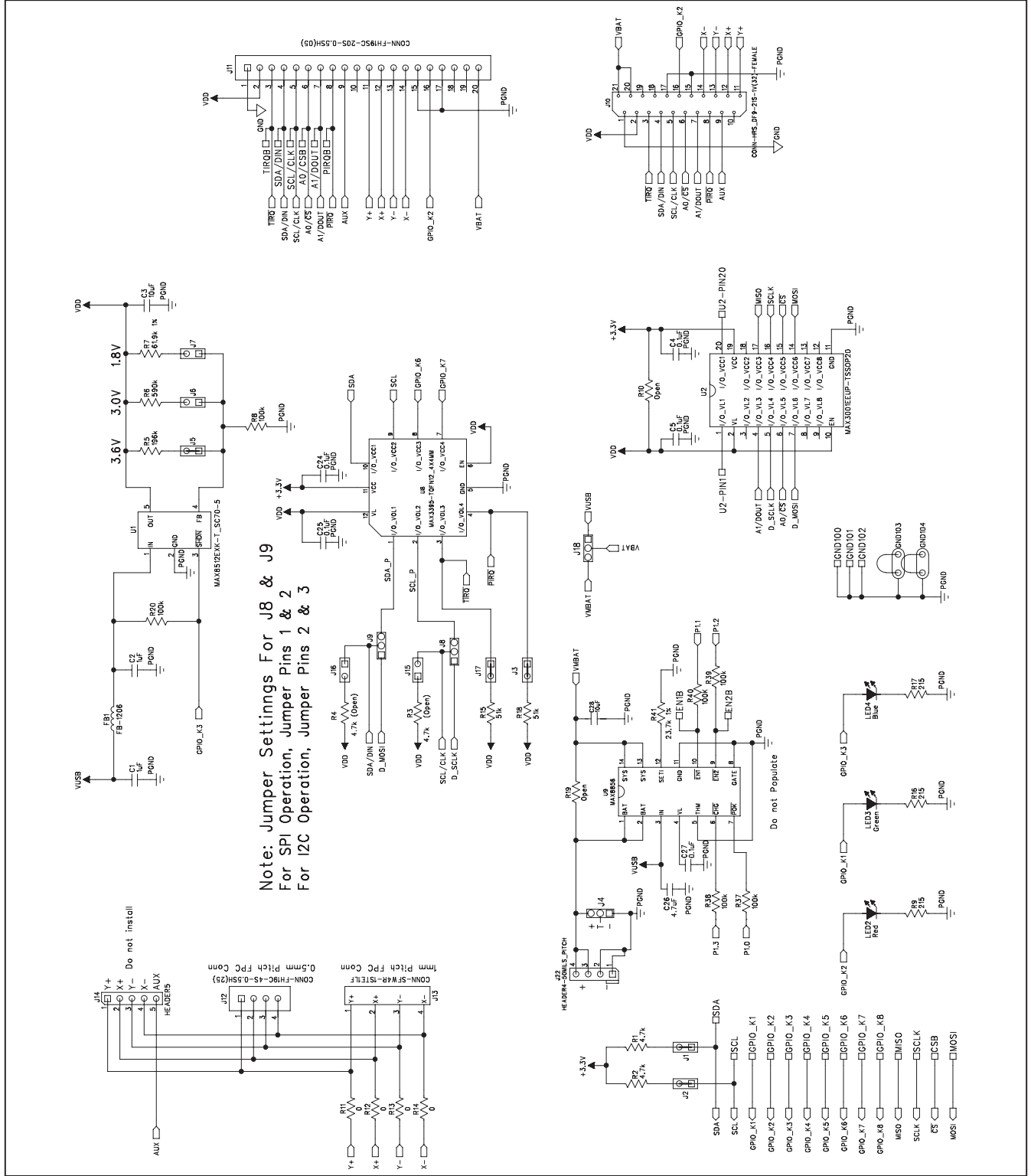


Figure 2a. UTIB Schematic—Main (Sheet 1 of 2)

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Evaluates: MAX11835

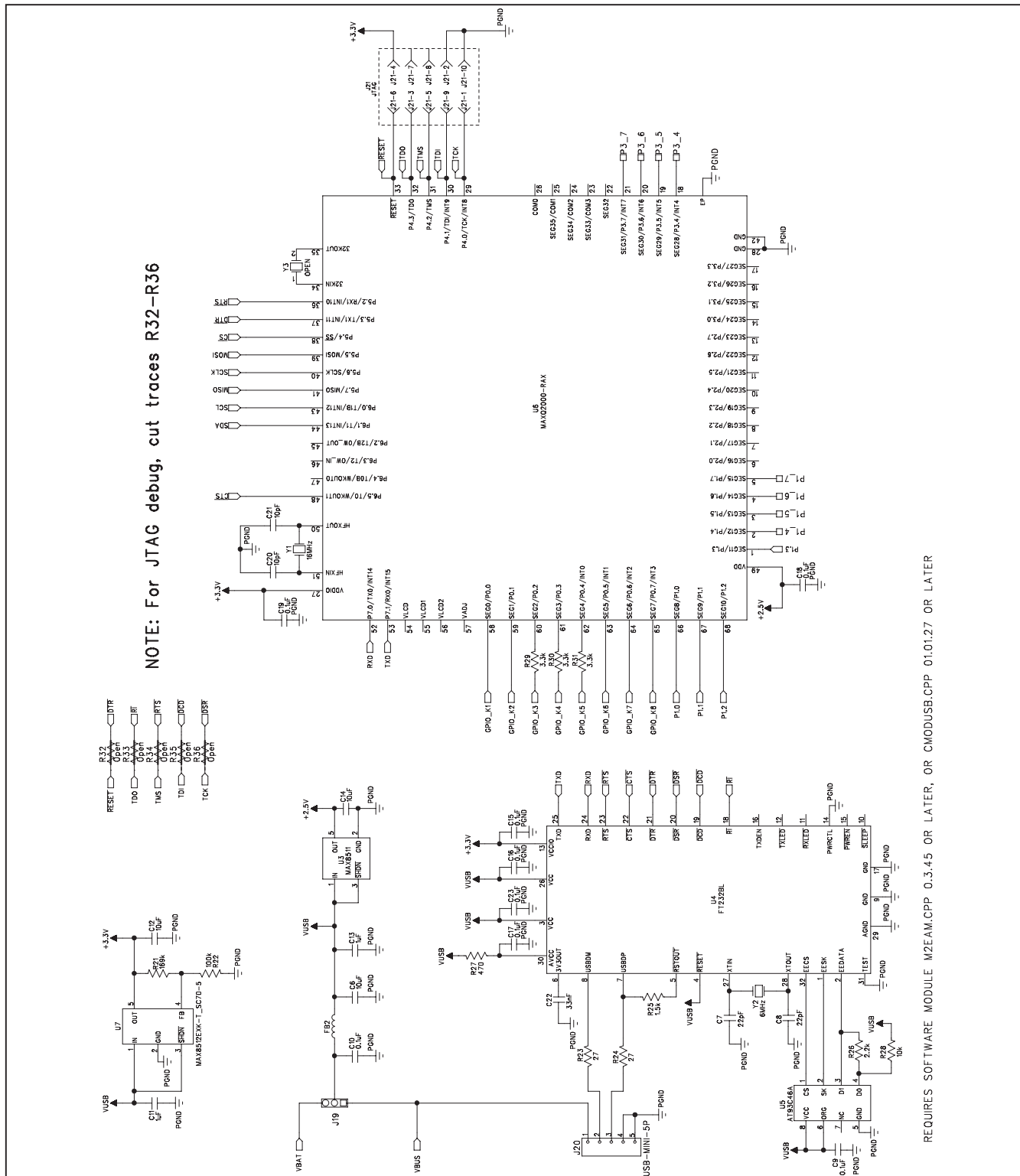


Figure 2b. UTIB Schematic—Mini USB (Sheet 2 of 2)



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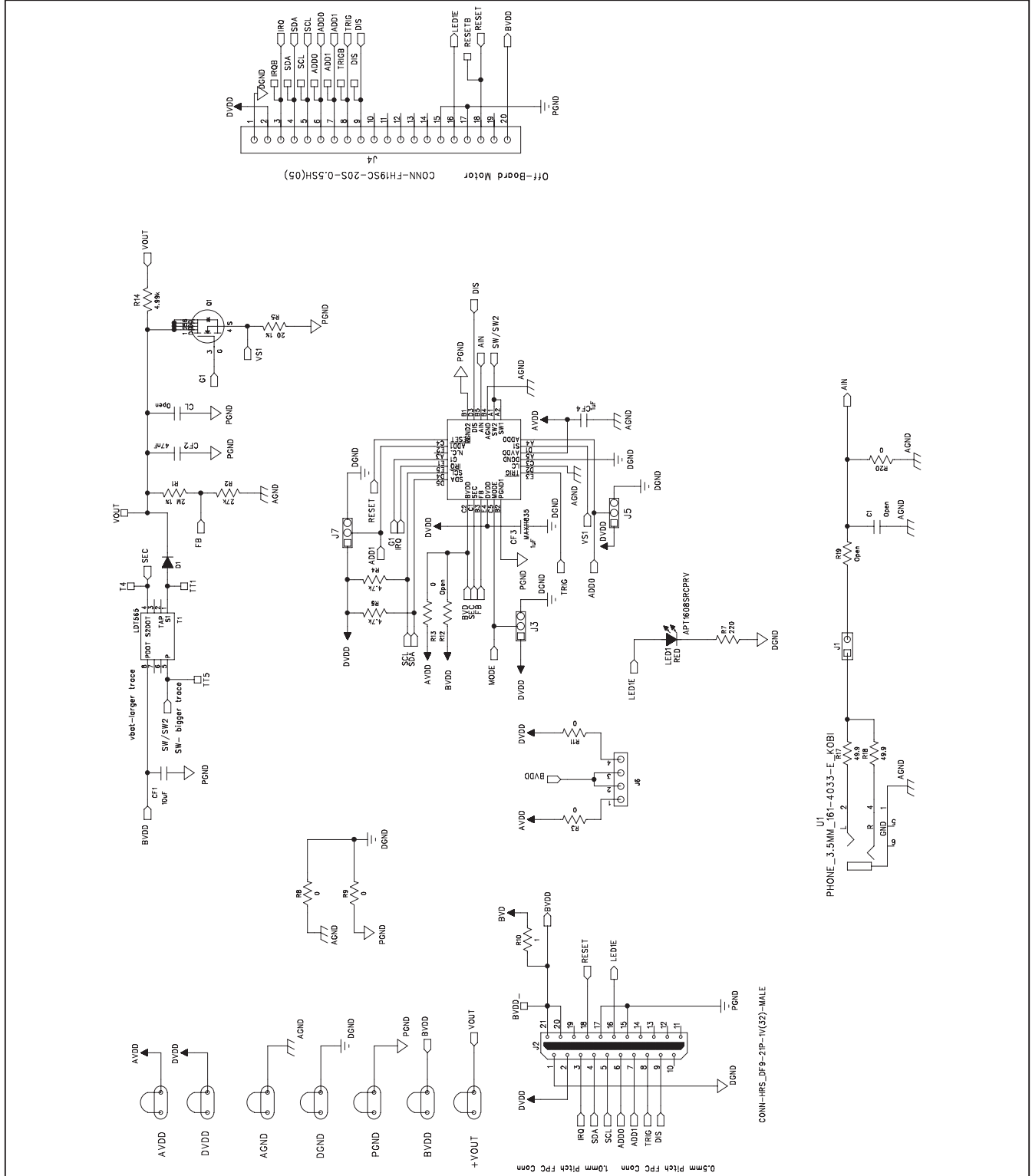


Figure 3. MAX11835 Daughter Board Schematic



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**Evaluate: MAX11835**

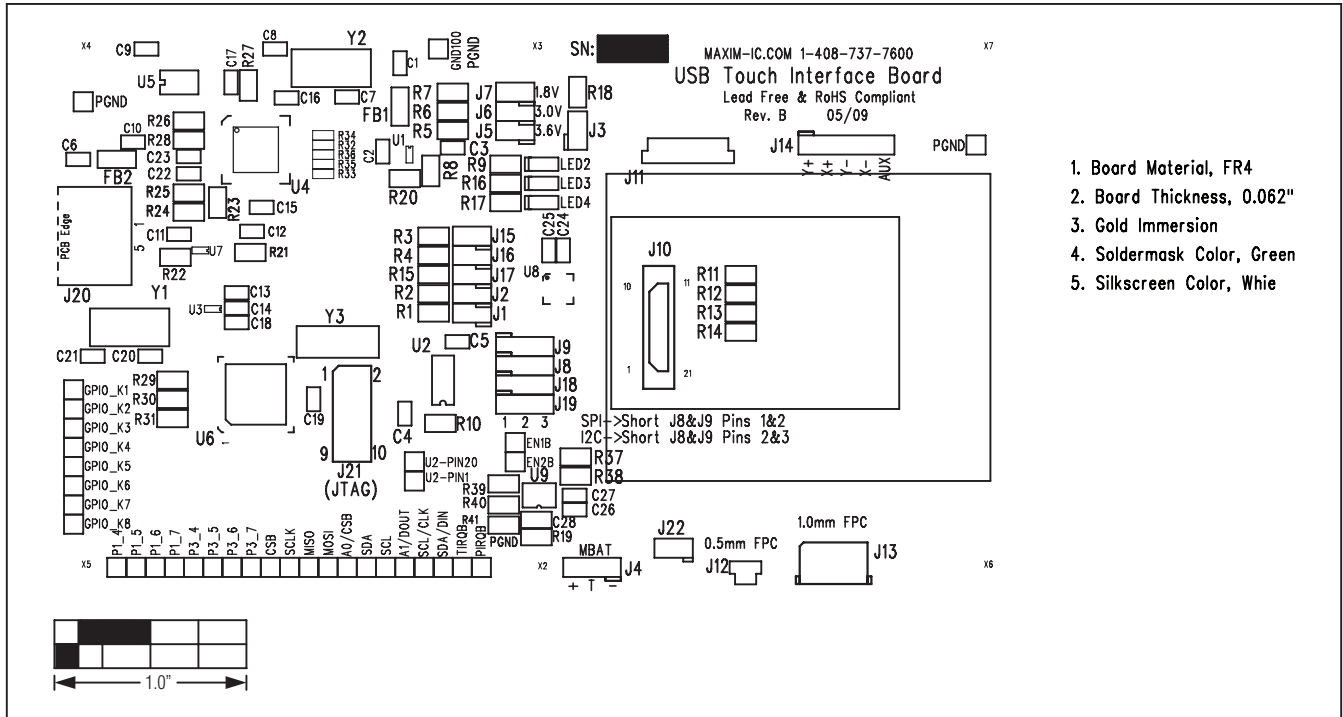


Figure 4. UTIB PCB Layout—Silkscreen

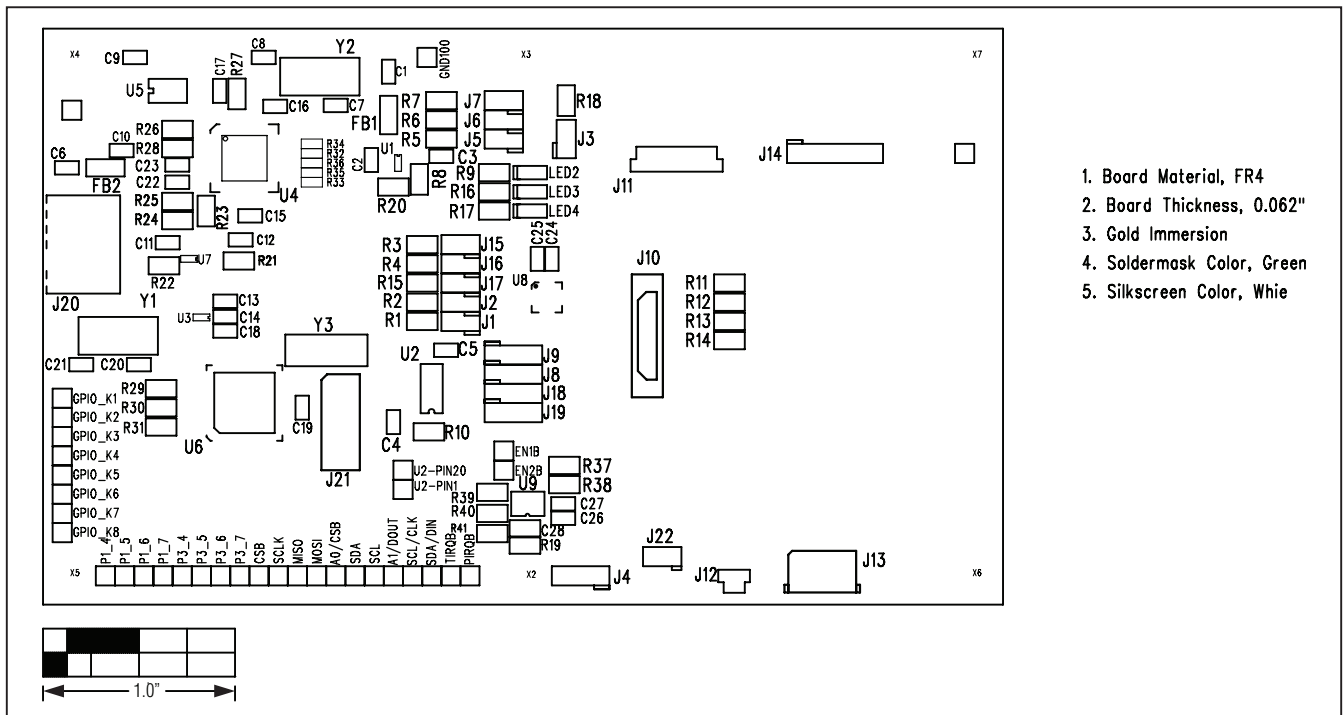


Figure 5. UTIB PCB Layout—Top Assembly

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Evaluates: MAX11835

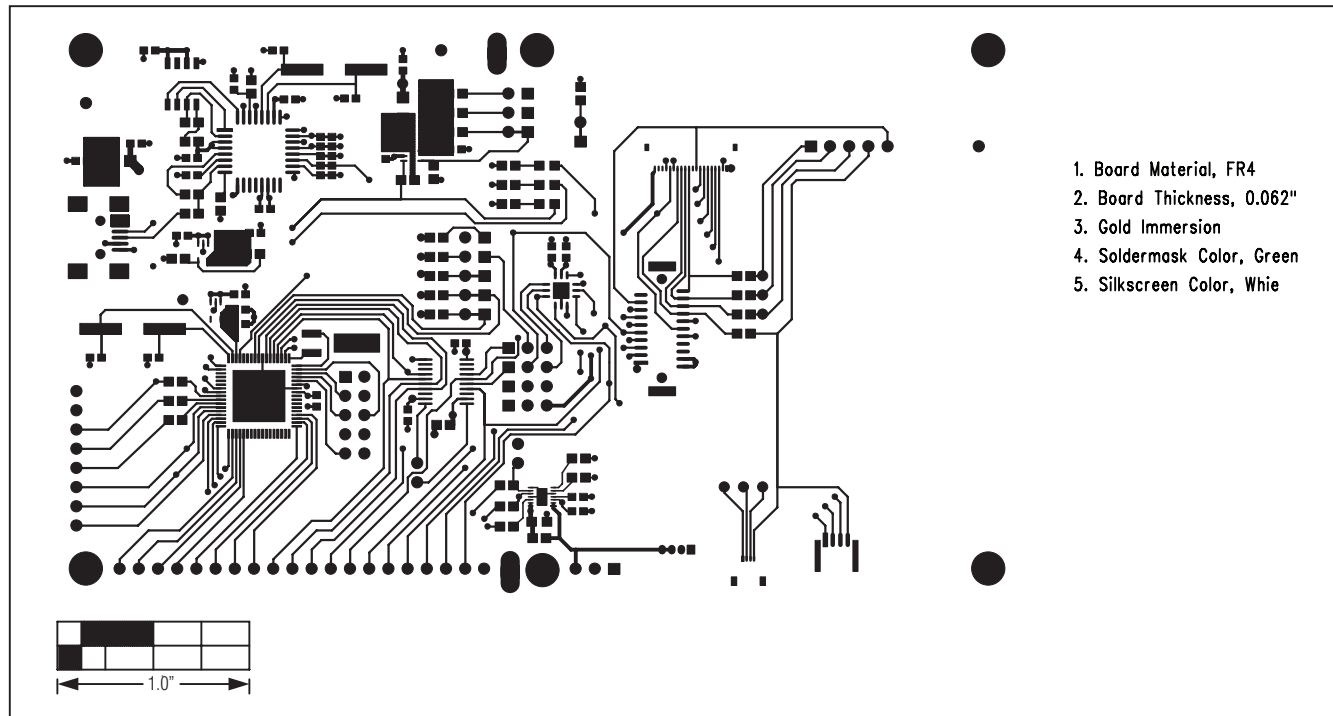


Figure 6. UTIB PCB Layout—Top Layer

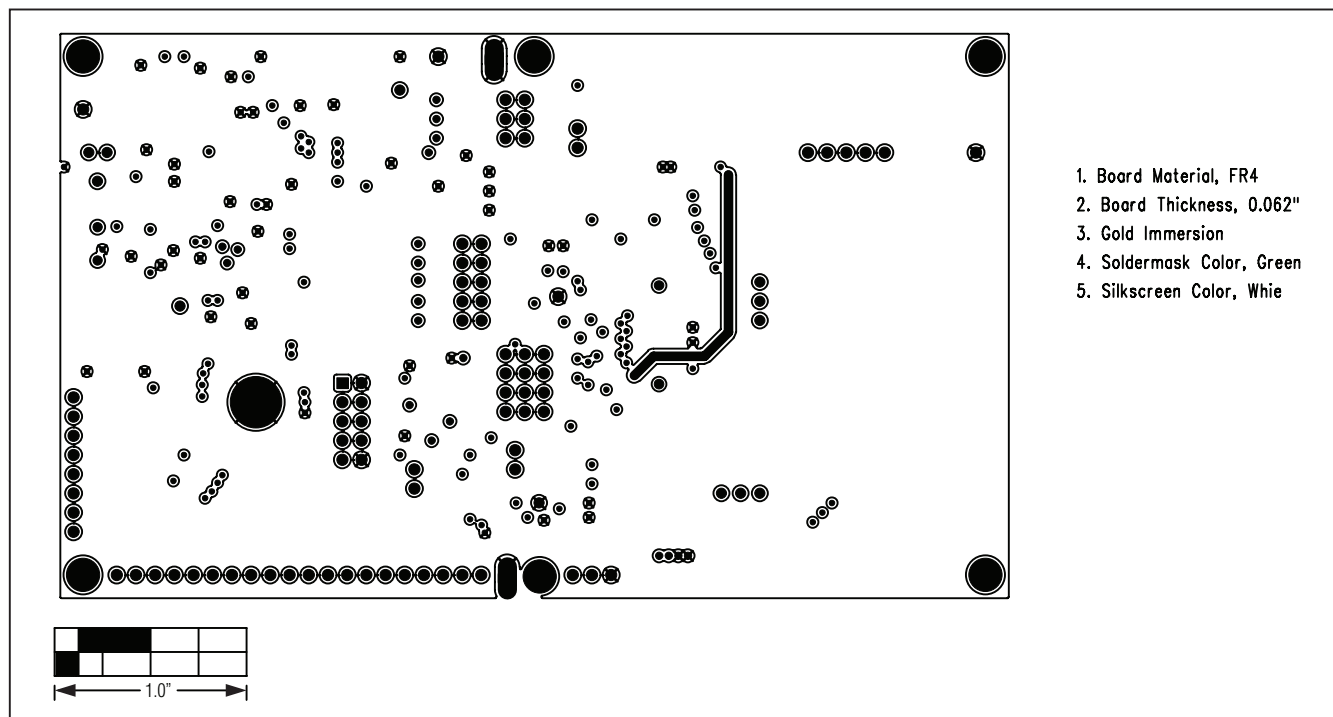


Figure 7. UTIB PCB Layout—Layer 2

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Evaluates: MAX11835

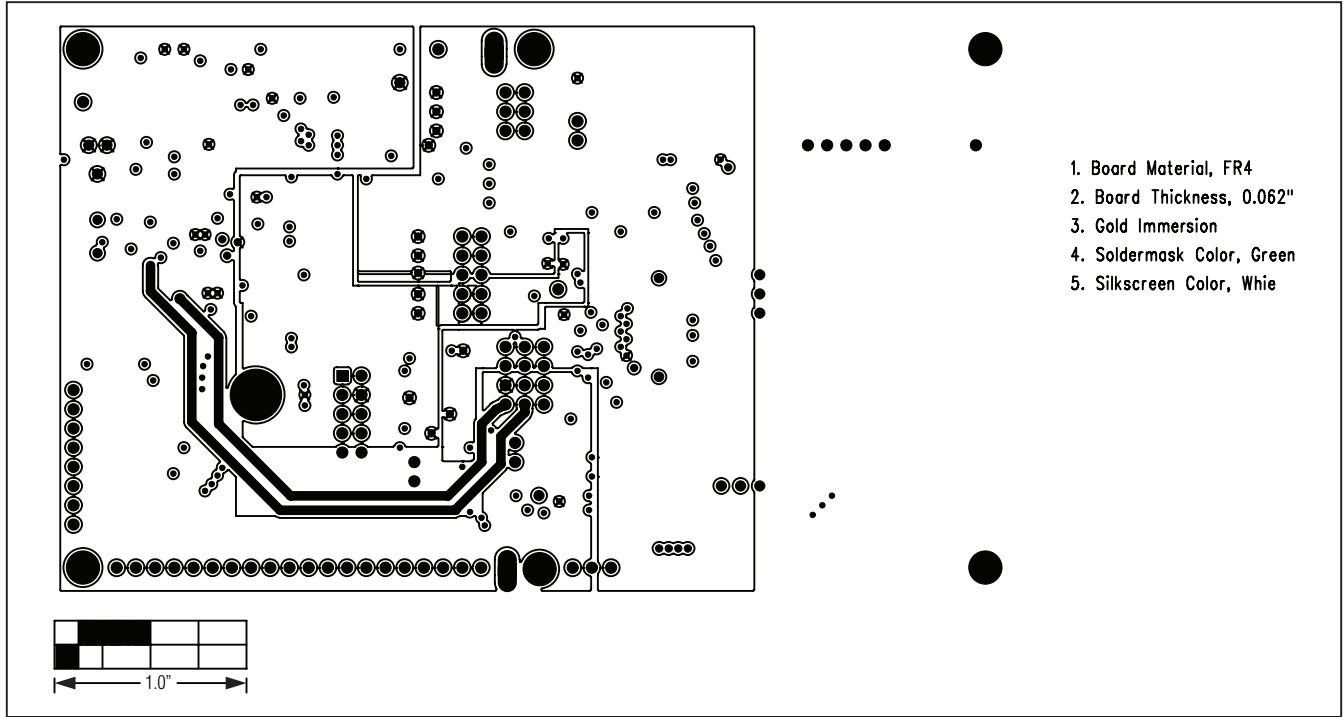


Figure 8. UTIB PCB Layout—Layer 3

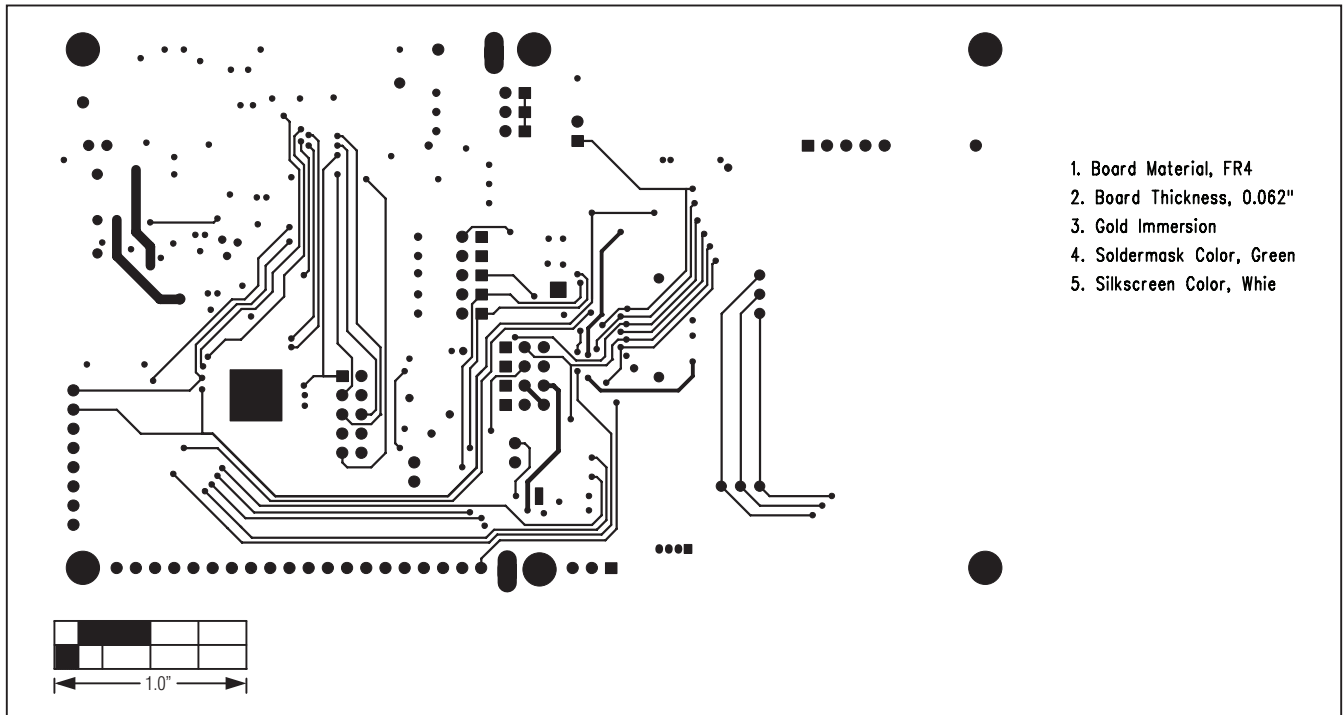


Figure 9. UTIB PCB Layout—Bottom Layer

# MAX11835 Evaluation System

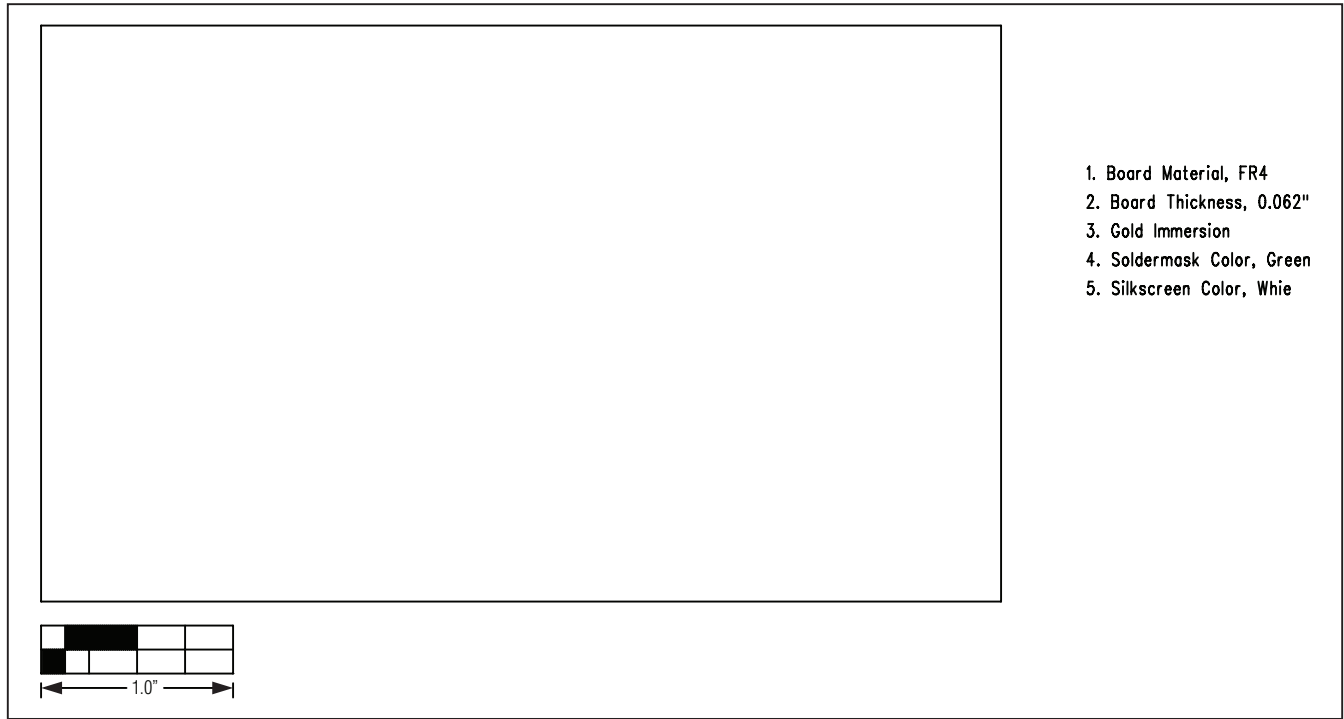


Figure 10. UTIB PCB Layout—Bottom Assembly

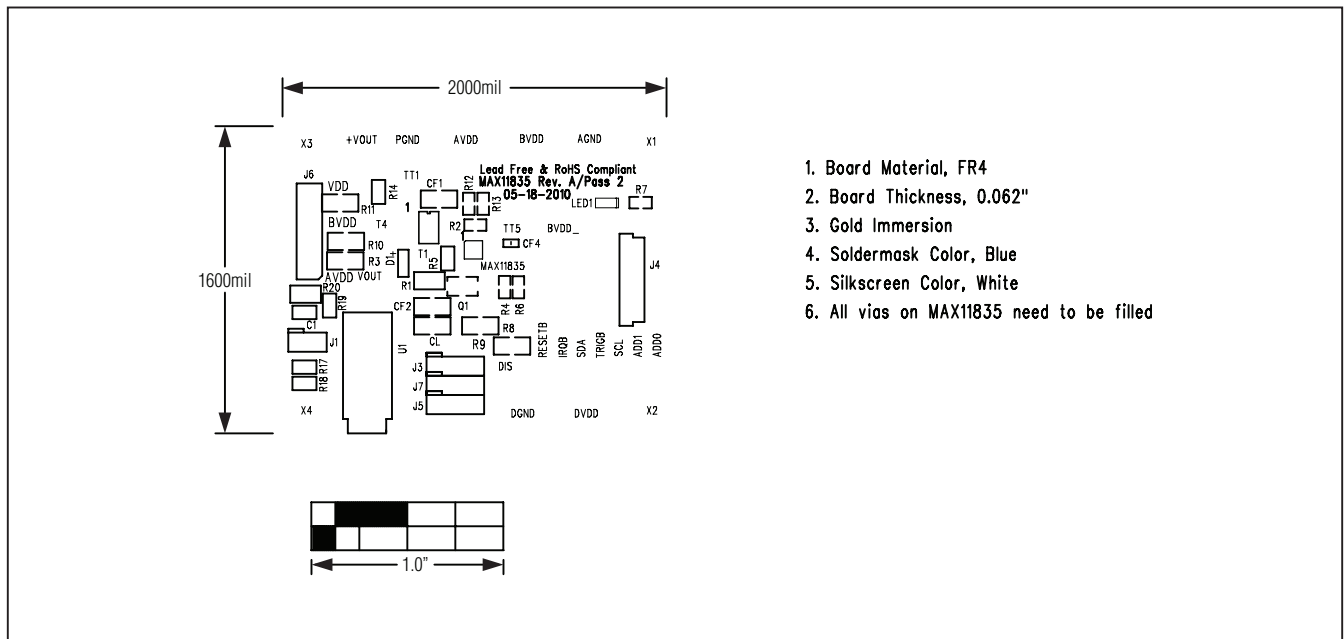


Figure 11. MAX11835 PCB Layout—Silkscreen

# MAX11835 Evaluation System

**Evaluates: MAX11835**

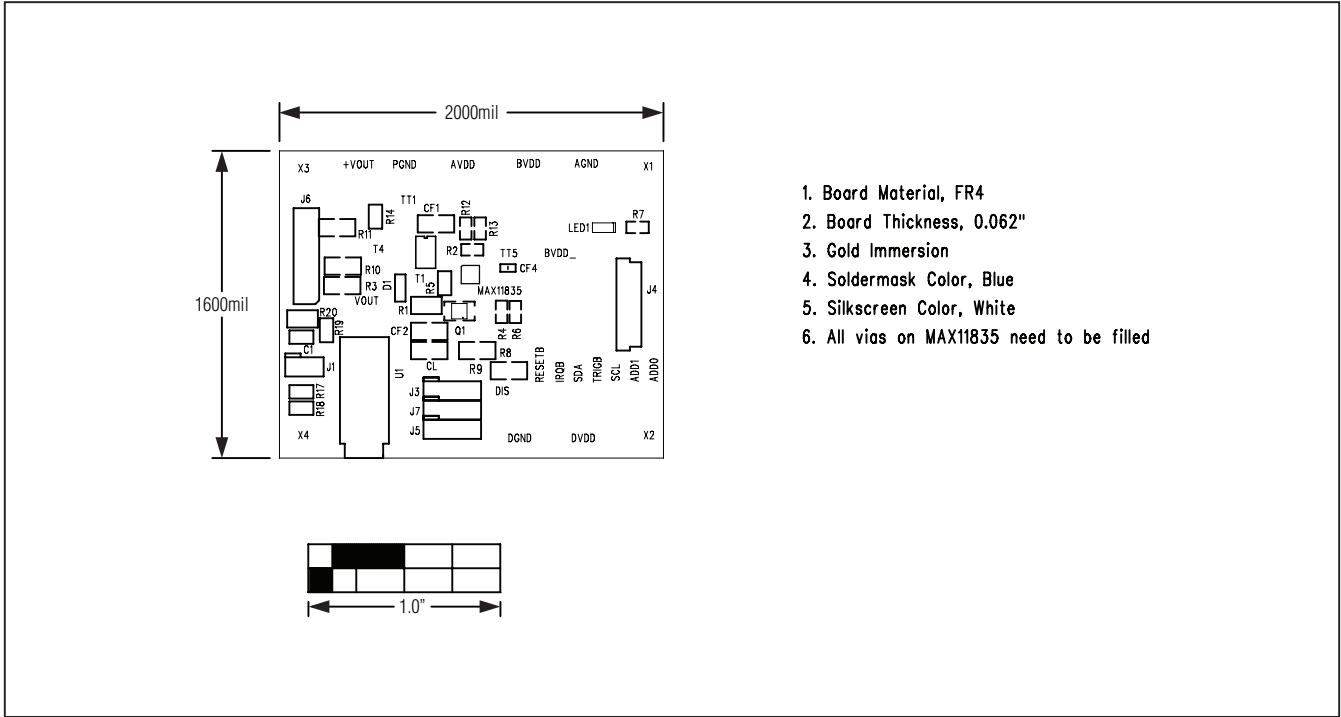


Figure 12. MAX11835 PCB Layout—Top Assembly

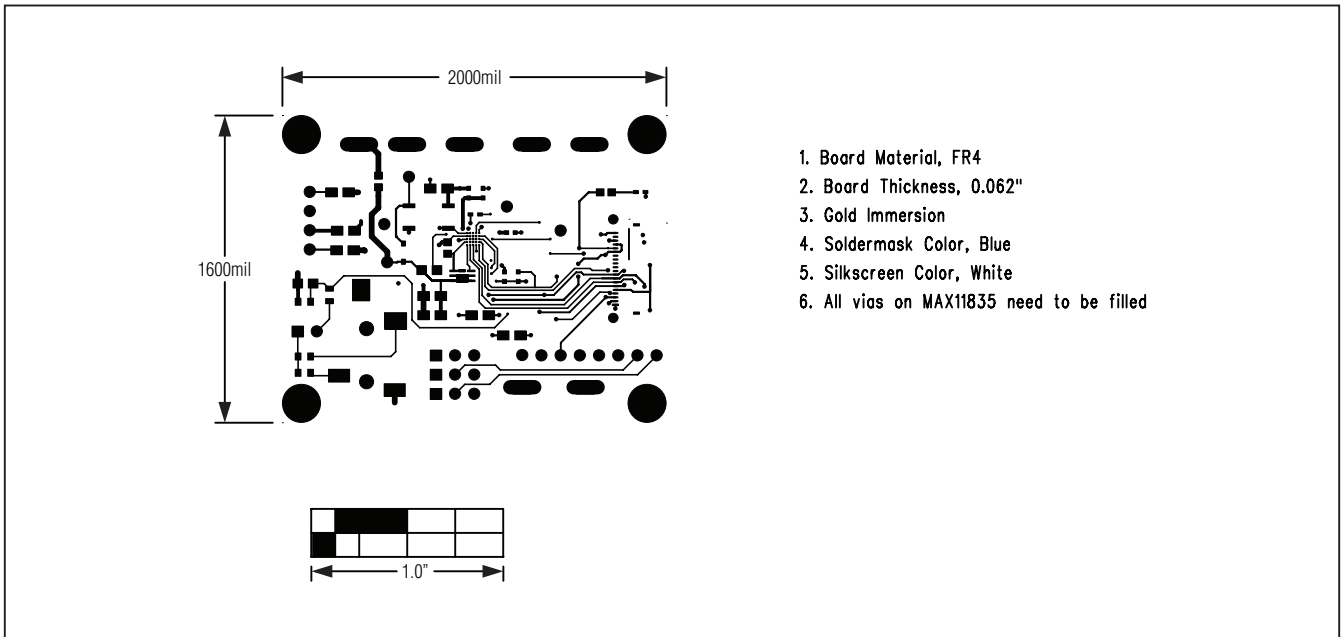


Figure 13. MAX11835 PCB Layout—Top Layer

# MAX11835 Evaluation System

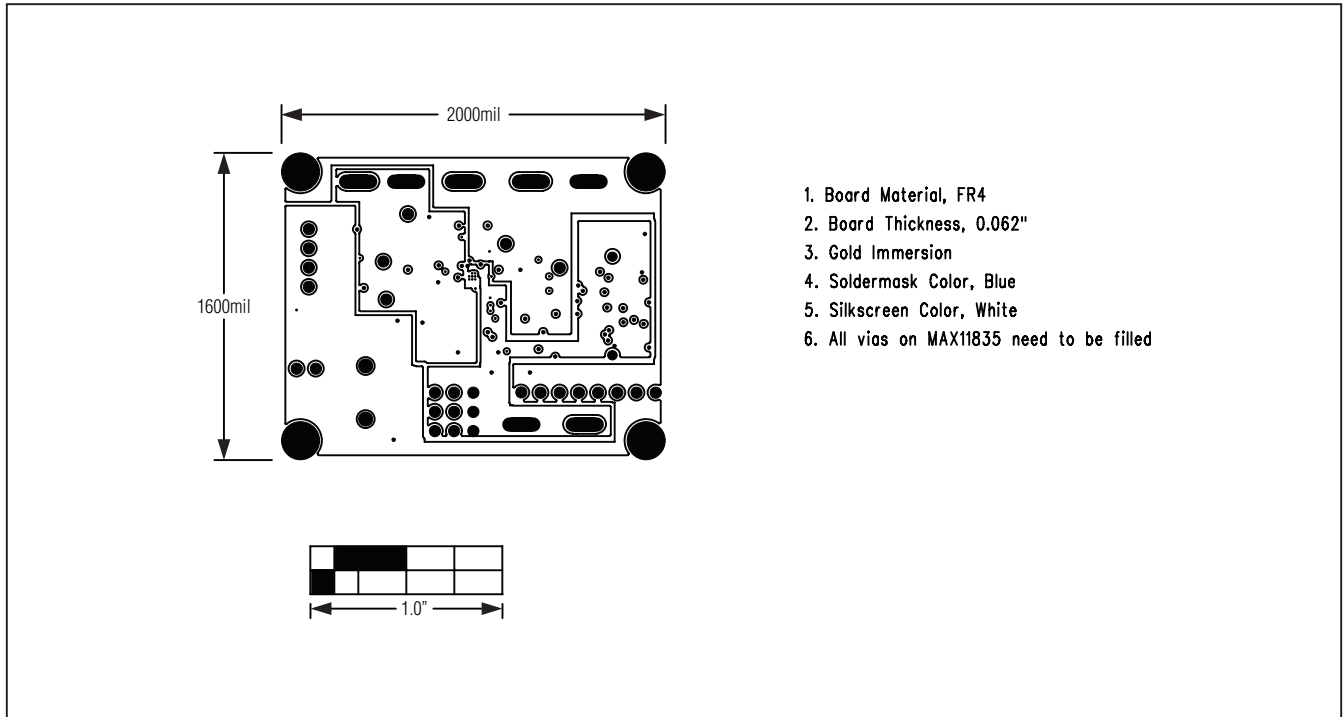


Figure 14. MAX11835 PCB Layout—Layer 2

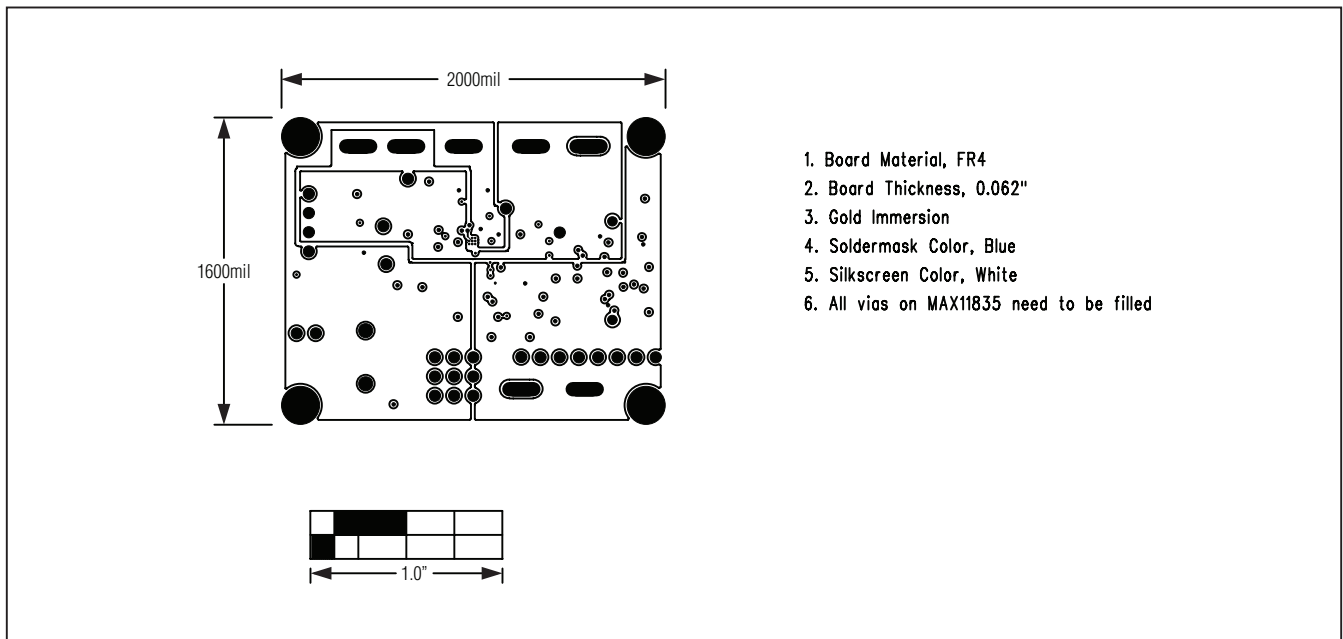


Figure 15. MAX11835 PCB Layout—Layer 3

# MAX11835 Evaluation System

**Evaluates: MAX11835**

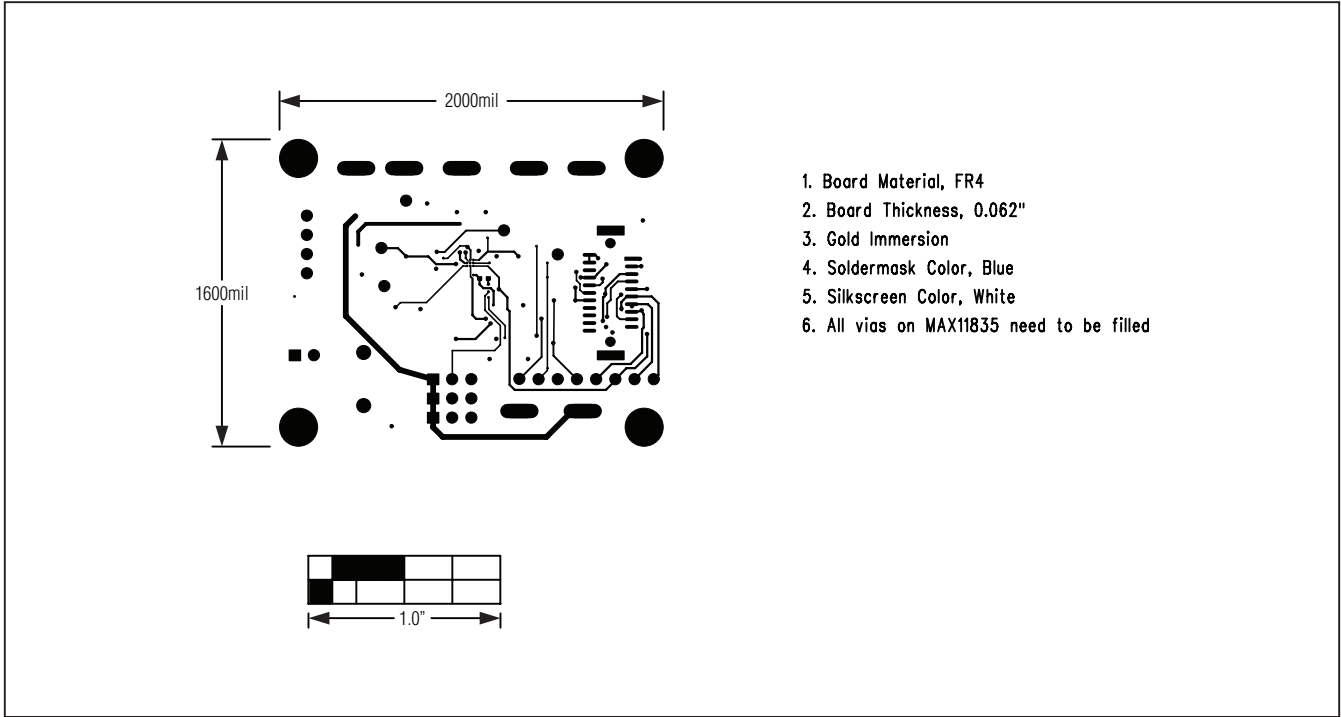


Figure 16. MAX11835 PCB Layout—Bottom Layer

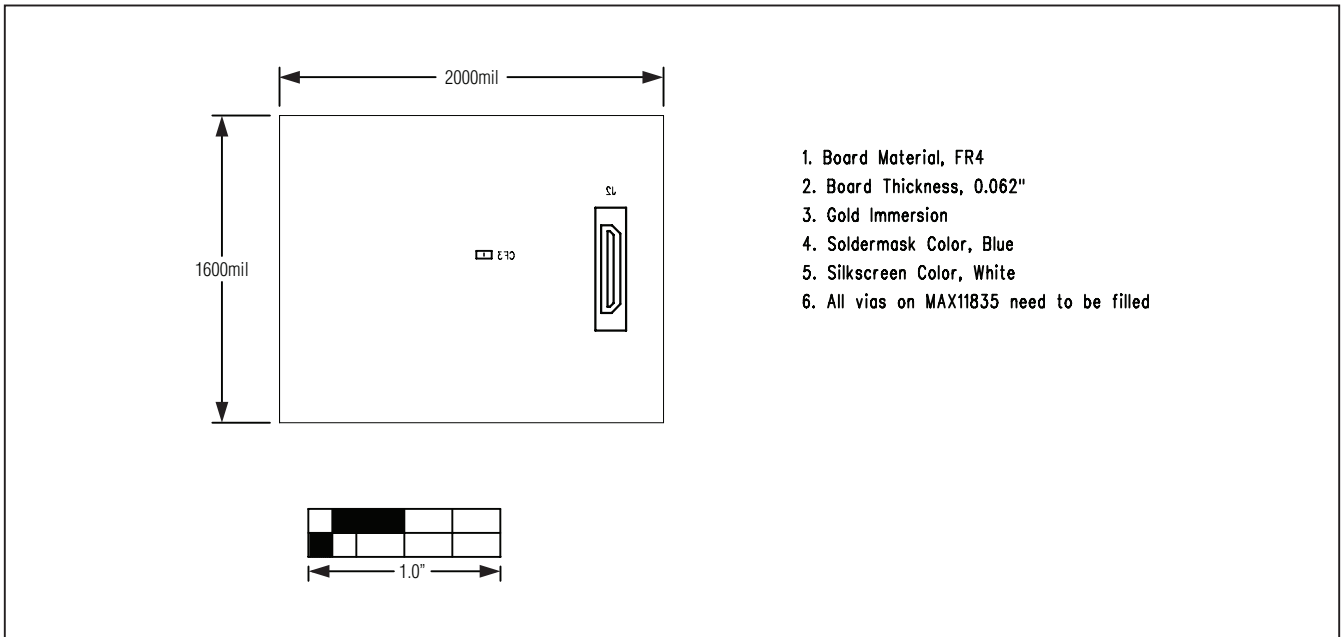


Figure 17. MAX11835 PCB Layout—Bottom Assembly



# MAX11835 Evaluation System

**Evaluates: MAX11835**

## Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	9/10	Initial release	—

Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.

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