



SILICON LABORATORIES

Si2400URT-EVB

EVALUATION BOARD FOR THE Si2400 WITH A UART INTERFACE

Description

The Si2400URT-EVB evaluation board provides the system designer an easy way to evaluate the Si2400 ISModem™. The Si2400URT-EVB consists of a motherboard with a power supply, an RS-232 interface, other ease-of-use features, and a complete removable modem module on a daughter card. (A functional block diagram of the Si2400URT-EVB is shown below.) The Si2400 ISModem is a complete controller-based modem chipset with an integrated and programmable direct access arrangement (DAA) that meets global telephone line requirements. Available as two 16-pin small outline (SOIC) packages, the Si2400 ISModem eliminates the need for a separate DSP data pump, modem controller, memories, analog front end (AFE), isolation transformer, relays, opto-isolators, and a 2- to 4-wire hybrid. The Si2400 is ideal for embedded modem applications due to its small board area, controller-based architecture, low power consumption, and global compliance. The Si2400URT-EVB provides an RJ-11 jack and a DB9 connector for interfacing the Si2400URT-EVB to the phone line and a PC or data terminal serial port. This allows the Si2400 ISModem to operate as a serial modem for straightforward evaluation. To evaluate the Si2400 ISModem in an embedded system, the daughter card can be used independently or with the motherboard. A direct access header (JP3) is available on the motherboard to bypass

the RS-232 transceivers and connect the Si2400 ISModem directly to a target system. The EVB also provides test points for access to the analog input and analog output. These interfaces can be used to evaluate the Si2400 PCM and voice modes. Given that any of the GPIO pins may be used as an audio input, the EVB provides access to all GPIO pins.

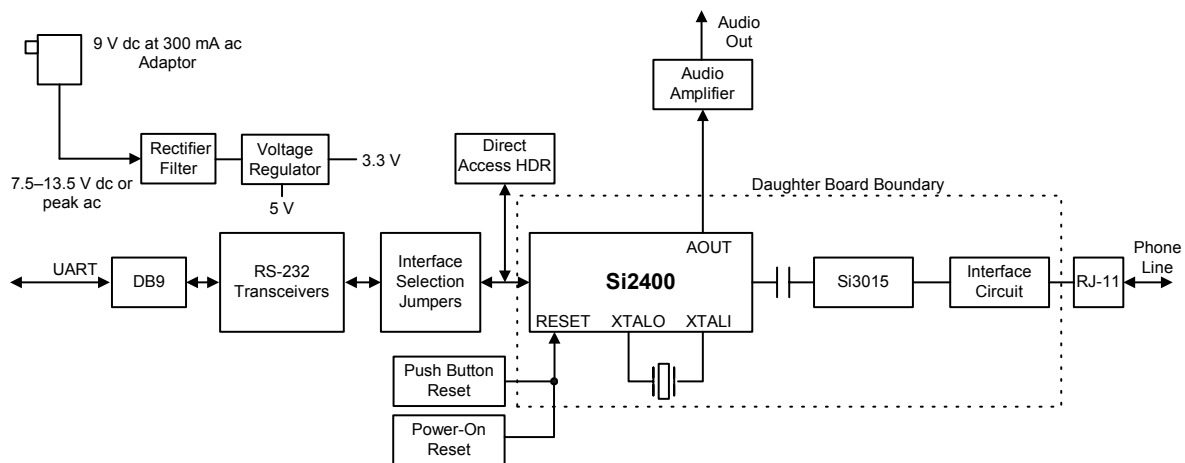
Power is supplied through a screw terminal (J3) or a standard 2 mm power jack (J4). An on-board rectifier, filter, and voltage regulator allow the power input to be 7.5 V–13 V ac or dc (either polarity). The Si2400URT-EVB can drive an external speaker for call monitoring or a piezoelectric speaker can be mounted directly on the board in the space provided.

Features

The Si2400URT-EVB includes the following:

- Dual RJ-11 connection to phone line
- Serial interface to PC
- Audio connector for call monitoring
- Direct access to Si2400 for embedded application evaluation
- Easy power connection to common 7.5 V–13.5 V power supplies
- 9 V ac adaptor
- Simple installation and operation

Functional Block Diagram



Introduction

Notable differences between the Si2400 and other ISModem products are highlighted in the bulleted list below. For complete details and specifications, please refer to the current Si2400 data sheet.

Unique Si2400 Features:

- Many AT commands execute when entered without <CR>
- AT COMMANDS MUST BE ENTERED IN UPPER CASE
- The +++ escape sequence is disabled at power-up and/or reset
 - ATS14=20 enables +++ escape
- S-Register address and value are entered in hex (example: ATS0F=2B)
- Result codes are abbreviated (example: "O" instead of "OK")
- The Si2400DC power can be 3.3 V or 5 V (3.3 V used on motherboard)
- Several AT commands are required to enable the speaker
 - ATSF4=00 removes Tx and Rx audio mute
 - ATSE4=02 turns on ADC and DAC power
 - ATM2 turns on speaker continuously
- DTE interface default is 8N1, 2400 bps, no handshaking and no line-feeds with carriage returns
- ATDT is disabled if line-feeds with carriage returns are enabled
- Some common AT Commands are not available
 - ATH1
 - A/
 - ATD (must be ATDT or ATDP)
 - AT&Tn (use ATSE4=20 for local digital loopback)

Table 1. Modem Configuration Examples

Modulation	ATS07=
V22bis	06
V.22	02
V.21	03
Bell 212A	00
Bell 103	01
V.23 (1200 TX, 75 RX—Answer)	14
V.23 (75 TX, 1200 RX—Originate)	24
V.23 (600 TX, 75 RX—Answer)	10
V.23 (75 TX, 600 RX—Originate)	20

Table 2. Modem Initialization Example

Command	Function
ATS00=02	Auto-answer after two rings
ATS07=06	Configures modem for V.22b
ATS14=20	Enables +++ escape
ATSF4=00	Removes audio mute
ATSE4=02	Turns on audio ADC and DAC
ATM1	Turns on speaker until carrier negotiated

Si2400URT-EVB Setup and Evaluation

This section explains how to set up the Si2400URT-EVB for evaluation as a serial interface modem. Jumper settings, power connection, PC/terminal connections, and terminal program configuration settings are given. The initial modem setup after power is applied along with a basic tutorial on modem operation is also provided. Si2400URT-EVB configurations for evaluating additional features are discussed separately.

Si2400URT-EVB Quick Start

1. Set jumpers according to Figure 1
2. Connect
 - DB-9 to PC COM 1 (with a pass-through cable)
 - RJ-11 to phone line or test box
 - the 9 V ac adaptor
3. Bring up
 - Turn on power to modem
 - Set Terminal Program for 2400 bps 8N1. No handshaking. Disable linefeeds with carriage returns (linefeeds with carriage returns disable ATDT commands.)
4. Type "AT" followed by a carriage return.
 - Should echo "AT" and then an "O".
5. Type
 - ATS14=20 to enable +++ escape
 - ATS07=06 to enable V.22b
 - ATS00=01 for auto-answer on first ring

Jumper Settings

Check all jumper settings on the Si2400URT-EVB before applying power. Figure 1 shows the standard factory jumper settings. These settings configure the Si2400URT-EVB for RS-232 serial operation. Any standard terminal program configured to communicate through a PC COM port can be used to communicate with the Si2400URT-EVB. The transceiver jumper (JP8) should be connected whenever the RS-232 UART interface is used. For normal operation, JP6 should have jumpers at positions 2-3, 5-6, 8-9, and 11-12.

ALERT/GPIO4 (Si2400, pin 10) is connected to RD (ring detect) (J1, pin 9) on the PC by via the jumper at JP6 pins 5-6. Removing this jumper disconnects RD from the ALERT/GPIO4 pin on the Si2400.

Placing a jumper at JP6 (pins 2-3) and JP5 (pins 2-3) connects EOFR/GPIO1 (Si2400, pin 16) to CD (J1, pin 1).

Placing a jumper at JP6 (pins 2-3) and JP5 (pins 1-2) connects CD/AIN/GPIO2 (Si2400, pin 15) to CD (J1, pin 1).

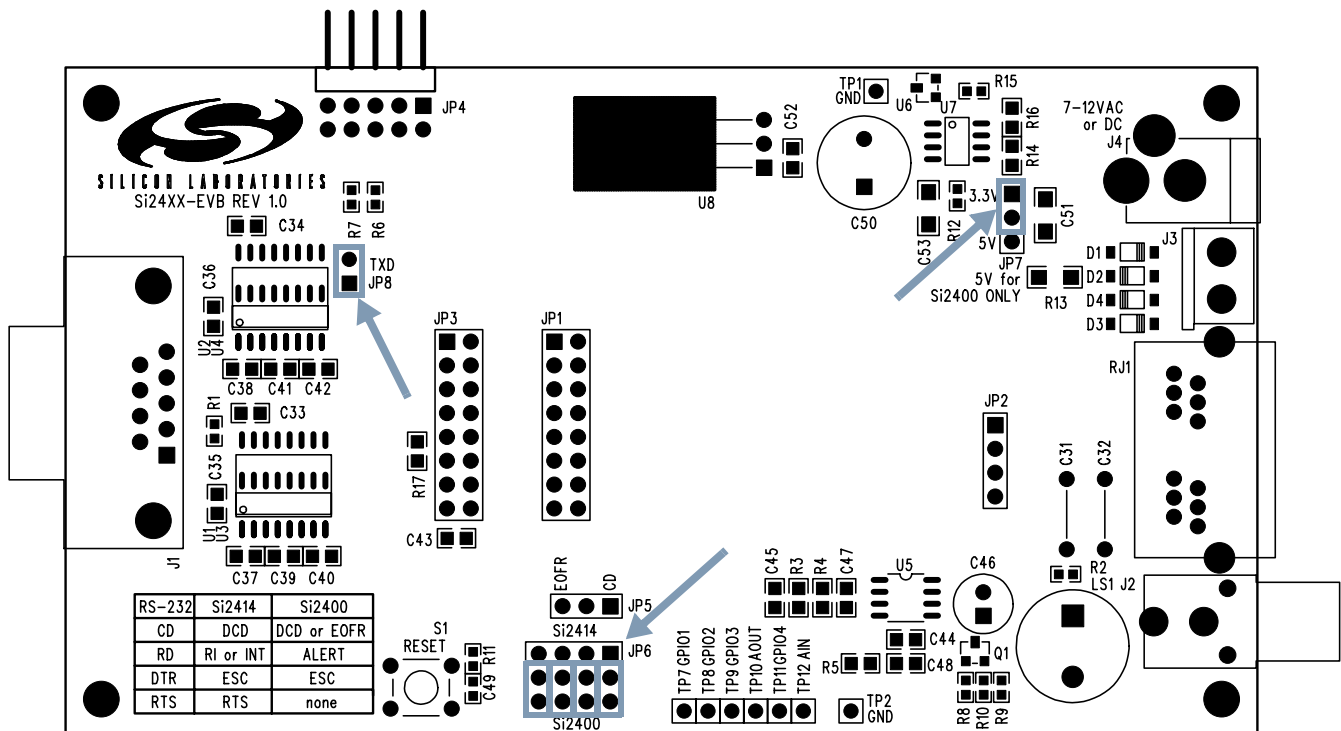


Figure 1. Standard Factory Jumper Settings (outlined in gray)

Si2400URT-EVB

Power Requirements

The Si2400URT-EVB has an on-board diode bridge, filter capacitor, and voltage regulator (U8). Power can be supplied from any source capable of providing 7.5 V–13 V dc or 7.5 V–13 V peak ac and at least 100 mA. (Additional current may be required if a speaker is connected for monitoring call progress tones.) Power may be applied to the Si2400URT-EVB through the screw terminals (J3) or the 2 mm power jack (J4). The on-board full-wave rectifier and filter ensures the correct polarity is applied to the Si2400URT-EVB. Daughter card power is supplied through voltage regulator U7 and is factory set at 3.3 V by connecting JP7 pins 1 and 2. Daughter card current can be measured by connecting an ammeter between JP7 pins 1 and 2. These pins must always be connected. Failure to connect pins 1 and 2 of JP7 through either a jumper or a low impedance ammeter may result in damage to the Si2400URT-EVB.

Terminal and Line Connections

The Si2400 can be tested as a standard serial data modem by connecting the Si2400URT-EVB to a personal computer or other data terminal equipment (DTE), phone line, and power. Connect a serial port on a PC to the DB9 connector on the Si2400URT-EVB with a pass-through cable. The RS-232 transceivers on the EVB can communicate with the DTE at rates up to 230.4 kbps. Any standard terminal program such as HyperTerminal or ProComm running on a PC will communicate with the Si2400URT-EVB. Configure the terminal emulation program to 2400 bps, 8 data bits, no parity, one stop bit, and no handshaking. Also, be sure to disable linefeeds with carriage returns. Connect the RJ-11 jack on the Si2400URT-EVB to an analog phone line or telephone line simulator such as a Teltone TLS 5.

Making Connections

With the terminal program properly configured and running, apply power to the Si2400URT-EVB. Type "AT<CR>" and the modem should return "O" indicating the modem is working in the command mode and communicating with the terminal. If the "O" response is not received, try resetting the modem by pressing the manual reset switch (S1) then again type "AT<CR>".

To take the modem off-hook, type "ATDT<CR>." The modem should go to the off-hook state, draw loop current, and respond with a "t", indicating a dial tone detection. Typing any characters will make the modem hang up (go on-hook) and stop drawing loop current.

To make a modem connection, type "ATDT(called modem phone number)<CR>." Once the connection is established, a "c" message will appear indicating the

two modems are in the data mode and communicating. Typing on one terminal should appear on the other terminal. To return to the command mode without interrupting the connection between the two modems, type "+++" Approximately two seconds later "O" will appear. The modem is now in command mode and will accept "AT" commands. This assumes the command ATS14=20 was issued during the initial modem configuration to enable "+++" escape. To return to the data mode, type "ATO." The modem will resume the data connection and no longer accept AT commands. Type "ATH" to terminate the data connection. Echo control effects data and command mode. To turn off the character echo, type "ATEO".

Si2400URT-EVB Functional Description

The Si2400URT-EVB is a multipurpose evaluation system. The modem daughter card illustrates the small size and few components required to implement an entire controller-based modem with global telecommunications compatibility. The daughter card can be used independently of, or in conjunction with, the motherboard. The motherboard adds features that enhance the ease of evaluating the many capabilities of the Si2400 ISModem™.

Motherboard

The motherboard provides a convenient interface to the Si2400DC (daughter card). The versatile power supply allows for a wide range of ac and dc voltages to power the board. RS-232 transceivers and a DB9 connector allow the Si2400URT-EVB to be easily connected to a PC or other terminal device. Jumper options allow direct access to the LVCMOS/TTL level serial inputs to the Si2400, bypassing the RS-232 transceivers. This is particularly useful for directly connecting the Si2400 to embedded systems.

The Si24xxURT-EVB motherboard connects to the daughter card through two connectors, JP1 and JP2. JP1 is an 8x2 socket providing connection to all Si2400 digital signals and regulated 3.3 V power for the Si2400. The Si2400 digital signals appearing at JP1 (daughter card interface) are LVCMOS and TTL compatible. The Si2400DC can be powered by 5.0 V or 3.3 V. The motherboard is factory configured for 3.3 V. It is recommended that JP7 pins 1 and 2 are connected any time the daughter card is used in conjunction with the motherboard. This ensures no damage will occur to the Si2456/33/14DC if used with this motherboard. JP2 is a 4x1 socket providing connection between the daughter card, the RJ-11 phone jack and chassis ground.

Voltage Regulator/Power Supply

The input voltage to either J3 or J4 must be between 7.5 and 13.5 V dc or 7.5 and 13.5 V_{PEAK} ac. The motherboard includes a diode bridge (D1–D4) to guard against a polarity reversal of the dc voltage or to rectify an ac voltage. The power source must be capable of continuously supplying at least 100 mA. C50 serves as a filter cap for an ac input. The voltage regulator U8 provides 5 V for the motherboard and the input for voltage regulator U7 which outputs 3.3 V for use on the motherboard and to power the daughter card. Si24xxDC power consumption can be measured by placing a meter between pins 1 and 2 of JP7. The connection between JP7 pins 1 and 2 must be made at all times when power is applied to the evaluation board either through a jumper block or a low impedance meter to avoid damage to the daughter card.

Reset Circuitry

The Si2400 requires a reset pulse to remain low for at least 5.0 ms after the power supply has stabilized during the power-up sequence or for at least 5.0 ms during a power-on reset then go high with a rise time <100 ns. Most production Si2400 modem chipset applications will require that RESET be controlled by the host processor. Certain Si2400 operation modes, including Power Down, require a hardware reset to recover.

The Si2400URT-EVB contains two reset options, an automatic power-on reset device, U6 (DS1818) (default), and a manual reset switch (S1) to permit resetting the chip without removing power. A reset, regardless of the mechanism, will cause all modem settings to revert to factory default values. See Figure 6 on page 12 for the reset circuit schematic.

DS1818

The DS1818 is a small low-cost device that monitors the voltage on VD and an external reset pushbutton. If VD drops below 3.0 V, the DS1818 provides a 220 ms active-low reset pulse. On power-up, the DS1818 also outputs an active low reset pulse for 220 ms after VD reaches 90% of the nominal 3.3 V value. The DS1818 will output a 220 ms reset pulse any time the power supply voltage exceeds the 3.3 V ±10% window.

Manual Reset

The manual reset switch (S1) performs a power-on reset. This resets the Si2400 to factory defaults without turning off power. If S1 is used in conjunction with U6, pressing S1 will activate the reset monitor in the DS1818 and produce a 220 ms active low reset pulse.

Interface Selection

The serial interface of the Si2400URT-EVB can be connected to a computer, terminal, embedded system,

or any other Data Terminal Equipment (DTE) via a standard RS-232 interface or through a direct TTL serial interface.

The Si2400 can be tested as a standard data modem by connecting the Si2400URT-EVB to a personal computer or other DTE, power and a phone line. The RS-232 transceivers on the Si2400URT-EVB can communicate at rates between 300 bps and 230.4 kbps. A PC can communicate with the Si2400URT-EVB using a standard terminal program such as HyperTerm or ProComm.

Jumper settings determine how the Si2400URT-EVB is connected to the DTE. Table 3 lists the interface controlled by each motherboard jumper. See Figures 6 and 11.

Table 3. Interface Selection Jumpers

Jumper	Function
JP1	Daughter Card Phone Line Connector
JP2	Daughter Card Digital Connector
JP3	Direct Access Header
JP4	PCM Connector (Si2456/33/14)
JP5	EOFR/CD Option (Si2400 support)
JP6	RS-232 Jumpers
JP7	3.3 V Power for Daughter Card
JP8	RS-232 Transceiver TXD Jumper

RS-232 Interface

This operation mode uses the standard factory jumper settings illustrated in Figure 1 on page 3. The Maxim MAX232A transceivers interface directly with the TTL levels available at the serial interface of the Si2400 and, using internal charge pumps, make these signals compatible with the RS-232 standard. This simplifies the connection to PCs and other Data Terminal Equipment (DTE). The transmit jumper (JP8) should be connected whenever the RS-232 UART interface is used. For normal RS-232 operation, JP6 should have jumpers at positions 2-3, 5-6, 8-9, and 11-12. The signals available on the Si2400URT-EVB serial interface (DB9 connector) are listed in Table 4.

Si2400URT-EVB

Table 4. DB9 Pin Connections

J1 Name	J1 Symbol	J1 Pin	Si2400 Pin	Si2400 Name
Carrier Detect	CD	1 ¹		
Received Data	RXD	2	5	RXD
Transmit Data	TXD	3	6	TXD
Data Terminal Ready	DTR	4 ²	14	ESC/ GPIO3
Signal Ground	SG	5	12	GND
Data Set Ready	DSR	6	Note 3	
Ready to Send	RTS	7	nc	
Clear to Send	CTS	8	7	$\overline{\text{CTS}}$
Ring Indicator	RD	9 ¹	10	ALERT/ GPIO4

Notes:

1. JP6 + JP5 jumper option.
2. JP6 Jumper option.
3. DSR connected to DTR at J1.

Direct Access Interface

The Si2400 motherboard supplies power, power-on reset and an RJ-11 jack for the modem. The direct access interface (JP3) is used to connect the motherboard to an embedded system. JP3 provides access to all of the Si2400 signals available on the daughter card. It is necessary to remove all jumpers from JP6 and JP8 to disconnect the RS232 transceivers to prevent signal contention. *Leave the jumper between JP7 pins 1 and 2.* Figure 2 illustrates the jumper settings required for the direct access mode using the motherboard.

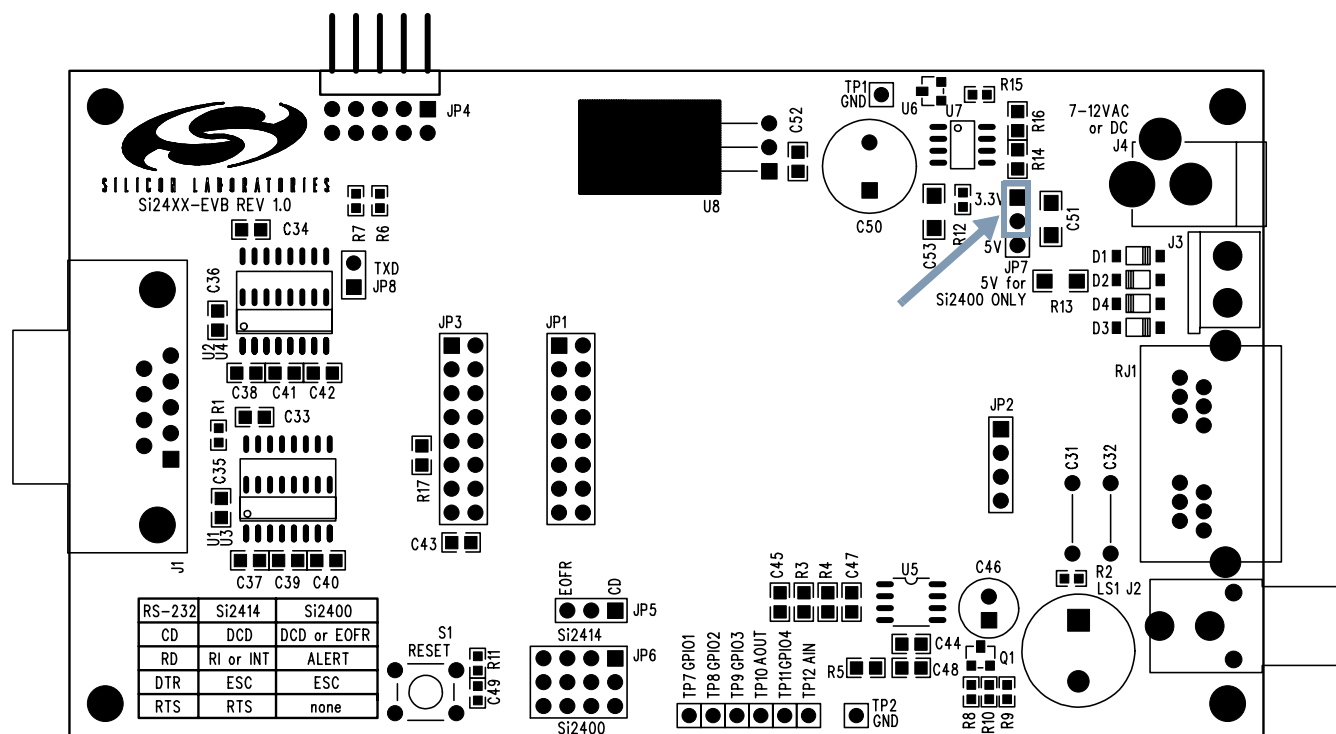


Figure 2. Direct Access Jumper Settings (outlined in gray)

Audio Output

Audio output is provided from the Si2400 on the pin AOUT. This signal allows the user to monitor call progress signals such as dial tone, DTMF dialing, ring, busy signals, and modem negotiation. Control of this signal is provided by AT commands and register settings described in the introduction. The AOUT signal can be connected to an amplifier such as the LM386 (the default stuffing option on the Si2400URT-EVB) for a high quality output. AOUT can also be connected to a summing amplifier or multiplexer in an embedded application as part of an integrated audio system.

Amplifier (LM386)

The audio amplifier circuit consists of U5 (LM386), C45, R3, R4, C47, C44, C48, R5, C46, and an optional loudspeaker (LS1). The LM386 has an internally set voltage gain of 20. R3 and R4 provide a voltage divider to reduce the AOUT signal to prevent overdriving the LM386. C45 provides dc blocking for the input signal and forms a high-pass filter with R3+R4 while R4 and C47 form a low-pass filter. These four components limit the bandwidth of the AOUT signal. C44 provides high frequency power supply bypassing for the LM386 and should be connected to a hard ground and located very close to the amplifier's power supply and ground pins. C48 and R5 form a compensation circuit to prevent oscillation of the high current pnp transistor in the LM386 output stage on negative signal peaks. These oscillations can occur between 2–5 MHz and can pose a radiation compliance problem if C48 and R5 are omitted. C46 provides dc blocking for the output of the LM386, which is biased at approximately 2.5 V ($V_{CC}/2$), and forms a high-pass filter with the impedance of the loudspeaker (LS1). The output from the LM386 amplifier circuit is available on the RCA jack, J2.

Modem Module Operation

The Si2400URT-EVB daughter card is a complete modem solution perfectly suited for use in an embedded system. The daughter card requires a 3.3 V or 5 V supply capable of providing at least 35 mA and communicates with the system via LVCMOS/TTL compatible digital signals on JP1. Chassis ground and the RJ-11 jack (TIP and RING) are connected via JP2. Be sure to provide the proper power-on reset pulse to the daughter card if it is used in the stand-alone mode.

Reset Requirements

The Si2400 ISModem daughter card must be properly reset at power up. The reset pin (pin 12) of the Si2400, (JP1, pin 13), must be held low for at least 5.0 ms after power is applied and stabilized and returned high with a rise time less than 100 ns to ensure the device is properly reset.

Crystal Requirements

Clock accuracy and stability are important in modem applications. To ensure reliable communication between modems, the clock must remain within ± 100 ppm of the design value over the life of the modem. The crystal selected for use in a modem application must have a frequency tolerance of less than ± 100 ppm for the combination of initial frequency tolerance, drift over the normal operating temperature range, and five year aging. Other considerations such as production variations in PC board capacitance and the tolerance of loading capacitors must also be taken into account.

Protection

The Si2400URT-EVB will meet or exceed all FCC and international PTT requirements and recommendations for high-voltage surge and isolation testing without any modification. The protection/isolation circuitry includes C1, C4, C24, C25, FB1, FB2, RV1, F1, Z4, Z5, D3, D4, Z1, and C30. The PCB layout is also a key "component" in the protection circuitry. The Si2400URT-EVB will provide isolation to 3 kV. Contact Silicon Laboratories for information about designing to higher levels of isolation.

Design

The following section contains the schematics, bill of materials, and layout for the Si2400 including the daughter card and motherboard. Refer also to AN48 for ISModem layout guidelines.

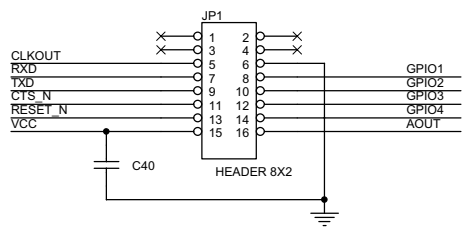
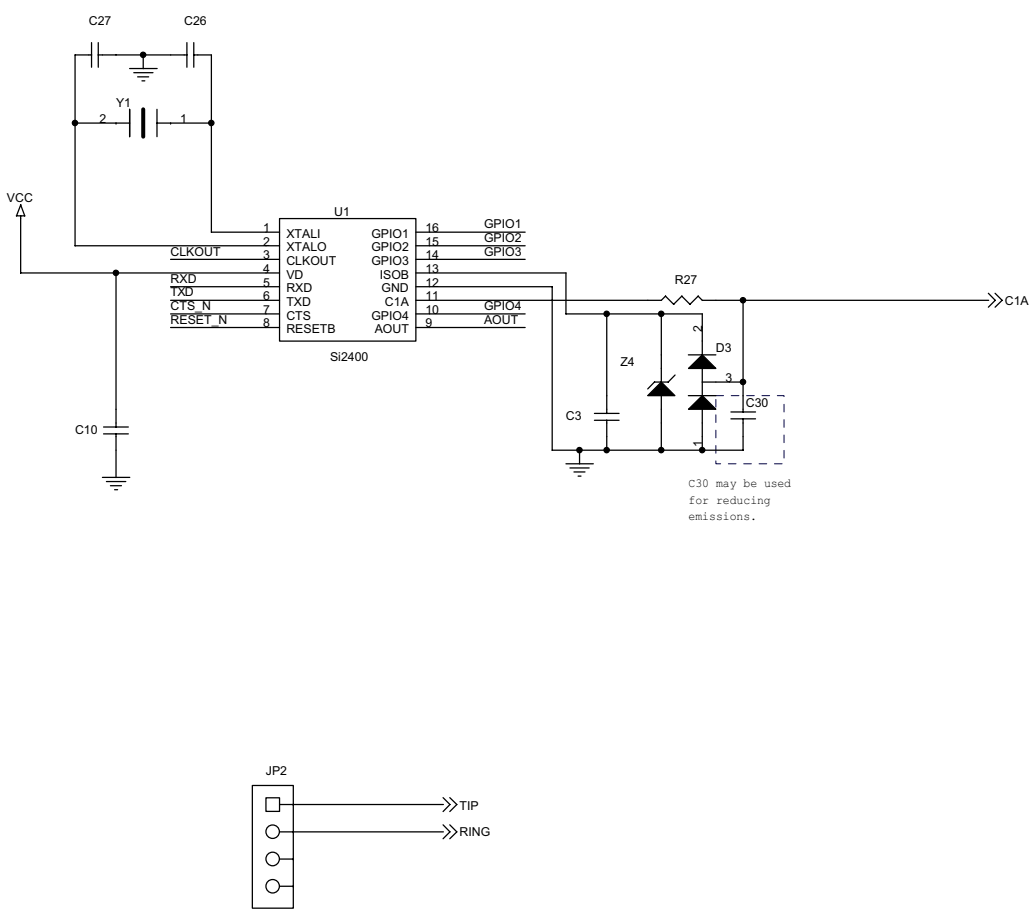


Figure 3. Si2400 Schematic





C41, C42, C43, C44 are provided for different population options to allow for surge testing greater than 3kV.

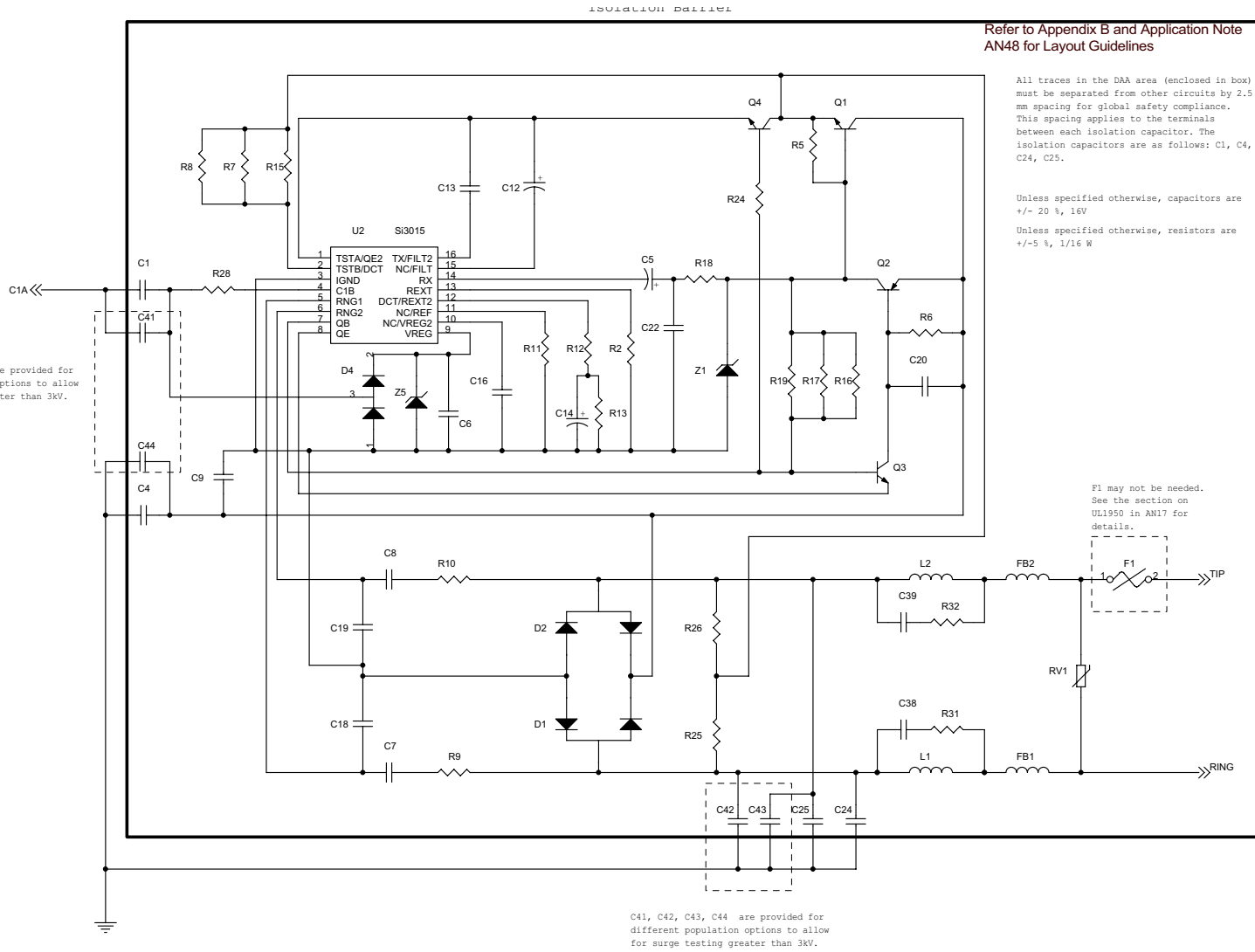
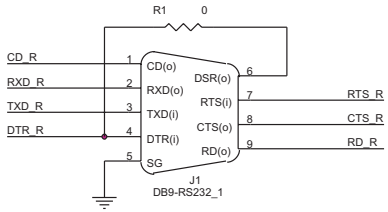


Figure 4. Si3015 DAA Schematic

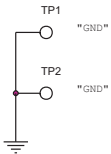
Table 5. Si2400 Daughter Card Bill of Materials

Component	Value	Supplier*
C1,C4	150 pF, 3 kV, X7R, $\pm 10\%$	Novacap
C3,C13	0.22 μ F, 25 V, X7R, $\pm 20\%$	Venkel
C5	0.1 μ F, 50 V, Tant, $\pm 20\%$	Venkel
C6,C10,C16	0.1 μ F, 16 V, X7R, $\pm 20\%$	Venkel
C7,C8	560 pF, 250 V, X7R, $\pm 10\%$	Venkel
C9	22 nF, 250 V, X7R, $\pm 10\%$	Venkel
C12	1.0 μ F, 35 V, Tant, $\pm 10\%$	Venkel
C14	0.68 μ F, 16 V, Tant, $\pm 10\%$	AVX
C18,C19	3.9 nF, 16 V, X7R, $\pm 10\%$	Venkel
C20	0.01 μ F, 16 V, X7R, $\pm 10\%$	Venkel
C22	1800 pF, 50 V, X7R, $\pm 10\%$	Venkel
C24,C25	1000 pF, 3 kV, X7R, $\pm 10\%$	Novacap
C26,C27	33 pF, 16 V, NPO, $\pm 5\%$	Venkel
C38,C39	47 pF, 16 V, X7R, $\pm 10\%$	Venkel
D1,D2	Dual Diode, 225 mA, 300 V	Central Semiconductor
D3,D4	BAV99, 300 mA, 100 V	Diodes, Inc.
FB1,FB2	Ferrite Bead	Murata
F1	Fuse	Teccor
JP1	HEADER 8x2	Samtec
JP2	4x1 Header_0	Berg
L1,L2	68 μ H, 150 mA, 4 Ω max, $\pm 10\%$	Murata
Q1,Q3	NPN, 300 V	Motorola
Q2	PNP, 300 V	Motorola
Q4	NPN, 80 V	Motorola
RV1	SiDactor, 275 V, 100 A	Teccor
R2	402, 1/16 W, $\pm 1\%$	Venkel
R5	100 K, 1/16 W, $\pm 1\%$	Venkel
R6	120 K, 1/16 W, $\pm 5\%$	Venkel
R7,R8,R15–17, R19	5.36 K, 1/4 W, $\pm 1\%$	Venkel
R9,R10	56 K, 1/10 W, $\pm 5\%$	Venkel
R11	9.31 K, 1/16 W, $\pm 1\%$	Venkel
R12	78.7, 1/16 W, $\pm 1\%$	Venkel
R13	215, 1/16 W, $\pm 1\%$	Venkel
R18	2.2 K, 1/10 W, $\pm 1\%$	Venkel
R24	150, 1/10 W, $\pm 5\%$	Venkel
R25,R26	10 M, 1/10 W, $\pm 5\%$	Venkel
R27,R28	10, 1/16 W, $\pm 5\%$	Venkel
R31,R32	470, 1/16 W, $\pm 5\%$	Venkel
U1	Si2400	Silicon Labs
U2	Si3015	Silicon Labs
Y1	4.9152 MHz, 20 pF load, 150 ESR, 50 ppm	CTS Reeves
Z1	Zener, 43 V, 300 mW	General Semi
Z4,Z5	Zener, 5.6 V, 500 mW	Diodes, Inc.
*Note: Many other suppliers are available. See the Si2400 data sheet.		

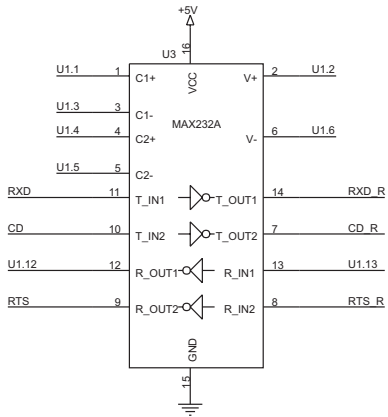
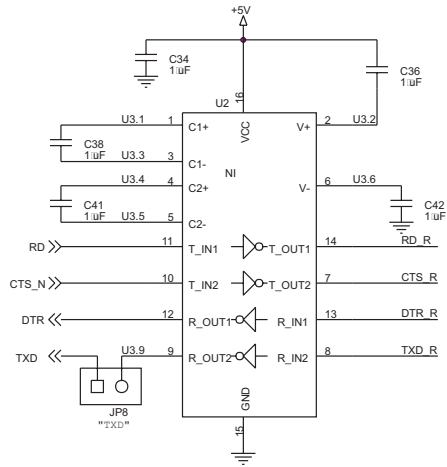
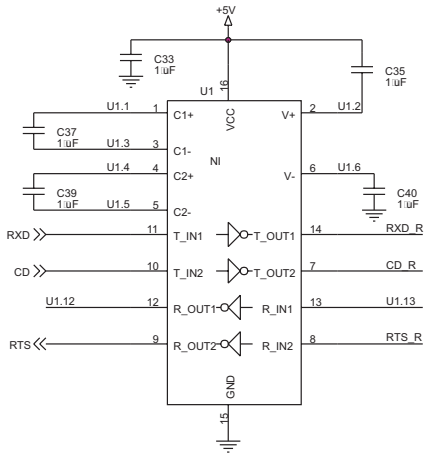
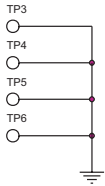


RS-232 Pin Functions (print on silkscreen)

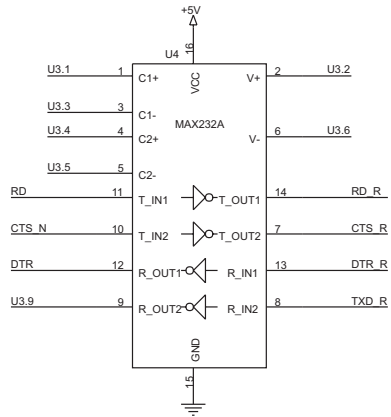
RS-232	Si2414	Si2400
CD	DCD	DCD or EOF
RD	RI or INT	ALERT
DTR	ESC	ESC
RTS	RTS	none



Standoffs in each corner of board.



NOTE: U3 footprint SOIC16-.150 wide to fit inside U1 footprint SOIC16-.300 wide. Use same pin 1 side pads for both parts.



NOTE: U4 footprint SOIC16-.150 wide to fit inside U2 footprint SOIC16-.300 wide. Use same pin 1 side pads for both parts.

Figure 5. RS-232 Transceiver Schematic

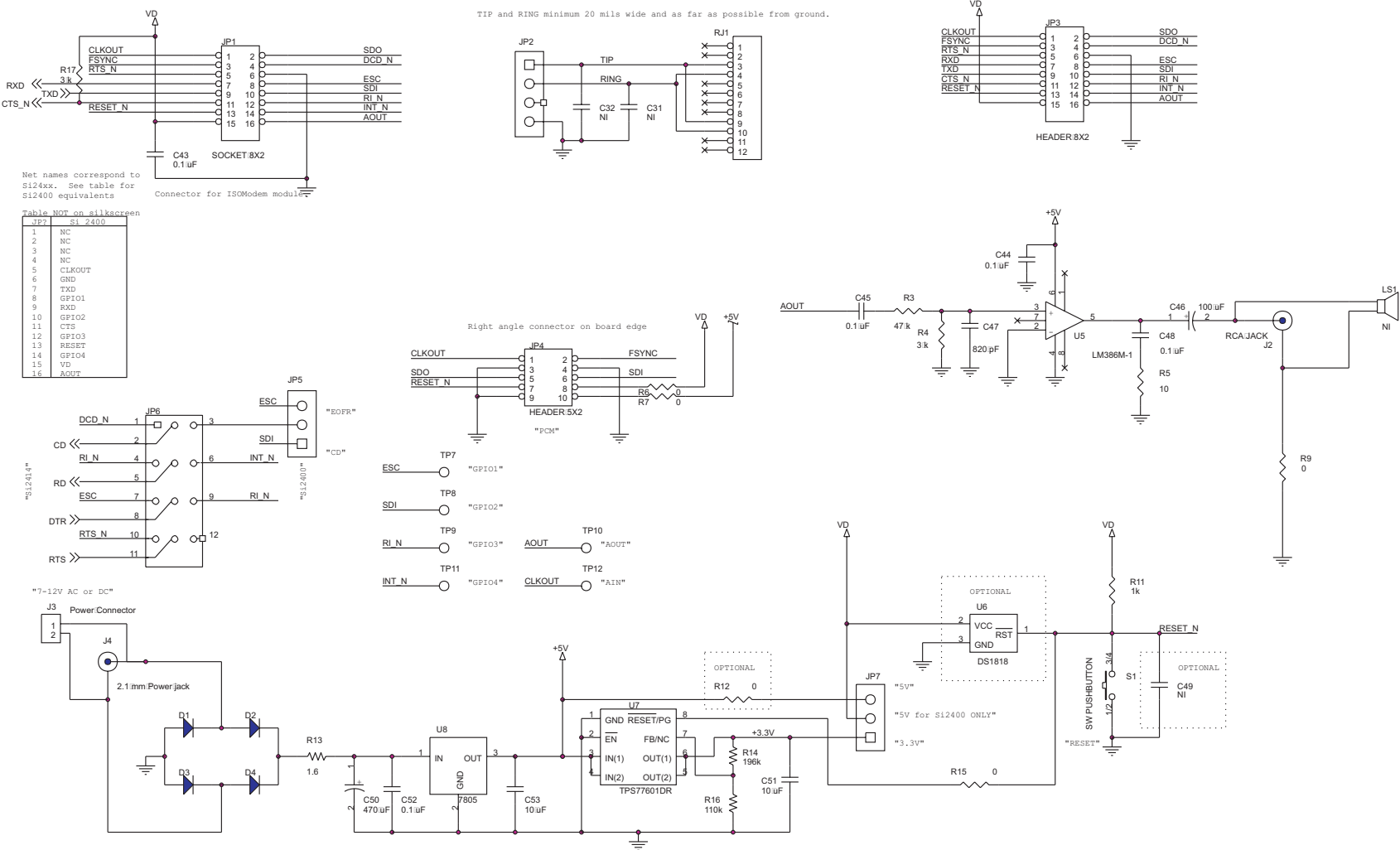


Figure 6. Si2400URT-EVB Motherboard Power, Connector, Audio Schematic

Table 6. Motherboard Bill of Materials

Component	Value	Supplier*
C31,C32	NI, Radial 7.5 mm space, not installed	
C33-42	1 μ F, 25 V, $\pm$ 10%, 0805,C0805X7R250-105KNE	Venkel
C43-45,C48,C52	0.1 μ F, 25 V, $\pm$ 10%, 0805,C0805X7R250-104KNE	Venkel
C46	100 μ F, 16 V, $\pm$ 10%, radial 6.3x11,UVX1C101MEA1TD	Nichicon
C47	820 pF, 50 V, $\pm$ 5%, 0805,C0805COG500-821JNE	Venkel
C49	Not installed	
C50	470 μ F, 25 V, $\pm$ 20%, radial 10x16,UVX1E471MPA	NIC Components
C51,C53	10 μ F, 16 V, $\pm$ 10%, 1206,C1206X7R100-106KNE	Venkel
D1,D2,D3,D4	DIODE, 30 V, 0.5 A, SOD-123,MBR0530T1	Motorola
JP1	SOCKET 8X2, 8x2 100 mil,SSW-108-01-T-D	Samtec
JP2	4X1 Socket, 4x1 100 mil,SSW-104-01-T-S	Samtec
JP3	HEADER 8X2, 8x2 100 mil,TSW-108-07-T-D	Samtec
JP4	HEADER 5X2, 5x2 100 mil,TSW-105-25-T-D-RA	Samtec
JP7,JP5	3X1 Header, 3x1 100 mil,68000-403	Berg
JP6	3X4_Jumper, 4X3X.1	Samtec
JP8	2X1 Header, 2x1 100 mil,68000-403	Berg
J1	DB9-RS232_1, thru-hole,K22-E9S-030	Kycon
J2	RCA JACK, thru-hole,16PJ097	Mouser
J3	Power Connector, thru-hole 2,TSA-2	Adam Tech
J4	2.1 mm Power jack, thru-hole 3,ADC-002-1	Adam Tech
LS1	Not installed	JL World
RJ1	MTJG-2-64-2-2-1, RJ11x2,MTJG-2-64-2-2-1	Adam Tech
R1,R6,R7	0, 1/16W, 5%, 0603,CR0603-16W-000J	Venkel
R2,R12,R15	Not installed	
R3	47 k, 1/10 W, $\pm$ 5%, 0805,NRC10J473TR	NIC Components
R4,R17	3 k, 1/10 W, $\pm$ 5%, 0805,NRC10J302TR	NIC Components
R5	10, 1/10 W, $\pm$ 1%, 0805,NRC10F10R0TR	NIC Components
R9	0, 1/10 W, 0603,CR0603-10W-000JT	Venkel
R11	1k, 1/10 W, $\pm$ 5%, 0603,CR0603-10W-103JT	Venkel
R13	1.6, 1/8 W, $\pm$ 5%, 1206,CR1206-8W-1R6JT	Venkel
R14	196k, 0805,MCHRIDEZHFX1963E	Classic Comp
R16	110k, 0805,CR21-114J-T	Classic Comp
S1	SW PUSHBUTTON, thru-hole,101-0161	Mouser
TP1,TP2	Test Point, .040 PTH,151-203	Mouser
TP3,TP4,TP5,TP6	Test Point, .125 PTH	Plastic Standoffs
TP7,TP8,TP9,TP10,TP11,TP12	Test Point, .040 PTH,151-205	Mouser
U1,U2	NI, SOIC16-.300,MAX232ACWE, not installed	Maxim
U3,U4	MAX232A,SOIC16-.150,MAX232ACSE	Maxim
U5	OP-AMP,M,LM386M-1	National Semi
U6	DS1818,SOT-23,DS1818-10	Dallas
U7	TPS77601DR,8-Pin SOIC,TPS77601DR	Texas Instruments
U8	7805,TO-220AB,uA7805CKC	Texas Instruments

*Note: Many other suppliers are available. See the Si2400 data sheet.

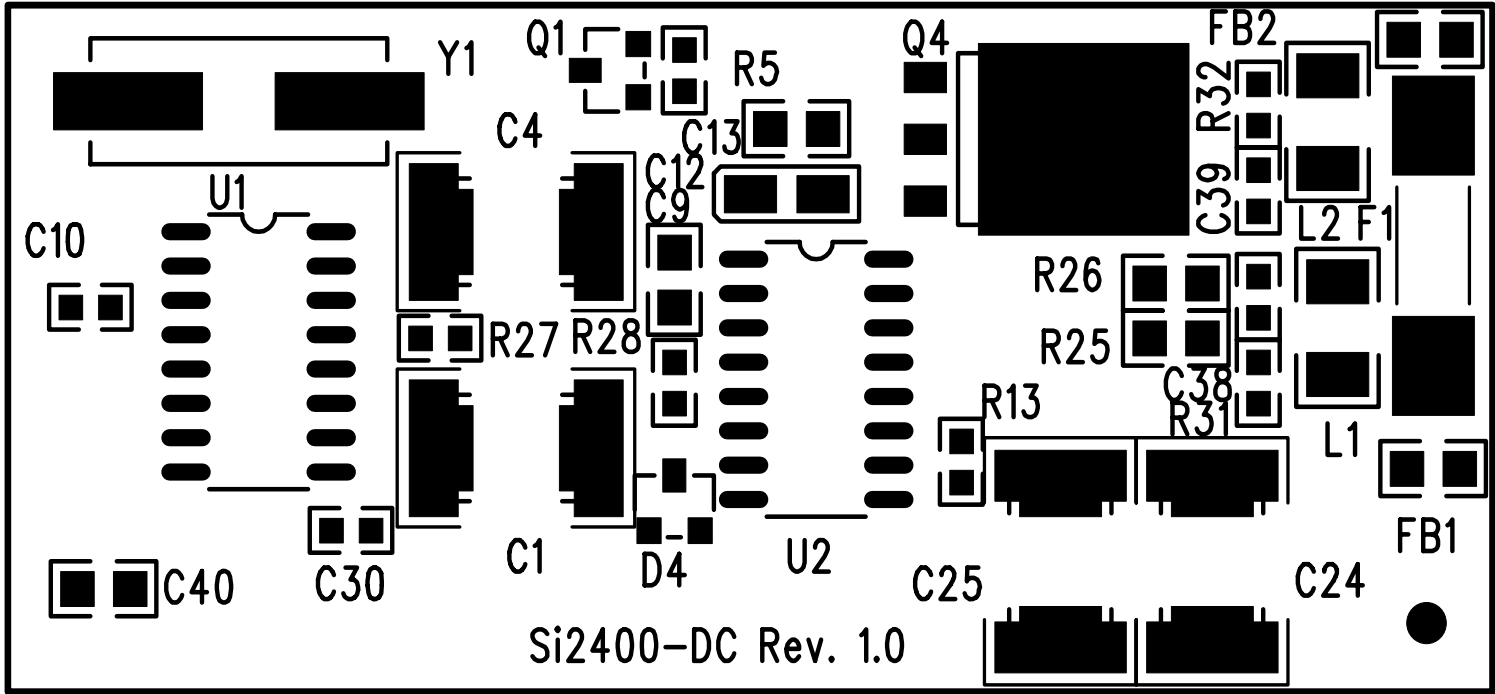


Figure 7. Daughter Card Component Side Silkscreen

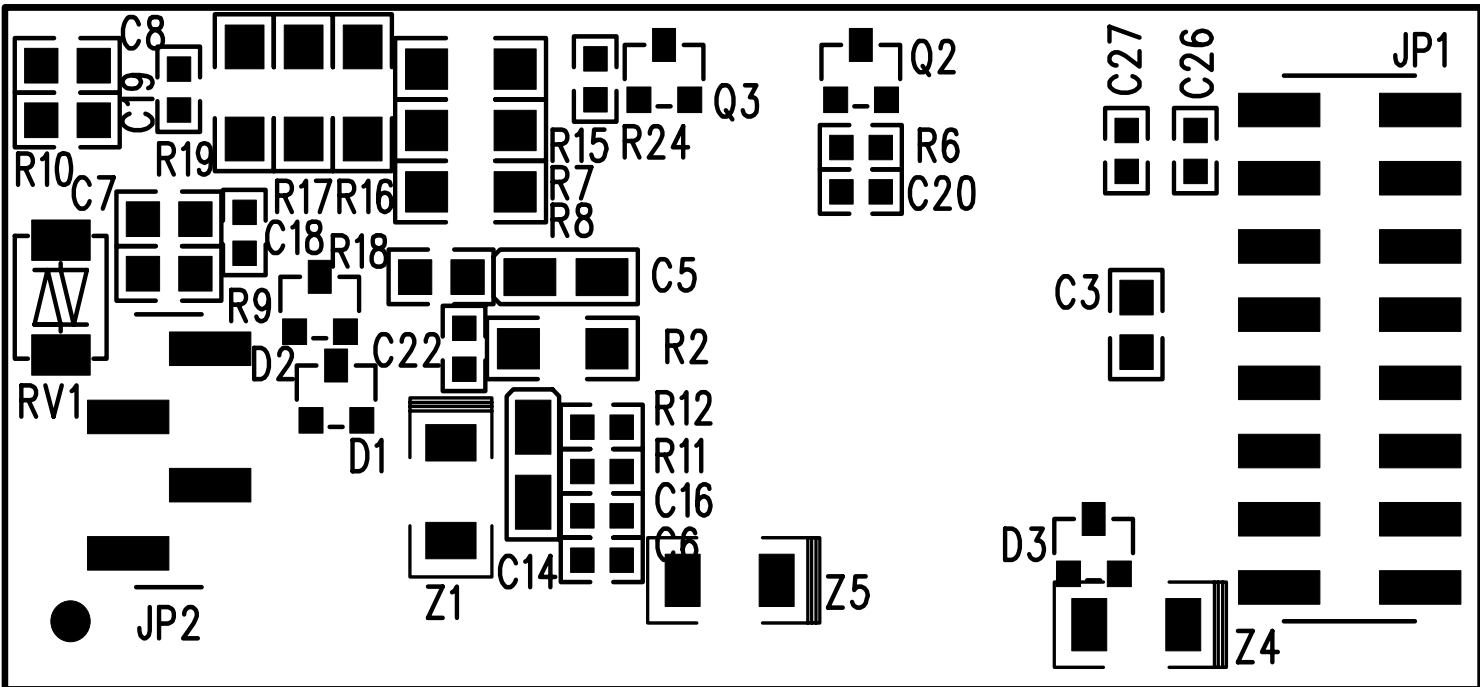


Figure 8. Daughter Card Solder Side Silkscreen

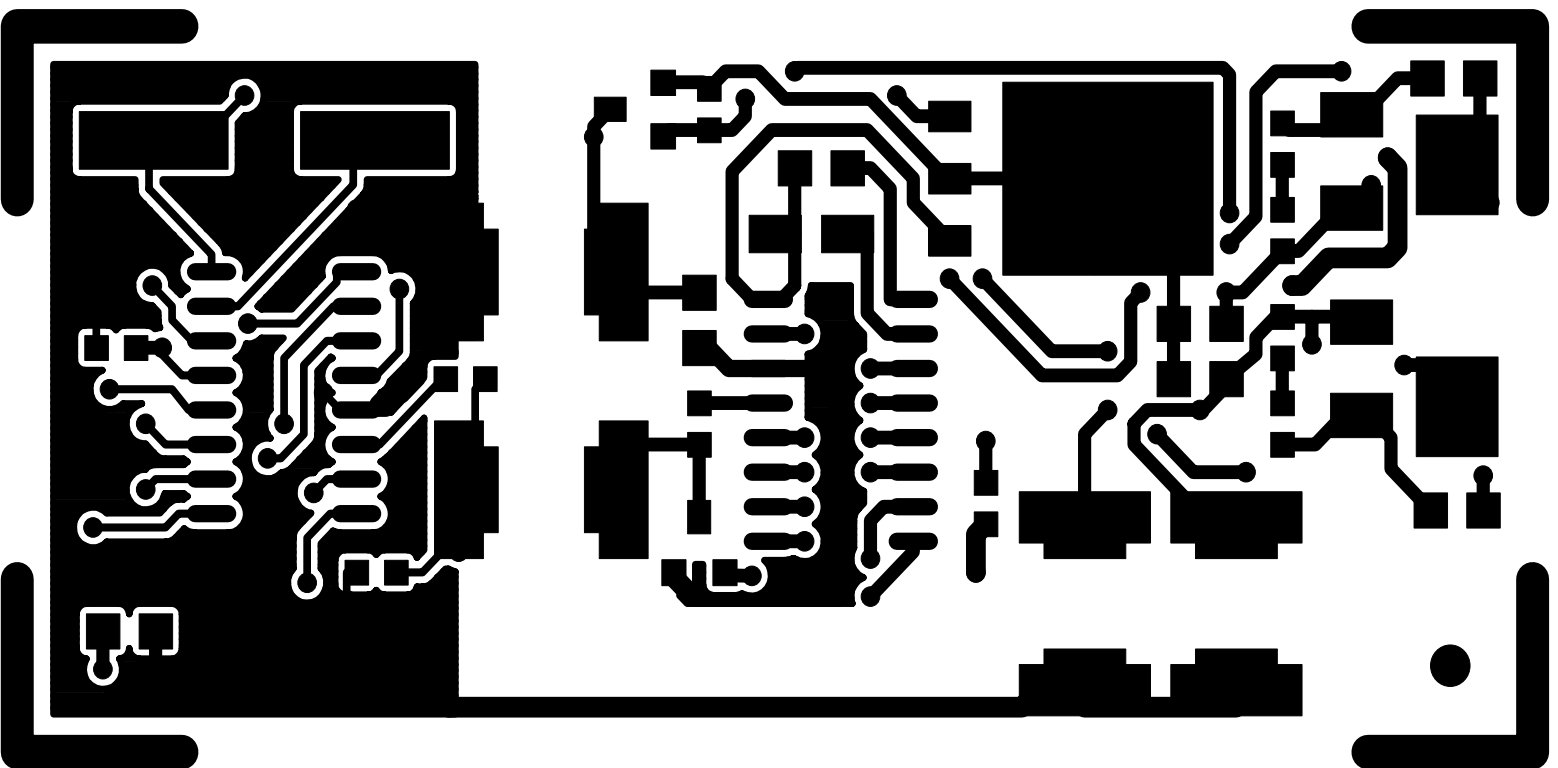


Figure 9. Daughter Card Component Side Layout

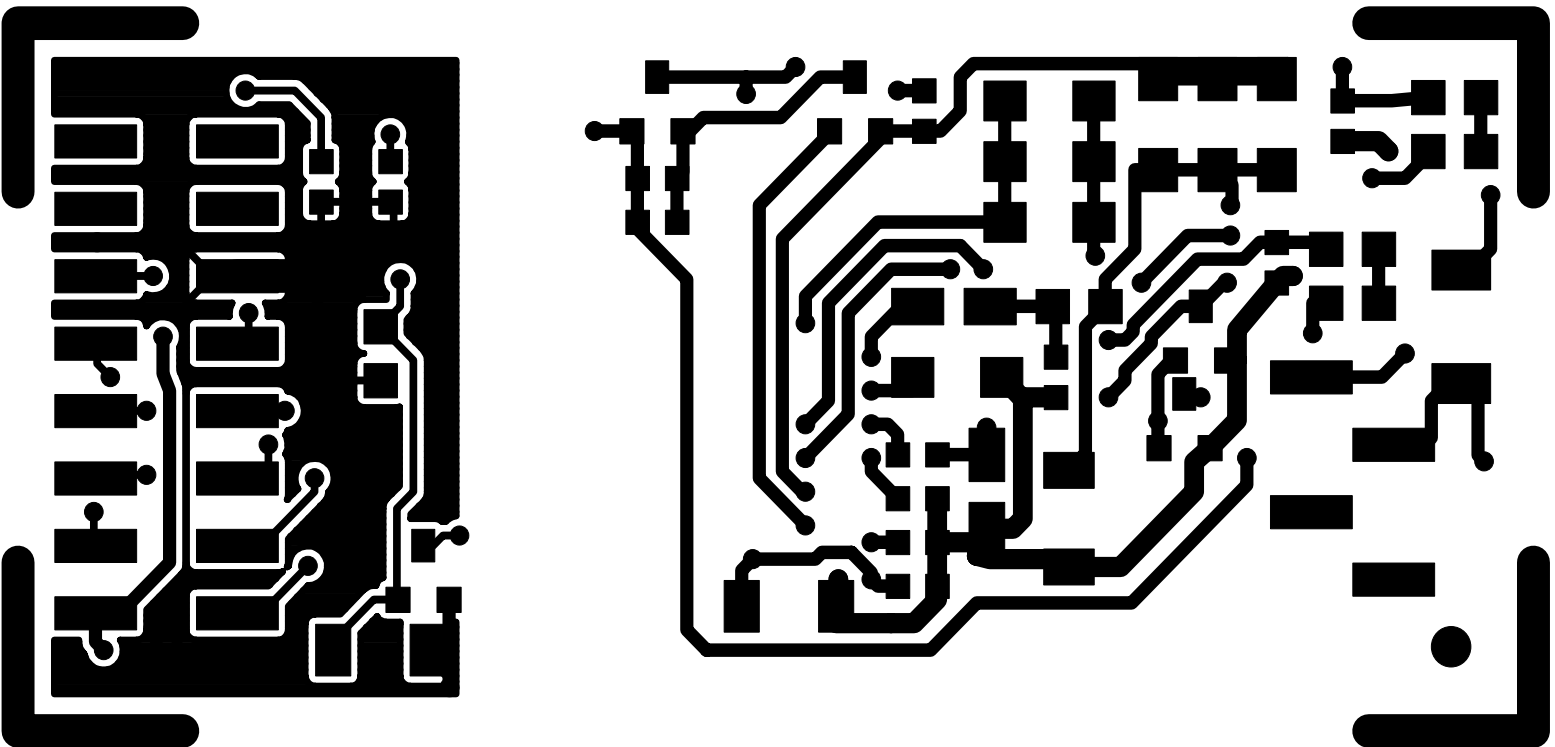


Figure 10. Daughter Card Solder Side Layout

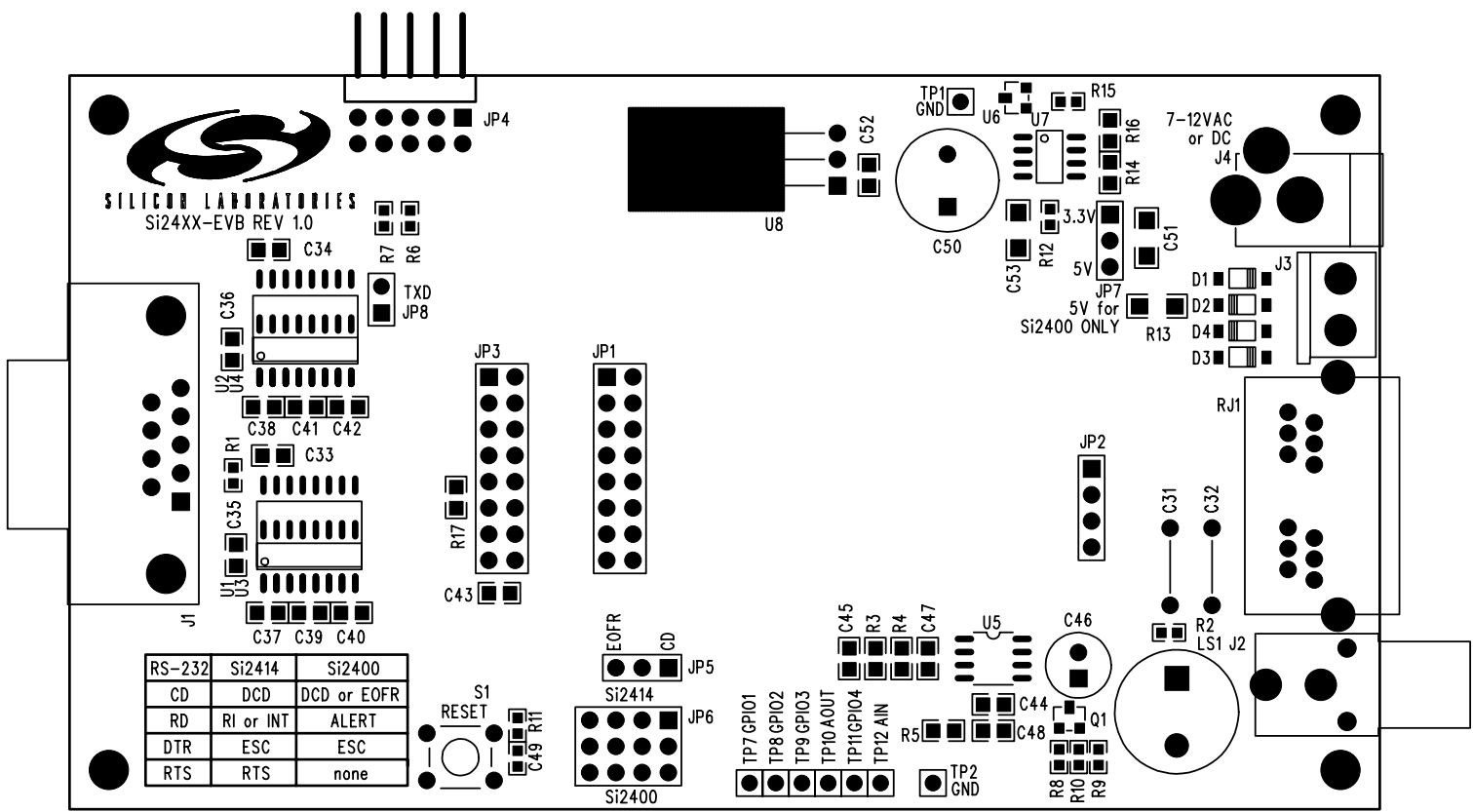


Figure 11. Motherboard Silkscreen

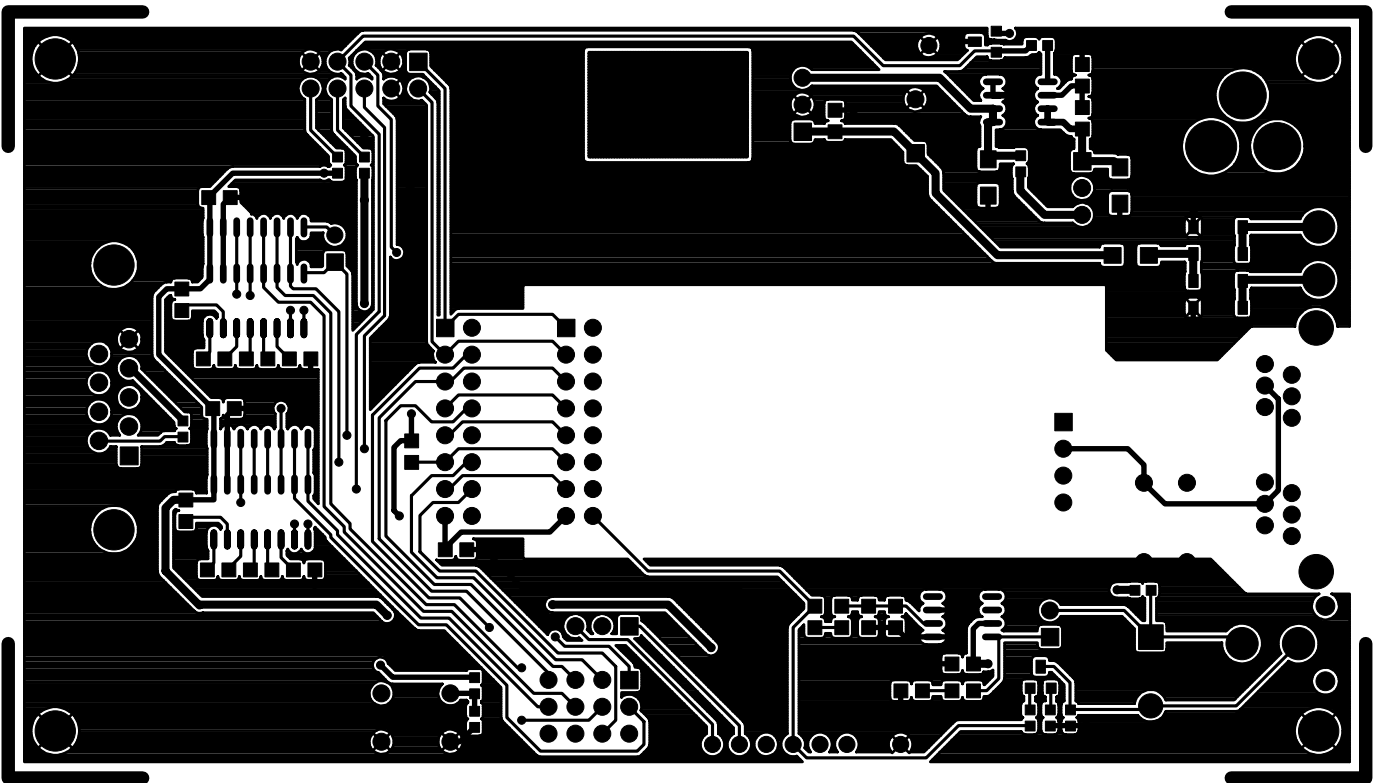


Figure 12. Motherboard Component Side Layout

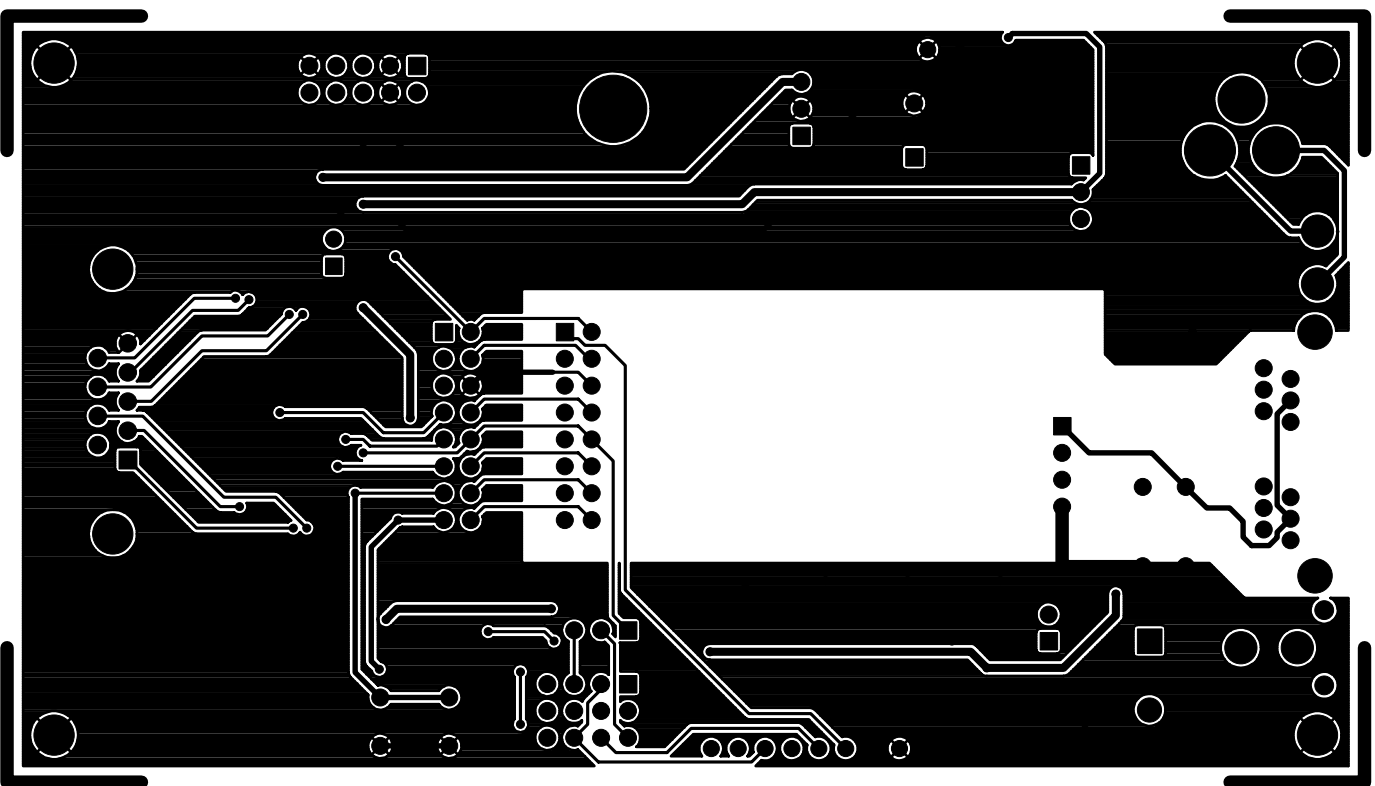


Figure 13. Motherboard Solder Side Layout

Complete Design Package on CD (see sales representative for details)

Silicon Laboratories can provide a complete design package of the Si2400URT-EVB including the following:

OrCad Schematics

Gerber Files

BOM

Documentation

Please contact your local sales representative or Silicon Laboratories headquarter sales for ordering information.

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