MAXLINEAR

XR34350
RS-232/RS-485/RS-422 Serial Transceiver
with Internal Termination and Wide Output Swing

EVB User Manual

Revision History

Document No.	Release Date	Change Description
003UMR01	February 23, 2021	**Updated:** ■ General document review. ■ "Half-Duplex RS-485 Mode #1" figure. ■ "Full-Duplex RS-485 Mode #1" figure. ■ "EVB Schematic—Power and USB Interface" figure. ■ "EVB Schematic—Interface" figure. ■ "EVB Schematic—Socket" figure.
003UMR00	May 14, 2020	Updated to MaxLinear format. SP338 and SP339 removed. Added default summary, Mode Selection table, schematic, PCB layers, and BOM.
2.0.1	April 2016	Initial release.

Table of Contents

List of Figures

List of Tables

Introduction

The XR34350 evaluation board provides a platform to evaluate the features and performance of the XR34350. The XR34350 is a RS-232/RS485/RS-422 serial transceiver with internal termination and wide output swing.

The XR34350, available in a 40-pin QFN package, has four modes of operation (two mode control pins). Table 1 on page 2 lists the device and the package that this evaluation board supports and the corresponding ordering part numbers.

The default configuration for the evaluation board is the following:

- SW3 and SW4 are all off, which isolates the XR34350. For more information, see "Evaluation Board Overview" on page 2.
- RS-232 mode is selected (J23 pins 7 and 8 and 9 and 10). For more information, see "Mode Selection" on page 3.
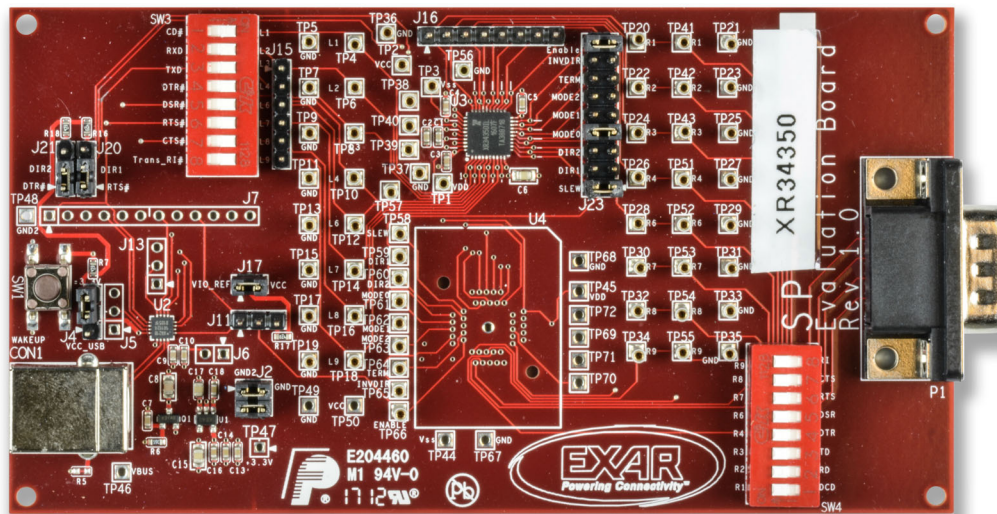- XR34350 is enabled (J23 pins 17 and 18). For more information, see "ENABLE" on page 7.

Figure 1: Top View of XR34350 EVB

Note: The XR34350 evaluation board uses the same PCB as the SP338 due to each part's pin compatibility, so you may see SP338 on the silkscreen of the XR34350 board.

Reference Documentation

This section lists the related documentation:

- RS-232/RS-485/RS-422 Serial Transceiver with Internal Termination and Wide Output Swing Data Sheet.
- Enhanced Receiver Failsafe Implementation in Dual Protocol SP339 and XR34350 Serial Transceivers Application Note.

Ordering Information

Table 1: **Evaluation Board Ordering Part Number**

Transceiver Part Number	Evaluation Board Part Number	Description	Device Package	Device Location
XR34350IL	XR34350ILEVB	XR34350 Evaluation Board.	QFN40 6×6 OPT1	U3
XR34350ILTR				

> **Note:** For the most up-to-date ordering information, go to www.maxlinear.com/XR34350.

Evaluation Board Overview

The following figure shows the block diagram of the evaluation board.
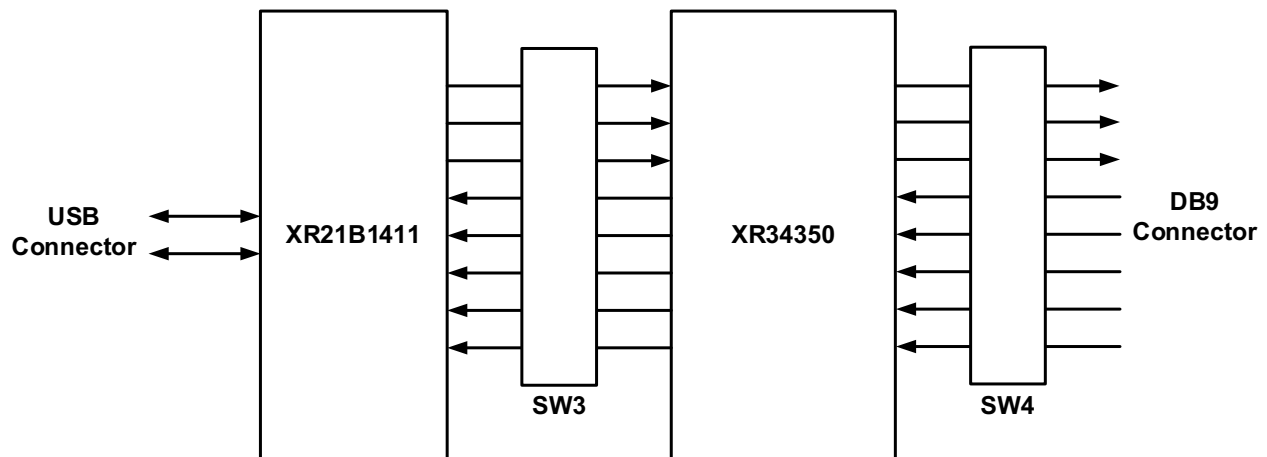

Figure 2: **Evaluation Board Block Diagram**

This evaluation board has the DUT (XR34350) and a XR21B1411 1-ch USB UART. By default, the SW3 and SW4 switches are off. Therefore, the XR34350 is isolated from both the XR21B1411 device and the DB9 connector.

To enable the connections between the XR21B1411 and the XR34350, slide all the SW3 switches to the ON position. To enable the connections between the XR34350 and the DB9 connector, slide all the SW4 switches to the ON position. All the XR34350 signals are accessible from the test points on the evaluation board.

Mode Selection

The modes of the XR34350 are selected using the following pins at J23:

■ Pins 7 and 8, labeled MODE0 on the board.

■ Pins 9 and 10, labeled MODE1 on the board.

The XR34350 has internal pull-down resistors on these pins. The corresponding MODE pins is 0 unless a jumper is installed on the J23 pins listed in this section to change the MODE bit to 1.

Table 2: Mode Selection Summary

MODE0	MODE1	Selection
0	0	Loopback Mode
0	1	Half-Duplex RS-485 Mode #1
1	0	RS-232 Mode
1	1	Full-Duplex RS-485/422 Mode #1

Loopback Mode

Figure 3 shows the XR34350 configured in the loopback mode.

■ J23 Pins 7 and 8 (MODE0) = 0

■ J23 Pins 9 and 10 (MODE1) = 0
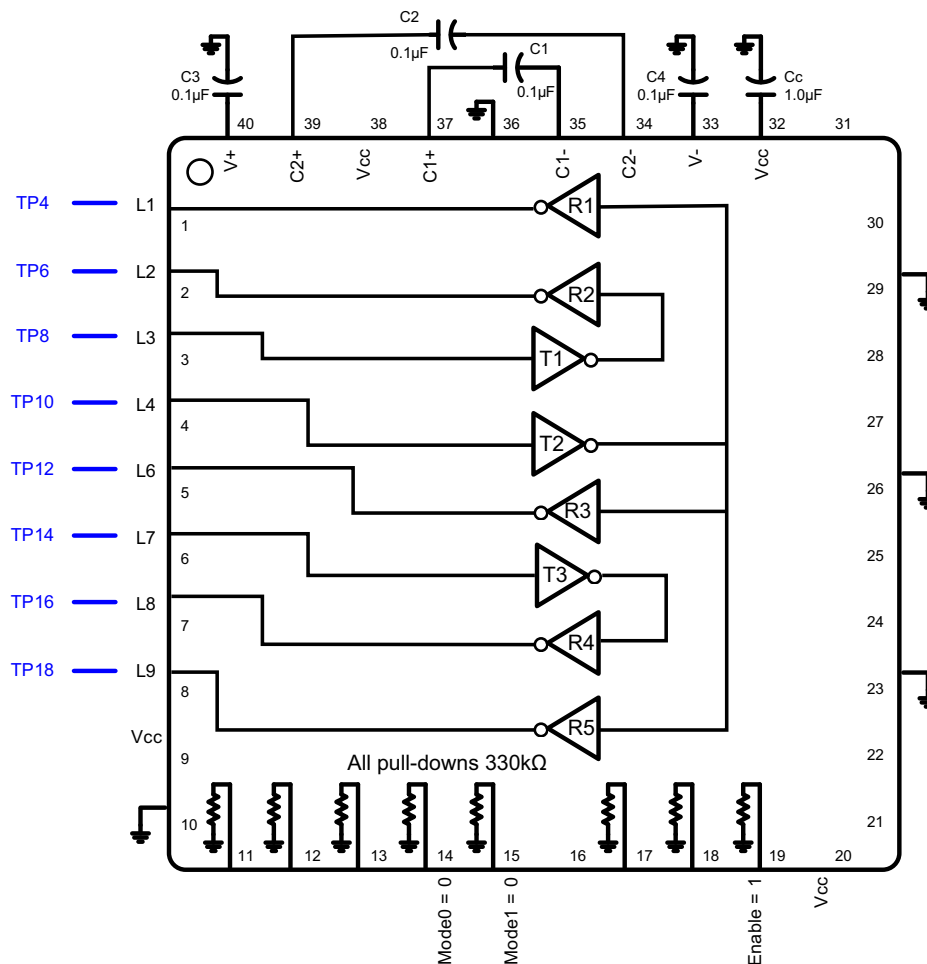
You can use this mode for diagnostic purposes.

Figure 3: Loopback Mode

RS-232 Mode

Figure 4 shows the XR34350 configured in the RS-232 mode.

- J23 Pins 7 and 8 (MODE0) = 1 (jumper installed between these pins).
- J23 Pins 9 and 10 (MODE1) = 0
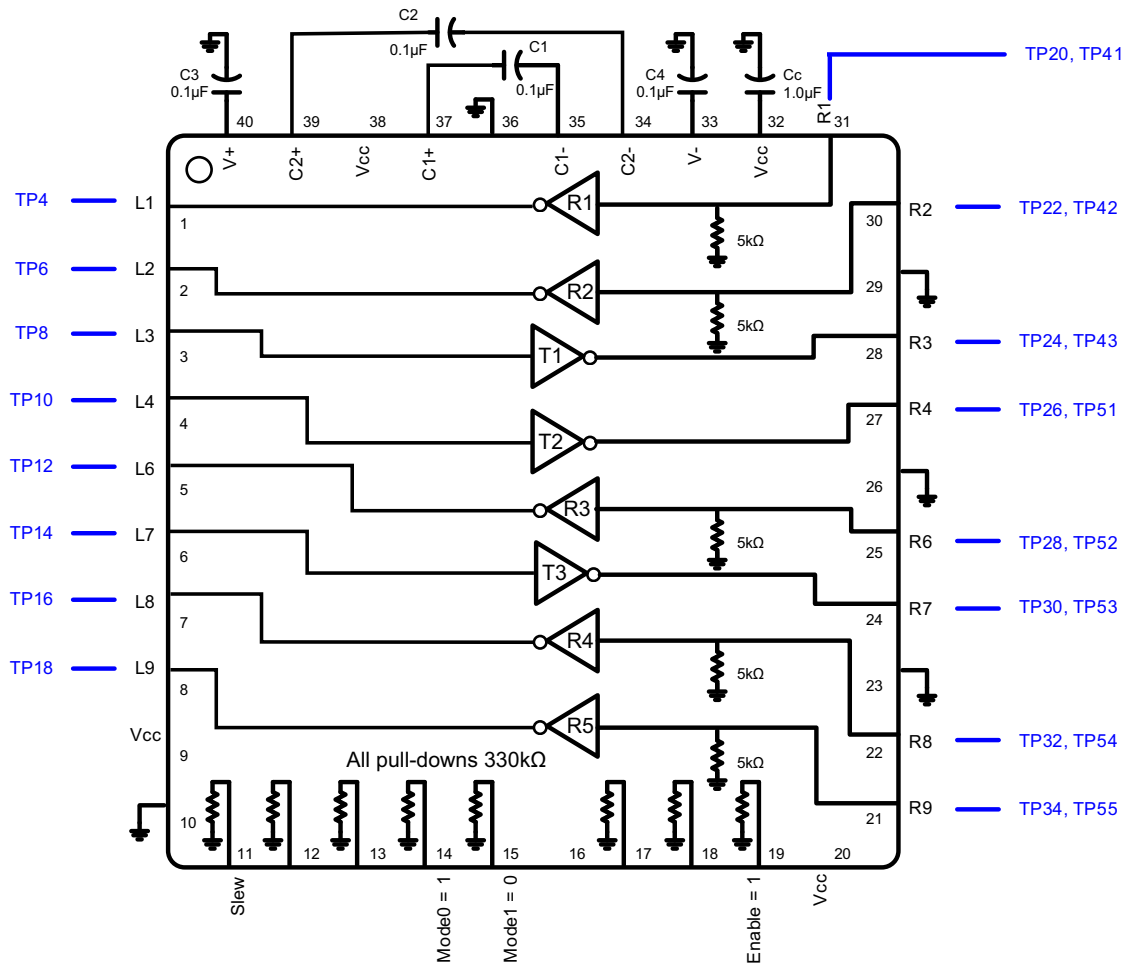
This is the default setting on the evaluation board.

Figure 4: RS-232 Mode

Half-Duplex RS-485 Mode #1

Figure 5 shows the XR34350 configured in the half-duplex RS-485 mode #1.

■ J23 Pins 7 and 8 (MODE0) = 0

■ J23 Pins 9 and 10 (MODE1) = 1 (jumper installed between these pins).
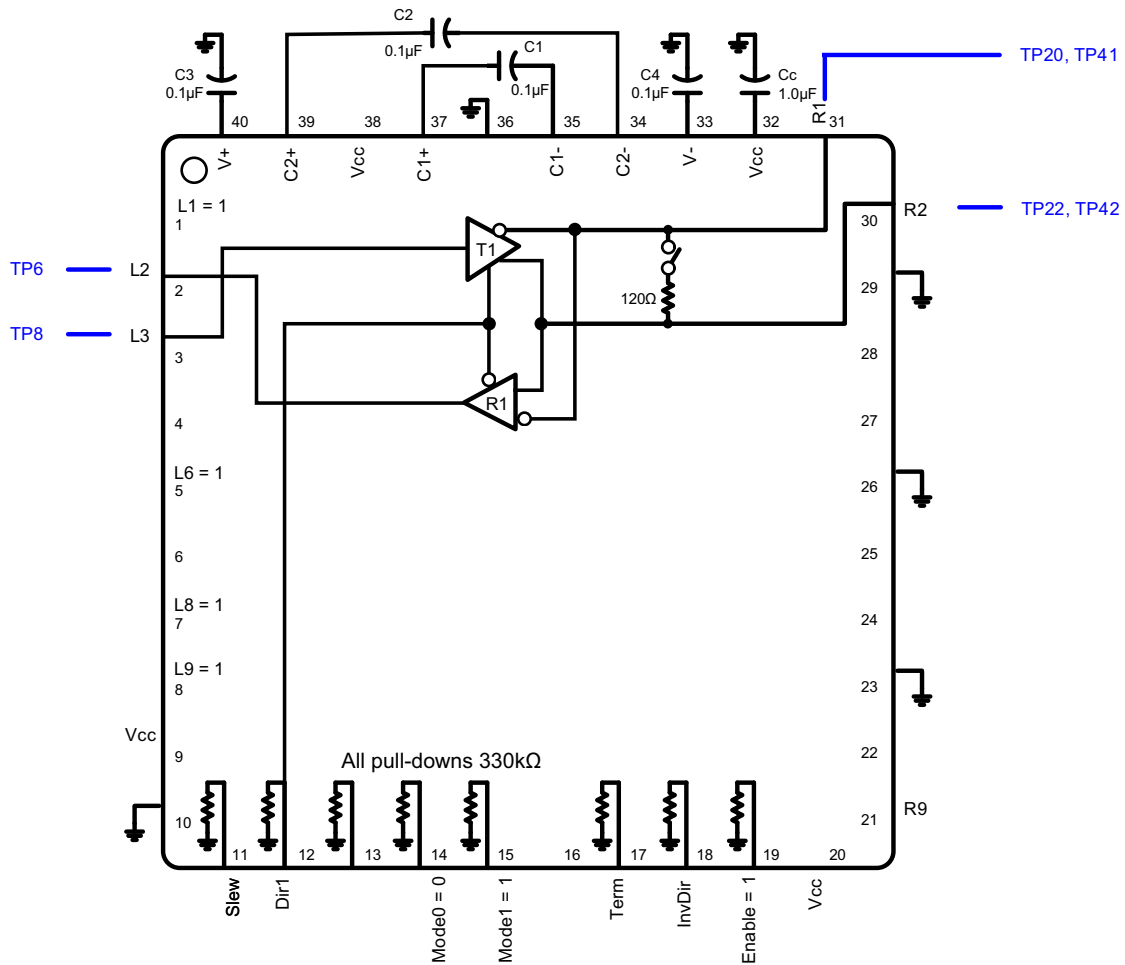
The RS-485 signals are also accessible at J16.

Figure 5: Half-Duplex RS-485 Mode #1

Full-Duplex RS-485/422 Mode #1

Figure 6 shows the XR34350 configured in the full-duplex RS-485/422 mode #1.

- J23 Pins 7 and 8 (MODE0) = 1 (jumper installed between these pins).
- J23 Pins 9 and 10 (MODE1) = 1 (jumper installed between these pins).
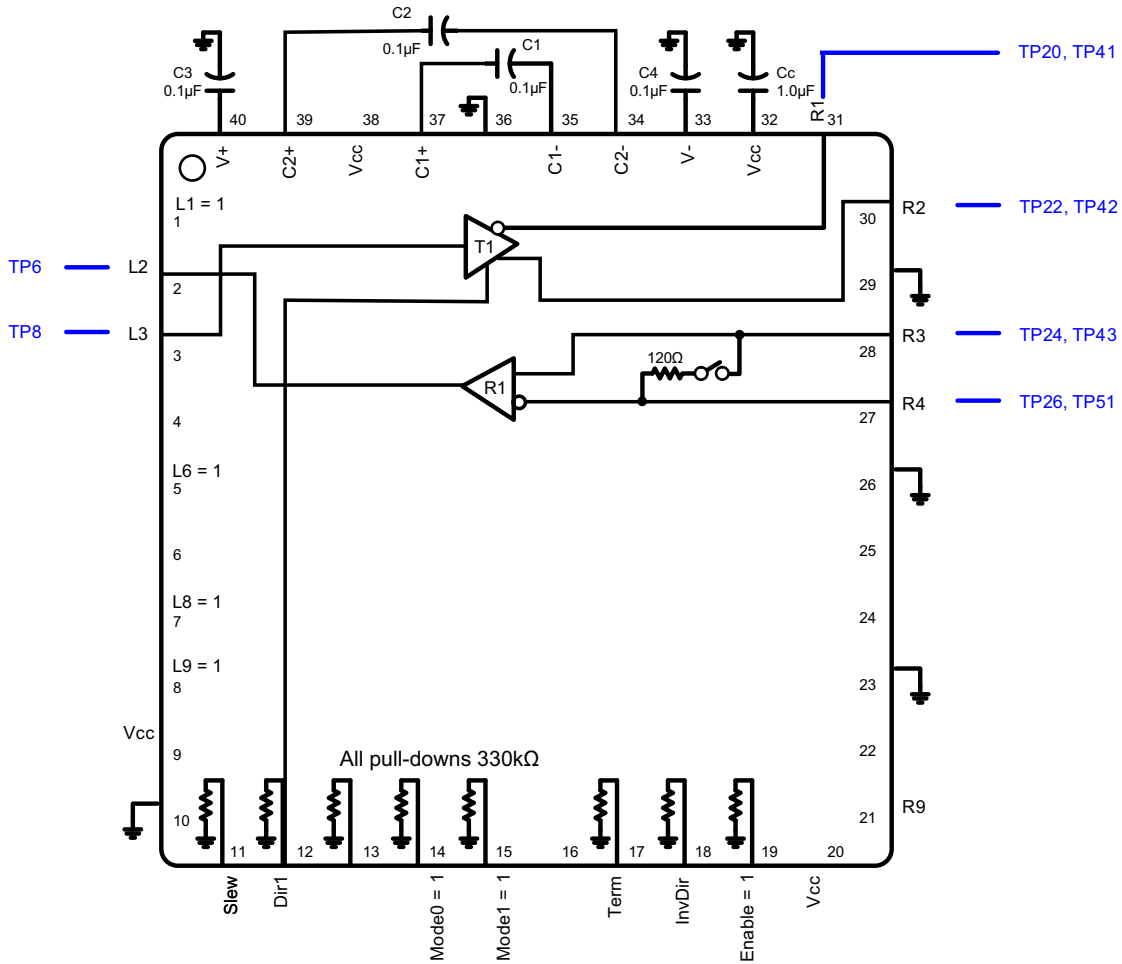
The RS-485 signals are also accessible at J16.

Figure 6: Full-Duplex RS-485 Mode #1

Additional Control Signals

SLEW

By default, the slew rate limiting is disabled. To enable the slew rate limiting, place a jumper between the J23 pins 1 and 2.

DIR1

This pin only applies in the half-duplex and full-duplex RS-485/RS-422 modes. The DIR1 signal can manually be controlled at the J23 pins 3 and 4. This pin has an internal pull-down resistor. To change the logic level on this pin, install a jumper at the J23 pins 3 and 4.

Full-Duplex Mode

In the full-duplex modes, this pin enables and disables the T1 differential driver. A logic low disables the T1 differential driver. A logic high enables the T1 differential driver.

Half-Duplex Mode

In the half-duplex modes, this pin controls the direction of the T1 different driver or R1 differential receiver. A logic low enables the R1 differential receiver and disables the T1 differential driver. A logic high enables the T1 differential driver and disables the R1 differential receiver.

DIR2

This pin only applies in the half-duplex and full-duplex RS-485/RS-422 modes. The DIR2 signal can manually be controlled at the J23 pins 5 and 6. This pin has an internal pull-down resistor. To change the logic level on this pin, install a jumper at the J23 pins 5 and 6.

Full-Duplex Mode

In the full-duplex modes, this pin enables and disables the T2 differential driver. A logic low disables the T2 differential driver. A logic high enables the T2 differential driver.

Half-Duplex Mode

In the half-duplex modes, this pin controls the direction of the T2 different driver or R1 differential receiver. A logic low enables the R2 differential receiver and disables the T2 differential driver. A logic high enables the T2 differential driver and disables the R2 differential receiver.

TERM

This pin only applies in the half-duplex and full-duplex RS-485/RS-422 modes. The TERM pin enables and disables the internal termination resistor. This pin has an internal pull-down resistor. The internal termination resistor is disabled when there is no jumper across the J23 pins 13 and 14. Install a jumper across the J23 pins 13 and 14 to enable the internal termination resistor.

ENABLE

This pin enables and disables the XR34350. This pin has an internal pull-down resistor. By default, a jumper is installed across the J23 pins 17 and 18 to enable the XR34350.

Evaluate the XR34350 Transceiver Only

When you evaluate only the XR34350, you can use an external power supply or power from a USB port.

External Power Supply

An external 3.3V or 5V power supply can be applied at TP2. You should not plug the USB cable into a USB nor install the J17 pin. However, a common ground should be present between the external power supply and the XR34350.

USB Powered

If you use power from a USB port, select the supply voltage at J4. A jumper across the J4 pins 1 and 2 selects the 5V output from the USB connector. A jumper across the J4 pins 2 and 3 selects the regulated 3.3V output from the SP6260. You must install a jumper across the J17 pins 1 and 2 to supply power to the XR34350. You must also install a jumper across the J2 pins 1 and 2 (or 3 and 4) to ensure that there is a common ground between the USB supplied voltage and the XR34350.

Evaluate the XR34350 with the XR21B1411

The XR21B1411 can be used to pass data through the XR34350. You can use an external power supply or power it directly from the USB bus. For more information, see the previous section. You should also install a jumper across the J2 pins 1 and 2 (or 3 and 4) to ensure that there is a common ground between the XR21B1411 and the XR34350. To enable the connection between the XR21B1411 and the XR34350, slide the SW3 switches to the ON position. In addition, if you use the DB9 connector, slide the SW4 switches to the ON position. You can download Windows, Linux, and Mac drivers for the XR21B1411 from the MaxLinear's website. For Windows, a sample USB UART test GUI is also available for download.

Loopback Mode or RS-232 Mode

The XR21B1411 can transmit and receive data through the XR34350 if the SW3 and SW4 switches are in the ON position. For RS-232 mode, an external null modem cable or connection is required to transmit and receive data.

Half-duplex, Full-Duplex and Mixed Duplex RS-485/422 Modes

You need additional jumpers if there is a requirement to control the DIR1 and/or DIR2 pins from the software driver or application. You should not install jumpers on the J23 pins 3 and 4 and pins 5 and 6.
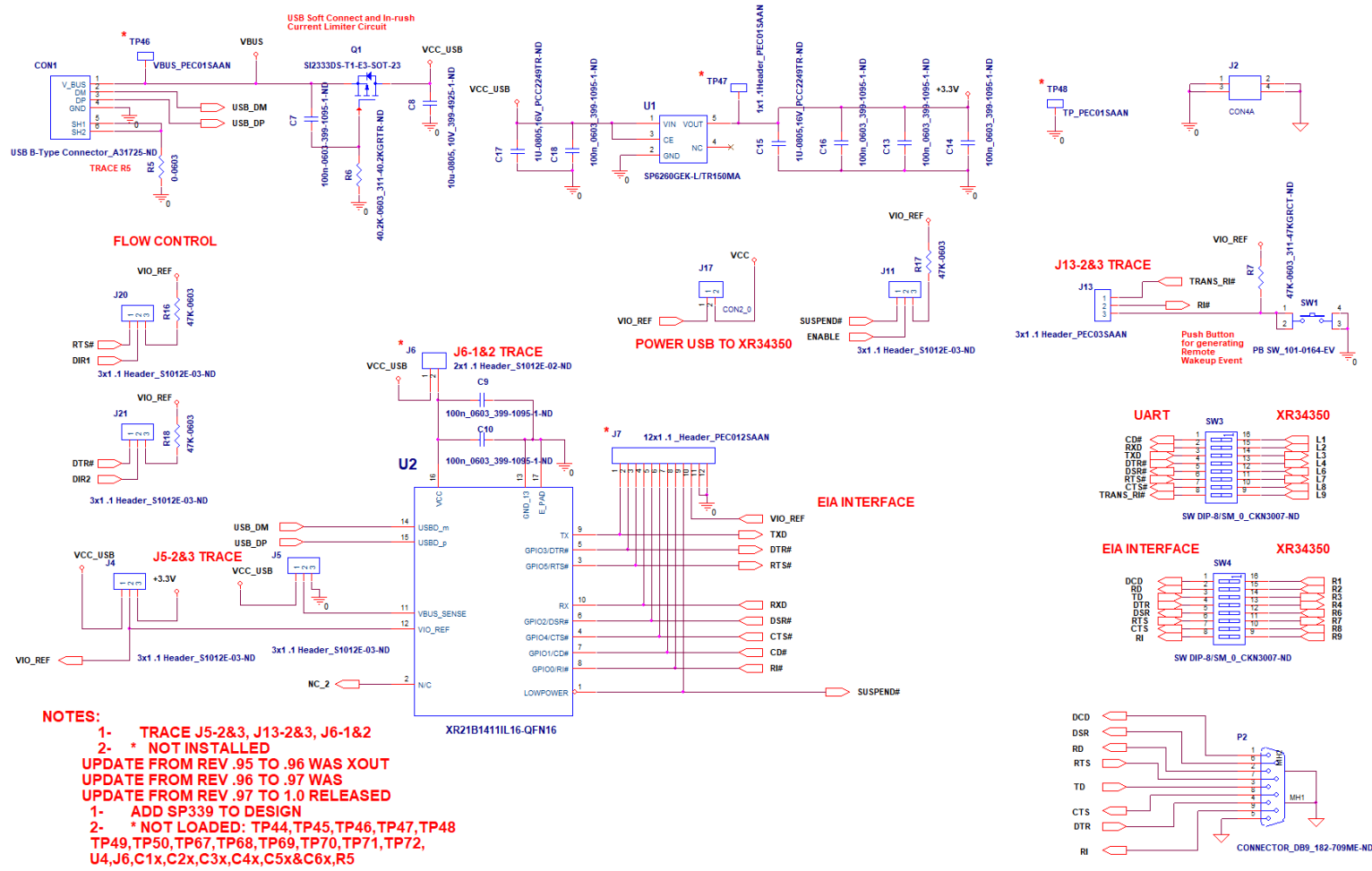
Control the DIR1 pin with the RTS# output pin of XR21B1411

The XR21B1411 can control the DIR1 pin with the RTS# output pin. To enable the connection between the RTS# pin of the XR21B1411 and the DIR1 pin, install a jumper across the J20 pins 1 and 2. If you use the Windows 2000, XP, Vista, 7, or 8 driver from the MaxLinear's website, you can enable the RS-485 mode from the **Properties** page. If you use it with a standard terminal application, the RS-485 mode is already enabled. Alternatively, you can enable the RS-485 mode with the sample USB UART test GUI from the MaxLinear's website. When it transmits data, the RTS# pin is high. When it does not transmit data—but receive or idle—, the RTS# pin is low. This feature works for both the half-duplex RS-485 modes and full-duplex RS-485/422 modes.

Control the DIR2 pin with the DTR# output pin of XR21B1411

The XR21B1411 can control the DIR2 pin with the DTR# output pin. To enable the connection between the DTR# pin of the XR21B1411 and the DIR2 pin, install a jumper across the J21 pins 1 and 2. There is no automatic direction control feature with the DTR# pin. However, the DTR# pin can be controlled manually from the software. The DTR# can use the standard *set DTR* and *clear DTR* APIs in Windows or Linux to set or clear the DTR# pin. You can also set or clear the DTR# pin by writing directly to the GPIO_SET and GPIO_CLEAR registers with the sample USB UART test GUI from the MaxLinear's website.

XR34350 EVB Schematic

Figure 7: EVB Schematic—Power and USB Interface
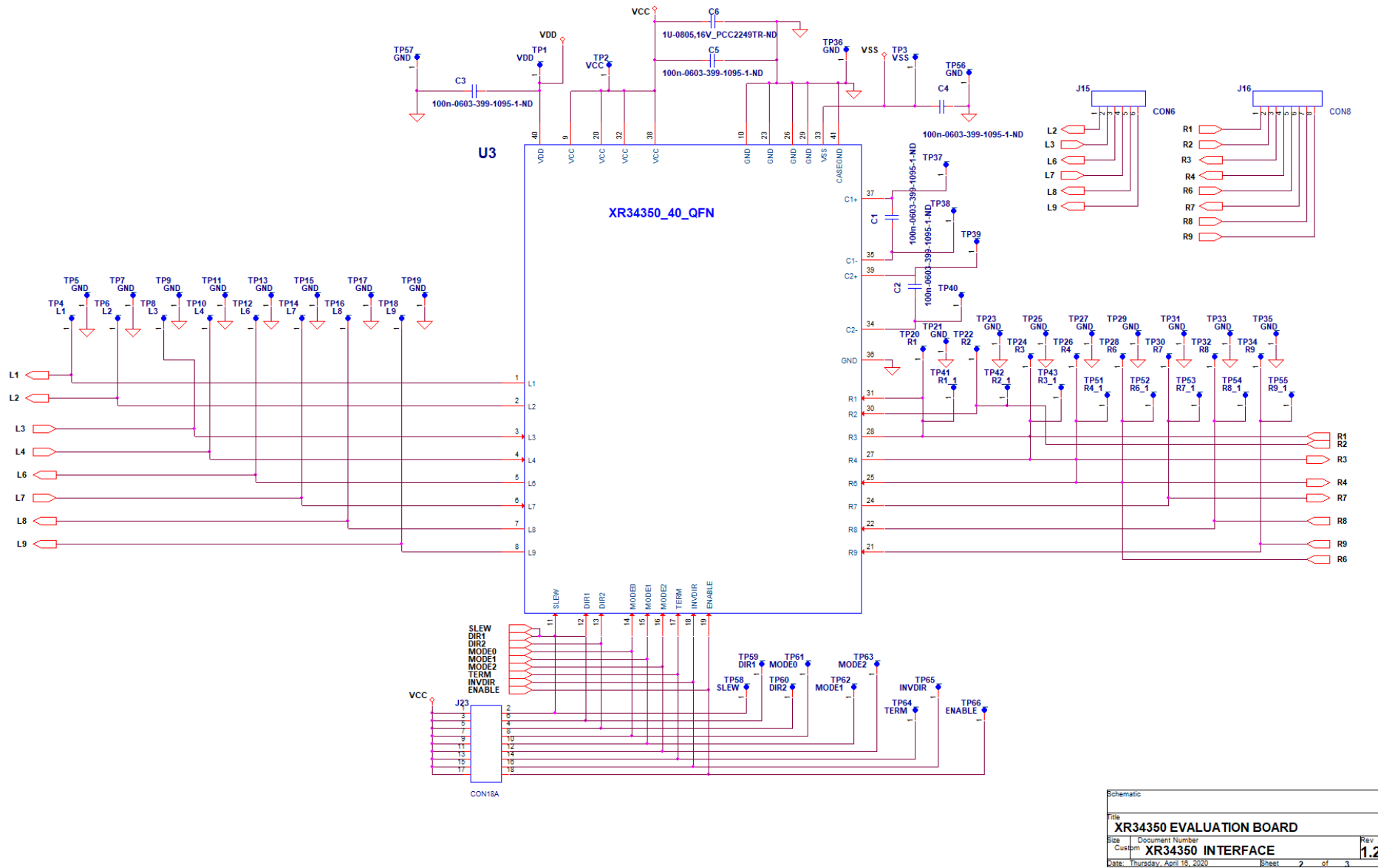
Figure 8: EVB Schematic—Interface
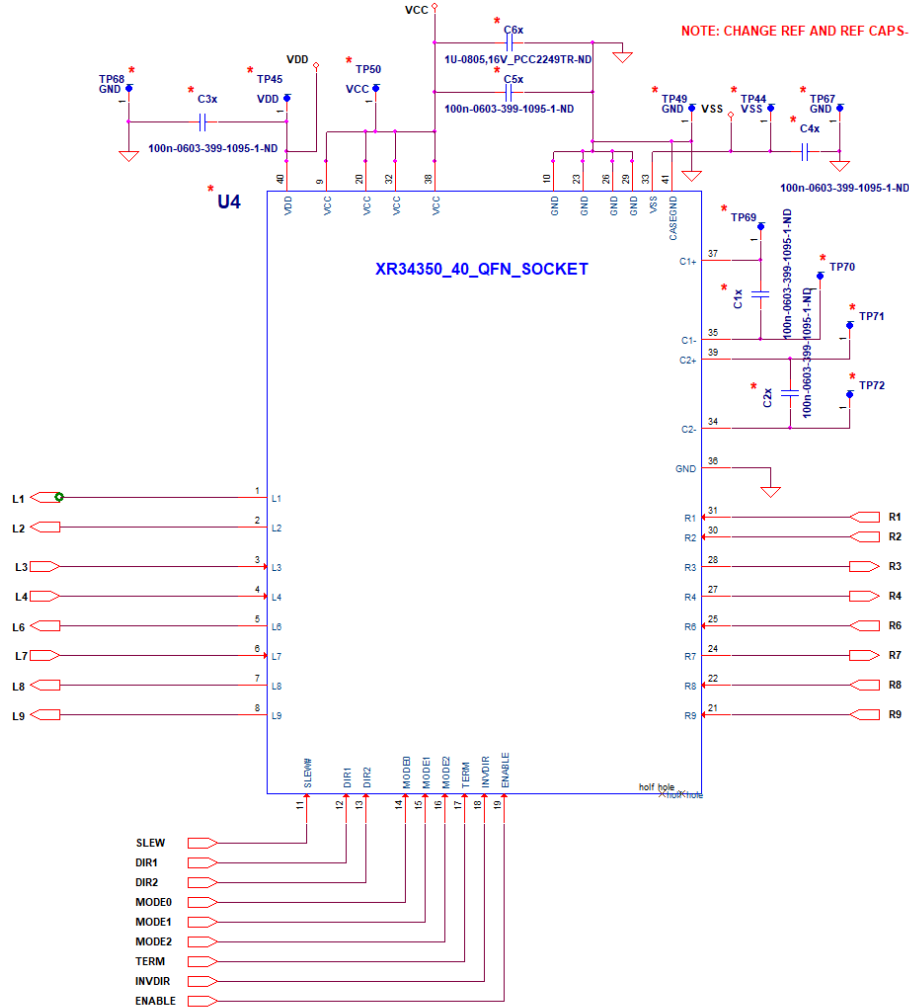
1. The U4 socket is not factory installed.

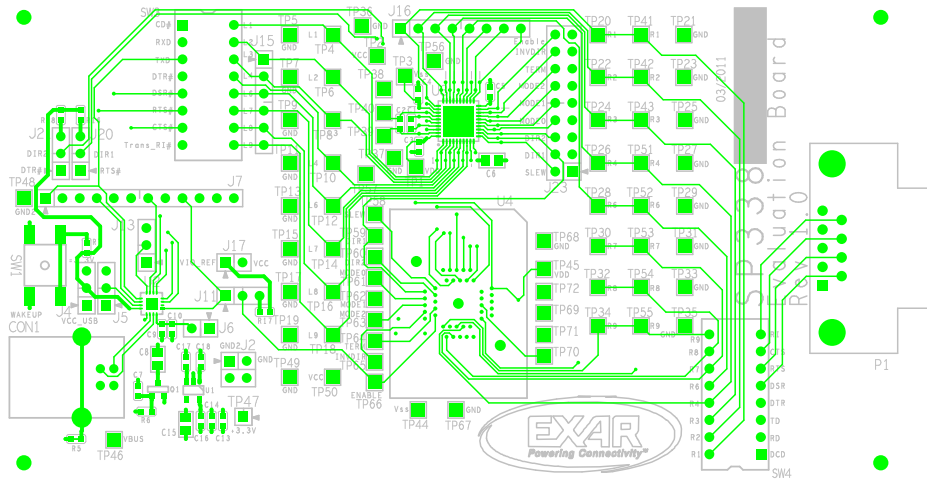**Figure 9: EVB Schematic—Socket**

XR34350 PCB Layers

Figure 10: PCB Layer 1 (Top)

Note: The XR34350 evaluation board uses the same PCB as the SP338 due to each part's pin compatibility, so you may see SP338 on the top silkscreen of the XR34350 board.
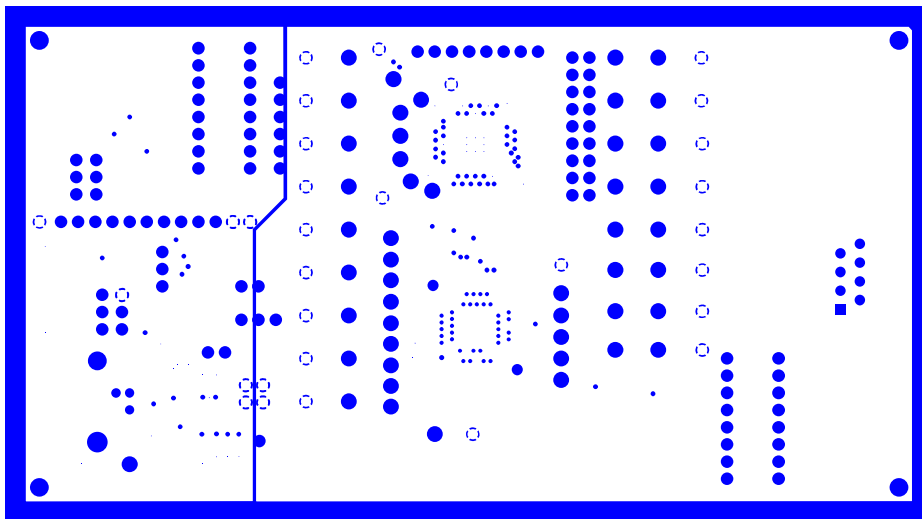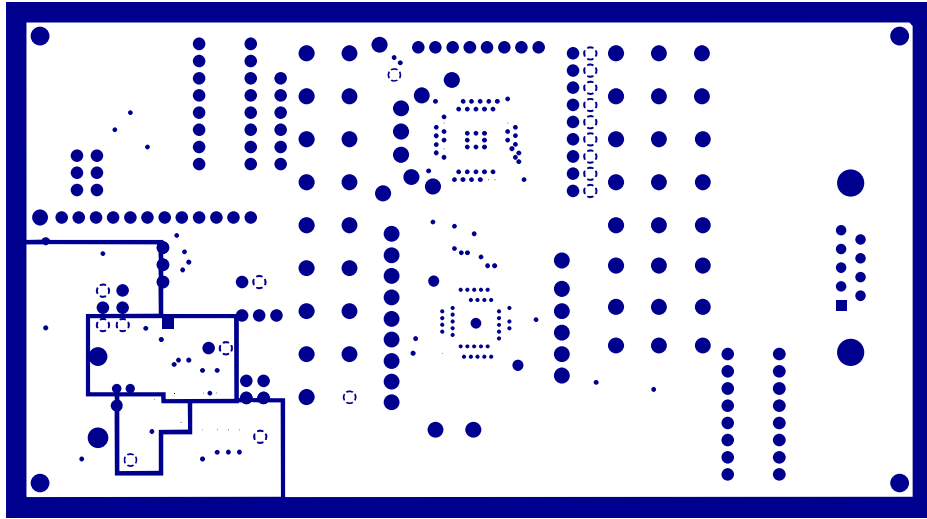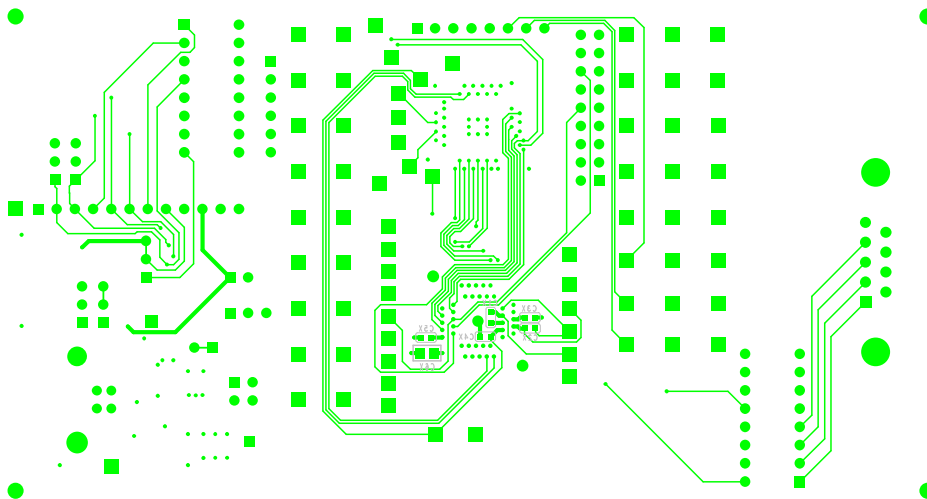

Figure 11: PCB Layer 2 (Ground)

Figure 12: PCB Layer 3 (Power)

Figure 13: PCB Layer 4 (Bottom)

XR34350 Bill of Materials

Table 3: **XR34350 Bill of Materials**

Item	Quantity	Reference Designator	Part
1	1	CON1	USB B-Type Connector_A31725-ND
2	11	C1x, C1, C2x, C2, C3x, C3, C4x, C4, C5x, C5, C7	100n-0603-399-1095-1-ND
3	4	C6x, C6, C15, C17	1U-0805,16V_PCC2249TR-ND
4	1	C8	10u-0805, 10V_399-4925-1-ND
5	6	C9, C10, C13, C14, C16, C18	100n_0603_399-1095-1-ND
6	1	J2	CON4A
7	5	J4, J5, J11, J20, J21	3x1 .1 Header_S1012E-03-ND
8	1	J6	2x1 .1 Header_S1012E-02-ND
9	1	J7	12x1 .1 _Header_PEC012SAAN
10	1	J13	3x1 .1 Header_PEC03SAAN
11	1	J15	CON6
12	1	J16	CON8
13	1	J17	CON2_0
14	1	J23	CON18A
15	1	P2	CONNECTOR_DB9_182-709ME-ND
16	1	Q1	SI2333DS-T1-E3-SOT-23
17	1	R5	0.0 -0603_311_0.0GRTR-ND
18	1	R6	40.2K-0603_311-40.2KGRTR-ND
19	1	R7	47K-0603_311-47KGRCT-ND
20	3	R16, R17, R18	47K-0603
21	1	SW1	PB SW_101-0164-EV
22	2	SW3, SW4	SW DIP-8/SM_0_CKN3007-ND
23	2	TP1, TP45	1x1 .1Header_PEC01SAAN
24	2	TP2, TP50	1x1 .1Header_PEC01SAAN
25	2	TP3, TP44	1x1 .1Header_PEC01SAAN
26	1	TP4	1x1 .1Header_PEC01SAAN
27	30	TP5, TP7, TP9, TP11, TP13, TP15, TP17, TP19, TP21, TP23, TP25, TP27, TP29, TP31, TP33, TP35, TP36, TP37, TP38, TP39, TP40, TP49, TP56, TP57, TP67, TP68, TP69, TP70, TP71, TP72	1x1 .1Header_PEC01SAAN
28	35	TP6, TP8, TP10, TP12, TP14, TP16, TP18, TP20, TP22, TP24, TP26, TP28, TP30, TP32, TP34, TP41, TP42, TP43, TP46, TP47, TP48, TP51, TP52, TP53, TP54, TP55, TP58, TP59, TP60, TP61, TP62, TP63, TP64, TP65, TP66	1x1 .1Header_PEC01SAAN

Table 3: XR34350 Bill of Materials (Continued)

Item	Quantity	Reference Designator	Part
29	1	U1	SP6260GEK-L/TR150MA
30	1	U2	XR21B1411IL16-QFN16
31	1	U3	XR34350IL-40-QFN
32	1	U4	XR34350IL-40-QFN-SOCKET (not populated)

Corporate Headquarters:
5966 La Place Court, Suite 100
Carlsbad, CA 92008
Tel.: +1 (760) 692-0711
Fax: +1 (760) 444-8598

www.maxlinear.com