

FEATURES

Plug and Play system evaluation
Easy evaluation of eight isolated Physical layer communication standards
Open source hardware
Open source software
iCoupler® and *isoPower®* technology
ADSP-BF548 Blackfin Processor running uCLinux
Sample PC application
Sample embedded UCLinux application
64 MB RAM
32 MB Flash
Extender connector for additional functionality

APPLICATIONS

Isolated Interfaces

EVALUATION KIT CONTENTS

One each

EZLINX-IIIDE-EBZ

Power Supply

USB-A to USB Mini B Cable

GENERAL DESCRIPTION

The ezLINX iCoupler Isolated Interface Development environment provides developers with a cost-effective, plug and play method for evaluating eight physical Layer, digitally-isolated communication standards(USB, RS-422, RS-485, RS-232, CAN, SPI, I2C and LVDS). The Blackfin® ADSP-BF548 processor is used to run the uCLinux operating system and allows for easy customization through the open source hardware and software platform. Development time is significantly reduced for embedded designers and system architects who are designing and evaluating isolated communication standards. The Interfaces on ezLINX use ADI's isolated transceivers with integrated iCoupler and isoPower® digital isolator technology.

The Hardware of the ezLINX iCoupler isolated interface development environment contains the ADSP-BF548 Blackfin processor with 64MB of RAM and 32MB of Flash memory. The

EZLINX-IIIDE-EBZ



Figure 1.

Isolated Physical layer communication standards are implemented using ADI's isolated transceivers with integrated iCoupler and isoPower technology. Included are the following:

- Isolated USB using the ADuM3160
- Isolated CAN using the ADM3053 Signal and Power Isolated CAN transceiver
- Isolated RS-485 and RS-422 using the ADM2587E Signal and Power Isolated RS-485/RS-422 transceiver
- Isolated RS-232 using the ADM3252E Signal and Power Isolated RS-232 transceiver
- Isolated I2C using the ADuM1250 and ADuM5000
- Isolated SPI using the ADuM3401, ADuM3402 and ADuM5000
- Isolated LVDS using the ADuM3442, ADuM5000, ADN4663 and ADN4664



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REVISION HISTORY

5/12—Revision PrA: Preliminary Version

SYSTEM ARCHITECTURE

The system architecture Block diagram of the ezLINX hardware is shown in Figure 2. An extender connector, Hirose FX8 120P-

SV(91), is added for additional functionality. The Ethernet option is not fitted on the standard ezLINX hardware.

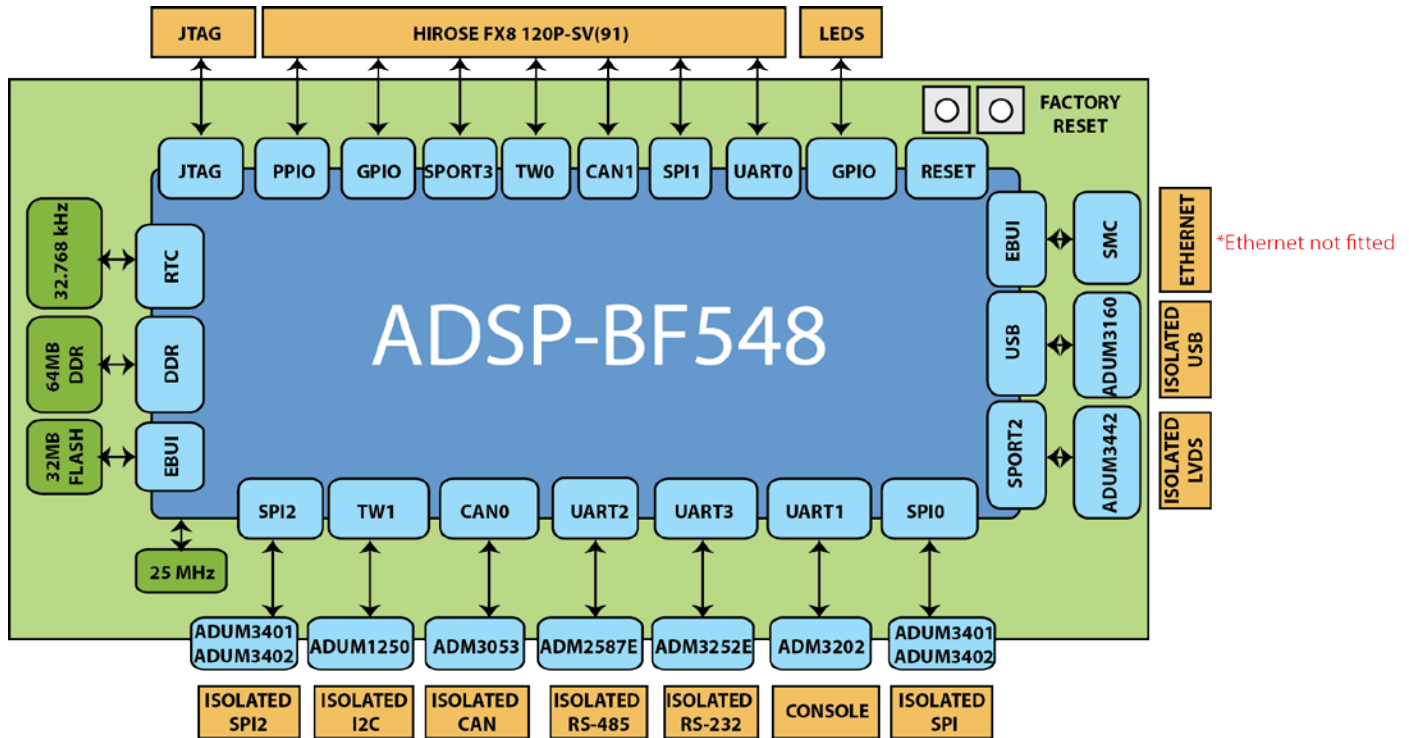


Figure 2. ezLINX Hardware Block diagram

ISOLATED CAN

The Isolated CAN port is implemented using the ADM3053 Signal and Power isolated CAN transceiver. The ADM3053 connects to CAN0 of the ADSP-BF548 and is capable of functioning at data rates of up to 1Mbit/s. Figure 3 shows a circuit diagram of the implementation of the ADM3053 on the ezLINX hardware.

The CAN Node can be configured using jumpers JP17 and JP18. When both jumpers JP17 and JP18 is fitted, the CAN node is split terminated with 120Ω and a common mode capacitor of 47nF. If termination is not required, remove JP17 and JP18. Table x show jumper configurations for all the interfaces on ezLINX.

The 5V supply is connected to V_{CC}(pin 8) to power the *isoPower* isolated Power supply of the ADM3053. This generates an isolated 5V on the Visoout pin(pin 12) of the ADM3053 and needs to is connected to the Visoin pin(pin 19). The 3.3V supply is connected to the V_{IO} pin(pin 6) to power the *iCoupler* signal isolation that needs to be compatible with the 3.3V logic of the Blackfin ADSP-BF548. The RS pin(pin 18) is connected through a 0Ω resistor to CAN_ISO_GND in order to de-activate slew rate limiting,

A four pin screw terminal connector, J8 is used for easy access to the CANH(Pin 1), CANL(Pin 3) and CAN_ISO_GND(Pin 2 and 4) connections.

Application note AN-1123 provides more information on implementing CAN Nodes.

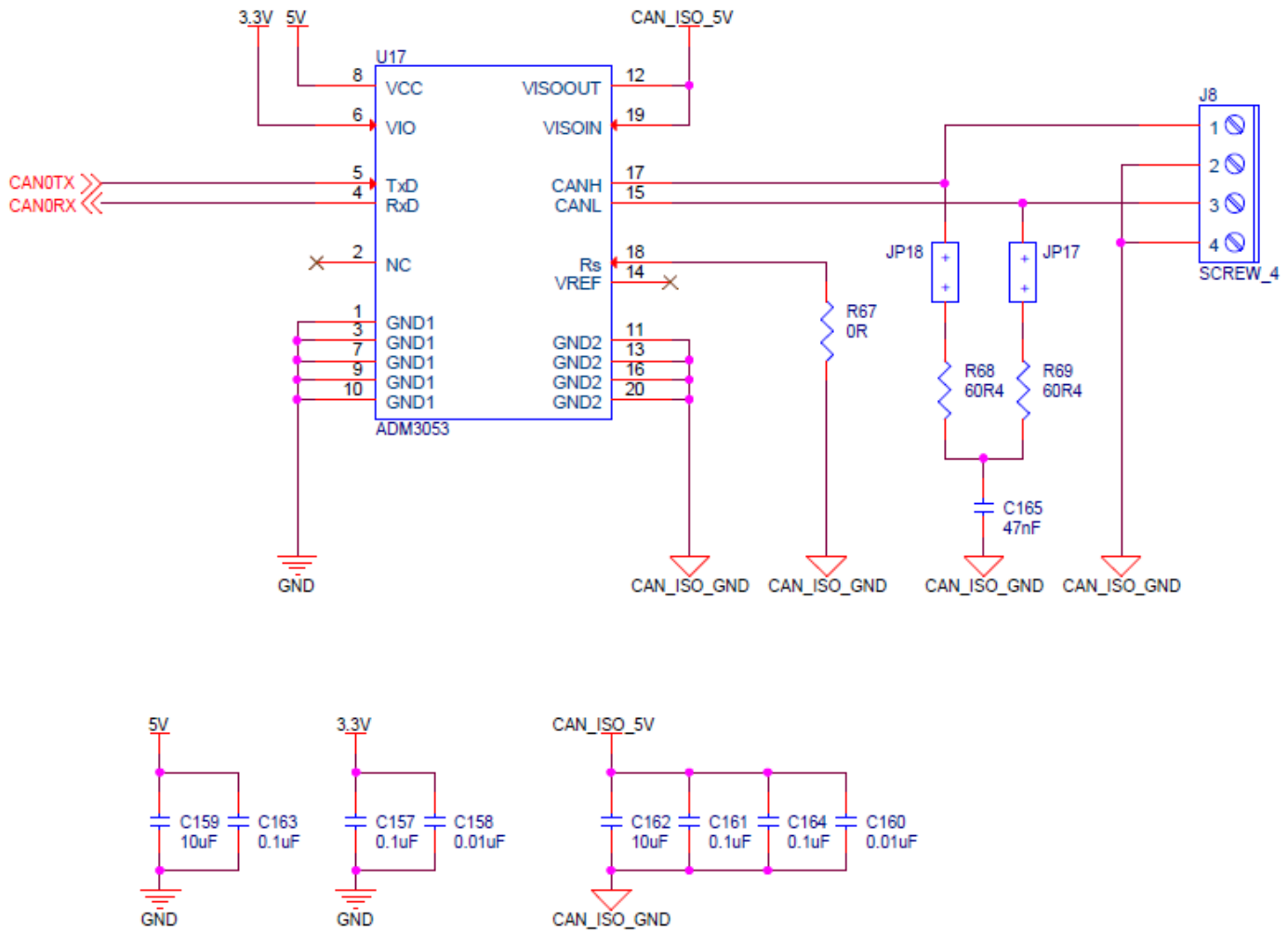


Figure 3. ADM3053 Isolated CAN Implementation

ISOLATED RS-485 AND RS-422

The Isolated RS-485 and RS-422 port is implemented using the ADM2587E Signal and Power isolated CAN transceiver. The ADM2587E connects to UART2 of the ADSP-BF548 and is capable of functioning at data rates of up to 500kbit/s. Figure 4 shows a circuit diagram of the implementation of the ADM3053 on the ezLINX hardware.

The RS-485 Node can be configured using jumpers JP3, JP4, JP19 and JP40. To configure the node as a half-duplex RS-485 node, connect JP3 and JP4. When JP3 and JP4 are fitted, it will connect A to Y and B to Z. When JP3 and JP4 are removed, the node will be configured as a full duplex RS-485 node or as a RS-422 node. When JP19 is fitted, the A and B pins will be terminated with 120Ω. If termination is not required, remove

JP19. When JP40 is connected a pull-up resistor on the RxD pin of 10kΩ will be connected. Table x show jumper configurations for all the interfaces on ezLINX.

The 3.3V supply is connected to V_{cc}(pin 2 and 8) to power the *isoPower* isolated Power supply and *iCoupler* signal isolation of the ADM2587E. This generates an isolated 3.3V on the Visoout pin(pin 12) of the ADM2587E and is connected to the Visoin pin(pin 19).

A six pin screw terminal connector, J7 is used for easy access to the A(Pin 2), B(Pin 3), Z(Pin 4), Y(Pin 5) and RS-485_ISO_GND(Pin 1 and 6) connections.

Application note AN-960 provides more information on circuit implementation of RS-485 and RS-422 applications.

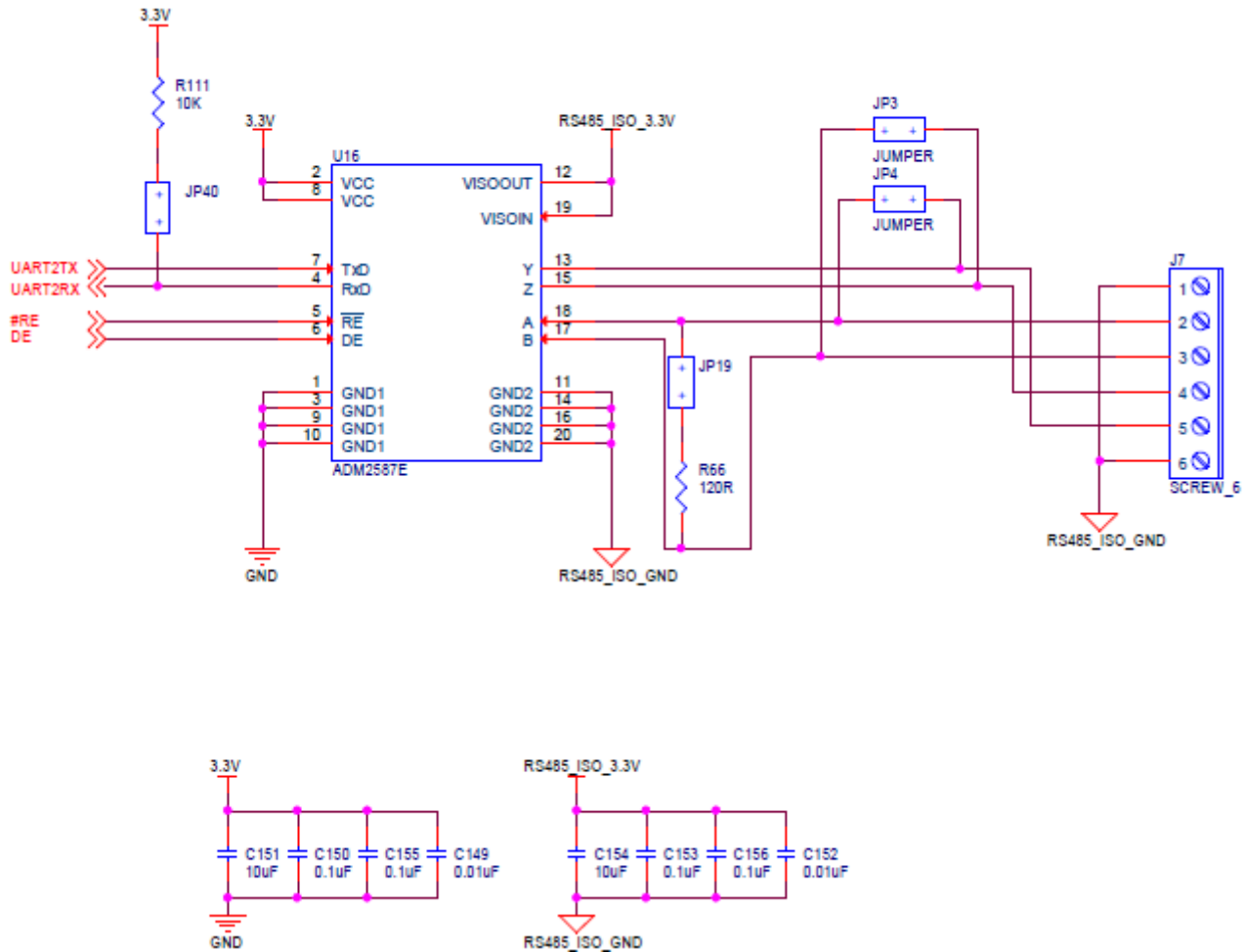


Figure 4. ADM2587E Isolated RS-485 and RS-422 implementation

ISOLATED USB

The Isolated USB port is implemented using the ADuM3160 Full speed USB Isolator. The ADuM3160 connects to the integrated USB PHY of the ADSP-BF548 and is capable of functioning at data rates of up to 12Mbit/s. Figure 5 shows a circuit diagram of the implementation of the ADuM3160 on the ezLINX hardware.

The V_{BUS1} and V_{DD1} of the ADuM3160 is powered from the bus power 5. V_{BUS2} and V_{DD2} is powered from 3.3V generated by the ezLINX power supply.

A mini USB-B connector is used for easy connection to a USB master.

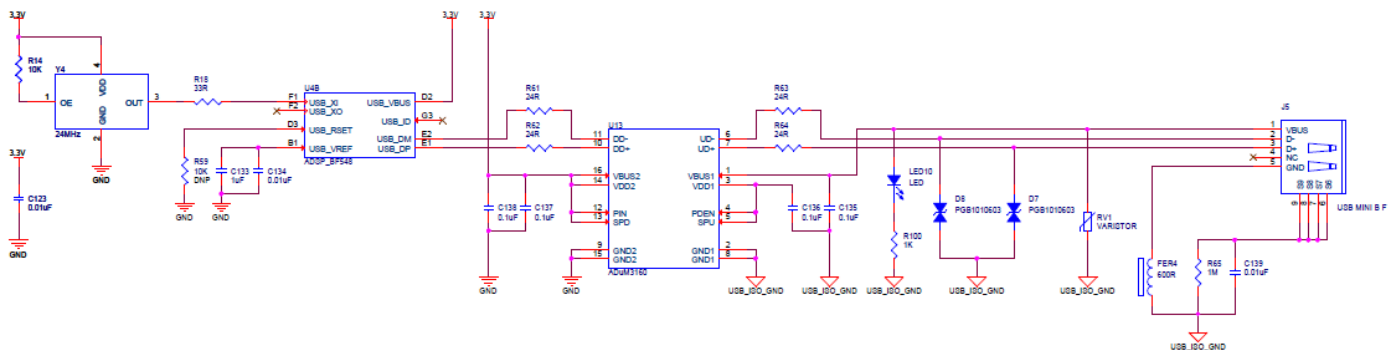


Figure 5. ADuM3160 Isolated USB Implementation

ISOLATED RS-232

The Isolated RS-232 port is implemented using the ADM3252E Signal and Power isolated RS-232 transceiver. The ADM3252E connects to UART3 of the ADSP-BF548 and is capable of functioning at data rates of up to 460kbit/s. Figure 6 shows a circuit diagram of the implementation of the ADM3252E on the ezLINX hardware.

The Isolated RS-232 JP2 jumper when fitted will implement a loopback of the transmitter output(TOUT1) to the receiver input(RIN1).

The V_{CC} of the ADM3252E is powered with 3.3V and will generate an isolated 3.3V on V_{ISO} using ADI's *isoPower* technology.

A three pin screw terminal connector, J6 is used for easy access to the TOUT1(pin 2), RIN1(pin 3) and RS232_ISO_GND(Pin 1) connections.

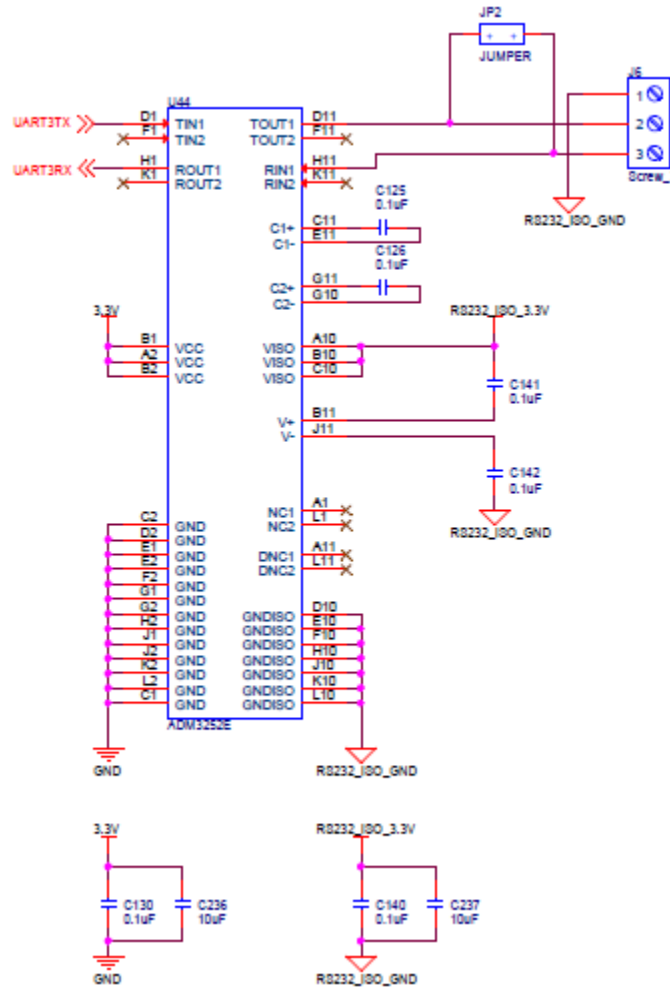


Figure 6. ADM3252E Isolated RS-232 Implementation

ISOLATED I²C

The Isolated I²C port is implemented using the ADuM1250 I2C Isolator and ADuM5000 *isoPower* Isolated DC to DC converter. The ADuM1250 connects to TW1 of the ADSP-BF548 and is capable of functioning at a maximum frequency of 1MHz. Figure 7 shows a circuit diagram of the implementation of the ADuM1250 and ADuM5000 on the ezLINX hardware.

V_{DD1} of the ADuM1250 and V_{DD1} of the ADuM5000 is powered by 3.3V. The ADuM5000 will generate an isolated 3.3V and is used to supply power to V_{DD2} of the ADuM1250.

A three pin screw terminal connector, J22 is used for easy access to the SDA(Pin 1), SCL(Pin 2) and I2C_ISO_GND(Pin 3) connections.

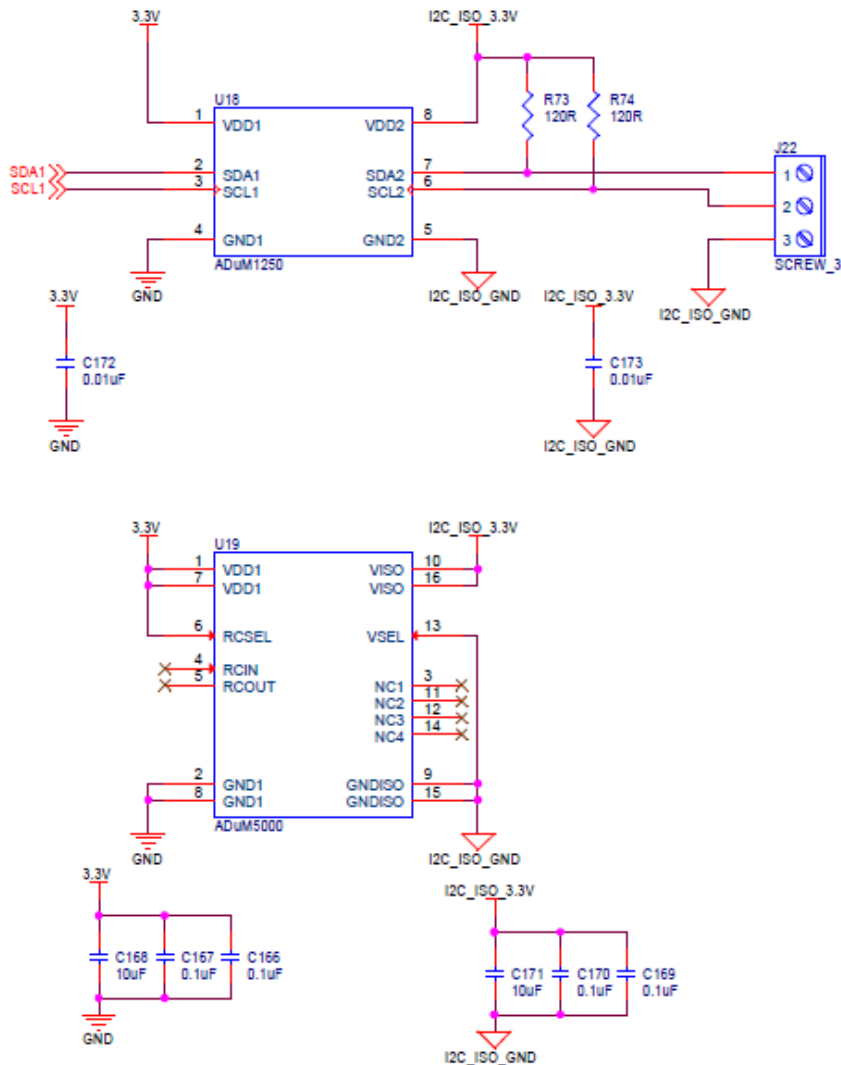


Figure 7. ADuM1250 and ADuM5000 Isolated I²C Implementation

ISOLATED SPI

Two Isolated SPI ports are implemented using the ADuM3401, ADuM3402 *iCoupler* signal isolators and the ADuM5000 *isoPower* Isolated DC to DC converter. The ADuM3401 of the isolated SPI1 is connected to SPI0 of the ADSP-BF548. The ADuM3402 is used for isolating the SPI slave select lines. Figure 8 shows a circuit diagram of the implementation of Isolated SPI1 using the ADuM3401, ADuM3402 and ADuM5000 on the *ezLINX* hardware.

The ADuM3401 of the isolated SPI2 is connected to SPI2 of the ADSP-BF548. The ADuM3402 is used for isolating the SPI slave select lines. Figure 9 shows a circuit diagram of the implementation of Isolated SPI2 using the ADuM3401, ADuM3402 and ADuM5000 on the *ezLINX* hardware.

V_{DD1} of the ADuM3401, ADuM3402 and V_{DD1} of the ADuM5000 are powered by 3.3V. The ADuM5000 will generate

an isolated 3.3V and is used to supply power to V_{DD2} of the ADuM3401 and ADuM3402.

Two seven pin screw terminal connectors, J10 and J25 are used for easy access to the SPISCK (Pin 1), SPIMOSI (Pin 2), SPISEL1/SPISS (Pin 3), SPIMISO (Pin 4), SPISEL2 (Pin 5), SPISEL3 (Pin 6) and SPI_ISO_GND (Pin 7).

To connect Isolated SPI1 as a master, connect jumpers JP5, JP7, JP9, JP11, JP13 and JP15 while leaving jumpers JP6, JP8, JP10, JP12, JP14 and JP16 open. To connect Isolated SPI1 as a slave, connect jumpers JP6, JP8, JP10, JP12, JP14 and JP16 while leaving jumpers JP5, JP11, JP13 and JP15 open.

To connect Isolated SPI2 as a master, connect jumpers JP22, JP24, JP26, JP28, JP30 and JP32 while leaving jumpers JP23, JP25, JP27, JP29, JP31 and JP33 open. To connect Isolated SPI1 as a slave, connect jumpers JP23, JP25, JP27, JP29, JP31 and JP33 while leaving jumpers JP22, JP24, JP26, JP28, JP30 and JP32 open.

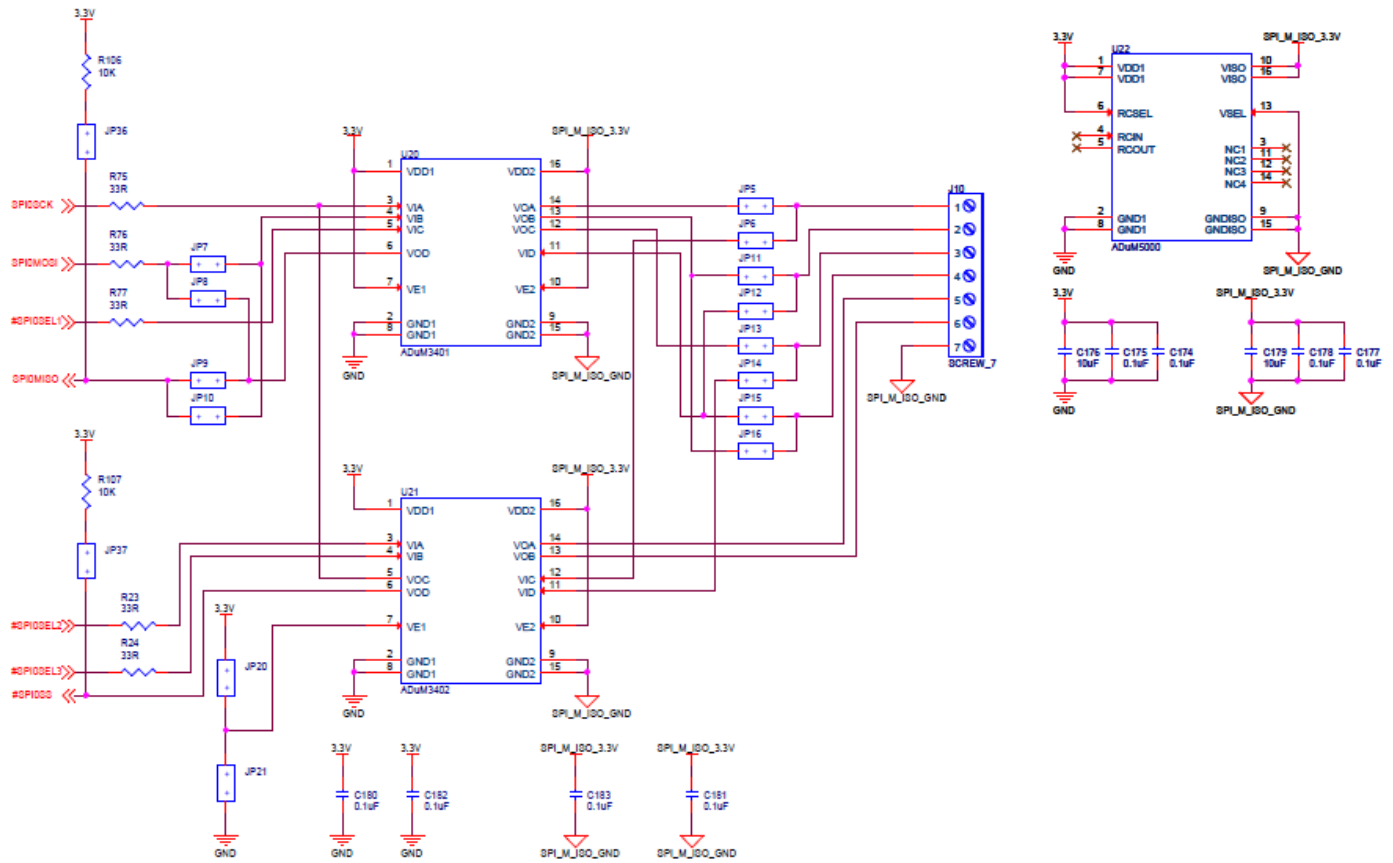


Figure 8. ADuM3401, ADuM3402, ADuM5000 Isolated SPI Implementation

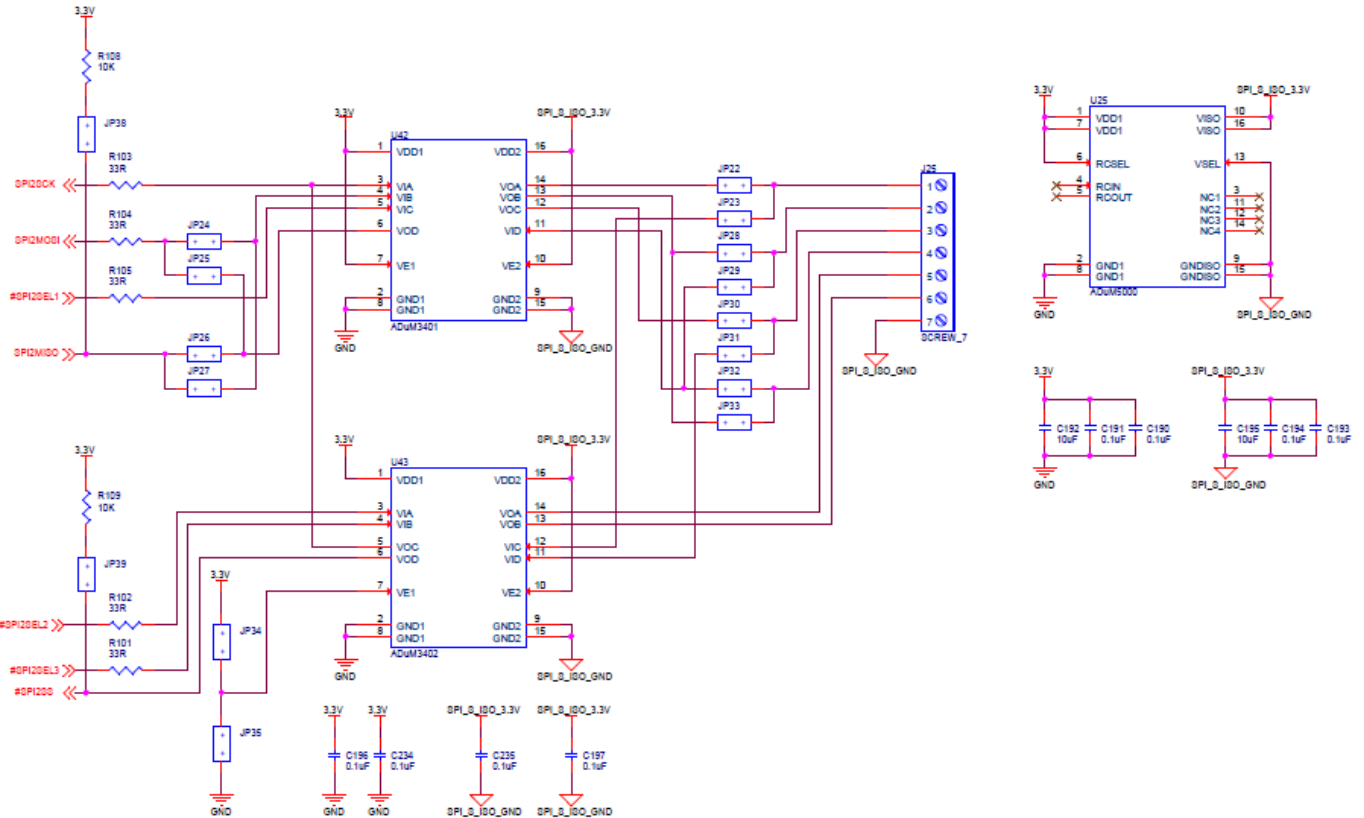


Figure 9. ADuM3401, ADuM3402, ADuM5000 Isolated SPI Implementation

ISOLATED LVDS

The Isolated LVDS port is implemented using the ADuM3442 iCoupler signal isolator, the ADN4664 dual LVDS receiver, the ADN4663 dual LVDS transmitter and the ADuM5000 isoPower Isolated DC to DC converter. The ADuM3442 is connected to SPORT2 of the ADSP-BF548. Figure 10 shows a circuit diagram of the implementation of Isolated LVDS using

the ADuM3442, ADN4663, ADN4664 and ADuM5000 on the ezLINX hardware.

V_{DD1} of the ADuM3442, and V_{DD1} of the ADuM5000 are powered by 3.3V. The ADuM5000 will generate an isolated 3.3V and is used to supply power to V_{DD2} of the ADuM3442, V_{CC} of the ADN4663 and the ADN4664.

A 32 pin header connector is used for easy access to the Isolated LVDS signals.

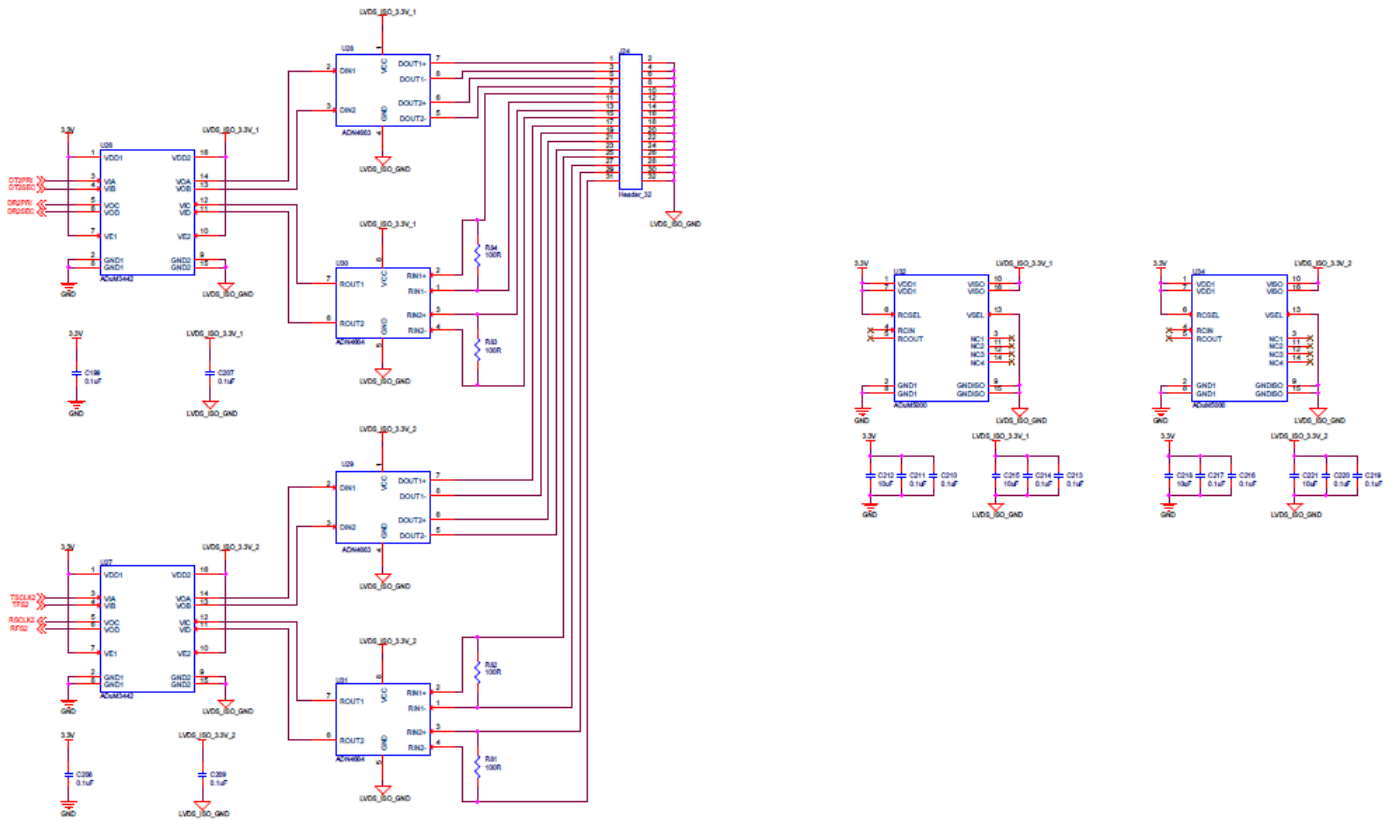


Figure 10. ADuM3442, ADN4663, ADN4664 and ADuM5000 Isolated LVDS Implementation

POWER INPUT

An AC/DC desktop power supply is used to supply 7.5V input to the barrel connector J1 on the ezLINX hardware. This supply

connects through a protection circuit as shown in Figure 11 to the UNREG_IN node of the circuit.

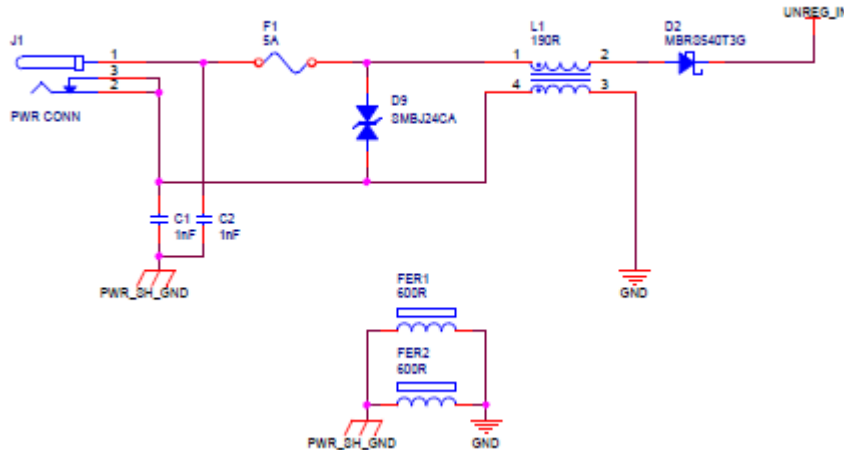


Figure 11. Power Input

3.3V POWER SUPPLY

The ADP1864 Constant Frequency Current-Mode Step-Down DC-to-DC Controller is used with an external P-Channel

Mosfet to generate the regulated 3.3V Power Supply for the ezLINX hardware. The circuit implementation of the 3.3V power supply is shown in Figure 12.

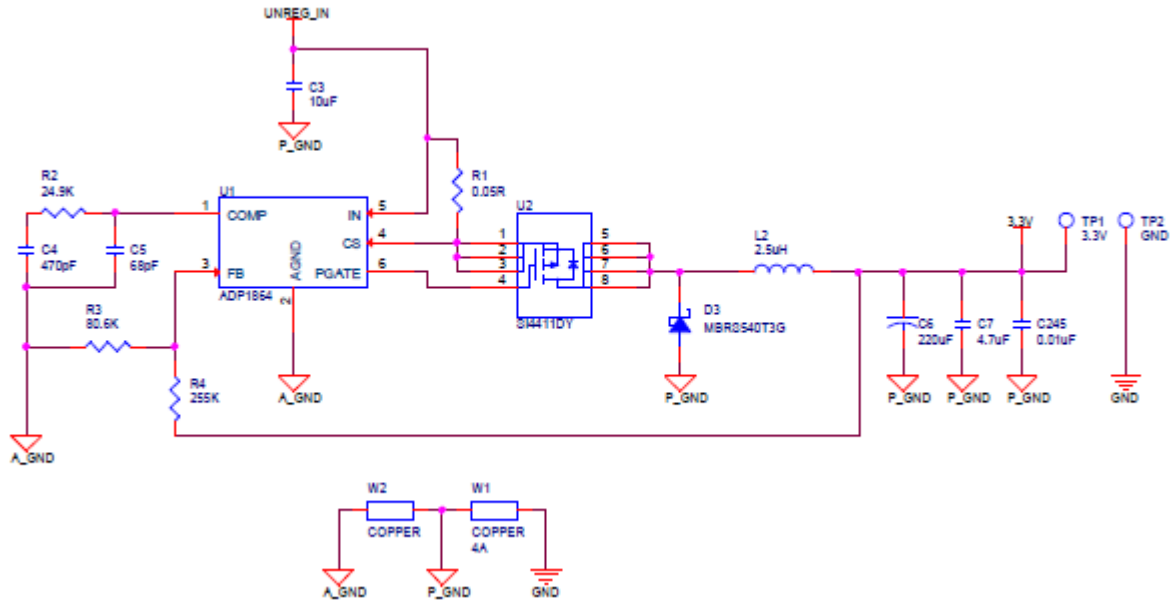


Figure 12. 3.3V Power Supply

1.2V, 2.5V AND 5V POWER SUPPLIES

A P-Channel mosfet is used to regulate the 3.3V input to 1.2V, See Figure 13. The ADP1706 Linear regulator is used to regulate

the 3.3V input to 2.5V, See Figure 14. The ADP3335 low dropout regulator is used to regulate the UNREG_IN input to 5V, See Figure 15.

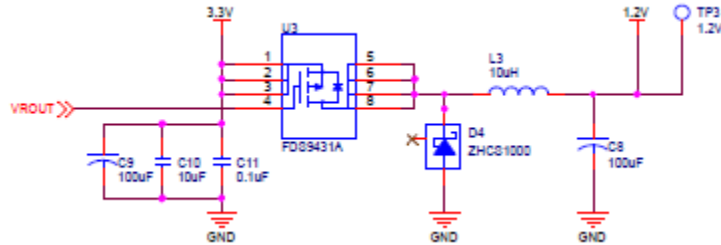


Figure 13. 1.2V Power Supply

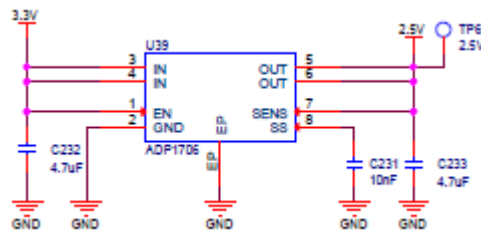


Figure 14. 2.5V Power Supply

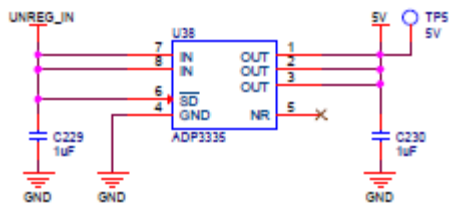


Figure 15. 5V Power Supply

EXTENDER CONNECTOR

The Hirose FX8 120P-SV(91) extender connector is used for daughter board connections. This allows for additional functionality to be added to the ezLINX hardware. Figure 16

shows the circuit implementation of the extender connector J23 and J26. Connector J26 is a three pin header connector and allows for the CAN1 signals of the ADSP-BF548 to be routed to an external daughter board.

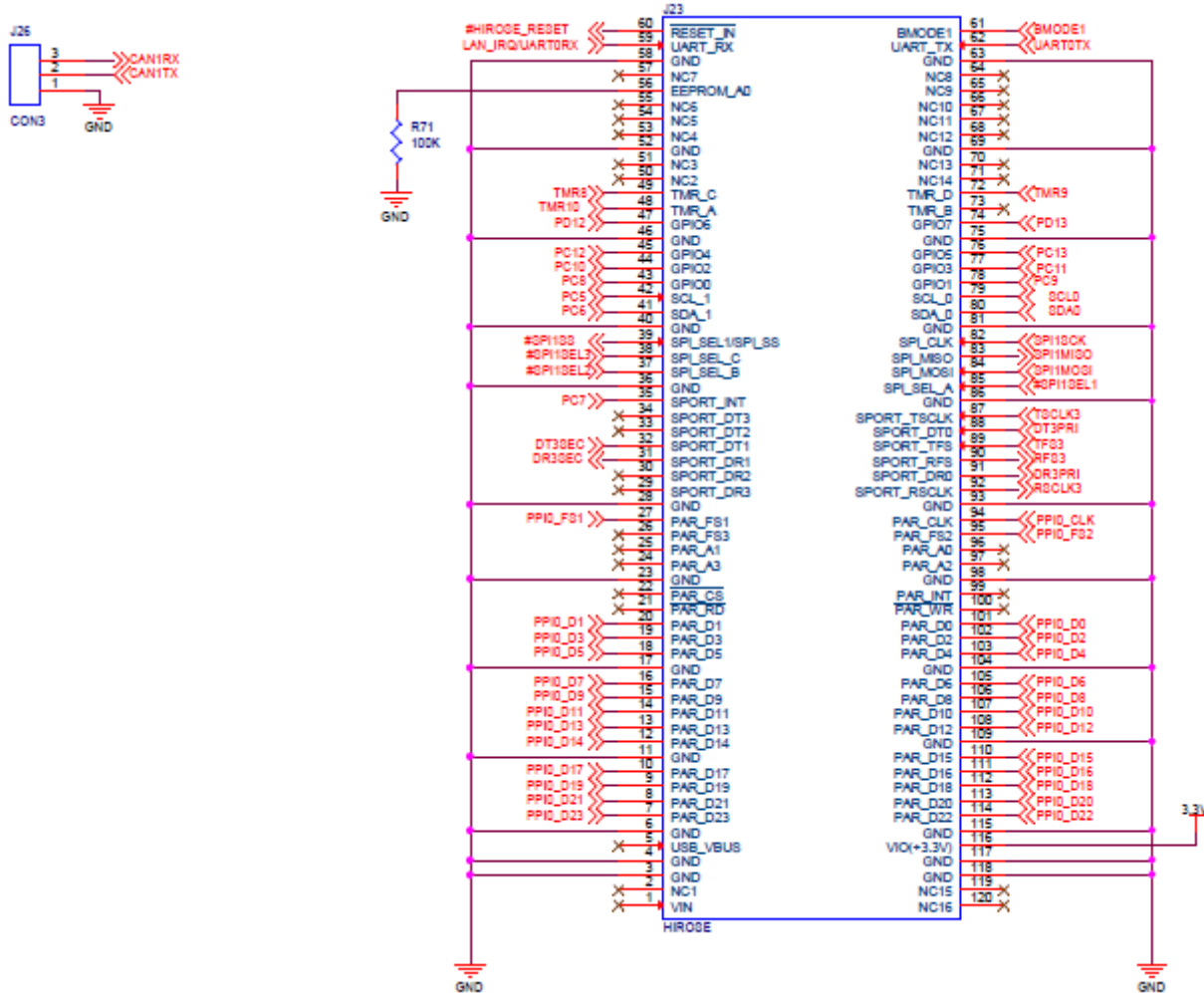


Figure 16. Extender Connector using Hirose FX8 120P-SV(91)

RS-232 CONSOLE

The RS-232 console connector is used for accessing the console of the uCLinux kernel running on the ADSP-BF548 processor. It uses the ADM3202 RS-232 line driver and receiver to connect

to UART1 of the ADSP-BF548. The RS-232 signals connect to a DB-9 connector, J4. A circuit implementation of the RS-232 console is shown in Figure 17.

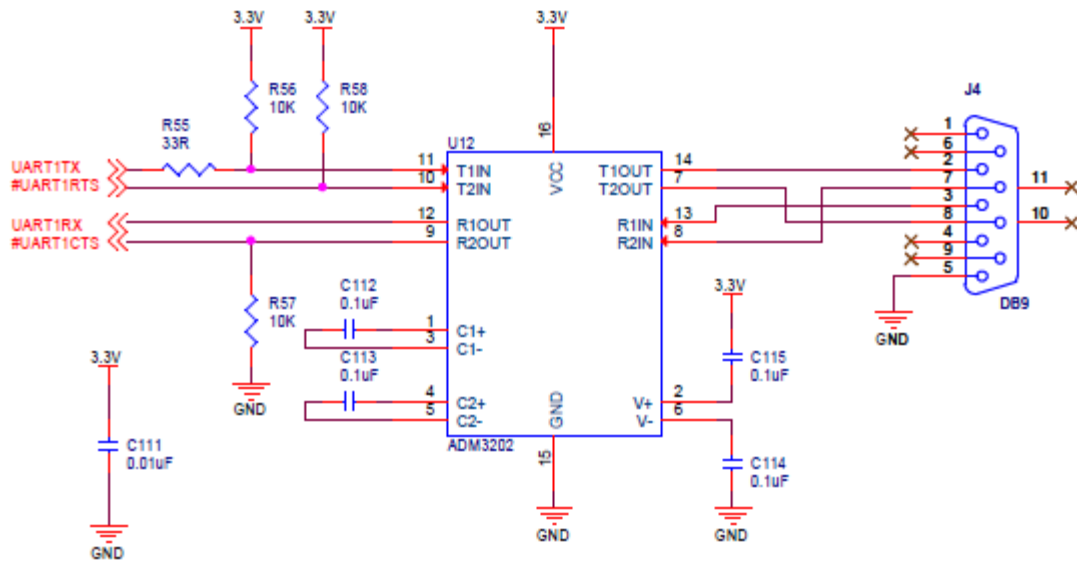


Figure 17. RS-232 Console Implementation

ORDERING INFORMATION

ORDERING GUIDE

Model	Description
ezLINX-IIIIDE-EBZ ¹	iCoupler Isolated Interface Development Environment Evaluation Board

¹ Z = RoHS Compliant part.

NOTES



ESD Caution

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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