Blackfin® Landscape LCD EZ-Extender® Manual

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ANALOG DEVICES

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Regulatory Compliance

The Blackfin Landscape LCD EZ-Extender is designed to be used solely in a laboratory environment. The board is not intended for use as a consumer end product or as a portion of a consumer end product. The board is an open system design which does not include a shielded enclosure and therefore may cause interference to other electrical devices in close proximity. This board should not be used in or near any medical equipment or RF devices.

The Blackfin Landscape LCD EZ-Extender is currently being processed for certification that it complies with the essential requirements of the European EMC directive 89/336/EEC amended by 93/68/EEC and therefore carries the "**CE**" mark.

CE

The Blackfin Landscape LCD EZ-Extender contains ESD (electrostatic discharge) sensitive devices. Electrostatic charges readily accumulate on the human body and equipment and can discharge without detection. Permanent damage may occur on devices subjected to high-energy discharges. Proper ESD precautions are recommended to avoid performance degradation or loss of functionality. Store unused extender boards in the protective shipping package.

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PREFACE

Thank you for purchasing the Blackfin® Landscape LCD EZ-Extender®, Analog Devices, Inc. extender board to the EZ-KIT Lite®/EZ-Board® evaluation system for the ADSP-BF526, ADSP-BF537, ADSP-BF538, and ADSP-BF548 Blackfin processors.

Blackfin processors are embedded processors that support a Media Instruction Set Computing (MISC) architecture. This architecture is the natural merging of RISC, media functions, and digital signal processing characteristics towards delivering signal processing performance in a microprocessor-like environment.

EZ-KIT Lites and Landscape LCD EZ-Extenders are designed to be used in conjunction with the CrossCore® Embedded Studio (CCES) and VisualDSP++® software development environments. The development environment facilitates advanced application code development and debug, such as:

- Create, compile, assemble, and link application programs written in C++, C, and Landscape LCD EZ-Extender assembly
- Load, run, step, halt, and set breakpoints in application programs
- Read and write data and program memory
- Read and write core and peripheral registers
- Plot memory

To learn more about Analog Devices development software, go to `http://www.analog.com/processors/tools`.

Product Overview

The Blackfin Landscape LCD EZ-Extender is a separately sold daughter board that plugs onto the expansion interface II of the ADSP-BF526 EZ-Board. The extender also plugs into the parallel peripheral interface (PPI) connector of the ADSP-BF537, ADSP-BF538, or ADSP-BF548 EZ-KIT Lite evaluation system. The extender board aids the design and prototyping phases of the ADSP-BF526, ADSP-BF537, ADSP-BF538, or ADSP-BF548 processor targeted applications.

Please visit www.analog.com/EX2-LLCD for additional information, including CCES support.

The board extends the capabilities of the evaluation system by providing a connection between the PPI of the Blackfin processor and the on-board 3.5 in. LCD display. The serial peripheral interconnect (SPI) port and TWI interface of the Blackfin processor are used to communicate to the LCD display, AD7879 touch screen controller, AD7147 capacitive touch controller, and the 2 KB serial ROM of the extender.

The following is a list of the Blackfin Landscape LCD EZ-Extender interfaces.

- LCD display with touch capabilities:
    - Sharp LQ035Q1DH02 3.5 in. LCD with resistive touch
    - 320 (horizontal) x 240 (vertical) landscape
    - 1.8V to 3.6V I/O operation
    - LCD backlight
- LCD touch controller:
    - Analog Devices AD7879 touchscreen controller
    - 1.8V to 3.3V I/O operation

- Capacitive touch controller:
  - Analog Devices AD7147 capacitive touch controller
  - Four push buttons and one scroll wheel
  - 1.8V to 3.3V I/O operation
- No power supply required: derives power from the EZ-KIT Lite/EZ-Board
- CE certified
- Dimensions: 3.75 in. (height) x 3.5 in. (width)

Before using any of the interfaces, follow the setup procedure in "Landscape LCD EZ-Extender Setup" on page 1-2.

Example programs are available to demonstrate capabilities of the Blackfin Landscape LCD EZ-Extender board.

Purpose of This Manual

The *Blackfin Landscape LCD EZ-Extender Manual* describes operation and configuration of the extender board's components. A schematic and a bill of materials are provided as a reference for future Blackfin processor board designs.

Intended Audience

This manual is a user's guide and reference to the Blackfin Landscape LCD EZ-Extender. Programmers who are familiar with the Analog Devices Blackfin processor architecture, operation, and development tools are the primary audience for this manual.

Programmers who are unfamiliar with Analog Devices processors can use this manual but should supplement it with other texts that describe your target architecture. For the locations of these documents, see "Related Documents".

Programmers who are unfamiliar with CCES or VisualDSP++ should refer to the online help and user's manuals.

Manual Contents

The manual consists of:

- Chapter 1, "Landscape LCD EZ-Extender Interfaces" on page 1-1, provides basic board information.
- Chapter 2, "Landscape LCD EZ-Extender Hardware Reference" on page 2-1, provides information on the hardware aspects of the board.
- Appendix A, "Landscape LCD EZ-Extender Bill of Materials" on page A-1, provides a list of components used to manufacture the EZ-Extender board.
- Appendix B, "Landscape LCD EZ-Extender Schematic" on page B-1, provides the resources to allow EZ-Board or EZ-KIT Lite board-level debugging or to use as a reference design. Appendix B is part of the online help.

What's New in This Manual

This is revision 1.1 of the *Blackfin Landscape LCD EZ-Extender Manual*. The manual has been updated to include CCES information. In addition, modifications and corrections based on errata reports against the previous manual revision have been made.

For the latest version of this manual, please refer to the Analog Devices Web site.

Technical Support

You can reach Analog Devices processors and DSP technical support in the following ways:

- Post your questions in the processors and DSP support community at EngineerZone®:
  `http://ez.analog.com/community/dsp`
- Submit your questions to technical support directly at:
  `http://www.analog.com/support`
- E-mail your questions about processors, DSPs, and tools development software from **CrossCore Embedded Studio** or **VisualDSP++**:

  Choose **Help > Email Support**. This creates an e-mail to `processor.tools.support@analog.com` and automatically attaches your **CrossCore Embedded Studio** or **VisualDSP++** version information and `license.dat` file.
- E-mail your questions about processors and processor applications to:
  `processor.support@analog.com` or
  `processor.china@analog.com` (Greater China support)

- In the **USA only**, call **1-800-ANALOGD** (1-800-262-5643)
- Contact your Analog Devices sales office or authorized distributor. Locate one at:
  www.analog.com/adi-sales
- Send questions by mail to:
  Processors and DSP Technical Support
  Analog Devices, Inc.
  Three Technology Way
  P.O. Box 9106
  Norwood, MA 02062-9106
  USA

Supported Products

The Blackfin Landscape LCD EZ-Extender is a daughter board for the ADSP-BF526, ADSP-BF537, ADSP-BF538, and ADSP-BF548 processor evaluation systems.

Product Information

Product information can be obtained from the Analog Devices Web site and the online help.

Analog Devices Web Site

The Analog Devices Web site, www.analog.com, provides information about a broad range of products—analog integrated circuits, amplifiers, converters, and digital signal processors.

To access a complete technical library for each processor family, go to http://www.analog.com/processors/technical_library. The manuals

selection opens a list of current manuals related to the product as well as a link to the previous revisions of the manuals. When locating your manual title, note a possible errata check mark next to the title that leads to the current correction report against the manual.

Also note, MyAnalog is a free feature of the Analog Devices Web site that allows customization of a Web page to display only the latest information about products you are interested in. You can choose to receive weekly e-mail notifications containing updates to the Web pages that meet your interests, including documentation errata against all manuals. MyAnalog provides access to books, application notes, data sheets, code examples, and more.

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EngineerZone is a technical support forum from Analog Devices. It allows you direct access to ADI technical support engineers. You can search FAQs and technical information to get quick answers to your embedded processing and DSP design questions.

Use EngineerZone to connect with other DSP developers who face similar design challenges. You can also use this open forum to share knowledge and collaborate with the ADI support team and your peers. Visit http://ez.analog.com to sign up.

Related Documents

For additional information about the product, refer to the following publications.

Table 1. Related Processor Publications

Title	Description
• *ADSP-BF522/ADSP-BF523/ADSP-BF524/ ADSP-BF525/ADSP-BF526/ADSP-BF527 Blackfin Embedded Processor Data Sheet* • *ADSP-BF534/ADSP-BF536/ADSP-BF537 Blackfin Embedded Processor Data Sheet* • *ADSP-BF538/ADSP-BF538F Blackfin Embedded Processor Data Sheet* • *ADSP-BF542/ADSP-BF544/ADSP-BF547/ ADSP-BF548/ADSP-BF549 Blackfin Embedded Processor Data Sheet*	General functional description, pinout, and timing of the processor
• *ADSP-BF52x Blackfin Processor Hardware Reference* • *ADSP-BF537 Blackfin Processor Hardware Reference* • *ADSP-BF538/ADSP-BF538F Blackfin Processor Hardware Reference* • *ADSP-BF54x Blackfin Processor Hardware Reference*	Description of the internal processor architecture and all register functions
Blackfin Processor Programming Reference	Description of all allowed processor assembly instructions

1 LANDSCAPE LCD EZ-EXTENDER INTERFACES

This chapter provides the setup procedure for the Blackfin Landscape LCD EZ-Extender and EZ-KIT Lite/EZ-Board (ADSP-BF526, ADSP-BF537, ADSP-BF538, or ADSP-BF548) and describes all interfaces the extender supports.

The information is presented in the following order.

- "Landscape LCD EZ-Extender Setup" on page 1-2
- "LCD Display" on page 1-3
- "LCD Touch Controller (AD7879)" on page 1-4
- "Capacitive Touch Controller (AD7147)" on page 1-4
- "Serial ROM" on page 1-5
- "Example Programs" on page 1-6

Landscape LCD EZ-Extender Setup

It is very important to set up all components of the system containing the Blackfin Landscape LCD EZ-Extender, then apply power to the system. The following procedure is recommended for the correct setup.

1. Read the applicable design interface section in this chapter—the text provides an overview of the interface capabilities.
2. Read "System Architecture" on page 2-2 to understand the physical connections of the extender board. For detailed information, refer to "Landscape LCD EZ-Extender Schematic" on page B-1.
3. Set the jumpers on the extender board. Use the block diagram in Figure 2-1 on page 2-2 in conjunction with "Jumper Settings" on page 2-3.
4. Set the switches and jumpers on the EZ-KIT Lite/EZ-Board. If not already, familiarize yourself with the board documentation and schematic drawings (see "Product Information").

   Compare the parallel peripheral interface (PPI) or expansion interface II connector signals of the extender board with the EZ-KIT Lite/EZ-Board signals to ensure there is no contention. For example, it may be necessary to disable other devices connected to the PPI or expansion II connector of the processor or disable the push buttons on the EZ-KIT Lite/EZ-Board.
5. Install the extender on the EZ-KIT Lite/EZ-Board via the PPI or expansion II connector.
6. Configure any other interfacing boards; for example, another EZ-Extender board.
7. Power your system.

LCD Display

The Blackfin Landscape LCD EZ-Extender is shipped with a 3.5 in. landscape, QVGA (320 x RGB x 240) display with an LCD backlight. All LCD data, touchscreen pins, and power pins connect to the display via a single connector (`P1`). The 18-bit display operates in 16-bit mode (RGB 5-6-5) and connects to the PPI [15–0] data pins of the processor. The display also uses the serial peripheral interconnect (SPI) port of the processor for control register setup. The LCD display can operate at a VDDIO of 1.6V to 3.6V. This allows you to connect the LCD display to the PPI/SPI interface of the processor gluelessly, without the need for voltage translation circuitry— a great benefit for power-sensitive applications.

The PPI clock of a Blackfin processor and the clock required by the LCD display are driven by the on-board 5 MHz oscillator. By default, the oscillator is enabled and drives the PPI interface. You can use the clock generated by the processor or can disable the 5 MHz oscillator by setting the appropriate jumpers on the extender. See "Jumper Settings" on page 2-3 for more information.

At power-up, the LCD backlight circuit is disabled. By default, the shut pin of the LCD display turns the display `OFF`. Write to the respective control registers to enable the backlight and take the display out of the shut mode. These settings provide significant power savings and are suited for power-sensitive applications.

For more information about the LCD display, go to the Sharp Web site.

An example program demonstrating capabilities of the LCD display is available in the `Examples` folder of the installation directory.

LCD Touch Controller (AD7879)

The Blackfin Landscape LCD EZ-Extender is shipped with a low-cost resistive touch controller (Analog Devices AD7879). The four pins generated by activating the LCD display (X+, X-, Y+, Y-) connect to a single connector (`P1`), controlled via the LCD display. You can access the controller via the SPI interface of the Blackfin processor. The controller generates an interrupt request for the processor whenever any new data is available or when a user touches the LCD Display. The processor uses the SPI interface to read the appropriate registers of the AD7879 controller. The IRQ line connects the AD7879 controller to the processor via the processor's general-purpose I/O (GPIO) pin. By default, the AD7879 controller uses the SPI select 1 and `GPIO1` pins. "Jumper Settings" on page 2-3 describe how the GPIO and SPI selects can be varied for different EZ-KIT Lites and EZ-Boards.

For more information about the AD7879 touch controller, go to `www.analog.com` and search for `AD7879`.

An example program demonstrating capabilities of the touch controller is available in the `Examples` folder of the installation directory.

Capacitive Touch Controller (AD7147)

The Landscape LCD EZ-Extender is equipped with a CapTouch™ programmable controller (Analog Devices AD7147) for applications implementing push buttons and scroll wheels. The four push button sensors and one scroll wheel are located on the top side of the extender's printed circuit board (PCB).

When the respective sensor is activated, the captouch controller recognizes and communicates the change to the Blackfin processor via the processor's 2-wire interface (TWI). The AD7147 controller generates an interrupt request for the Blackfin processor whenever any new data is available or

when a user touches the push buttons (PB1–4) or scroll wheel. The push buttons and scroll wheel are copper pads created inside the PCB. Touch the respective push button or traverse around the scroll wheel with a finger to enable the sensor pads and to generate the interrupt request. The IRQ line connects the AD7147 controller to the processor via its GPIO pin. By default, the AD7147 controller uses the SPI select 2 and GPIO2 pins. "Jumper Settings" on page 2-3 describe how the GPIO and SPI selects can be varied for different EZ-KIT Lites and EZ-Boards.

For more information about the AD7147 touch controller, go to www.analog.com and search for AD7147.

An example program demonstrating capabilities of the touch controller is available in the Examples folder of the installation directory.

Serial ROM

The Blackfin Landscape LCD EZ-Extender is equipped with a 2 KB serial ROM device (M24C02) for revision and configuration control: bill of materials and PCB revision information is available by reading the ROM. The part connects to the Blackfin processor via the processor's TWI interface. By default, the serial ROM is read-only to protect the internally stored contents. On the extender, the last three significant TWI address bits are strapped to logic '0' (default). To modify the last three significant TWI address bits, use the provided jumpers; see "Jumper Settings" on page 2-3 for more information.

For more information on the M24C02 device, go to the STMicroelectronics Web site.

More information on the revision and configuration control is available in the Examples folder of the installation directory.

Example Programs

Example programs are provided with the Landscape LCD EZ-Extender EZ-KIT Lite to demonstrate various capabilities of the product. The programs are included in the product installation kit and can be found in the `Examples` folder of the installation. Refer to a readme file provided with each example for more information.

CCES users are encouraged to use the example browser to find examples included with the EZ-KIT Lite Board Support Package.

2 LANDSCAPE LCD EZ-EXTENDER HARDWARE REFERENCE

This chapter describes the hardware design of the Blackfin Landscape LCD EZ-Extender.

The following topics are covered.

- "System Architecture" on page 2-2
  Describes the board configuration and explains how the board components interface with the processor and EZ-KIT Lite/EZ-Board.
- "Jumper Settings" on page 2-3
  Describes the on-board configuration jumpers.
- "Connectors" on page 2-12
  Describes the connectors on the EZ-Extender.

System Architecture

A block diagram of the Blackfin Landscape LCD EZ-Extender is shown in Figure 2-1.

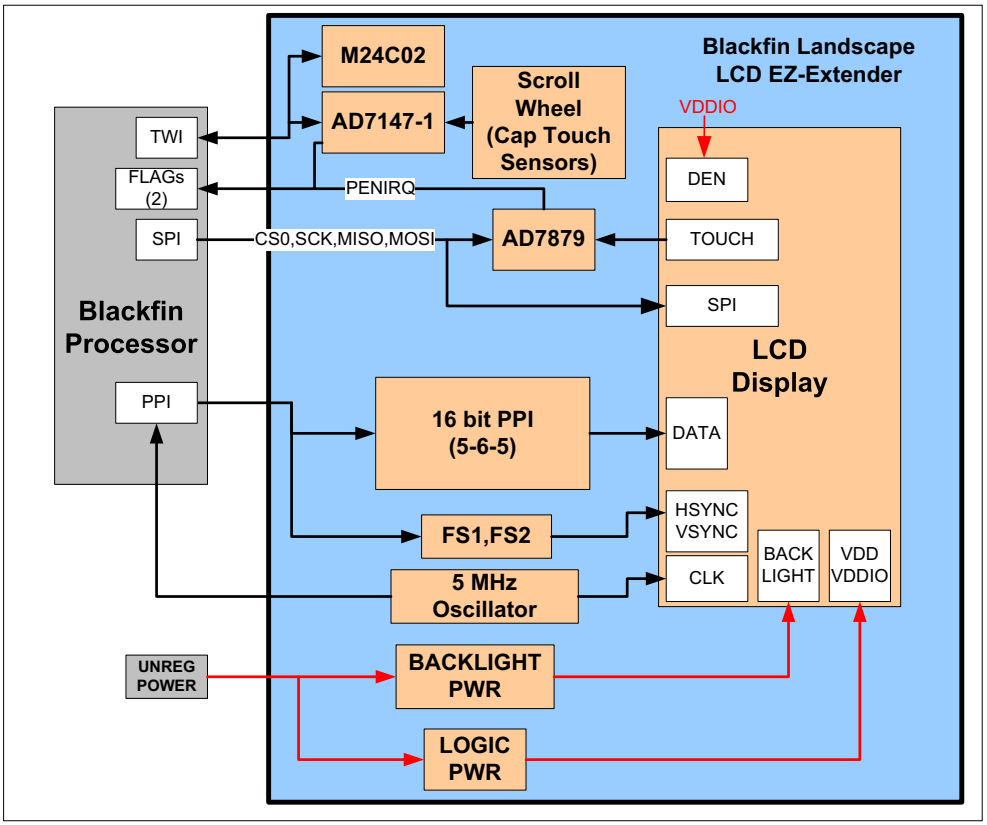

Figure 2-1. Block Diagram

Jumper Settings

Before using the Blackfin Landscape LCD EZ-Extender, follow the setup procedure in "Landscape LCD EZ-Extender Setup" on page 1-2.

Figure 2-2 shows the locations of all jumper headers. A two-pin jumper can be placed on the respective jumper header for different functionality. The following sections describe all possible jumper settings and associated functionality.

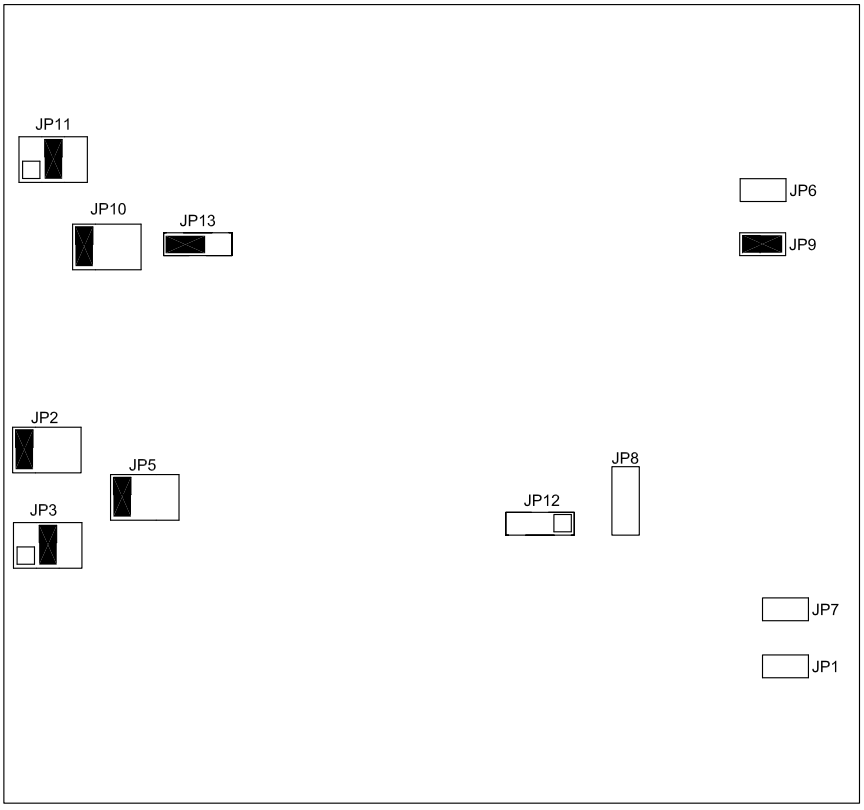

Figure 2-2. Jumper Locations

AD7147 ADDR0 Jumper (JP1)

The AD7147 ADDR0 jumper (JP1) changes the least significant address bit used to communicate to the AD7147 touch controller via the TWI interface of the processor. By default, JP1 requires no jumpers. When no jumper is installed, the ADDR0 bit is pulled low and is a logic '0' (see Table 2-1).

Table 2-1. JP1 Settings

AD7147 ADDR0	JP1 Setting
ADDR0 = logic '0'	**No jumper installed (default)**
ADDR0 = logic '1'	Jumper installed

LCD SPI Chip Select Jumper (JP2)

The LCD SPICS jumper (JP2) connects the chip select pin of the serial peripheral interconnect (SPI) interface of the LCD display to one of three SPI select pins of the Blackfin processor. JP2 allows you to choose any one of the available SPI select pins (SPISEL1–3) of the processor (see Table 2-2).

By default, JP2 is populated, so that the SPISEL1 pin of the expansion interface II or the parallel peripheral interface (PPI) stamp connector can be used. When the PPI stamp connector is used to attach the extender, SPISEL3 is unavailable and only SPISEL1 and SPISEL2 are available for JP2.

Table 2-2. JP2 Settings

Functionality	JP2 Setting
LCD SPICS connected to SPISEL1	**JP2.1 and JP2.2 (default)**
LCD SPICS connected to SPISEL2	JP2.3 and JP2.4
LCD SPICS connected to SPISEL3	JP2.5 and JP2.6

LCD Touch SPI Chip Select Jumper (JP3)

The LCD touch SPICS jumper (JP3) connects the chip select pin of the AD7879 SPI interface (U1) to one of three SPI select pins of the Blackfin processor. JP3 adds flexibility to the extender: you can choose any one of the available SPI select pins (SPISEL1–3) of the processor (see Table 2-3).

By default, JP3 is populated, so that SPISEL2 of the expansion interface II or the PPI stamp connector can be used. When the PPI stamp connector is used to attach the extender, SPISEL3 is unavailable and only SPISEL1 and SPISEL2 are available for JP3.

Table 2-3. JP3 Settings

Functionality	JP3 Setting
LCD touch SPICS connected to SPISEL1	JP3.1 and JP3.2
LCD touch SPICS connected to SPISEL2	**JP3.3 and JP3.4 (default)**
LCD touch SPICS connected to SPISEL3	JP3.5 and JP3.6

LCD Reset Jumper (JP5)

The LCD reset jumper (JP5) connects the reset pin of the LCD display to one of the following.

- The reset pin of the EZ-KIT Lite/EZ-Board
- A general-purpose I/O (GPIO) pin of the AD7147 capacitive touch controller (U3)
- A GPIO pin connected directly to the Blackfin processor

JP5 adds flexibility to the extender: you can control the LCD display reset by one of three available methods. By default, JP5 is populated so that the EZ-KIT Lite/EZ-Board reset pin connects to the reset pin of the LCD display (P1.28). Consequently, a reset supervisory circuit located on the EZ-KIT Lite/EZ-Board controls the reset pin going to the LCD display (see Table 2-4).

To control the LCD display reset via software, write to the respective AD7147 (U3) control registers using the 2-wire interface (TWI) of the processor and control the AD7147 GPIO pin.

When using the expansion interface II (EZ-Boards), you can also control the LCD display reset via the GPIO4 flag pin. GPIO4 connects directly to the processor and LCD display, and can be controlled without the need to communicate to the AD7147 controller. The GPIO4 pin is unavailable on the PPI stamp connector; as a result, when using a PPI connector, you can not use GPIO4 to control the LCD display reset.

Table 2-4. JP5 Settings

Functionality	JP5 Setting
EZ-KIT Lite/EZ-Extender reset connected to LCD reset	**JP5.1 and JP5.2 (default)**
AD7147 GPIO pin connected to LCD reset	JP5.3 and JP5.4
GPIO4 pin connected to LCD reset	JP5.5 and JP5.6

PPICLK Disable Jumper (JP6)

The PPICLK disable jumper (JP6) disables and tri-states the buffer (U4) that drives the 5 MHz clock coming from the on-board oscillator (U2). The buffer is powered via the V_Select pin and used for level translation of the 3.3V oscillator to the VDDIO coming from the EZ-KIT Lite/EZ-Board. Use JP6 to disable the buffer if the PPI clock is generated via the Blackfin processor. This tri-states the 5 MHz clock driven by the buffer and prevents any signal contention issues. By default, JP6 is not populated, and the 5 MHz clock is driven to the PPI clock line (see Table 2-5).

Table 2-5. JP6 Settings

Functionality	JP6 Setting
Buffer (U4) drives 5 MHz on the PPI0CLK net	**No jumper installed (default)**
Buffer (U4) is tri-stated	Jumper installed

AD7147 ADDR1 Jumper (JP7)

The AD7147 ADDR1 jumper (JP7) changes the second least significant address bit used to interface to the AD7147 capacitive touch controller via the TWI interface of the Blackfin processor. By default, JP7 requires no jumpers. When no jumper is installed, the ADDR1 bit is pulled low and is a logic '0' (see Table 2-6).

Table 2-6. JP7 Settings

AD7147 ADDR1	JP7 Setting
ADDR1 = logic '0'	**No jumper installed (default)**
ADDR1 = logic '1'	Jumper installed

Serial ROM Addr Jumper (JP8)

The serial ROM address jumper (JP8) can change the three least significant address bits (ADDR0–3) used to interface to the serial ROM device via the TWI interface of the Blackfin processor. By default, JP8 requires no jumpers. When no jumpers are installed, all three address bits are pulled low and are logic '0'. This causes the serial ROM device select (address) to default to a binary 1010 000. To change any one of the three least significant address bits to a logic '1', install the respective jumper (Table 2-7).

Table 2-7. JP8 Settings

Serial ROM TWI Address	JP8.5 and JP8.6 (ADDR2) Settings	JP8.3 and JP8.4 (ADDR1) Settings	JP8.1 and JP8.2 (ADDR0) Settings
1010 000	**No jumper (default)**	**No jumper (default)**	**No jumper (default)**
1010 001	No jumper	No jumper	Jumper installed
1010 010	No jumper	Jumper installed	No jumper
1010 011	No jumper	Jumper installed	Jumper installed
1010 100	Jumper installed	No jumper	No jumper
1010 101	Jumper installed	No jumper	Jumper installed
1010 110	Jumper installed	Jumper installed	No jumper
1010 111	Jumper installed	Jumper installed	Jumper installed

Serial ROM Write Protect Jumper (JP9)

The serial ROM write protect jumper (JP9) protects the entire contents of the memory device (M24C02) from inadvertent write operations. By default, JP9 has a jumper installed, making the memory a read-only device. The default setting ensures that any hardware or software revision information stored in the ROM is preserved. Remove JP9 when you need to write to serial ROM (see Table 2-8).

Table 2-8. JP9 Settings

Serial ROM Write Protect	JP9 Setting
Read operations only	**Jumper installed (default)**
Read and write operations	No jumper installed

AD7879 PENIRQ Jumper (JP10)

The AD7879 PENIRQ jumper (JP10) connects the interrupt pin of the Analog Devices AD7879 LCD touch controller (U1) to one of three GPIO pins of the Blackfin processor. JP10 adds flexibility to the extender: you can choose any one of the available GPIO pins (GPIO1–3). By default, JP10 is populated so that the GPIO1 pin of the expansion interface II or the PPI stamp connector can be used to connect to the AD7879 Penirq pin (see Table 2-9).

Table 2-9. JP10 Settings

Functionality	JP10 Setting
AD7879 PENIRQ connects to GPIO1	**JP10.1 and JP10.2 (default)**
AD7879 PENIRQ connects to GPIO2	JP10.3 and JP10.4
AD7879 PENIRQ connects to GPIO3	JP10.5 and JP10.6

AD7147 INT Jumper (JP11)

The AD7147 INT jumper (JP11) connects the interrupt pin of the Analog Devices AD7147 capacitive touch controller (U3) to one of three GPIO pins of the Blackfin processor. JP11 adds flexibility to the extender: you can choose any one of the available GPIO pins (GPIO1–3). By default, JP11 is populated so that the GPIO2 pin of the expansion interface II or the PPI stamp connector can be used to connect to the AD7147 interrupt pin (see Table 2-10).

Table 2-10. JP11 Settings

Functionality	JP11 Setting
AD7147 INT connected to GPIO1	JP11.1 and JP11.2
AD7147 INT connected to GPIO2	**JP11.3 and JP11.4 (default)**
AD7147 INT connected to GPIO3	JP11.5 and JP11.6

Oscillator Disable Jumper (JP12)

The oscillator disable jumper (JP12) disables the 5 MHz oscillator driving the PPIOCLK net and LCD display. The disabled oscillator mode is particularly suited for low-power applications.

By default, JP12 requires no jumpers. As a result, the oscillator is driving the 5 MHz clock. You can permanently disable the oscillator by populating a jumper between JP12.2 and JP12.3. The oscillator also can be enabled or disabled via the GPIO pin of the AD7147 capacitive touch controller. To enable or disable the oscillator, write to the respective control registers of the AD7147 controller (U3) and place a jumper between JP12.1 and JP12.2 (see Table 2-11).

Table 2-11. JP12 Settings

Oscillator	JP12 Setting
Enabled	**No jumper installed (default)**
Controlled via AD7147 GPIO	JP12.1 and JP12.2
Disabled	JP12.2 and JP12.3

LCD Backlight Enable Jumper (JP13)

The LCD backlight enable jumper controls the power circuitry for the LCD backlight. The disabled LCD backlight option is particularly suited for low-power applications.

By default, JP13 requires a jumper between JP13.1 and JP13.2. When the EZ-Extender is powered up, the backlight power circuit (VR1) is OFF.

To enable the LCD backlight, use the GPIO (Aux) pin of the AD7879 touch controller (U1). Write to the appropriate control registers of the controller using the SPI interface of the Blackfin processor. You also can control the LCD backlight via the GPIO3 flag pin, which is linked to the Blackfin processor directly. In the latter case, you do not need to

communicate to the controller in order to control the LCD backlight. The benefit of using the AD7879 device over the GPIO3 flag pin for LCD control is that the flag pin remains free and can be used for other applications (see Table 2-12).

Table 2-12. JP13 Settings

LCD Backlight	JP13 Setting
Controlled via AD7879 GPIO	**JP13.1 and JP13.2 (default)**
Controlled via GPIO3	JP13.2 and JP13.3

Connectors

Figure 2-3 shows the locations of all connectors on the Blackfin Landscape EZ-Extender. The following sections describe the connectors and associated functionality.

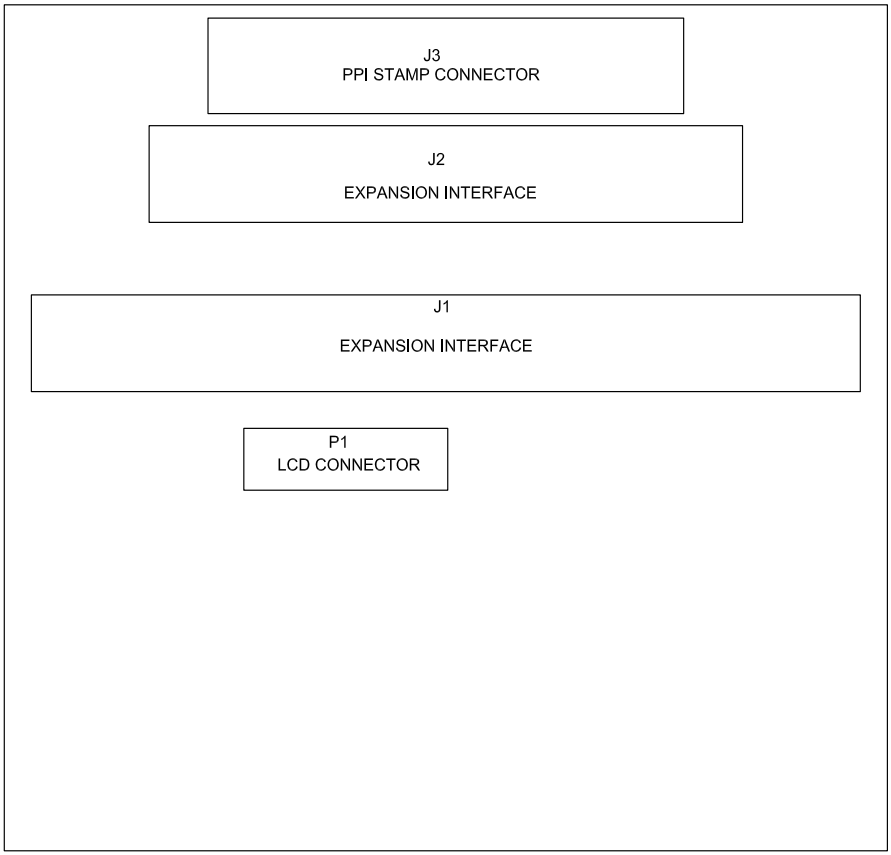

Figure 2-3. Connector Locations

Expansion II PPI Connector (J1)

The expansion II PPI connector (J1) connects the Landscape LCD EZ-Extender to the PPI interface of the Blackfin processor. Use J1 to connect the extender to the ADSP-BF526 EZ-Board/ EZ-KIT Lite. The reset, power, and ground lines from the ADSP-BF526 EZ-Board/ EZ-KIT Lite also are brought up from J1 to the extender.

Use the expansion II PPI connector and low speed I/O (LSIO) connector (J2, described in "Expansion II LSIO Connector (J2)") on the ADSP-BF526 EZ-Board/ EZ-KIT Lite for the extender to function properly.

Expansion II LSIO Connector (J2)

The expansion II LSIO connector (J2) connects the Landscape LCD EZ-Extender to the SPI, TWI, and GPIO pins of the Blackfin processor. Use J2 to connect the extender to the ADSP-BF526 EZ-Board/ EZ-KIT Lite. The power and ground lines from the ADSP-BF526 EZ-Board/ EZ-KIT Lite also are brought up from J2 to the extender.

Use the expansion II PPI connector and LSIO connector on the ADSP-BF526 EZ-Board/ EZ-KIT Lite for the extender to function properly.

PPI Stamp Connector (J3)

The PPI stamp connector (J3) connects the Landscape LCD EZ-Extender to the PPI, SPI, TWI, and GPIO pins of the Blackfin processor. J3 also connects the extender with the reset, power, and ground lines of the ADSP-BF537, ADSP-BF538, and ADSP-BF548 processors. Use J3 to connect the extender to the ADSP-BF537, ADSP-BF538, and ADSP-BF548 EZ-KIT Lites. When using J3, do not use J1 and J2.

LCD Connector (P1)

The LCD connector (P1) is used to attach the LCD display to the Landscape LCD EZ-Extender. The two backlight power pins, four resistive touch pins, LCD SPI interface, and well as the data, sync, and clock pins of the LCD display are extracted from the cable and connected to the extender.

A LANDSCAPE LCD EZ-EXTENDER BILL OF MATERIALS

The bill of materials corresponds to "Landscape LCD EZ-Extender Schematic" on page B-1.

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
1	1	SN74LVC1G125 SOT23-5	U4	TI	74LVC1G125DBVRE4
2	1	5MHZ OSC003	U2	EPSON	SG-8002CA-MP
3	1	MIC94040 MLF4	U6	MICREL	MIC94040YFL
4	1	M24C02 TSSOP8DW	U5	ST MICRO	M24C02-RDW6TP
5	1	ADP1611 MSOP8	VR1	ANALOG DEVICES	ADP1611ARMZ-R7
6	1	AD7879 LFCSP_VQ16	U1	ANALOG DEVICES	AD7879ACPZ-500R7
7	1	AD7147-1 LFCSP_VQ24	U3	ANALOG DEVICES	AD7147ACPZ-1500RL7
8	6	IDC 3X2 IDC3X2_SMT	JP2-3,JP5,JP8, JP10-11	SAMTEC	TSM-103-01-T-DV
9	1	FPC 67PIN CON063	P1	KYOCERA ELCO	046281267212846+
10	1	IDC 35X2 IDC35x2_SMT_F	J1	SAMTEC	SSW-135-22-F-D-VS
11	1	IDC 25X2 IDC25x2_SMT_F	J2	SAMTEC	SSW-125-22-F-D-VS

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
12	1	IDC 20X2 IDC20x2_SMT_F	J3	SAMTEC	SSW-120-22-F-D-VS
13	4	IDC 2X1 IDC2X1_SMT	JP1,JP6-7,JP9	SAMTEC	TSM-102-01-T-SV
14	2	IDC 3X1 IDC3X1_SMT	JP12-13	SAMTEC	TSM-103-01-T-SV
15	5	0.22UF 25V 10% 0805	C1,C14-17	AVX	08053C224KAT2A
16	1	0.1UF 50V 10% 0805	C27	AVX	08055C104KAT
17	1	600 100MHZ 200MA 0603	FER1	DIGI-KEY	490-1014-2-ND
18	4	0.1UF 10V 10% 0402	C31-32,C34-35	AVX	0402ZD104KAT2A
19	2	0.01UF 16V 10% 0402	C18-19	AVX	0402YC103KAT2A
20	15	10K 1/16W 5% 0402	R1-4,R7-8, R17-19,R21-24, R26-27	VISHAY	CRCW040210K0FKED
21	10	2.2UF 10V 10% 0805	C2-3,C6-13	AVX	0805ZD225KAT2A
22	2	0.1UF 16V 10%0603	C23-24	AVX	0603YC104KAT2A
23	2	10K 1/10W 5% 0603	R10-11	VISHAY	CRCW060310K0JNEA
24	1	100K 1/10W 5% 0603	R9	VISHAY	CRCW0603100KJNEA
25	1	2.21K 1/10W 1% 0603	R14	DIGI-KEY	311-2.21KHRTR-ND
26	1	390PF 25V 5% 0603	C20	AVX	06033A391FAT2A

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
27	2	10UF 10V 10% 0805	C30,C33	PANASONIC	ECJ-2FB1A106K
28	1	1UF 50V 10% 0603	C22	DIGI-KEY	587-1257-1-ND
29	1	15uH 20% IND015	L1	COILCRAFT	MSS4020-153ML
30	3	.5A B0540W SOD-123	D1-3	DIODES INC	B0540W-7-F
31	1	.5A BZT52C33S SOD-323	D4	DIODES INC	BZT52C33S-7-F
32	5	2.2UF 25V 10% 0805	C4-5,C25-26, C28	DIGI-KEY	490-3331-1-ND
33	1	51.1 1/16W 1% 0402	R12	DIGI-KEY	541-51.1LCT-ND
34	1	10000PF 25V10% 0402	C29	DIGI-KEY	399-1278-1-ND

BLACKFIN LANDSCAPE LCD EZ-EXTENDER SCHEMATIC

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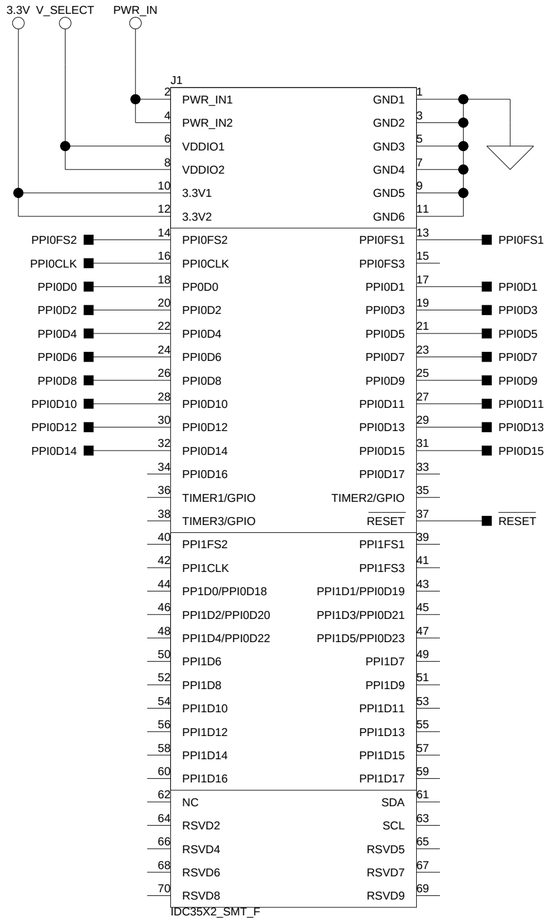
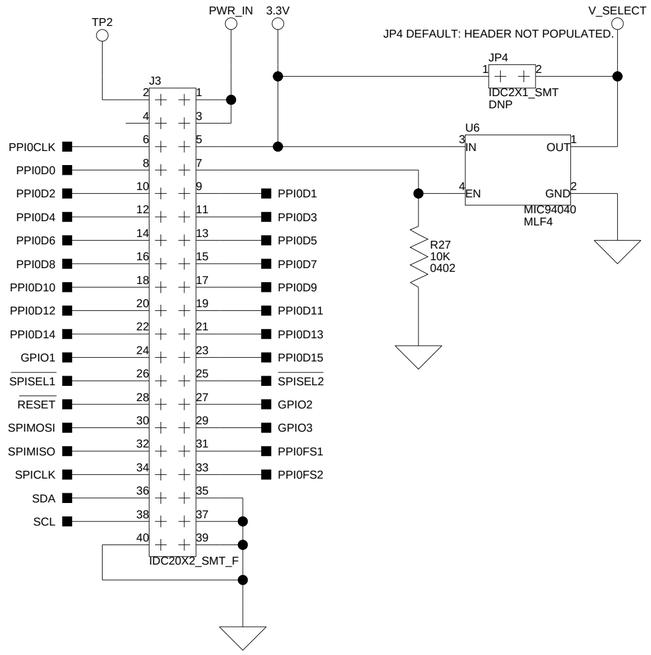
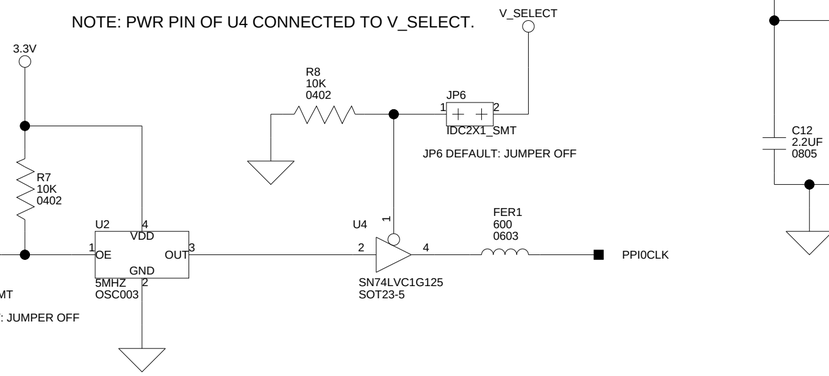
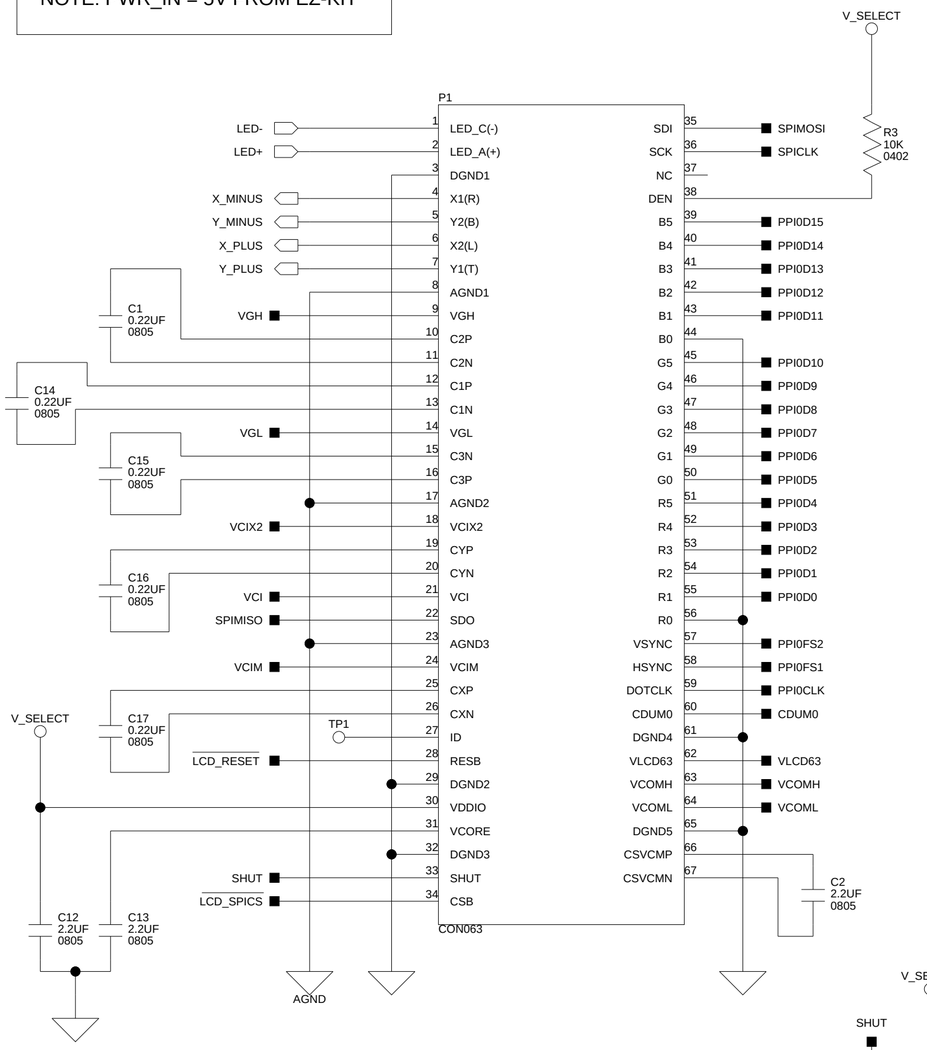
Title	BLACKFIN LANDSCAPE LCD EZ-EXTENDER TITLE		
Size: C	Board No.: A0216-2008		Rev: 1.1
Date: 7-18-2008_14:58		Sheet: 1 of 3	

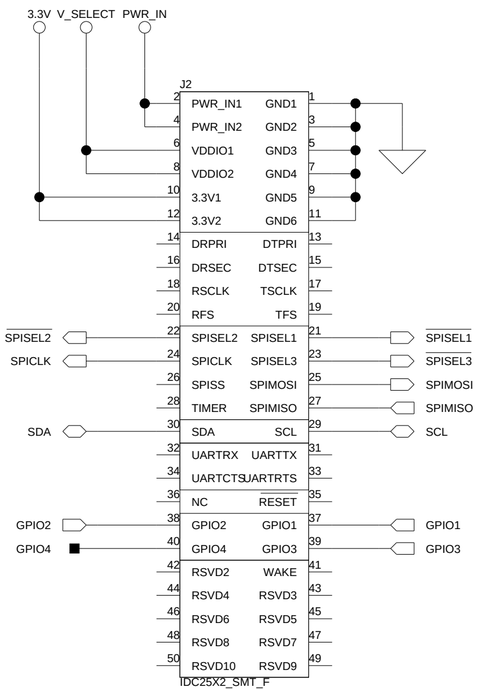


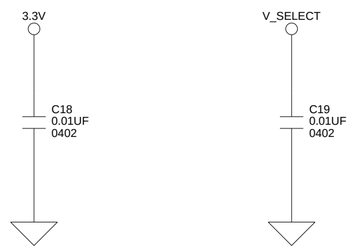


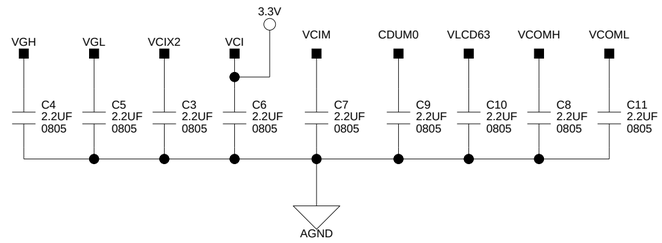
NOTE: PWR PIN OF U4 CONNECTED TO V_SELECT.

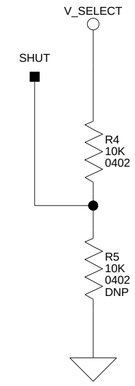


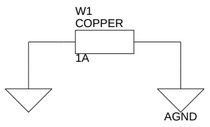


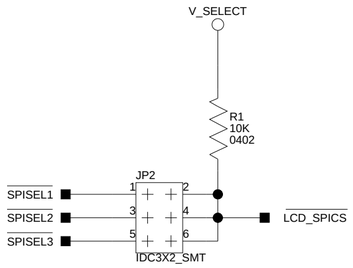




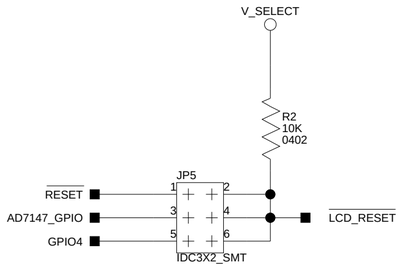








JP2 DEFAULT: JUMPER ON JP2.1 & JP2.2



JP5 DEFAULT: JUMPER ON JP5.1 & JP5.2

NOTE: PWR_IN = 5V FROM EZ-KIT

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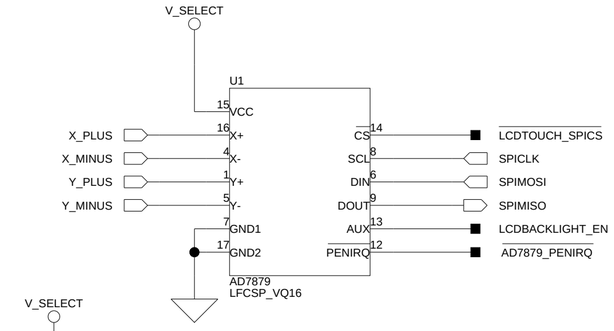
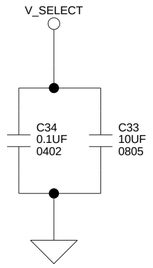
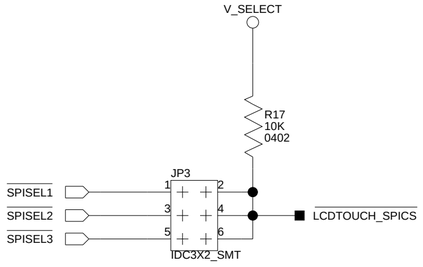
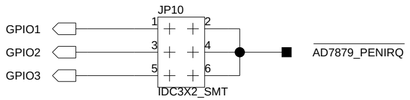


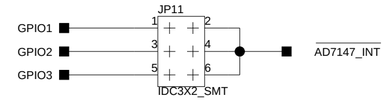




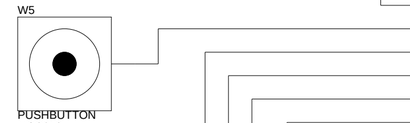
JP3 DEFAULT: JUMPER ON JP3.3 & JP3.4

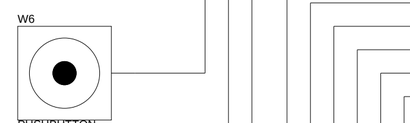


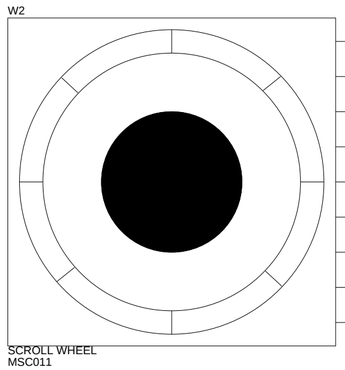
JP10 DEFAULT: JUMPER ON JP10.1 & JP10.2

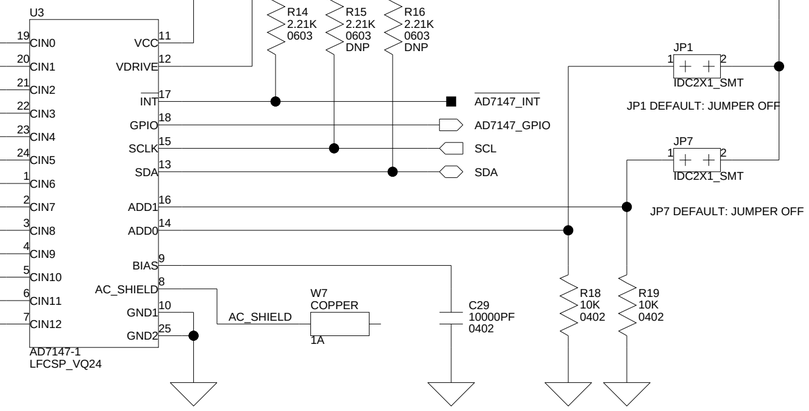


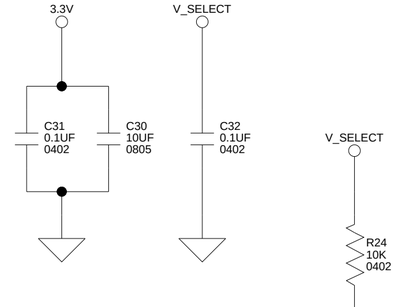
JP11 DEFAULT: JUMPER ON JP11.3 & JP11.4

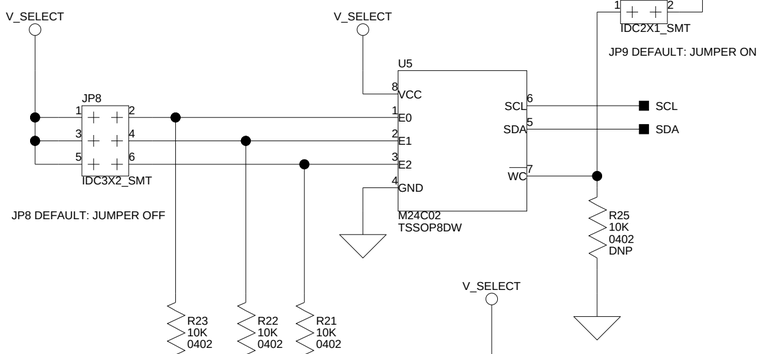


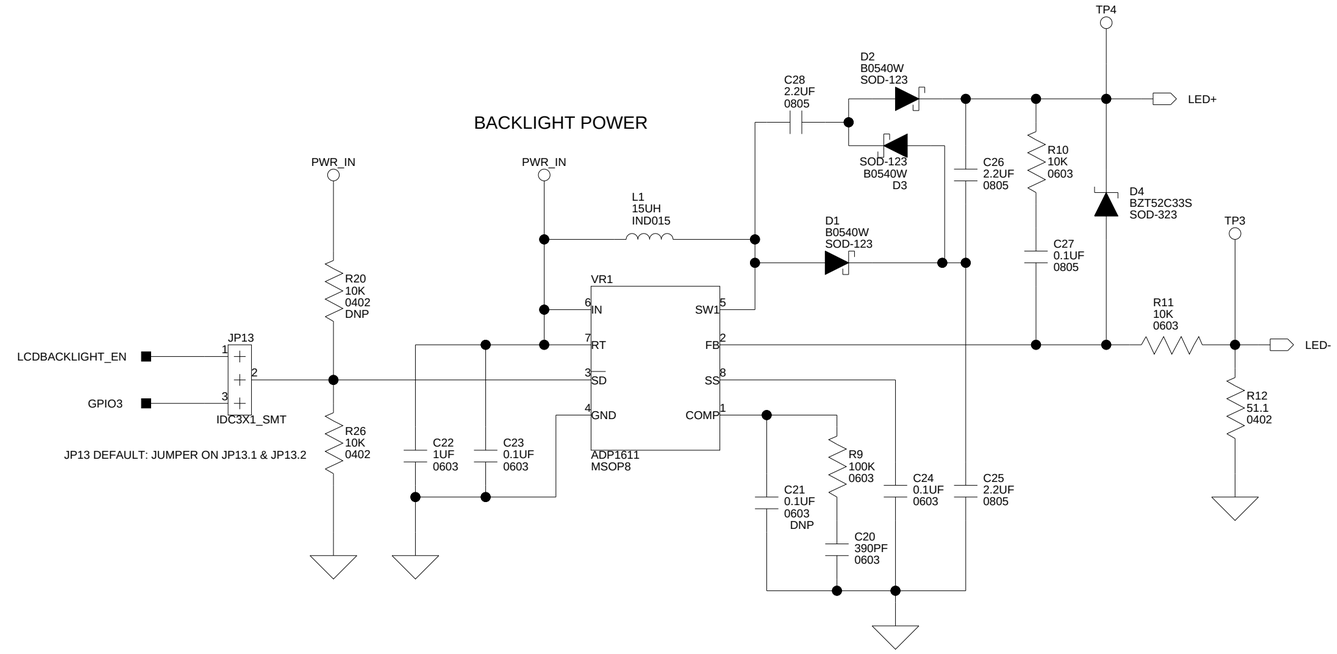












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Поставка электронных компонентов

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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