Regulatory Compliance

The Video Encoder EI3 Extender Board 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 Video Encoder EI3 Extender Board has been certified to comply with the essential requirements of the European EMC directive 2004/108/EC and therefore carries the “CE” mark.

The Video Encoder EI3 Extender Board has been appended to Analog Devices, Inc. EMC Technical File (EMC TF) referenced DSPTOOLS1, issue 2 dated June 4, 2008 and was declared CE compliant by an appointed Notified Body (No.0673) as listed below.


Issued by: Technology International (Europe) Limited
56 Shrivenham Hundred Business Park
Shrivenham, Swindon, SN6 8TY, UK

The extender board 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 Video Encoder EI3 Extender Board, an EZ-Extender® product for EZ-KIT Lite®/EZ-Board® evaluation systems with the expansion interface 3 (EI3).

The EZ-KIT Lite/EZ-Board and Video Encoder EI3 Extender Board are designed to be used in conjunction with the CrossCore® Embedded Studio (CCES) development environment.

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

Product Overview

The Video Encoder EI3 Extender Board is a separately sold daughter board that plugs onto the expansion interface 3 (EI3) of an EZ-KIT Lite/EZ-Board evaluation system. The extender board aids the design and prototyping phases of embedded processor-targeted applications.

The board extends the capabilities of the evaluation system by providing a connection between the parallel peripheral interface (PPI) of the processor and the ADV7511 and ADV7341 video encoders. The SPORT is used for transmitting audio data. The two-wire interface (TWI) port of the processor is used to communicate to the video encoders and SoftConfig on the extender.
The following is a list of the Video Encoder EI3 Extender Board interfaces.

- Video interface
  - ADV7511 — 225 MHz, high performance HDMI transmitter with ARC
  - ADV7341 — multi-format video encoder, six 12-bit noise-shaped video DACs

- Video connectors
  - One HDMI
  - One SVIDEO
  - One component
  - One composite

- No power supply required: derives power from the EZ-KIT Lite/EZ-Board

- CE certified

- Traditional mechanical switches and jumpers for changing the board’s factory setup have been removed in favor of I\(^2\)C-controlled software switches.

Purpose of This Manual

The Video Encoder EI3 Extender Board Manual provides instructions for installing the product hardware (board). The text describes operation and configuration of the board components and provides guidelines for running your own code on the Video Encoder EI3 Extender Board. Finally, a schematic and a bill of materials are provided for reference.
Intended Audience

The primary audience for this manual is a programmer who is familiar with Analog Devices processors. This manual assumes that the audience has a working knowledge of the appropriate processor architecture, instruction set, and C/C++ programming languages.

Programmers who are unfamiliar with Analog Devices processors can use this manual, but should supplement it with other texts that describe your target architecture and hardware development tools.

Programmers who are unfamiliar with the CrossCore Embedded Studio programming environment or the mating evaluation board, should refer to the CCES online help.

Manual Contents

The manual consists of:

- Chapter 1, “Using Video Encoder EI3 Extender Board” on page 1-1
  Provides basic board information.

- Chapter 2, “Video Encoder EI3 Extender Board Hardware Reference” on page 2-1
  Provides information about the product’s hardware components.

  Provides a list of hardware components used to manufacture the extender board.

- Appendix B, “Video Encoder EI3 Extender Board Schematic” on page B-1
  Provides all circuits on the extender board.
What's New in This Manual

This is the second revision of the Video Encoder EI3 Extender Board Manual. It includes the updated regulatory compliance section and minor modifications based on the errata report against the first revision.

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](http://ez.analog.com/community/dsp)

- Submit your questions to technical support directly at:
  [http://www.analog.com/support](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

This extender board supports EZ-KIT Lite/EZ-Board evaluation systems with the expansion interface 3.

Product Information

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

Analog Devices Web Site


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.com 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.com provides access to books, application notes, data sheets, code examples, and more.

Visit myAnalog.com (found on the Analog Devices home page) to sign up. If you are a registered user, just log on. Your user name is your e-mail address.

EngineerZone

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

<table>
<thead>
<tr>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor Data Sheet</td>
<td>General functional description, pinout, and timing of the processor</td>
</tr>
<tr>
<td>Processor Hardware Reference</td>
<td>Description of the internal processor architecture and all register functions</td>
</tr>
<tr>
<td>Blackfin® Processor Programming Reference</td>
<td>Description of all allowed processor assembly instructions</td>
</tr>
</tbody>
</table>

Notation Conventions

Text conventions used in this manual are identified and described as follows. Additional conventions, which apply only to specific chapters, may appear throughout this document.

<table>
<thead>
<tr>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Close command (File menu)</td>
<td>Titles in reference sections indicate the location of an item within the CCES environment’s menu system (for example, the Close command appears on the File menu).</td>
</tr>
<tr>
<td>{this</td>
<td>that}</td>
</tr>
<tr>
<td>[this</td>
<td>that]</td>
</tr>
<tr>
<td>[this,...]</td>
<td>Optional item lists in syntax descriptions appear within brackets delimited by commas and terminated with an ellipse; read the example as an optional comma-separated list of this.</td>
</tr>
</tbody>
</table>
## Notation Conventions

<table>
<thead>
<tr>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>.SECTION</code></td>
<td>Commands, directives, keywords, and feature names are in text with <em>letter gothic font</em>.</td>
</tr>
<tr>
<td><code>filename</code></td>
<td>Non-keyword placeholders appear in text with <em>italic</em> style format.</td>
</tr>
<tr>
<td><img src="note.png" alt="Note" /></td>
<td><strong>Note</strong>: For correct operation, ...&lt;br&gt;A Note provides supplementary information on a related topic. In the online version of this book, the word <strong>Note</strong> appears instead of this symbol.</td>
</tr>
<tr>
<td><img src="caution.png" alt="Caution" /></td>
<td><strong>Caution</strong>: Incorrect device operation may result if ...&lt;br&gt;<strong>Caution</strong>: Device damage may result if ...&lt;br&gt;A Caution identifies conditions or inappropriate usage of the product that could lead to undesirable results or product damage. In the online version of this book, the word <strong>Caution</strong> appears instead of this symbol.</td>
</tr>
<tr>
<td><img src="warning.png" alt="Warning" /></td>
<td><strong>Warning</strong>: Injury to device users may result if ...&lt;br&gt;A Warning identifies conditions or inappropriate usage of the product that could lead to conditions that are potentially hazardous for the devices users. In the online version of this book, the word <strong>Warning</strong> appears instead of this symbol.</td>
</tr>
</tbody>
</table>
1 USING VIDEO ENCODER EI3 EXTENDER BOARD

This chapter provides the setup procedure for the Video Encoder EI3 Extender Board and describes the interfaces the extender supports.

The information is presented in the following order.

- “Package Contents” on page 1-2
- “Video Encoder EI3 Extender Board Installation” on page 1-2
- “High Performance HDMI Transmitter (ADV7511)” on page 1-3
- “Multi-Format Video Encoder (ADV7431)” on page 1-4
- “Expansion Interface III” on page 1-5
- “Example Programs” on page 1-6
- “Board Design Database” on page 1-7
Package Contents

Your Video Encoder EI3 Extender Board package contains the following items.

- Video Encoder EI3 Extender Board
- A bag containing hardware for securing the extender board on the EZ-KIT Lite/EZ-Board
- Video cables – one HDMI and one component
- Release note containing information about the product download

Contact the vendor where you purchased your extender board or contact Analog Devices, Inc. if any item is missing.

Video Encoder EI3 Extender Board Installation

Follow these instructions to ensure correct operation of the product hardware and software.

1. Attach the extender board to the EZ-KIT Lite/EZ-Board.
   
   The J1 connector on the extender board can be connected to the P1A, P2A, or P3A connector on the EZ-KIT Lite/EZ-Board. Refer to the example program for a reference to the proper connector.

2. Use the provided hardware to secure the extender to the EZ-KIT Lite/EZ-Board. See Figure 1-1.
3. Refer to the EZ-KIT Lite/EZ-Board manual for information on connecting to a personal computer (PC) and running CCES.

**High Performance HDMI Transmitter (ADV7511)**

The ADV7511 is a 225 MHz high-definition multimedia interface (HDMI) transmitter, which is ideal for home entertainment products including DVD players/receivers, digital set top boxes, A/V receivers, gaming consoles and PCs.

The digital video interface contains an HDMI v1.4 and a DVI v1.0 compatible transmitter and supports all HDTV formats (including 1080p with 12-bit Deep Color). The ADV7511 supports the HDMI v1.4 spe-
specific features, HEAC (ARC), and 3D video. In addition, the ADV7511 supports x.v.Color, high bit rate audio and programmable AVI Info Frames features. With the inclusion of HDCP, the ADV7511 allows the secure transmission of protected content as specified by the HDCP v1.4 protocol.

The ADV7511 high-performance HDMI transmitter with ARC connects to the PPI, SPORT, TWI and GPIO of the processor. This device supports up to 1080p.

The ADV7511 can be configured to generate an interrupt based on various events. The TWI port is used for communication between the transmitter and processor. The PPI is used for transmitting video data. The SPORT is used for transmitting audio data. An interrupt signal from the transmitter is connected to a GPIO signal on the processor. The GPIO signal is configured via a software switch. Refer to “Software-Controlled Switches (SoftConfig)” on page 2-3 for more information.

For more information about the ADV7511, go to www.analog.com and search for ADV7511.

An example program demonstrating capabilities of the ADV7511 is available by installing the Video Encoder EI3 Extender Board Support Package (BSP).

Multi-Format Video Encoder (ADV7431)

The ADV7341 is a high speed, digital-to-analog video encoder. Six high speed, NSV, 3.3V, 12-bit video DACs provide support for composite (CVBS), S-Video (Y-C), and component (YPrPb/RGB) analog outputs in standard definition (SD), enhanced definition (ED), or high definition (HD) video formats.

The ADV7341 has a 30-bit pixel input port that can be configured in a variety of ways. SD video formats are supported over an SDR interface.
and ED/HD video formats are supported over SDR and DDR interfaces. Pixel data can be supplied in either the YCrCb or RGB color space.

The part also supports embedded EAV/SAV timing codes, external video synchronization signals, and I²C communication protocol.

In addition, simultaneous SD and ED/HD input and output are supported. Full-drive DACs ensure that external output buffering is not required, while 216 MHz (SD and ED) and 297 MHz (HD) oversampling ensures that external output filtering is not required.

The ADV7341 multi-format video encoder connects to the PPI and TWI of the processor. This device supports up to 1080i/720p.

The TWI port is used for communications between the encoder and processor. The PPI is used for transmitting video data. Refer to “Software-Controlled Switches (SoftConfig)” on page 2-3 for more information.

For more information about the ADV7341, go to www.analog.com and search for ADV7341.

An example program demonstrating capabilities of the ADV7341 is available by installing the Video Encoder EI3 Extender Board Support Package (BSP).

### Expansion Interface III

The Expansion Interface III (EI3) allows an extender board to be tested across various hardware platforms that have the same expansion interface connectors.

The EI3 implemented on the Video Encoder EI3 Expander Board contains the PPI, SPORT, TWI and GPIO ports. These signals are used for the peripherals on the extender. For pinout information, go to Appendix B, “Video Encoder EI3 Extender Board Schematic”. The
mechanical dimensions of the expansion connectors can be obtained by contacting “Technical Support”.

The Video Encoder EI3 Extender Board supports interfacing with EZ-Boards which are operating at an IO voltage of 3.3V. Other IO voltages are not supported.

The Video Encoder EI3 Extender Board supports being powered from either the EZ-Board or through the on board 5V power connector (p1).

For more information about other daughter boards, visit the Analog Devices Web site.

Limits to current and interface speed must be taken into consideration when using the EI3. Current for the EI3 can be sourced from the EZ-KIT Lite/EZ-Board; therefore, the current should be limited to 200 mA for 5V and 300 mA for the 3.3V planes. If more current is required, then a separate power connector and a regulator must be designed on the daughter card. Additional circuitry can add extra loading to signals, decreasing their maximum effective speed.

Analog Devices does not support and is not responsible for the effects of additional circuitry.

Example Programs

Example programs are included with the Video Encoder EI3 Extender Board Support Package (BSP). Example programs demonstrate various capabilities of the product. The support package is installed on top of CrossCore Embedded Studio. Once installed, the example programs can be found in the following directory:

<install_path>\Video_Encoder_EI3_Extender_Board-Release\X.X.X\Video_Encoder_EI3, where X.X.X denotes the support package release number.
Board Design Database

A .zip file containing all of the electronic information required for the design, layout, fabrication, and assembly of the product is available for download from the Analog Devices board design database at:

This chapter describes the hardware design of the Video Encoder EI3 Extender Board.

The following topics are covered.

- **“System Architecture” on page 2-2**
  Describes the daughter board configuration and explains how the board components interface with the processor and EZ-KIT Lite.

- **“Software-Controlled Switches (SoftConfig)” on page 2-3**
  Lists and describes the software-controlled switches.

- **“Connectors” on page 2-11**
  Shows the locations and provides part numbers for the on-board connectors. In addition, the manufacturer and part number information is provided for the mating parts.

- **“LEDs” on page 2-15**
  Describes the on-board LEDs.
System Architecture

A block diagram of the Video Encoder EI3 Extender Board is shown in Figure 2-1.

Figure 2-1. Video Encoder EI3 Extender Board Block Diagram
Software-Controlled Switches
(SoftConfig)

On the Video Encoder EI3 Extender Board, all of the traditional mechanical switches/jumpers have been replaced by I²C software-controlled switches. Refer to any SoftConfig*.c file found in the installation directory of CCES for an example of how to set up the SoftConfig feature of the product through software.

The SoftConfig section of this manual serves as a reference to any user that intends to modify an existing software example. If software provided by ADI is used, there should be little need to reference this section.

Care should be taken when changing SoftConfig settings not to create a conflict with interfaces. The same GPIO signal and SPICS should not be configured for more than one interface.

Overview of SoftConfig

In order to further clarify the use of electronic single FET switches and multi-channel bus switches, an example of each is illustrated and compared to a traditional mechanical switching solution. This is a generic example. After this generic discussion there is a detailed explanation of the SoftConfig interface specific to the extender.

Figure 2-2 shows two individual FET switches (Pericom PI3A125CEX) with reference designators UA and UB. Net names ENABLE_A and ENABLE_B control UA and UB. The default FET switch enable settings in this example are controlled by resistors RA and RB which pull the enable pin 1 of UA and UB to ground (low). In a real example, these enable signals are controlled by the Microchip IO expander. The default pull-down resistors connect the signals EXAMPLE_SIGNAL_A and EXAMPLE_SIGNAL_B and also connect signals EXAMPLE_SIGNAL_C and EXAMPLE_SIGNAL_D. To disconnect EXAMPLE_SIGNAL_A from EXAMPLE_SIGNAL_B, the Microchip IO expander is
used to change `ENABLE_A` to a logic 1 through software that interfaces with the Microchip. The same procedure for `ENABLE_B` would disconnect `EXAMPLE_SIGNAL_C` from `EXAMPLE_SIGNAL_D`.

Figure 2-2. Example of Individual FET Switches

Figure 2-3 shows the equivalent circuit to Figure 2-2 but utilizes mechanical switches that are in the same package. The default is shown by black boxes located closer to the `ON` label of the switches. In order to disconnect these switches, physically move the switch to the `OFF` position.

Figure 2-3. Example of Mechanical Switch Equivalent to Figure 2-2
Figure 2-4 shows a bus switch example, reference designator UC (Pericom PI3LVD512ZHE), selecting between lettered functionality and numbered functionality. The signals on the left side are multiplexed signals with naming convention letter_number.

![Bus Switch Diagram]

**Figure 2-4. Example of Bus Switch**

The right side of the circuit shows the signals separated into letter and number, with the number on the lower group (eg. 0B1) and the letter on the upper group (eg. 0B2). The default setting is controlled by the signal CONTROL_LETTER_NUMBER which is pulled low. This selects the number signals on the right to be connected to the multiplexed signals on the left by...
default. In this example, the Microchip IO expander is not shown but controls the signal CONTROL_LETTER_NUMBER and allows the user to change the selection through software.

Figure 2-5 shows the equivalent circuit to Figure 2-4 but utilizes mechanical switches. Notice the default for reference designators SWC and SWD is illustrated by black boxes located closer to the ON label of the switches to enable the number signals by default. Note the default setting for reference designators SWE and SWF is OFF. In order to connect the letters instead of the numbers, the user physically changes all switches on SWC and SWD to the OFF position and all switches on SWE and SWF to the ON position.

Figure 2-5. Example of Mechanical Switch Equivalent to Figure 2-4
Programming SoftConfig

On the Video Encoder EI3 Extender Board, a single Microchip MCP23017 device controls individual and electronic bus switches via TWI. The device has the following programming characteristics:

- There are two programmable GPIO registers.

<table>
<thead>
<tr>
<th>GPIO Register</th>
<th>Register Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPIOA</td>
<td>0x12</td>
</tr>
<tr>
<td>GPIOB</td>
<td>0x13</td>
</tr>
</tbody>
</table>

- Each GPIO register controls eight signals (software switches).

- By default, the GPIO signals function as input signals; therefore, all electronic switches are in the **OFF** state.

The signals must be programmed as output signals to override their default values. The following table shows the Microchip register addresses and values that must be written to them to program the signals as output signals.

<table>
<thead>
<tr>
<th>IODIR Register</th>
<th>IODIR Register Address</th>
<th>Value to be Written to Program Signals as Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>IODIRA</td>
<td>0x00</td>
<td>0</td>
</tr>
<tr>
<td>IODIRB</td>
<td>0x01</td>
<td>0</td>
</tr>
</tbody>
</table>
Each example in Cross Core Embedded Studio includes source files that program the soft switches, even if the default settings are being used. The README for each example identifies only the signals that are being changed from their default values. The code that programs the soft switches is located in two files:

- `SoftConfig_Encoder.c` for configuring the extender board
- `SoftConfig_XXX.c` for configuring the EZ-KIT Lite/EZ-Board; `XXX` identifies the EZ-KIT Lite/EZ-Board file in each example.

Page 2 of Appendix B, “Video Encoder EI3 Extender Board Schematic” shows how the GPIO signals are connected to the board’s ICs.

U13 and U10-U13 are 24-bit bus switches. They are used to select how the transmitter/encoder is connected to the processor. You can select an 8-bit, 16-bit, or 24-bit interface.

U8-U9 are 2-port bus switches. They are used for selecting which GPIO signals to use as the interrupt.

U18 is an 8-port bus switch. It is used to connect/disconnect the SPORT to the ADV7511.

Table 2-1 and Table 2-2 show the output signals of the GPIO expander (U10) with a TWI address of 0100 101X, where X represents the read or write bit. The signals that control an individual FET have an entry under the FET column. The Component Connected column shows the board IC that is connected if the FET is enabled.
Table 2-1. Output Signals of GPIO Expander (U19 Port A)

<table>
<thead>
<tr>
<th>Bit</th>
<th>Signal Name</th>
<th>Description</th>
<th>FET</th>
<th>Component Connected</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>24_BIT_ADV7511</td>
<td>24-bit video mode</td>
<td>U10</td>
<td>U14</td>
<td>Off</td>
</tr>
<tr>
<td>1</td>
<td>24_BIT_ADV7341</td>
<td>24-bit video mode</td>
<td>U11</td>
<td>U2</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>16_BIT_ADV7511</td>
<td>16-bit video mode</td>
<td>U13</td>
<td>U14</td>
<td>Off</td>
</tr>
<tr>
<td>3</td>
<td>16_BIT_ADV7341</td>
<td>16-bit video mode</td>
<td>U12</td>
<td>U2</td>
<td>Off</td>
</tr>
<tr>
<td>4</td>
<td>27MHZ_CLK_EN</td>
<td>Enable 27 MHz oscillator</td>
<td></td>
<td>U15</td>
<td>Off</td>
</tr>
<tr>
<td>5</td>
<td>74MHZ_CLK_EN</td>
<td>Enable 74 MHz oscillator</td>
<td></td>
<td>U14</td>
<td>Off</td>
</tr>
<tr>
<td>6</td>
<td>8_BIT_ADV7341</td>
<td>8-bit video mode</td>
<td>U3</td>
<td>U2</td>
<td>Off</td>
</tr>
<tr>
<td>7</td>
<td>SPORT_ENABLE</td>
<td>Enable SPORT interface</td>
<td>U18</td>
<td>U14</td>
<td>Off</td>
</tr>
</tbody>
</table>

Table 2-2. Output Signals of GPIO Expander (U19 Port B)

<table>
<thead>
<tr>
<th>Bit</th>
<th>Signal Name</th>
<th>Description</th>
<th>FET</th>
<th>Component Connected</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>ADV7511_INT_GPIO0</td>
<td>Transmitter interrupt</td>
<td>U9</td>
<td>U14</td>
<td>Off</td>
</tr>
<tr>
<td>1</td>
<td>ADV7511_INT_GPIO1</td>
<td>Transmitter interrupt</td>
<td>U9</td>
<td>U14</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>ADV7511_INT_GPIO2</td>
<td>Transmitter interrupt</td>
<td>U19</td>
<td>U14</td>
<td>Off</td>
</tr>
<tr>
<td>3</td>
<td>ADV7511_INT_GPIO3</td>
<td>Transmitter interrupt</td>
<td>U9</td>
<td>U14</td>
<td>Off</td>
</tr>
<tr>
<td>4</td>
<td>ADV7511_INT_GPIO4</td>
<td>Transmitter interrupt</td>
<td>U8</td>
<td>U14</td>
<td>Off</td>
</tr>
<tr>
<td>5</td>
<td>ADV7511_INT_GPIO5</td>
<td>Transmitter interrupt</td>
<td>U8</td>
<td>U14</td>
<td>Off</td>
</tr>
<tr>
<td>6</td>
<td>ADV7511_INT_GPIO6</td>
<td>Transmitter interrupt</td>
<td>U8</td>
<td>U14</td>
<td>Off</td>
</tr>
<tr>
<td>7</td>
<td>ADV7511_INT_GPIO7</td>
<td>Transmitter interrupt</td>
<td>U8</td>
<td>U14</td>
<td>Off</td>
</tr>
</tbody>
</table>
Software-Controlled Switches (SoftConfig)

Video Encoder Mode Select

The Video Encoder Mode Select determines whether the interface to the processors PPI is 8, 16 or 24 bits. The Video Encoder Mode select is chosen by driving low either the 24_BIT_ADV7511, 16_BIT_ADV7511, 24_BIT_ADV7341, 16_BIT_ADV7341 or 8_BIT_ADV7341 signal (U20 ports GPA0-GPA3, GPA6. Driving one of these signals low enables the appropriate bus switches (U10-U13 and U3).

ADV7511_INT_GPIOx Signal

The ADV7511_INT_GPIOx signal connects the interrupt signal of the ADV7511 to one of eight GPIO pins of the processor. U20 ports GPB0-GPB7 are used to select the connection to the appropriate GPIO signal via the U8 and U9 bus switch.

27MHZ_CLK_EN Signal

The 27MHZ_CLK_EN signal is used to enable the onboard 27 MHz oscillator which connects to the ADV7511 and ADV7341. U20 port GPA4 is used to enable and disable the oscillator. The default is disabled.

74MHZ_CLK_EN Signal

The 74MHZ_CLK_EN signal is used to enable the onboard 74.25 MHz oscillator which connects to the ADV7511 and ADV7341. U20 port GPA5 is used to enable and disable the oscillator. The default is disabled.

SPORT_ENABLE Signal

The SPORT_ENABLE signal connects the audio signal of the ADV7511 to the SPORT interface of the processor. U20 port GPA7 is used to enable or disable the connection via the U18 bus switch. The default is disabled.
Connectors

This section describes connector functionality and provides information about mating connectors. Figure 2-6 shows the locations of all connectors on the Video Encoder EI3 Extender Board.

Figure 2-6. Connector Locations

Connectors denoted by a dotted line are located on the opposite side of the board.
Connectors

Expansion III (EI3) Connectors (J4)

One board-to-board connectors (J4) provide signals from the PPI, SPORT, TWI, and GPIO interfaces of the processor. The connector is located on the bottom side of the board.

<table>
<thead>
<tr>
<th>Part Description</th>
<th>Manufacturer</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>120-pin, 0.6 mm</td>
<td>HIROSE</td>
<td>FX8-120S-SV(21)</td>
</tr>
<tr>
<td></td>
<td>Mating Connector</td>
<td></td>
</tr>
<tr>
<td>120-pin, 0.6 mm</td>
<td>HIROSE</td>
<td>FX8-120P-SV1(91)</td>
</tr>
</tbody>
</table>

S-Video Connector (J2)

The S-Video connector (J2) is a DIN connector which connects to the ADV7341. This connector can be used for Y-C mode and supports SD, ED, and HD video modes.

<table>
<thead>
<tr>
<th>Part Description</th>
<th>Manufacturer</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-Video</td>
<td>CUI</td>
<td>MD-40SM</td>
</tr>
<tr>
<td></td>
<td>Mating Cable</td>
<td></td>
</tr>
<tr>
<td>S-Video Cable</td>
<td>Belkin</td>
<td>F8V308-06</td>
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</table>
Component Connector (J 14)

The Component connector (J14) is a group of three RCA jacks which connect to the ADV7341. This connector can be used for YPrPb and RGB modes and supports SD, ED, and HD video modes.

<table>
<thead>
<tr>
<th>Part Description</th>
<th>Manufacturer</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component (3x1 RCA)</td>
<td>CUI</td>
<td>RCJ-32265</td>
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Mating Cable

<table>
<thead>
<tr>
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<th>Part Number</th>
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</thead>
<tbody>
<tr>
<td>Component Cable</td>
<td>Belkin</td>
<td>AV21000-06</td>
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</table>

HDMI Connector (J 5)

The HDMI connector (J5) is an HDMI receptacle that is connected to the ADV7511. This connector can be used for YCbCr and RGB modes and supports SD, ED, and HD video modes. It supports ARC and is v.1.4 compliant.

<table>
<thead>
<tr>
<th>Part Description</th>
<th>Manufacturer</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDMI</td>
<td>FCI</td>
<td>10029449-002TLF</td>
</tr>
</tbody>
</table>

Mating Cable

<table>
<thead>
<tr>
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<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDMI Cable</td>
<td>Mediabridge</td>
<td>91-02X-06B</td>
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</table>
Connectors

**Composite Connector (J6)**

The Composite connector (J6) is a single RCA jack which connects to the ADV7341. This connector can be used for CVBS and supports SD, ED, and HD video modes.

<table>
<thead>
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<th>Part Description</th>
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<th>Part Number</th>
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</thead>
<tbody>
<tr>
<td>Composite (1 RCA)</td>
<td>Switchcraft</td>
<td>PJRAN1X1U01X</td>
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</tbody>
</table>

**Power Connector (P1)**

Under normal circumstances the power connector is not needed because the Video Encoder EI3 Extender Board derives its power from the EZ-KIT Lite/EZ-Board. If the EZ-KIT Lite/Video Encoder EI3 Extender Board is not able to supply enough power to the Video Encoder EI3 Extender Board, then an external power supply can be connected to P14 which will power the Video Encoder EI3 Extender Board and EZ-KIT Lite/EZ-Board.

<table>
<thead>
<tr>
<th>Part Description</th>
<th>Manufacturer</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.65 mm power jack</td>
<td>CUI</td>
<td>045-0883R</td>
</tr>
<tr>
<td><a href="mailto:5.0VDC@3.6A">5.0VDC@3.6A</a> power supply</td>
<td>GLOBETEK</td>
<td>GS-1750(R)</td>
</tr>
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</table>
LEDs

This section describes the on-board LEDs.

HDMI Detect LED (LED1)

When LED1 is lit solid (yellow), it indicates that an HDMI device has been detected (connected to the HDMI connector (J5)).

Power LED (LED2)

When LED2 is lit solid (green), it indicates that power is being supplied to the board properly.
The bill of materials corresponds to “Video Encoder EI3 Extender Board Schematic” on page B-1.

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Qty.</th>
<th>Description</th>
<th>Reference Designator</th>
<th>Manufacturer</th>
<th>Part Number</th>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>SN74LVC1G125 SOT23-5</td>
<td>U22</td>
<td>TI</td>
<td>74LVC1G125DBVRE4</td>
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<tr>
<td>2</td>
<td>2</td>
<td>SN74LVC1G04 SOT23-5</td>
<td>U4-U5</td>
<td>TI</td>
<td>SN74LVC1G04DBVT</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>27MHZ OSC003</td>
<td>U15</td>
<td>EPSON</td>
<td>SG-8002CA-MP</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>SN74CB3Q16211 TSSOP56</td>
<td>U3,U10-U13</td>
<td>DIGI-KEY</td>
<td>296-17629-1-ND</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>SN74AVC4T245 SOIC16</td>
<td>U1</td>
<td>DIGI-KEY</td>
<td>296-17930-1-ND</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>SN74AVC8T245 TSSOP24</td>
<td>U18</td>
<td>TI</td>
<td>SN74AVC8T245PW</td>
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<td>7</td>
<td>1</td>
<td>12MHZ OSC015</td>
<td>U17</td>
<td>DIGI-KEY</td>
<td>535-9413-2-ND</td>
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<tr>
<td>8</td>
<td>1</td>
<td>MCP23017 QFN65P600X600-29N</td>
<td>U19</td>
<td>DIGI-KEY</td>
<td>MCP23017-E/ML-ND</td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>PI3C3125 TSSOP14</td>
<td>U7-U9</td>
<td>PERICOM</td>
<td>PI3C3125</td>
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<td>1</td>
<td>74.25MHZ OSC003</td>
<td>U16</td>
<td>CTS</td>
<td>CB3LV-3I-74M2500</td>
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<td>74AVC24T245 LFBGA84</td>
<td>U6</td>
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<td>296-17662-1-ND</td>
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<tr>
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<td>ADV7341BSTZ LQFP64</td>
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<td>ADI</td>
<td>ADV7341BSTZ</td>
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<tr>
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<td>3</td>
<td>ADA4430 SC70_6</td>
<td>U23-U25</td>
<td>ADI</td>
<td>ADA4430-1YKSZ-R2</td>
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<tr>
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<td>ADP1706-1.8V LFCSP8</td>
<td>VR2</td>
<td>ADI</td>
<td>ADP1706ACPZ-1.8-R7</td>
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<tr>
<td>15</td>
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<td>ADP1706-3.3V LFCSP8</td>
<td>VR1</td>
<td>ADI</td>
<td>ADP1706ACPZ-3.3-R7</td>
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<tr>
<td>16</td>
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<td>10MA AD1580BRTZ SOT23D</td>
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<tr>
<td>Ref.</td>
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<td>Description</td>
<td>Reference Designator</td>
<td>Manufacturer</td>
<td>Part Number</td>
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<tr>
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<td>ADV7511KSTZ LQFP100</td>
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<td>ADI</td>
<td>ADV7511KSTZ</td>
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<tr>
<td>18</td>
<td>1</td>
<td>RCA 1X1 CON012</td>
<td>J6</td>
<td>SWITCH-CRAFT</td>
<td>PJRAN1X1U01X</td>
</tr>
<tr>
<td>19</td>
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<td>PWR .65MM CON027</td>
<td>P1</td>
<td>DIGI-KEY</td>
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<tr>
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<td>1A RESETTABLE 1206</td>
<td>F1</td>
<td>RAYCHEM</td>
<td>NANOSMDC110F-2</td>
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<tr>
<td>21</td>
<td>1</td>
<td>HDMI 19P FCI_10029449-002TLF</td>
<td>J5</td>
<td>FCI</td>
<td>10029449-002LF</td>
</tr>
<tr>
<td>22</td>
<td>1</td>
<td>RCA 3X1 CUI-STACK_RCJ-32265</td>
<td>J1</td>
<td>DIGI-KEY</td>
<td>CP-1446-ND</td>
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<tr>
<td>23</td>
<td>1</td>
<td>MINI-DIN 4PIN CUI-STACK_MD-40SM</td>
<td>J2</td>
<td>DIGI-KEY</td>
<td>CP-2240-ND</td>
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<tr>
<td>24</td>
<td>1</td>
<td>.6MM 120P DIP HIROSE_FX8-120S-SV(21)</td>
<td>J4</td>
<td>HIROSE</td>
<td>FX8-120S-SV(21)</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>YELLOW LED001</td>
<td>LED1</td>
<td>DIGI-KEY</td>
<td>P512TR-ND</td>
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<tr>
<td>26</td>
<td>3</td>
<td>10K 1/10W 5% 0805</td>
<td>R5, R7, R9</td>
<td>VISHAY</td>
<td>CRCW080510KJNEA</td>
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<tr>
<td>27</td>
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<td>10K 1/10W 5% 0805</td>
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<td>VISHAY</td>
<td>CRCW080510KJNEA</td>
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<tr>
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<td>10K 31MW 5% RNET8</td>
<td>RN1-RN2</td>
<td>CTS</td>
<td>746X101103JP</td>
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<tr>
<td>29</td>
<td>9</td>
<td>10UH 10% 1008</td>
<td>L1-L9</td>
<td>PANASONIC</td>
<td>ELJ-FC100KF</td>
</tr>
<tr>
<td>30</td>
<td>9</td>
<td>10UF 6.3V 10% 0805</td>
<td>C22, C49, C58, C66, C68, C84-C85, C92, C95</td>
<td>AVX</td>
<td>08056D106KAT2A</td>
</tr>
</tbody>
</table>
## Video Encoder EI3 Extender Board Bill Of Materials

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Qty.</th>
<th>Description</th>
<th>Reference Designator</th>
<th>Manufacturer</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>45</td>
<td>0.1UF 10V 10% 0402</td>
<td>C1-C4,C7-C12, C14-C19,C23, C26,C29-C30, C35-C37,C40, C43-C44,C51, C53-C54,C57, C60-C62,C64, C70,C72-C73, C76-C77,C80, C82,C87,C90, C93,C96</td>
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<tr>
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<td>0.01UF 16V 10% 0402</td>
<td>C41-C42,C45, C48,C50,C52, C55-C56,C59, C65,C69,C71, C74-C75,C81, C83,C86,C91, C94</td>
<td>AVX</td>
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<tr>
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<td>10K 1/16W 5% 0402</td>
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<td>PANASONIC</td>
<td>ERJ-2GE0R00X</td>
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<td>7</td>
<td>0 1/16W 5% 0402</td>
<td>R11,R13, R26-R27,R49-R 51</td>
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<td>ERJ-2GE0R00X</td>
</tr>
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<td>VISHAY</td>
<td>CRCW040233R0JNEA</td>
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<td>R41-R42, R47-R48, R52-R53</td>
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<td>LN1361CTR</td>
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<td>PANASONIC</td>
<td>ERJ-2RKF1101X</td>
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<tr>
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<td>2</td>
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<td>DIGI-KEY</td>
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<tr>
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<td>1</td>
<td>VARISTOR V5.5MLA 30A 0603</td>
<td>R55</td>
<td>LITTLE- FUSE</td>
<td>V5.5MLA0603</td>
</tr>
<tr>
<td>46</td>
<td>2</td>
<td>0.15UF 10V 10% 0603</td>
<td>C31,C33</td>
<td>AVX</td>
<td>0603ZC154KAT2A</td>
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<tr>
<td>47</td>
<td>3</td>
<td>1A MBR130LSFT1G SOD-123FL</td>
<td>D4-D6</td>
<td>ON SEMI</td>
<td>MBR130LSFT1G</td>
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<tr>
<td>48</td>
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<td>27K 1/16W 5% 0402</td>
<td>R20</td>
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<td>ERJ-2GEJ273X</td>
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<td>50</td>
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<td>311-887HRTR-ND</td>
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<td>51</td>
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<td>5A RCLAMP0524 DIO_RCLAMP0524</td>
<td>D9-D11</td>
<td>SEMTECH</td>
<td>RCLAMP0524P.TCT</td>
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<td>30MA DB3X314 DIO_DB3X314</td>
<td>D8</td>
<td>PANASONIC</td>
<td>DB3X314K0L</td>
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<tr>
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<td>49.9 1/16W 1% 0402</td>
<td>R23-R24</td>
<td>STACKPOLE</td>
<td>RMCF0402FT49R9</td>
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<tr>
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<td>2.0K 1/10W 1% 0402</td>
<td>R21-R22,R31</td>
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<td>ERJ-2RKF2001X</td>
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<td>R33</td>
<td>PANASONIC</td>
<td>ERJ-2RKF4121X</td>
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<td>0.012UF 10V 10% 0402</td>
<td>C32,C34</td>
<td>DIGI-KEY</td>
<td>399-3009-2-ND</td>
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<td>57</td>
<td>2</td>
<td>169.0 1/10W 1% 0402</td>
<td>R35-R36</td>
<td>PANASONIC</td>
<td>ERJ-2RKF1690X</td>
</tr>
<tr>
<td>58</td>
<td>1</td>
<td>510.0 1/10W 1% 0402</td>
<td>R34</td>
<td>PANASONIC</td>
<td>ERJ-2RKF5100X</td>
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<tr>
<td>59</td>
<td>3</td>
<td>300.0 1/10W 1% 0402</td>
<td>R39,R44-R45</td>
<td>PANASONIC</td>
<td>ERJ-2RKF3000X</td>
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<tr>
<td>61</td>
<td>3</td>
<td>100MA BAT54S SOT23D</td>
<td>D1-D3</td>
<td>FAIRCHILD</td>
<td>BAT54S</td>
</tr>
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</table>
Video Encoder EI3 Extender Board
Schematic
TWI Address 0111 001x
x is the R/W bit. Read - 1, Write - 0
TWI Address 0101 011x
x is the R/W bit. Read - 1, Write - 0

Place as close to U2 as possible and on same pcb side
Component

R49-R51 should be very close to J3.

VGA

100 Ohm diff pairs (50 Ohms to GND)

HDMI

Composite

Place close to ADV7341

Place close to ADV7341

Place close to ADV7341

75 Ohm traces

Terminators close to video filters

Terminator close to video filter

75 Ohm traces
1.8V @ 1A

3.3V @ 1A
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