

**Atmel®**  
**ATF15xx-DK3-U**  
**Development Kit**



## Atmel ATF15xx-DK3-U Development Kit User Guide

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**Atmel®**

**Atmel ATF15xx-DK3-U Development Kit**



## Specifications

- **Product Name:** ATF15xx-DK3-U CPLD Development/Programmer Kit
- **Supported Devices:** ATF1502AS/ASL, ATF1504AS/ASL, ATF1508ASV/ASVL, ATF1502ASV, ATF1504ASV/ASVL, ATF1508AS/ASL
- **Features:**
  - 10-pin JTAG-ISP Port
  - Regulated Power Supply Circuits for 9VDC Power Source
  - Selectable I/O Voltage Supply: 5V, 3.3V, 2.5V, or 1.8V
  - Selectable Core Voltage Supply: 1.8V, 3.3V, or 5.0V
  - 44-pin TQFP Socket Adapter Board
  - Headers for I/O Pins of the ATF15xx Device
  - 2MHz Crystal Oscillator
  - Four 7-segment LED Displays
  - Eight Individual LEDs
  - Eight Push-button Switches
  - Global Clear and Output Enable Push-button Switches
  - Current Measurement Jumpers

## Product Usage Instructions

### Hardware Setup

- Connect the CPLD Development/Programmer Board to your computer using the provided USB-based JTAG ISP Download Cable.

### Device Programming

- Insert the Atmel 44-pin TQFP Sample Device into the Socket Adapter Board.
- Use the appropriate software tools to program the desired logic into the CPLD device.

## Power Supply Configuration

- Select the desired I/O and Core Voltage Supply levels using the switches provided on the board.

## Logic Doubling Feature

- The CPLD device supports Logic Doubling Architecture for enhanced functionality.

## FAQ

### **Q: Can I use other socket adapter boards with this kit?**

**A:** The kit includes a 44-pin TQFP Socket Adapter Board. Other socket adapter boards are sold separately and can be used with this kit.

### **Q: What software tools are compatible with this kit for programming the CPLD device?**

**A:** Please refer to the product documentation for a list of compatible software tools for programming the CPLD device included in this kit.

### **Q: How do I access technical support for this product?**

**A:** Technical support information can be found in the References and Support section of the user guide included in the kit.

## Introduction

The Atmel® ATF15xx-DK3-U Complex Programmable Logic Device (CPLD) Development/Programmer Kit is a complete development system and an In-System Programming (ISP) programmer for the Atmel ATF15xx Family of industry-standard pin compatible CPLDs with Logic Doubling® features. This kit provides designers with a very quick and easy way to develop prototypes and evaluate new designs with an ATF15xx ISP CPLD. The ATF15xx Family of ISP CPLDs includes the Atmel ATF15xxAS, ATF15xxASL, ATF15xxASV, and ATF15xxASVL CPLDs. With the availability of the different socket adapter boards to support most of the package types(1) offered in the ATF15xx Family of ISP CPLDs, this kit can be used as an ISP programmer to program the ATF15xx ISP CPLDs in most of the available package types(1) through the industry standard JTAG interface (IEEE 1149.1).

## Kit Contents

- CPLD Development/Programmer Board (ATF15xx-DK3)
- 44-pin TQFP Socket Adapter Board (ATF15xxDK3-SAA44)(2)
- ATF15xx USB-based JTAG ISP Download Cable (ATDH1150USB or ATDH1150USB-K)
- Two Atmel 44-pin TQFP Sample Devices

## Device Support

The ATF15xx-DK3-U CPLD Development/Programmer Kit supports the following devices in all currently available Atmel speed grades and packages (except the 100-PQFP).

- ATF1502AS/ASL

- ATF1504AS/ASL
- ATF1508ASV/ASVL
- ATF1502ASV
- ATF1504ASV/ASVL
- ATF1508AS/ASL

1. The socket adapter board is not offered for the 100-pin PQFP.
2. Only the 44-pin TQFP Socket Adapter Board is included in this kit. Other socket adapter boards are sold separately. See “Hardware Description” section for more information on socket adapter board ordering codes.

## **Kit Features**

### **CPLD Development/Programmer Board**

- 10-pin JTAG-ISP Port
- Regulated Power Supply Circuits for 9VDC Power Source
- Selectable 5V, 3.3V, 2.5V, or 1.8V I/O Voltage Supply
- Selectable 1.8V, 3.3V, or 5.0V Core Voltage Supply
- 44-pin TQFP Socket Adapter Board
- Headers for I/O Pins of the ATF15xx Device
- 2MHz Crystal Oscillator
- Four 7-segment LED Displays
- Eight Individual LEDs
- Eight Push-button Switches
- Global Clear and Output Enable Push-button Switches
- Current Measurement Jumpers

### **Logic Doubling CPLDs**

ATF15xx ISP CPLD with Logic Doubling Architecture

### **ATF15xx ISP Download Cable**

- 5V, 3.3V, 2.5V, or 1.8V ISP Download Cable for the Universal Serial Bus (USB) port of a PC
- There are two versions of the ATF15xx USB ISP Download Cable; ATDH1150USB and ATDH1150USB-K. They are built by two different vendors but have identical circuit designs, and the Atmel Ordering Code is ATDH1150USB.
- The ATDH1150USB-K is built by Kanda ([www.kanda.com](http://www.kanda.com)) and it can be directly purchased from Kanda. More details are available online at [www.atmel.com/tools/ATDH1150USB.aspx](http://www.atmel.com/tools/ATDH1150USB.aspx).

### **PLD Development Software**

- The Atmel PLD development software tools are available online for PLD designers' use of the ATF15xx ISP CPLDs.

- Please reference the Overview document, “PLD Design Software Overview” available at:  
<http://www.atmel.com/images/atmel-3629-pld-design-software-overview.pdf>

## System Requirements

- The minimum hardware and software required to program an ATF15xx ISP CPLD device designed using the Atmel ProChip Designer Software on the CPLD Development/Programmer Board through the Atmel ATMISP (ATF15xx CPLD ISP Software) are.
- x86 or x64 Microprocessor-based Computer
- Windows XP® or Windows 7
- 128-MByte RAM
- 500-MByte Free Hard Disk Space
- Windows-supported Mouse
- Available USB 1.1 / 2.0 / 3.0 Port
- 9VDC Power Supply with 500mA of Supply Current
- SVGA Monitor (800 x 600 Resolution)

## Ordering Information

Atmel Part Number	Description
ATF15xx-DK3-U	CPLD Development/Programmer Kit (includes the ATF15xxDK3-SAA44 <sup>(1)</sup> and A TDH1150USB or ATDH1150USB-K)
ATF15xxDK3-SAA100	100-pin TQFP Socket Adapter Board for DK3 Board
ATF15xxDK3-SAJ44	44-pin PLCC Socket Adapter Board for DK3 Board
ATF15xxDK3-SAJ84	84-pin PLCC Socket Adapter Board for DK3 Board
ATF15xxDK3-SAA44 <sup>(1)</sup>	44-pin TQFP Socket Adapter Board for DK3 Board

**Note:** Only the 44-pin TQFP Socket Adapter Board is included in this kit. Other socket adapter boards are sold separately. See the “Hardware Description” section for more information on socket adapter board ordering codes.

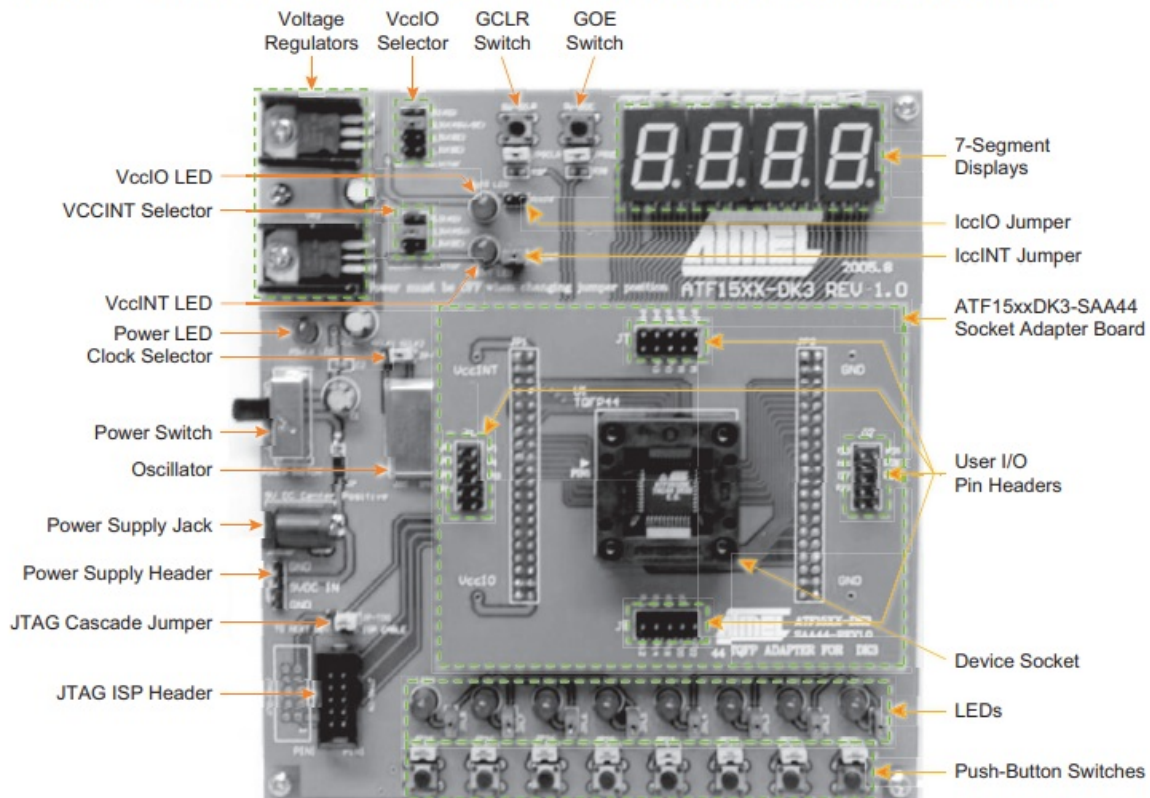
## Hardware Description

### CPLD Development/Programmer Board

- The CPLD Development/Programmer and Socket Adapter Boards shown in the below figure contain features that are useful for developing, prototyping, or evaluating ATF15xx CPLD designs.
- Features that make this a very versatile starter/development kit and an ISP programmer for the ATF15xx family of JTAG-ISP CPLDs include.
- Push-button Switches
- LEDs
- 7-segment Displays
- 2MHz Crystal Oscillator
- 5V, 3.3V, 2.5V, or 1.8V VCCIO Selector

- 1.8V, 3.3V, or 5.0V VCCINT Selector
- JTAG ISP Port
- Socket Adapters

**Figure 1. CPLD Development/Programmer Kit with 44-pin TQFP Socket Adapter Board**



### 7-segment Displays with Selectable Jumpers

- The CPLD Development/Programmer Board contains four 7-segment displays that allow the observation of the ATF15xx CPLD outputs. These four displays are labeled as DSP1, DSP2, DSP3, and DSP4. The 7-segment displays have common anode LEDs with the common anode lines connected to the VCCIO (I/O supply voltage for the CPLD) through a series of resistors with selectable jumpers labeled as JPDSP1, JPDSP2, JPDSP3, and JPDSP4. These jumpers can be removed to disable the displays by unconnecting the VCCIO to the displays. Individual cathode lines are connected to the I/O pins of the ATF15xx CPLD on the CPLD Development/Programmer Kit. To turn on a particular segment, including the DOT of a display, the corresponding ATF15xx I/O pin connected to this LED segment must be in a logic low state with the corresponding selectable jumper set; therefore, the outputs of the ATF15xx device will require configuration for active-low outputs in the design file.
- The displays work best at 2.5V VCCIO or higher.
- Each segment of each display is hard-wired to one specific I/O pin of the ATF15xx device. For the higher pin count devices (100-pin and larger), all seven segments and the DOT segments of the four displays are connected to the I/O pins; however, for the lower pin count devices, only a subset of the displays, first and fourth displays, are connected to the ATF15xx device's I/O pins. Tables 1 and 2 show the 7-segment display package connections to the ATF15xx device.
- The circuit schematic of the displays and jumpers is shown in the figure below.

Figure 2. Circuit Diagram of 7-segment Display and Jumpers

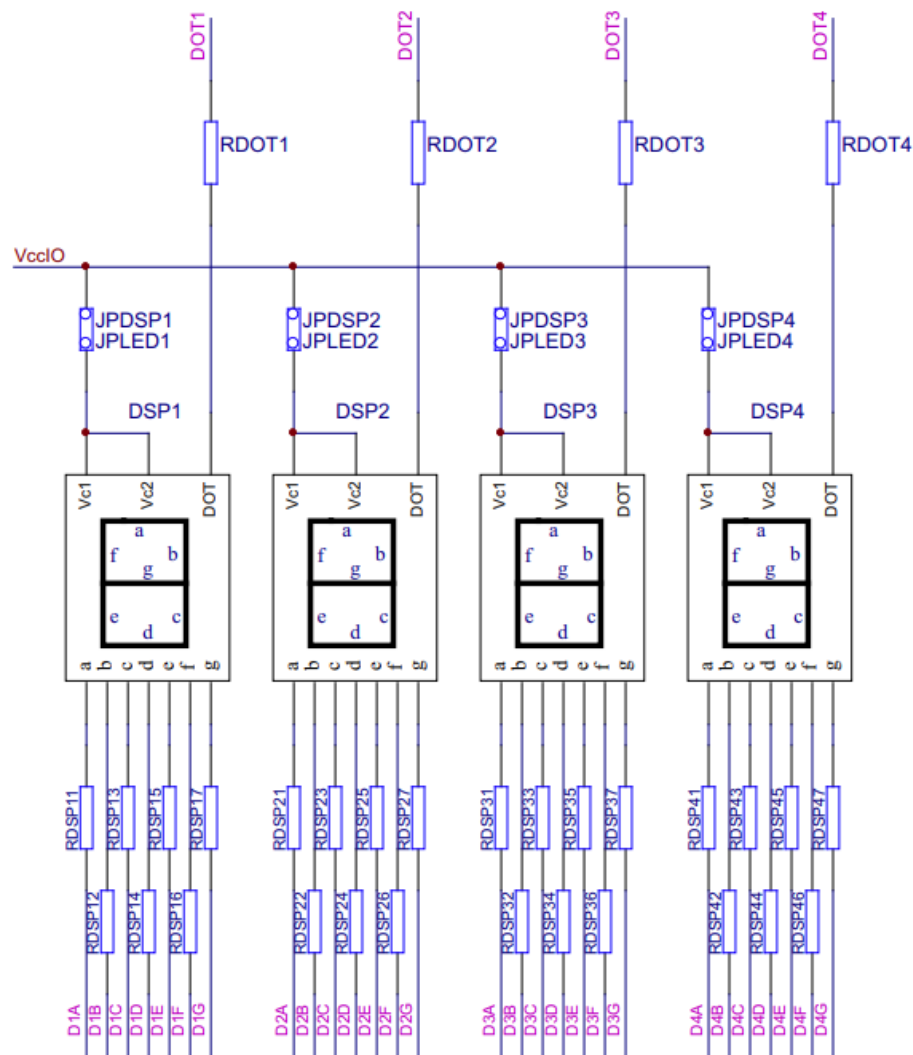


Table 1. ATmega16 44-pin Connections to 7-segment Displays

44-pin TQFP			
DSP/Segment	PLD Pin	DSP/Segment	PLD Pin
1/A	27	3/A	NC
1/B	33	3/B	NC
1/C	30	3/C	NC
1/D	21	3/D	NC
1/E	18	3/E	NC
1/F	23	3/F	NC
1/G	20	3/G	NC
1/DOT	31	3/DOT	NC
2/A	NC	4/A	3
2/B	NC	4/B	10
2/C	NC	4/C	6
2/D	NC	4/D	43
2/E	NC	4/E	35
2/F	NC	4/F	42
2/G	NC	4/G	34
2/DOT	NC	4/DOT	11



44-pin PLCC			
DSP/Segment	PLD Pin	DSP/Segment	PLD Pin
1/A	33	3/A	NC
1/B	39	3/B	NC
1/C	36	3/C	NC
1/D	27	3/D	NC
1/E	24	3/E	NC
1/F	29	3/F	NC
1/G	26	3/G	NC
1/DOT	37	3/DOT	NC
2/A	NC	4/A	9
2/B	NC	4/B	16
2/C	NC	4/C	12
2/D	NC	4/D	5
2/E	NC	4/E	41
2/F	NC	4/F	4
2/G	NC	4/G	40
2/DOT	NC	4/DOT	17

**Table 2. ATF15xx 84-pin and 100-pin Connections to 7-segment Displays**

84-pin PLCC			
DSP/Segment	PLD Pin	DSP/Segment	PLD Pin
1/A	68	3/A	22
1/B	74	3/B	28
1/C	70	3/C	25
1/D	63	3/D	21
1/E	58	3/E	16
1/F	65	3/F	17
1/G	61	3/G	12
1/DOT	73	3/DOT	29
2/A	52	4/A	5
2/B	57	4/B	10
2/C	55	4/C	8
2/D	48	4/D	79
2/E	41	4/E	76
2/F	50	4/F	77
2/G	45	4/G	75
2/DOT	56	4/DOT	11

100-pin TQFP			
DSP/Segment	PLD Pin	DSP/Segment	PLD Pin
1/A	67	3/A	13
1/B	71	3/B	19
1/C	69	3/C	16
1/D	61	3/D	8
1/E	57	3/E	83
1/F	64	3/F	6
1/G	60	3/G	92
1/DOT	75	3/DOT	20
2/A	52	4/A	100
2/B	54	4/B	94
2/C	47	4/C	97
2/D	41	4/D	81
2/E	46	4/E	76
2/F	40	4/F	80
2/G	45	4/G	79
2/DOT	56	4/DOT	93

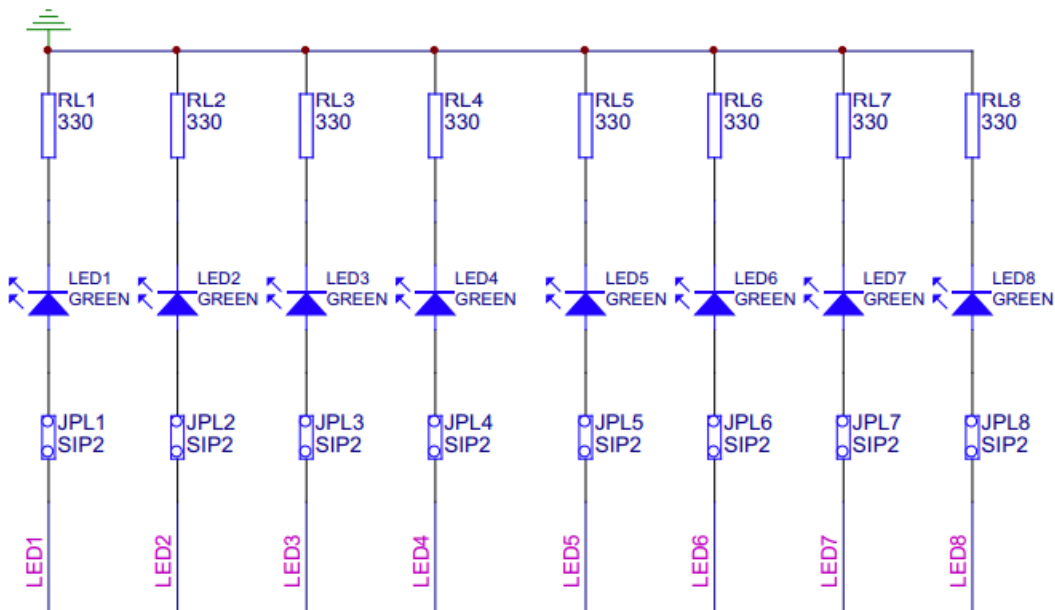
### LEDs with Selectable Jumpers

- The CPLD Development/Programmer Board has eight individual LEDs, which allow designers to display the output signals from the user I/Os of the ATF15xx devices. These eight LEDs are labeled LED1 to LED8 on the CPLD Development/Programmer Board. The cathode of each LED is connected to Ground (GND) through a

series resistor, while the anode of each LED is connected to a user I/O pin of the CPLD through the JPL1/2/3/4/5/6/7/8 selectable jumper.

- These jumpers can be removed to disable the LEDs by unconnecting the anodes of the LEDs to the I/O pins of the CPLD. The figure below illustrates the circuit diagram of the LEDs with the selection jumpers.
- To turn on a particular LED, the corresponding ATF15xx I/O pin connected to the LED must be in a logic high state with the corresponding jumper set; therefore, the outputs of the ATF15xx device will need to be configured as active high outputs.
- The LEDs work best at 2.5V VCCIO or higher.
- The lower pin count devices (44-pin) only have four I/Os connected to LED1/2/3/4. For the higher pin-count devices (100-pin and larger), all eight LEDs are connected to the I/Os of the device.
- Table 3 shows the different package connections of the CPLD I/Os to the LEDs.

**Figure 3. Circuit Diagram of the LEDs and Jumpers**



**Table 3. ATF15xx Connections to LEDs**

44-pin TQFP	
LED	PLD Pin
LED1	28
LED2	25
LED3	22
LED4	19

44-pin PLCC	
LED	PLD Pin
LED1	34
LED2	31
LED3	28
LED4	25

84-pin PLCC	
LED	PLD Pin
LED1	69
LED2	67
LED3	64
LED4	60
LED5	27
LED6	24
LED7	18
LED8	15

100-pin TQFP	
LED	PLD Pin
LED1	68
LED2	65
LED3	63
LED4	58
LED5	17
LED6	14
LED7	10
LED8	9

### Push-button Switches with Selectable Jumpers for I/O Pins

- The CPLD Development/Programmer Board contains eight push-button switches, which are connected to the I/O pins of the CPLD. The switches send input logic signals to the user I/O pins of the ATF15xx device. These switches are labeled SW1 to SW8 on the CPLD Development/Programmer Board. One end of each input push-button switch is connected to VCCIO, while the other end of each push-button switch is connected to a pull-down resistor and then connected to the specific I/O pin of the CPLD through the JPS1/2/3/4/5/6/7/8 selectable jumper.
- If any one of these switches is pressed and the corresponding jumper is set, the specific I/O pin of the device will be driven to a logic high state by the output of the switch circuit.
- Since each push-button switch is also connected to a pull-down resistor, the input will have a logic low state if the switch is not pressed with the corresponding jumper set. If the push-button jumper is not set, the corresponding pin will be treated as an unconnected pin.
- Figure 4 is a circuit diagram of the push-button switch and selectable jumper. Table 4 shows the connections of these eight push-button switches to the CPLD I/O pins in the different package types.

Figure 4. Circuit Diagram of the Push-button Switches and Jumpers for the I/O Pins

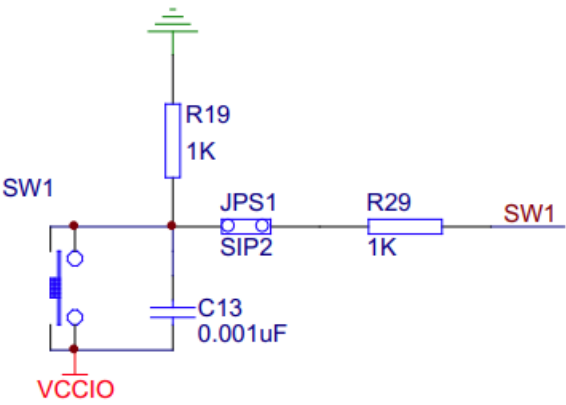


Table 4. ATF15xx Connections to the I/O Pin Switches

44-pin TQFP	
Push Button	PLD Pin
SW1	15
SW2	14
SW3	13
SW4	12
SW5	8
SW6	5
SW7	2
SW8	44

44-pin PLCC	
Push Button	PLD Pin
SW1	21
SW2	20
SW3	19
SW4	18
SW5	14
SW6	11
SW7	8
SW8	6

84-pin PLCC	
Push Button	PLD Pin
SW1	54
SW2	51
SW3	49
SW4	44
SW5	9
SW6	6
SW7	4
SW8	80

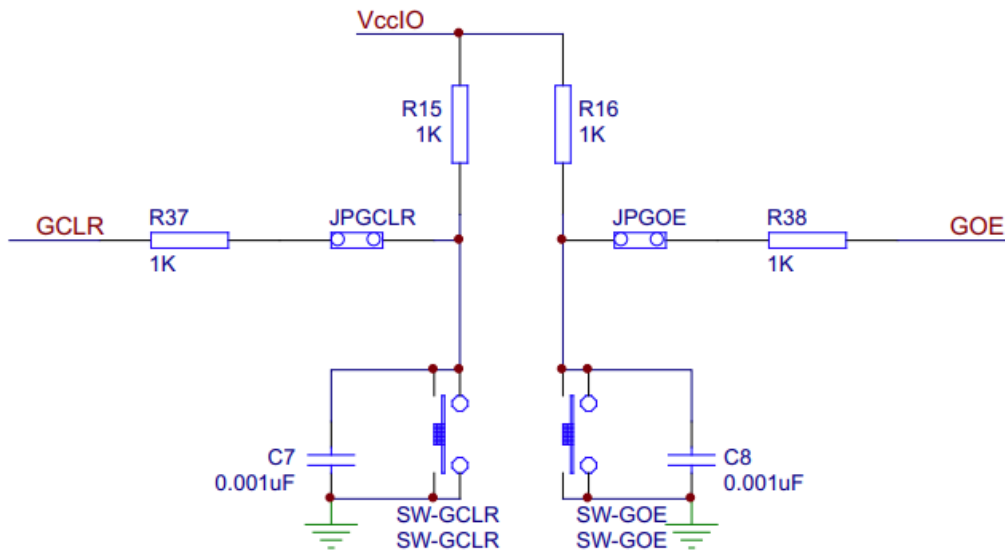


100-pin TQFP	
Push Button	PLD Pin
SW1	48
SW2	36
SW3	44
SW4	37
SW5	96
SW6	98
SW7	84
SW8	99

#### Push-button Switches with Selectable Jumpers for GCLR and OE1 Pins

- The CPLD Development/Programmer Board contains two push-button switches for the Global Clear (GCLR) and Output Enable (OE1) pins of the CPLD. The switches control the logic states of the OE1 and GCLR inputs of the ATF15xx devices. These switches are labeled SW-GCLR and SW-GOE1 on the board. One end of the SW-GCLR input push-button switch is connected to GND. The other end of the push-button switch is connected to a pull-up resistor to VCCIO and then connected to the GCLR dedicated input pin of the ATF15xx device. It is intended to be used as an active-low reset signal to reset the registers in the ATF15xx device with the JPGCLR selectable jumper set. Similarly, one end of the SW-GOE1 input push-button switch is connected to GND.
- The other end of the push-button switch is connected to a pull-up resistor to VCCIO, and then connected to the OE1 dedicated input pin of the
- ATF15xx device. It is intended to be used as an active-low output enable signal to control the enabling/disabling of the tri-state output buffers in the ATF15xx with the JPGOE selectable jumper set.
- Figure 5 is the circuit diagram of the push-button switches and the jumpers for the GCLR and OE1 pins.
- If any of these push-button switches is pressed and the corresponding jumper is set, the specific I/O of the CPLD will be driven to a logic low state. Since each push-button is also connected to a pull-up resistor, the corresponding CPLD input will have a logic high state if the push-button switch is not pressed with the corresponding selectable jumper set. If the selectable jumper is not set, the corresponding dedicated input pin of the CPLD can be considered a No Connect (NC) pin. Table 5 shows the pin numbers of the GCLR and OE1 dedicated input pins of the ATF15xx devices in all available package types.

**Figure 5. Circuit Diagram of Push-button Switches and Selectable Jumpers for GCLR and OE1**



**Table 5. Pin Numbers of GCLR and OE1**

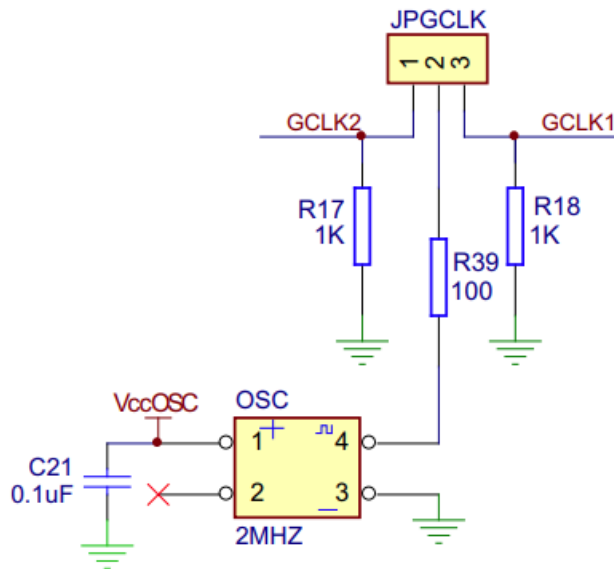
	44-pin TQFP	44-pin PLCC	84-pin PLCC	100-pin TQFP
GCLR	39	1	1	89
OE1	38	44	84	88

## 2MHz Oscillator and Clock Selection Jumper

- The Clock Selection Jumper labeled JP-GCLK on the CPLD Development/Programmer Board is a two-position jumper that allows the users to select which GCLK dedicated input pin (either GCLK1 or GCLK2) of the ATF15xx device should be connected to the output of the 2MHz oscillator. In addition, the jumper can be removed to allow an external clock source to be connected to GCLK1 and/or GCLK2 of the ATF15xx device. Figure 6 is an illustration of the circuit diagram of the oscillator and selection jumper.
- Table 6 shows the pin numbers for the GCLK1 and GCLK2 dedicated input pins of the ATF15xx device in all the different available package types.

If the GCLK1 jumper is set, the jumper will be located toward the side of the board. On the other hand, if the GCLK2 jumper is set, the jumper will be located toward the middle of the board.

**Figure 6. Circuit Diagram of Oscillator and Clock Selection Jumper**



**Table 6. Pin Numbers of GCLK1 and GCLK2**

	44-pin TQFP	44-pin PLCC	84-pin PLCC	100-pin TQFP
GCLK1	37	43	83	87
GCLK2	40	2	2	90

### VCCIO and VCCINT Voltage Selection Jumpers and LEDs

- The VCCIO and VCCINT Voltage Selection Jumpers labeled VCCIO Selector and VCCINT Selector respectively on ATF15xx-DK3 Development/Programming Kit, allow the selection of the I/O supply voltage level (VCCIO) and core supply voltage level (VCCINT) that are used for the target CPLD on the kit. Once these jumpers are set correctly, the LEDs (labeled VCCINT LED and VCCIO LED) will turn on; however, at lower supply voltage levels (i.e. 2.5V or lower), the LEDs might be very dim.
- For ATF15xxAS/ASL (5.0V) CPLDs, both the VCCIO Selector and VCCINT Selector jumpers must be set to 5.0V.
- For ATF15xxASV/ASVL (3.3V) CPLDs, both the VCCIO Selector and VCCINT Selector Jumpers must be set to 3.3V only.
- The power of the CPLD Development/Programmer Kit must be turned OFF when changing the position of the VCCIO or VCCINT Voltage Selection Jumper (VCCIO Selector or VCCINT Selector).

### ICCIO and ICCINT Jumpers

- The ICCIO and ICCINT jumpers can be removed and used as ICC measurement points. When the jumpers are removed, current meters can be connected to the posts to measure the current consumption of the target CPLD.
- When users are not using these jumpers to measure the current, these jumpers must be set for the kit and CPLD to operate.

## Voltage Regulators

- Two voltage regulators labeled VR1 and VR2, are used to independently generate and regulate the
- VCCINT and VCCIO voltages from the 9VDC power supply. For details, please see the ATF15xx-DK3 kit schematic, Figure 11.

## Power Supply Switch and Power LED

The Power Supply Switch labeled POWER SWITCH, can be switched to the on or off position, which is used to turn on or off the power of the ATF15xx-DK3 board respectively. It allows the 9VDC voltage at the Power Supply Jack to pass to the voltage regulators when it is in the on position. When the Power Supply Switch is turned on, the Power LED (labeled POWER LED) will light up to indicate that the ATF15xx-DK3 Kit is supplied with power.

## Power Supply Jack and Power Supply Header

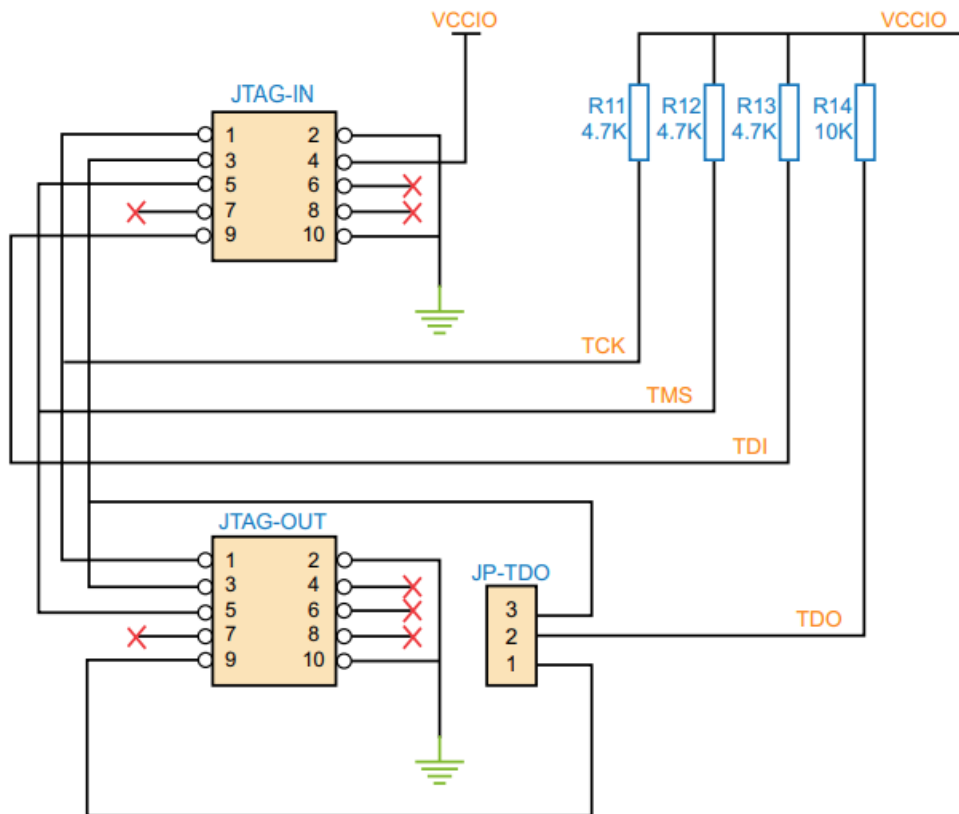
- The ATF15xx-DK3 board contains two different types of power supply connectors labeled JPower and JP Power. Either one of these power supply connectors can be used to connect a 9VDC power source to the kit.
- The first power connector labeled JPower, is a barrel power jack with a 2.1mm diameter post, and it mates to a 2.1mm (inner diameter) x 5.5mm (outer diameter) female plug.
- The second power supply header labeled JP Power, is a 4-pin male 0.100" header with 0.025" square posts.
- The availability of these two types of power connectors allows the users to choose the type of power supply equipment to use for the ATF15xx-DK3 Development/Programmer Kit.
- Only one of these two power supply connectors should be powered with a 9VDC source but not both at the same time.

## JTAG ISP Connector and TDO Selection Jumper

- The JTAG ISP Connector labeled JTAG-IN, is used to connect the ATF15xx JTAG port pins (TCK, TDI, TMS, and TDO) through the ISP download cable to the parallel printer (LPT) port of a PC for JTAG ISP programming of the ATF15xx device. Polarized connectors are used on the ATF15xx-DK3 and ISP Download Cable to minimize connection problems. The PIN1 label at the bottom of the JTAG ISP connector indicates the pin 1 position of the 10-pin header and further reduces the chance of connecting the ISP Download Cable incorrectly.
- To the left of the JTAG-IN connector, there are two columns of vias, and they are labeled JTAG-OUT. They are intended to allow the users to create a JTAG daisy chain to perform JTAG operations on multiple devices.
- Users will need to solder the same type of connector as the one used for JTAG-IN into the JTAG-OUT position to utilize this available feature.
- To create a JTAG daisy chain using multiple ATF15xx-DK3 boards, the TDO Selection Jumper, labeled JP-TDO, must be set to the appropriate position. For all the devices in the daisy chain except the last device, this jumper must be set to the TO NEXT DEVICE position. For the last device in the chain, this jumper must be set to the TO ISP CABLE position. When this jumper is in the TO NEXT DEVICE position, the TDO of that particular JTAG device will be connected to the TDI of the next JTAG device in the chain. When this jumper is in the TO ISP CABLE position, the TDO of that device will be connected to the TDO of the JTAG 10-pin connector, which will allow the TDO signal of that device in the chain to be transmitted back to the host PC with the ISP software. The figure below is a circuit diagram of the JTAG connectors and the JP-TDO jumper. The table below lists the PINs of the four JTAG pins for the ATF15xx device in all the available packages.

- For a single device setup, the position of the JP-TDO jumper must be set to TO ISP CABLE.

**Figure 7. Circuit Diagram of the JTAG ISP Connectors and TDO Jumper**

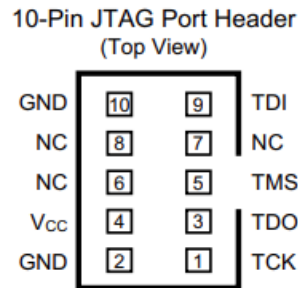


**Table 7. Pin Numbers of JTAG Port Signals**

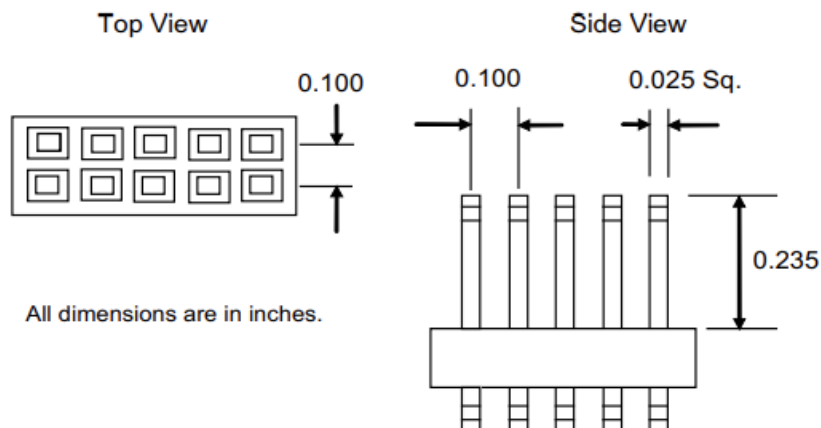
	44-pin TQFP	44-pin PLCC	84-pin PLCC	100-pin TQFP
TDI	1	7	14	4
TDO	32	38	71	73
TMS	7	13	23	15
TCK	26	32	62	62

- The ISP algorithm is controlled by the ATMISP software, which is running on the PC. The four JTAG signals are generated and buffered by the ISP download cable before going into the ATF15xx device on the CPLD Development/Programmer board.
- The 10-pin JTAG Port Header pinout on the CPLD Development/Programmer board is shown in Figure 8, and the dimensions of this 10-pin male JTAG header are shown in Figure 9.

**Figure 8. 10-pin JTAG Port Header Pinout**



**Figure 9. 10-pin Male Header Dimensions**



- The 10-pin JTAG Port Header pinout is compatible with the ATDH1150USB and ATDH1150USB-K USB-based ISP cables as well as the ATDH1150PC/VPC and ByteBlaster/MV/II LPT port-based ISP cables.
- ATMISP v6.7 supports both the USB and LPT port-based ISP cables while ATMISP v7.x and later only supports the USB port-based ISP cables.

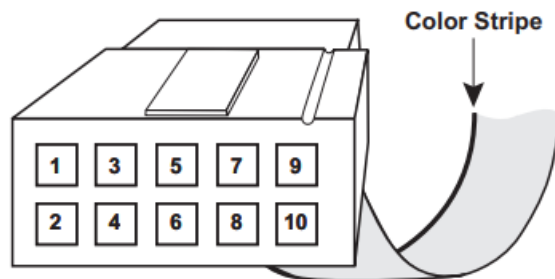
## Socket Adapter Board

- The ATF15xx-DK3 CPLD Development/Programmer Socket Adapter Boards (ATF15xxDK3-XXXXX) are circuit boards that interface with the ATF15xx-DK3 CPLD Development/Programmer Board. They are used in conjunction with the ATF15xx-DK3 CPLD Development/Programmer Board to evaluate or program ATF15xx ISP CPLD devices in different package types. There are four Socket Adapter Boards available for the ATF15xx-DK3 covering the 44-TQFP, 44-PLCC, 84-PLCC, and 100-TQFP package types in the ATF15xx family of CPLDs.
- Each socket adapter board contains a socket for the ATF15xx device and has male headers on the bottom side, labeled JP1 and JP2.
- The headers on the bottom side mate with the female headers on the ATF15xx-DK3 board labeled JP4 and JP3. The four 7-segment displays, push-button switches,
- JTAG port signals, oscillator, VCCINT, VCCIO, and GND on the CPLD Development/Programmer Board are connected to the ATF15xx device on the Socket Adapter Board through these two sets of connectors.
- On the top of the 44-TQFP socket adapter, there are four 10-pin connectors with the same dimensions as the JTAG ISP connector. The pins of these four connectors are connected to the input and I/O pins (except the four JTAG pins) of the target CPLD device. They can be used to connect to an oscilloscope or logic analyzer to capture the activities of the input and I/O pins of the CPLD. They also can be used to connect the input and I/O pins of the CPLD to other external boards or devices for system-level evaluation or testing.

## Atmel ATF15xx ISP Download Cable

- The ATF15xx USB ISP Download Cable connects the USB port of the PC to the 10-pin JTAG header on the CPLD Development/Programmer Board or a custom circuit board. This ISP cable also acts as a buffer to buffer the JTAG signals for the JTAG devices on the target circuit board. The status LED on the ATF15xx USB ISP Download Cable indicates whether the communication between the PC and the target JTAG devices and the JTAG operation is successful or not.
- This ISP cable contains a standard B USB connector, which is connected to the USB port of a PC. The 10-pin female plug connects to the 10-pin male JTAG header on the ISP circuit board.
- The red color stripe on the ribbon cable indicates the orientation of pin 1 of the female plug. The 10-pin male JTAG header on the CPLD Development/Programmer Board is polarized to prevent users from inserting the female plug in the wrong orientation.
- The CPLD Development/Programmer kits include the ATF15xx USB ISP Download Cable (ATDH1150USB or ATDH1150USB-K); however, other supported ISP cables can also be used.
- The ATDH1150VPC, ATDH1150USB, ByteBlasterMV, and ByteBlasterII cables can be used for the ATF15xx/ASL (5V) and ATF15xxASV/ASVL (3.3V) devices, while the older ATDH1150PC and the ByteBlaster cables can be used for the ATF15xxAS/ASL (5V) only.
- Figure 10 illustrates the 10-pin female header pinout for the ATF15xx ISP Download Cable. The 10-pin male header pinout on the PC board (if used for ISP) must match this pinout.

**Figure 10. ATF15xx ISP Download Cable 10-pin Female Header Pinout**



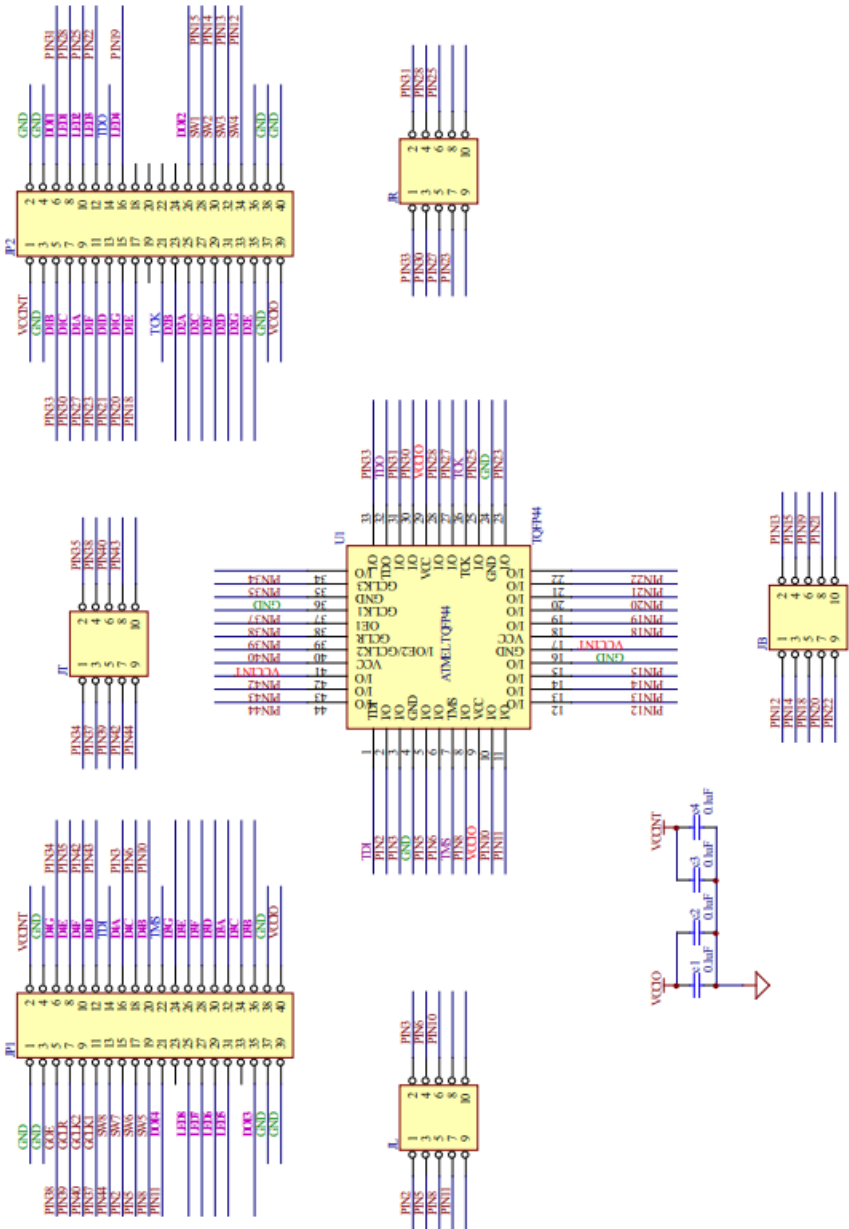
- **Note:** The circuit board must supply VCC and GND to the CPLD ISP Cable through the 10-pin male header.

## Schematic Diagrams





Figure 12. 44-pin TQFP Socket Adapter Board Schematic Diagram



The figure shows the pin connections for the ADXL345 digital accelerometer. The main diagram is a pinout for the ADXL345 chip, which is a 28-pin package. The pins are labeled as follows:

- Pin 1:** VCC
- Pin 2:** GND
- Pin 3:** I2C/SPI
- Pin 4:** I2C/SPI
- Pin 5:** I2C/SPI
- Pin 6:** I2C/SPI
- Pin 7:** I2C/SPI
- Pin 8:** I2C/SPI
- Pin 9:** I2C/SPI
- Pin 10:** I2C/SPI
- Pin 11:** I2C/SPI
- Pin 12:** I2C/SPI
- Pin 13:** I2C/SPI
- Pin 14:** I2C/SPI
- Pin 15:** I2C/SPI
- Pin 16:** I2C/SPI
- Pin 17:** I2C/SPI
- Pin 18:** I2C/SPI
- Pin 19:** I2C/SPI
- Pin 20:** I2C/SPI
- Pin 21:** I2C/SPI
- Pin 22:** I2C/SPI
- Pin 23:** I2C/SPI
- Pin 24:** I2C/SPI
- Pin 25:** I2C/SPI
- Pin 26:** I2C/SPI
- Pin 27:** I2C/SPI
- Pin 28:** I2C/SPI

The diagram also shows a small circuit diagram for the VCC pin, indicating a 0.1µF decoupling capacitor and a 1kΩ pull-up resistor.

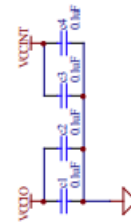
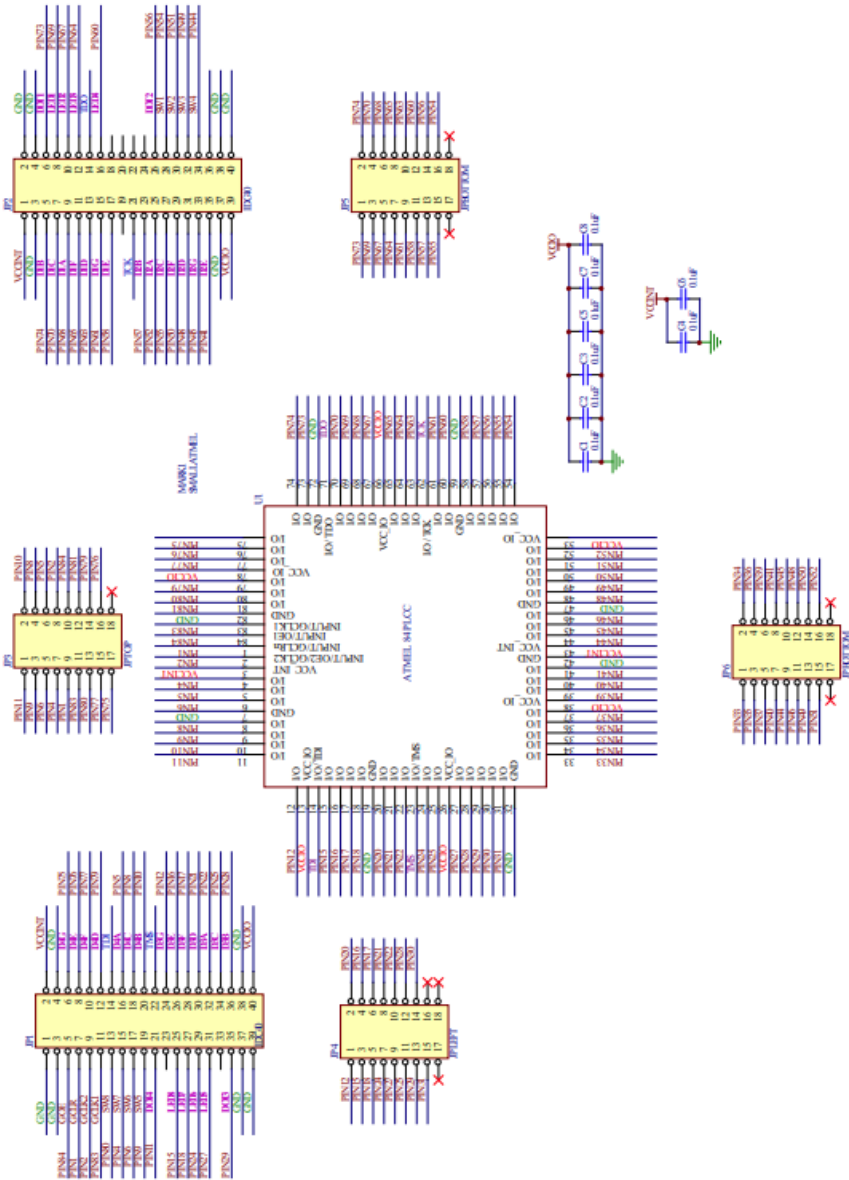


Figure 14. 84-pin PLCC Socket Adapter Board Schematic Diagram



[illegible]

For additional PLD design software references and support, documentation such as help files, tutorials, application notes/briefs, and user guides are available at [www.atmel.com](http://www.atmel.com).

### Table 8. ProChip Designer References and Support

<b>ProChip Designer</b>	<b>From the main ProChip window menu...</b>
Help	<b>Select <i>Help</i> &gt; <i>Prochip Designer Help</i>.</b>
Tutorials	<b>Select <i>Help</i> &gt; <i>Tutorials</i>.</b>
Known Problems and Solutions	<b>Select <i>Help</i> &gt; <i>Review KPS</i>.</b>
Website	<b><a href="http://www.atmel.com/tools/PROCHIPDESIGNERV5_0.aspx">www.atmel.com/tools/PROCHIPDESIGNERV5_0.aspx</a></b>

## Atmel WinCUPL Software

**Table 9.** WinCUPL References and Support

WinCUPL	From the main WinCUPL window menu...
Help	Select <i>Help &gt; Contents</i> .
CUPL Programmers Reference Guide	Select <i>Help &gt; CUPL Programmers Reference</i> .
Tutorials	Select <i>Help &gt; Atmel Info &gt; Tutorial1.pdf</i> .
Known Problems and Solutions	Select <i>Help &gt; Atmel Info &gt; CUPL_BUG.pdf</i> .
Website	<a href="http://www.atmel.com/tools/WINCUP_L.aspx">www.atmel.com/tools/WINCUP_L.aspx</a>

## Atmel ATMISP Software

**Table 10.** ATMISP References and Support

ATMISP	From the main ATMISP window menu...
Help Files	Select <i>Help &gt; ATMISP Help</i> .
Tutorials	Select <i>Help &gt; Quick Start Tutorial</i> .
Known Problems and Solutions	Using the Windows Explorer browser, locate the ATMISP folder and open the <i>readme.txt</i> file with an ASCII text editor.
Website	<a href="http://www.atmel.com/tools/ATMISP.aspx">www.atmel.com/tools/ATMISP.aspx</a>

## Atmel POF2JED Conversion Software

**Table 11.** POF2JED References and Support

POF2JED	From the main POF2JED window menu...
ATF15xx Conversion Application Brief	Select <i>Help &gt; Conversion Options</i> .

## Technical Support

- For technical support on any Atmel PLD-related issues, contact the Atmel PLD Applications Group at.
- Email [pld@atmel.com](mailto:pld@atmel.com)
- Hotline (+1) [408-436-4333](tel:408-436-4333)
- Online Support Form [www.atmel.com/design-support/](http://www.atmel.com/design-support/)

## Revision History

Revision	Date	Description
8961A	07/2015	Initial document release.

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## Documents / Resources

	<p><a href="#">Atmel ATF15xx-DK3-U Development Kit</a> [pdf] User Guide ATF1502AS-ASL, ATF1504AS-ASL, ATF1508ASV-ASVL, ATF15xx-DK3-U Development Kit, AT F15xx-DK3-U, Development Kit, Kit</p>
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## References

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