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Spec No: 001-64673

Spec Title: AN64673 - GETTING STARTED WITH  
AT2LP(TM)

Replaced By: NONE

## AN64673

## Getting started with AT2LP™

Author: Rama Sai Krishna Vakkantula

Associated Project: No

Associated Part Family: CY7C68300C/CY7C68301C/CY7C68320C/CY7C68321C/CY7C68013

Software Version: None

Related Application Notes: None

If you have a question, or need help with this application note, contact the author at [rskv@cypress.com](mailto:rskv@cypress.com).

This application note summarizes the features and the important documents associated with AT2LP™ family of chipsets. The document serves as a starting point for new users to get familiar with AT2LP.

## Introduction

The EZ-USB AT2LP™ (CY7C68300C/CY7C68301C and CY7C68320C/CY7C68321C) implement a fixed function bridge between one USB port and one or two ATA or ATAPI-based mass storage device ports. This bridge adheres to the Mass Storage [USB Mass Storage Bulk Only-Transport \(BOT\) specification](#). The Cypress ATA/ATAPI-6 controller can communicate with the following devices.

- IDE devices (ATA complaint)
  - 3.5", 2.5" Hard disk drives
- CompactFlash (CF) and micro drives
- ATAPI devices
  - ZIP drives
  - CD-ROM/R/RW drives
  - DVD-ROM/RAM/RW drives
  - Tape drives

## Features

- Fixed function mass storage device, which does not require any firmware.
- Allows programming AT2LP configuration files (.iic) to i<sup>2</sup>c based EEPROM.
- Low power operation with suspend current varying from 100 - 380 µA.
- General Purpose I/O (GPIO) pins can be individually configured as Input or Output mode.

- Certified as USB 2.0 compliant (TID# 40490119) by [USB.org](#)

- 3.3 V operation with 5 V tolerant inputs
- Available in space saving 56-pin packages

## ATA-ATAPI-6 Standard features support

- Complies with ATA-ATAPI-6 specification
- Supports ATA security features, ATAPI serial number VPD page retrieval and an optional Content Security Management interface (CSM) for Digital Rights Management (DRM) compatibility.
- Supports data transfer modes like PIO mode-0 and 4 multiword DMA mode 2, UDMA modes 2.3 and 4.
- Supports any ATA command with the ATACB function
- Supports mode page 5 for BIOS boot support
- ATA interface IRQ signal support
- Supports one or two ATA, ATAPI devices
- Supports CompactFlash and one ATA/ATAPI device. When using a CF device, the CF is always master and the ATA or ATAPI device must be set as the slave.

## Additional Features (CY7C68320C/CY7C68321C only)

Supports an HID interface or custom GPIOs to enable features such as single button backup, power-off, LED-based notification and so on.

- 56-pin QFN and 100-pin TQFP Pb-free packages
- CY7C68321C is ideal for battery-powered designs
- CY7C68320C is ideal for self- and bus-powered designs

## Additional Features (CY7C68300C/CY7C68301C only)

- Pin-compatible with CY7C68300A (using Backward Compatibility mode)
- 56-pin SSOP and 56-pin QFN Pb-free packages
- CY7C68301C is ideal for battery-powered designs
- CY7C68300C is ideal for self- and bus-powered designs

## CY4615B – AT2LP Development Kit

The AT2LP board designed by Cypress is based on 100 pin TQFP CY7C68320C. In the initial phase of the design this board is extremely helpful for developers to understand the chip features and limitations before proceeding for a complete design. The DVK comes with support documents about board hardware, PC application software and the EEPROM configuration data (.iic) files. These documents help you to evaluate the chip features and limitations using the DVK board. The chip can be tested with several ATA-ATAPI-6 compliant devices using several EEPROM configuration files (.iic).

## Hardware Resources

The CY4615B AT2LP DVK software kit has several hardware resources to act as a guideline for you to design your own custom board. The hardware directory (in the DVK kit software) has the following major documents:

- ❑ *121-26500\_BOM\_C.pdf*: This document lists all the vendor hardware components used in designing the AT2LP DVK board.
- ❑ *Schematic AT2LP DVK\_C.pdf*: The document shows the schematic design of the DVK board.
- ❑ *PDC-9265-A.brd*: This file can be opened in PCB software (for example Allegro) to understand the via, trace lengths and so on of the AT2LP DVK board.

The document revisions under hardware directory vary with new DVK releases. Apart from DVK documents, following App notes are useful to USB system developers:

### ■ EZ-USB AT2LP™ Hardware Design Review Guide

This application note contains detailed review of important hardware circuits like RESET, crystal, EEPROM, power etc. on AT2LP DVK board (CY4615B). The document serves as a valuable guideline for customer to avoid pitfalls while designing a custom AT2LP board.

### ■ Measuring USB Signal Quality

This application note outlines problems in measuring signal quality of the USB. It helps the designer to isolate setup issues from design issues.

### ■ High-speed USB PCB Layout Recommendations

This app note describes general guidelines to be followed when designing any Cypress high speed USB 2.0 device products based on FX2LP/NX2LP/AT2LP family of chips.

## Firmware Resources

CY4615B AT2LP board is designed based on CY7C68320C. This is a fixed function device and requires only EEPROM configuration files (.iic) in the range of 170- 200 bytes to communicate with different ATA-ATAPI-6 compliant mass storage devices.

CY4611B is a reference design based on FX2LP chip which is a firmware programmable version. This firmware contains all the ATA/ATAPI-6 commands support to communicate with different storage devices. This kit is explained in detail under Reference Designs section in the document.

## Application Software Resources

### ■ Blaster.exe

This is a PC application software available in the CY4615B AT2LP DVK kit under manufacturing software directory. The AT2LP board is a fixed function device and initially requires EEPROM configuration (.iic) files with appropriate configuration information. Blaster.exe software is utilized to perform the following two major operations

- ❑ Read the configuration files already pre-programmed to on-board EEPROM
- ❑ Write the configuration file to on-board EEPROM

The Read configuration files can be modified based on certain ATA-ATAPI parameters to suit a certain type of mass storage device. After successful programming, the software pops up a small window to indicate the status. More details on how to use this software can be found in *AT2LP Blaster User's Guide.pdf* in the "Manufacturing Software" directory of the CY4615B DVK kit software.

#### ■ Primer.exe

This software tool allows you to instantly program the EEPROM configuration (.iic) files at the click of a button. The tool initially prompts you to plug-in the AT2LP device and then the EEPROM is automatically programmed with image specified as a configuration file. The status box of this software window turns yellow during programming or turns to GREEN if successful or turns to RED if otherwise. This tool does not allow you to change any of the ATA/ATAPI parameters like Blaster tool. The tool is useful for mass programming of AT2LP boards. More details on how to use this software can be found in [AT2LP Primer User's Guide.pdf](#) in the "Manufacturing Software" directory of the CY4615B DVK kit software.

## Reference Designs

#### ■ CY4611B -USB 2.0 to ATA Reference Design

Designers can test variety of storage devices using CY4615 DVK board by changing only the EEPROM configuration (.iic) files but they cannot update any Storage device related features. CY4611B reference design kit can be used to add or update features. The board that comes along with CY4611B is based on FX2LP chip, a general purpose USB 2.0 high speed device. After programming the ATA/ATAPI command processing firmware and the configuration files (.iic) combined the board emulates AT2LP (similar to CY4615B DVK board). Here, you have a choice to modify the firmware by either adding new features or modify the existing firmware logic. The reference design kit contains documents related to hardware, firmware and the application softwares useful to users while working with the board available in this kit.

#### ■ CY4651 v1.3 - Cypress and AuthenTec Reference Design for Biometric Security in External USB Hard Disk Drives

The CY4651 is a third party reference design from AuthenTec. The design uses the AuthenTec EntrePad 2510, biometric fingerprint slide sensor, and Cypress's EZ-USB FX2LP(TM) uC, the industry's most popular high-speed USB 2.0 microcontroller, which interfaces with AuthenTec's sensor and delivers data from the HDD to the host computer.

## Getting Started With DVK

The CY4615B DVK kit software includes an *AT2LP DDK Users Guide.pdf* as an initial quick start reference for system designers working with the board. The document explains how to get started with the board and different jumper setting modifications on DVK board to operate it across several mass storage devices.

## Application Notes

For AT2LP family of chipsets following is the list of documents available on the website:

#### ■ [ATA Bus Sharing with the EZ-USB AT2LP](#)

This application note explains how to share the ATA bus pins apart from the AT2LP chip. This feature makes AT2LP to easily fit into systems of different end applications.

#### ■ [Migrating from CY7C68300A\(AT2\) to CY7C68300B/C\(AT2LP\)](#)

This application note discusses the hardware and some of the EEPROM configuration changes needed to be done when end customer designs switch from older AT2 chipsets to newer AT2LP. The AT2LP is an enhanced version of older AT2 series. There are very few schematic changes that needs to be done since both series of chipsets are pin-to-pin compatible.

#### ■ [Multiple IDE Drives Access using AT2LP](#)

This application note explains the hardware set up and PC software configuration process required to access more than one hard drive using AT2LP. The app note uses AT2LP DVK board(CY4615B) and a 80 conductor IDE cable to interface two self powered hard drives to AT2LP. With this entire set up when AT2LP board is connected to PC using a USB cable, you can have access to all the logical partitions available in both the drives simultaneously.

#### ■ [EZ-USB AT2LP\(TM\) Features - AN5071](#)

This application note provides a detailed overview of the hardware features and the ATA/ATAPI-6 standard features supported by AT2LP.

#### ■ [AT2LP Revision: C Reset Issue and Workaround](#)

This application note explains a hard drive hang-up failure seen during boot time (or) soft reset in AT2LP Rev C chipsets. The note suggests a workaround on how to modify the RESET duration of AT2LP using Blaster tool software.

## Summary

The AT2LP family of Cypress chipsets is supported by several documents in the form of development kit collateral, reference designs and application notes. The kits are supported with well defined documentation to make it easier for customer to perform hands-on application development and testing with the boards. Also the Cypress website contains several **USB Knowledge Base articles** to resolve customer queries. Cypress also provides **Technical support** through cypress.com to assist customers at various stages of the product from concept to production.

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## Document History

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**	3057572	NMMA	10/28/2010	New Application Note.
*A	4174046	RSKV	10/25/2013	Updated in new template. Completing Sunset Review.
*B	5542693	RAJV	12/05/2016	Obsolete document. Completing Sunset Review.

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