THIS SPEC IS OBSOLETE

Spec No: 001-67823

Spec Title: MIGRATING FROM EZ-USB(R) FX(TM) TO EZ-USB FX1 - AN5063

Replaced By: NONE

AN5063

Migrating from EZ-USB® FX™ to EZ-USB FX1

Author: Prajith Cheerakkoda
Associated Project: No
Associated Part Family: NA
Software Version: NA
Related Application Notes: None

To get the latest version of this application note, or the associated project file, please visit http://www.cypress.com/go/AN5063.

This application note is intended for developers who are moving their existing CY7C64613 design to the new CY7C6471314 EZ-USB® FX1™ device, the next-generation full-speed USB microcontroller offered by Cypress. This application note highlights the differences between the two products and contains a brief description of the collateral available.

Contents

Introduction

The CY7C64713/14 FX1 is the next-generation full-speed USB chip offered by Cypress. The FX1 offers developers increased design flexibility and also provides an improved set of development tools and general-purpose driver.

With the introduction of the FX1, developers will want to update future revisions of their design to take advantage of the FX1. The FX1 however is not a drop-in replacement for the FX family. The FX1 and the FX do not share all of the same features. Also, in addition to required firmware modifi-cations, developers must also consider that the pinouts and package types vary between the two families. This application note is intended to provide guidance on design elements to consider while redesigning an existing FX appli-cation for the FX1.

Packaging

Table 1 lists the available FX1 parts by pin and package type. As not all features are available in all pin out packages, the features brought out by the various pin and package types need to be considered during your redesign. The FX1 data sheet will need to be consulted to ensure the features you need are available in the pin and package option you are considering.

Table 1. FX1 Packages

Ideal for battery powered applications	
CY7C64714-128AXC	128 TQFP – Lead-Free
CY7C64714-100AXC	100 TQFP – Lead-Free
CY7C64714-56LFXC	56 QFN – Lead-Free
Ideal for non-battery powered applications	
CY7C64713-128AXC	128 TQFP - Lead-Free
CY7C64713-100AXC	100 TQFP - Lead-Free
CY7C64713-56LFXC	56 QFN - Lead-Free

Table 2 provides a brief feature comparison between the FX family and the FX1 part. Again, the FX1 data sheet should be consulted to verify that the feature you need, or the FX1 equivalent feature, is available in the pin and package part you are considering to use in your redesign. FX1 features that can be used in place of FX features not available with the FX1 are discussed later in this application note.

Table 2. FX to FX1 Feature Comparison by pinout

Feature	CY7C64613	FX1
RAM	8K	16K
ISO support	Yes	Yes
Endpoints	52-pin PQFP: 18 80-pin PQFP: 32 128-pin PQFP: 32	All packages have 4 configurable endpoints with double, triple and quad buffering options. 1 additional 64-byte endpoint
Data bus	Available in the 128-pin PQFP package	Available in the 128-pin TQFP package
Program-mable I/Os	128-pin PQFP: 40 80-pin PQFP: 32 52-pin PQFP: 18	128-pin TQFP: 40 100-pin TQFP: 40 56-pin QFN: 24

Hardware Considerations

As previously mentioned, the FX1 is not a drop-in replacement for the FX family. The two families are not offered in the same package sizes and the parts are not pin-to-pin compatible. A new layout for the USB portion will be required during the conversion. A benefit of a new layout is that the FX1 is fit, form, and function upgradeable to the FX2LP™, enabling a rapid conversion to high-speed USB, if desired in the future.

While not necessary, but because a FX1 design is easily converted to a USB high-speed design, Cypress recom-mends that developers design the layout with the stricter requirements of a high-speed design. Sections 7.1.6.1 and 7.3.2 of the USB 2.0 Specification describe electrical design requirements. The following component changes are required when converting to the FX1:

- **Crystal**: 24-MHz, 12-pF load capacitance (see the Con-verting From EZ-USB FX2™ to EZ-USB FX2LP™ application note for information on using other load capacitance values).
- **Series Termination Resistors**: The series termination re-sistors on D+ and D– are not required, as they are internal to the FX1.

The development kit includes schematics, PCB layout files, and a BOM that are used to assemble the development board. These files are provided to assist developers with their design. Note, however, that the data sheet should always be consulted for proper pin connections instead of the devel-opment board schematic.

In addition to information available in the USB Specification, that should be consulted for any design, the following application notes are available to assist developers:

- EZ-USB FX2 PCB Layout Rec-ommendations
- High Speed USB PCB Layout Recommendations

Also available at usb.org:

- Intel® High Speed USB Platform Design Guidelines

Tools

An improved set of development tools are provided with the FX1 development kit. The only common tool shared between the FX and the FX1 is the Cypress utility hex2bix. A brief discussion of the new tools is provided below. Additional infor-mation, such as a tutorial and help files, are included with the development kit. The developer will find it beneficial to, at a minimum, review the tutorial in the development kit prior to using the development tools.

CY3674 Development Kit

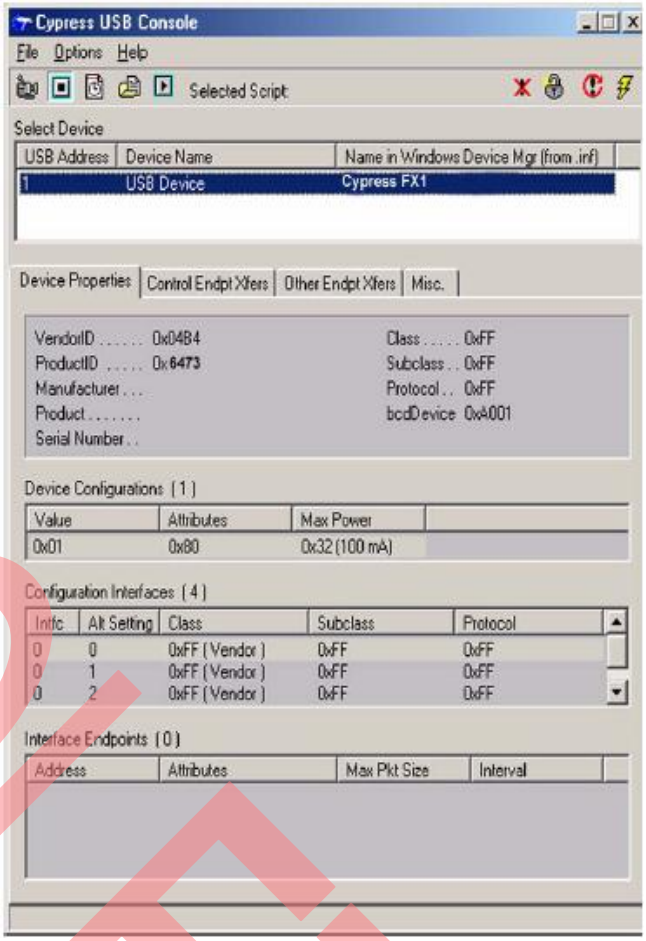
The CY3674 Development Kit is the primary development tool used with the FX1. Developers who previously used the CY3671 for the FX family will find familiar features with the new development tools such as host and firmware examples including source code, two serial ports, 64K of RAM, debug LEDs and options to select various memory models. While providing the same basic look and feel as the tools in the CY3671, the CY3674 Development kit includes an improved general-purpose driver, as well as an improved and easier to use API for host application development. While not recommended, developers do have the option of using the devel-opment tools provided with the CY3671 — the EZ-USB Control Panel, ezusb.sys etc. — with the FX1. Using the older tools requires the FX1 default VID/PID combination to be added to ezusbw2k.inf and for the user to select FX2 vice “EZ-USB & FX” in the Target Window of the EZ-USB Control Panel.

The CY3674 Development Kit will install in the same directory structure as the CY3671 development kit tools did. The CY3674 Development Kit install program will detect the older tools and prompt you to remove them prior to installing the newer tools. You may want to rename or otherwise save the folders of the older tools before installing the CY3674 Devel-opment Kit.

CyConsole

The CyConsole is the new host application used for basic communication with the FX1 in place of the EZ-USB Control Panel during development. The CyConsole offers two user interfaces - the standard CyConsole interface and the EZ-USB Interface. The EZ-USB interface is an enhanced version of the classic EZ-USB Control Panel. The CyConsole and the EZ-USB Interface bind to the cyusb.sys driver. Figure 1 and Figure 2 are screen captures showing the two available user interfaces. Detailed user documentation is provided with the development kit.

Figure 1. Cypress USB Console



cyusb.sys

The cyusb.sys is the general-purpose driver provided with the development kit. Unlike the ezusb.sys driver, the cyusb.sys driver is WHQL certifiable, supports power management levels S1-S4 and supports scripts processing. Script processing provides the ability to download firmware at device connection similar to the EZLoader firmware loader driver.

Keil® µVision

The FX1 continues to use the Keil µMicrovision tools for development. A debug monitor is automatically loaded via script when the default VID/PID combination is reported at device connection.

Firmware Frameworks

Firmware developed for the FX family must be modified for use with the FX1. The two parts do not share register names or addresses, furthermore, some registers in the FX family do not exist in the FX1.

The “Endpoint FIFO Architecture of EZ-USB FX1/FX2” appli-cation note should be considered essential reading as it describes in detail the FIFO architecture of the EZ-USB FX1. Further discussion in this application note assumes the reader has read the “Endpoint FIFO Architecture of EZ-USB FX1/FX2” application note.

Cypress Frameworks

As with the FX family, Cypress provides a firmware frame-works for the FX1 that we recommend to be included with each design. While the file names are unchanged, the framework files, fw.c and periph.c, files used with the FX family will not work with the FX1. Equivalent FX1 frameworks files are located in the Cypress\USB\Target\FW directory after installing the CY3674 Development Kit tools.

Include Files

The basic include files used with an FX project must also be changed when converting to the FX1. The new include files to use are:

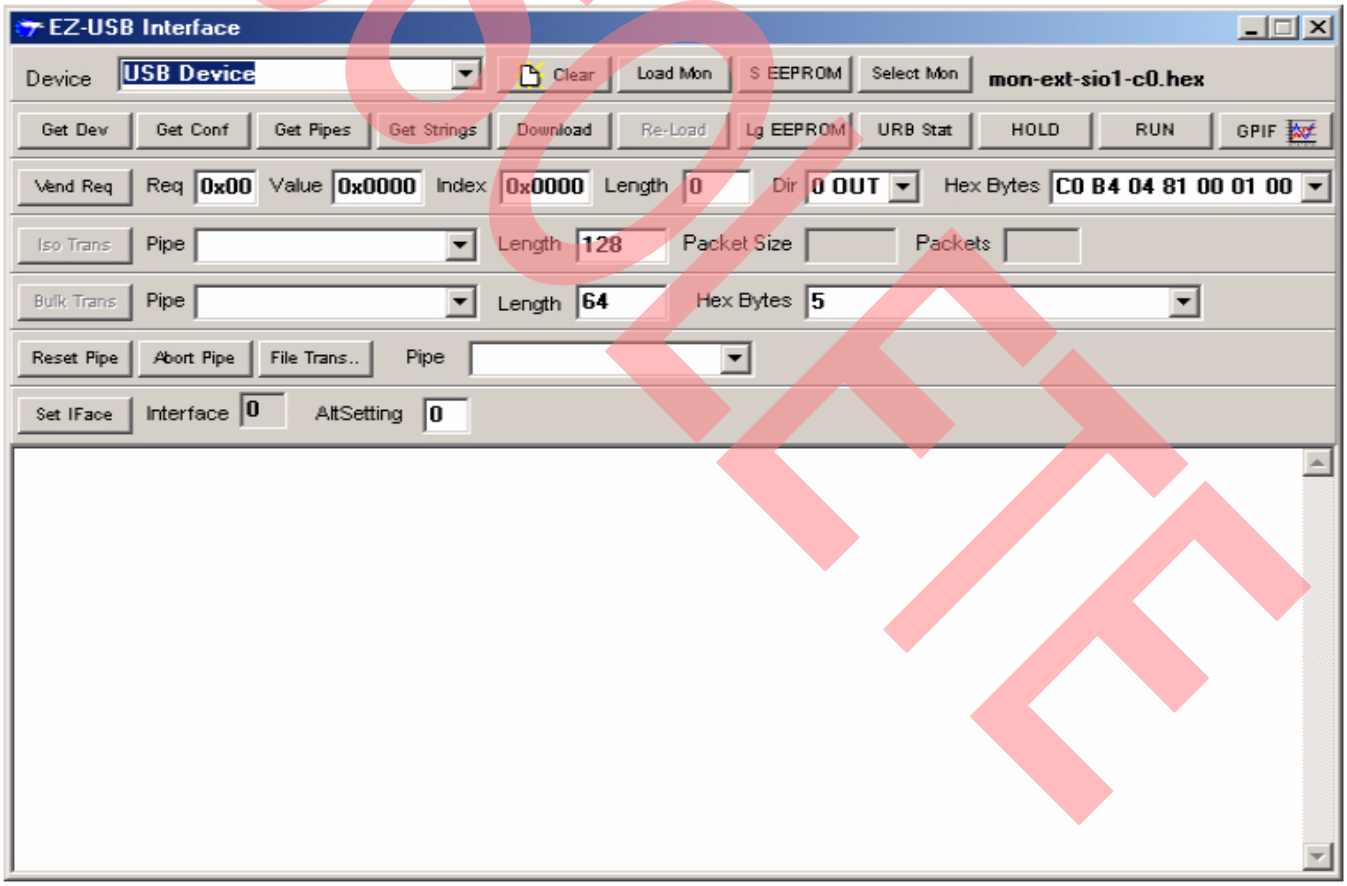
fx2.h: This file replaces and provides the same functionality as did ezusb.h for the FX family.

fx2regs.h: This file replaces and provides the same function-ality as ezregs.h and Fx.h or the FX1.

syncdly.h: “syncdly.h” is a file not previously needed with FX family projects. This file keeps timing synchronized when accessing certain registers identified in section 15.15 of the Technical Reference Manual.

These framework files are located in the Cypress\USB\Target\Inc folder after installing the CY3674 Development Kit tools.

Figure 2. EZ-USB Interface



Library Files

When converting a FX family project to the FX1 the library and jump table files must also be replaced. Like with the FX family, the library for the FX1 is built using the Small memory model. Cypress provides the source code for library files enabling the developer to rebuild the library to either the Compact or Large memory models as required by their particular application. These files are located in the Cypress\USB\Target\lib directory after installing the CY3674 Development Kit.

Features

While the FX family and the FX1 share some of the same basic features — I2C interface, Timers/Counters and the Serial Interface — there are FX features that do not exist on the FX1. In the case where a feature of the FX family does not exist on the FX1, a possible solution to consider using the enhanced FX1 features are included.

FX Design using the DMA Feature

The DMA feature of the FX is not available with the FX1. The DMA feature allowed for data transfer without 8051 inter-vention. The FX1 accomplishes this functionality using either the GPIF (in Auto mode) or the Slave FIFO interface.

The choice between using GPIF or the Slave FIFO feature depends on how an existing application connects the external component to the FX. The FX1 GPIF feature would be used where the external component acts as a slave. The FX1 Slave FIFO feature is used when the external component acts as the master. The Slave FIFO feature is easier to use than the GPIF feature so if the external component can act as either a master or slave device, we suggest using the external component as the master and the FX1 as the slave. Figure 3 and Figure 4 compare the data path for both IN and OUT transfers with the FX using DMA and the FX1 using the GPIF or Slave FIFO method.

Figure 3. FX DMA Data Path vs. FX1 Data Path IN Transfers

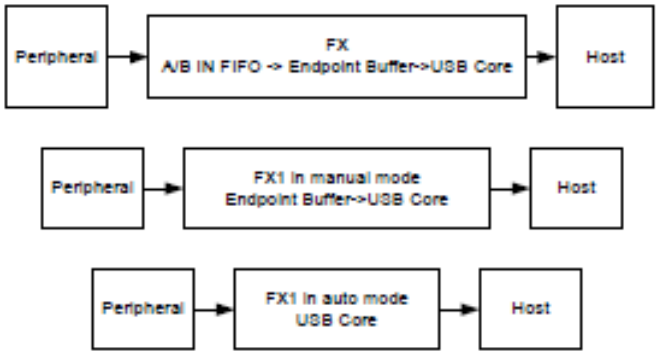
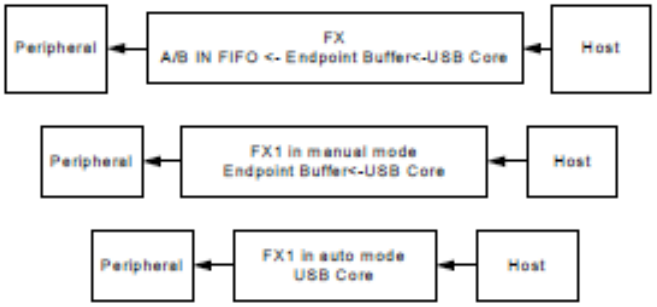


Figure 4. FX DMA Data Path vs. FX1 Data Path OUT Transfers



Available examples using these features to assist with project conversions via our web site, development kit, or web based support system request:

- GPIF Long Transfer
- GPIF Single Burst
- Slave FIFO
- Slave FIFO Programmable Flag
- Slave FIFO Source OUT

Available Application Notes/Tools to assist with project conversions via our web site or development kit:

- FX2 GPIF Primer
- Implementing an 8-Bit Asynchronous Peripheral Interface Utilizing the EZ-USB FX GPIF/Slave FIFOs
- Introduction to the EZ-USB FX2 GPIF Engine
- FX2 GPIF Flow State Feature for UDMA
- GPIF Designer

Port I/O

Applications using only the PORT I/O functionality will be the easiest applications to convert. These designs require the frameworks changes previously mentioned and appropriate syntax changes to the user code.

I2C Interface

The I2C interface is identical between the FX and the FX1. Applications using the I2C interface will still require the frame-works changes previously mentioned.

The FX1 uses a first byte of either C0 or C2 instead of the B4 and B6 used for the FX. A C0 first byte indicates VID/PID/DID information will be obtained from the EEPROM.

Applications using a first byte of B6 in the serial EEPROM to indicate a firmware download will use a C2 as the first byte to indicate a firmware download.

An 8th byte, the EEPROM Configuration Byte, available with the FX1, must be included in the serial EEPROM for both C0 and C2 first byte configurations. The EEPROM Configuration Byte is used to set the I2C bus speed and also provides the developer control of the “connect state” of the device. Detailed information on the EEPROM Configuration Byte is found in section 3.5 of the Technical Reference Manual.

Endpoints

As shown in Table 1, the FX1 has fewer endpoints than the FX family. Existing designs using more endpoints than available with the FX1 will need to share endpoints. One suggestion is to have the Host application either assign or read a first byte ID of the packet to signify destination or source. The FX1 firmware either reads or assigns a first byte ID of the packet to determine source or destination. Feasibly, only 1 endpoint in each direction is needed in this scenario.

New Features

The following is a brief discussion of new features that the FX developer may not be familiar with. Each feature discussed indicates where additional detailed information can be found.

Additional On-part RAM

The FX1 offers 16K of on part RAM vice the 8K offered in the FX. Developers should take this additional on board RAM into consideration when converting their designs, a memory mapping change may be needed or a requirement for additional external memory may be eliminated. Additional information on FX1 memory is found in Chapter 5 of the Technical Reference Manual.

GPIF Engine

The GPIF is an internal master to the FX1 endpoint FIFOs and replaces external logic which might otherwise be needed to interface the FX1 with the outside world. The FX1 GPIF is conceptually identical to the FX GPIF feature.

Table 3 provides a brief comparison of GPIF pins between the FX and the FX1.

Table 3. FX vs. FX1 GPIF Pin Description

PIN	Description	FX	FX1
ADR[5:0]	Address outputs	O	
GDA[7:0]	Bidirectional A-FIFO data bus	I/O	
GDB[7:0]	Bidirectional B-FIFO data bus	I/O	
CTL[5:0]	Programmable control outputs	O	O/Hi-Z
RDY[5:0]	Sampleable ready inputs	I	I
FD[15:0]	Bidirectional FIFO data bus		I/O/Hi-Z
GPIFADR[8:0]	Address outputs		O/Hi-Z
IFCLK	Interface clock		I/O
GSTATE[2:0]	Current GPIF state number (for debug)		O/Hi-Z

As indicated by Table 3, the FX1 provides an increase in address outputs to 9 from 6, a single configurable 8- or 16-bit bidirectional data bus, a debug tool to identify current GPIF state and the ability to select an internal 30- or 48-MHz clock.

GPIF Enhancements

Re-executing Control Task

The FX1 GPIF introduces the ability to re-execute a control task within a Decision Point state every time the RDYx input is sampled. This feature can be used to burst a large amount of data without passing through the Idle State. This feature is enabled via the GPIF Designer Tool.

TC Expire not RDY5

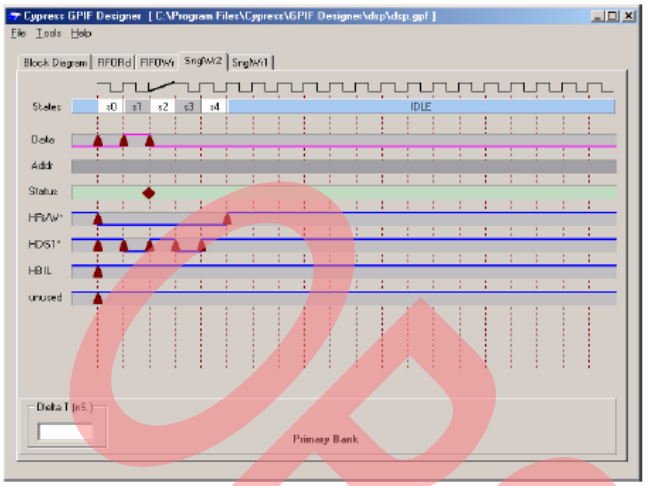
The FX1 adds the ability to sample a “Transaction Count Expired” signal in place of RDY5 as one of the two signals that can be sampled in a State Instruction. This feature allows the Transaction Counter to be used without passing through the Idle State after each transaction. This feature is enabled by setting GPIFREADYCFG.5 to 1 causing the RDY5 input to be replaced with the transaction-count expiration flag. This feature is used for FIFO transactions and is not intended to be used for single transactions.

Transaction Counter

The Transaction Counter for the FX1 is 4 Bytes long, allowing up to 4,294,967,295 transactions instead of a maximum of 64 with the FX.

GPIF Designer

The Cypress utility GPIF Designer is the recommended tool to use when creating waveforms. This tool provides a GUI approach that facilitates quick wave form designing and subsequent code generation.



In addition to the GPIF resources mentioned earlier, the following examples are available demonstrating how to interface the FX1 with other components and in creating waveforms:

- GPIF User's Guide - included with GPIF Designer
- DSP Design Example - included with GPIF Designer
- 16-bit Interface to External Synchronous Cypress FIFO CY7C4625-15AC - included with GPIF Designer

Chapter 10 of the Technical Reference Manual provides a detailed description of the GPIF feature.

Error-Correcting Codes (ECC) Generation

The FX1 can calculate ECCs on data that passes across its GPIF or Slave FIFO interfaces. The ECC can correct any one-bit error or detect any two-bit error. To use this feature the GPIF or Slave FIFO interface must be configured for byte-wide operation. Two configurations are available:

- Two ECCs, each calculated over 256 bytes
- One ECC calculated over 512 bytes

Chapter 15 of the Technical Reference Manual provides additional details and example usage for this feature.

Additional Support Resources

In addition to the examples, application notes, and Cypress utilities already mentioned, Cypress offers the following resources to help a developer with the transition to the FX1.

Training Presentations

- CY7C64713 - 101: IC Overview
- CY7C64713 - 201: Block Function description
- CY3674-101: DVK Overview
- CY4604 - 101: CyConsole Overview
- CY4604 - 201: CyConsole Features
- CY4604 - 202: CyConsole Installation

CyPros Certified Consultant Program

CyPros is an expansion of our customer-design support network providing customers with access to engineering and development resources to help speed their systems from design to production. The CYPros certified consultants program maintains a list of independent consultants that have been certified and have demonstrated competence in Cypress products insuring that only consultants with the best skill sets are available to our customers.

KnowledgeBase Articles

Extensive KnowledgeBase articles are available that can answer many common questions regarding various aspects for all USB products offered by Cypress.

Discussion Boards

Discussion boards on the Cypress web site provide the opportunity to connect with other customers and product experts to discuss Cypress Products and Technologies. The different discussion boards include Programmable System on a Chip (PSoC™), Universal Serial Bus (USB), Network Search Engines (NSE). Each discussion board is split into multiple subcategories.

Technical Support

A web based technical support system is available to provide answers to technical questions. The web based support system allows you to track your support case at any time and to receive an e-mail notification when updates are posted to your case.

Conclusion

Because the USB controller and layout are changed, the device will require a new certification test to be completed in order to continue using the USB logo.

This application note has introduced the reader to the differences between the FX and the FX1. Although there are many changes required when redesigning to the FX1, as discussed in this application note, Cypress offers an array of support material to assist in with the redesign.

As with the FX family, the FX1 is made available with world-class development tools and software support. Visit www.cypress.com for more device details and data sheet information.

A listing of FX registers and their equivalent FX1 registers follow, the Technical Reference Manual provides details on the use of these registers and should be consulted for information on their use. Note that the listing does not include all FX1 register, for a complete list of FX1 registers consult the data sheet and the Technical Reference Manual.

FX register	Address	Default Value		FX1 register	Address	Default Value
AINDATA	7800	XXXXXXXX		EP2FIFOBUF EP4FIFOBUF EP6FIFOBUF EP8FIFOBUF	F000 F400 F800 FC00	XXXXXXXX
AINBC	7801	00000000		EP2FIFOBCH EP2FIFOBCL EP4FIFOBCH EP4FIFOBCL EP6FIFOBCH EP6FIFOBCL EP8FIFOBCH EP8FIFOBCL	E6AB E6AC E6AD E6AE E6AF E6B0 E6B1 E6B2	00000000
AINPF	7802	00100000		EP2FIFOFLGS EP4FIFOFLGS EP6FIFOFLGS EP8FIFOFLGS	E6A7 E6A8 E6A9 E6AA	00000010 00000010 00000110 00000110
AINPFPIN	7803	00000000		PINFLAGSAB PINFLAGSCD	E602 E603	00000000 00000000
BINDATA	7805	XXXXXXXX		EP2FIFOBUF EP4FIFOBUF EP6FIFOBUF EP8FIFOBUF	F000 F400 F800 FC00	XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX
BINBC	7806	00000000		EP2FIFOBCH EP2FIFOBCL EP4FIFOBCH EP4FIFOBCL EP6FIFOBCH EP6FIFOBCL EP8FIFOBCH EP8FIFOBCL	E6AB E6AC E6AD E6AE E6AF E6B0 E6B1 E6B2	00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
BINPF	7807	00100000		EP2FIFOFLGS EP4FIFOFLGS EP6FIFOFLGS EP8FIFOFLGS	E6A7 E6A8 E6A9 E6AA	00000010 00000010 00000110 00000110
BINPFPIN	7808	00000000		PINFLAGSAB PINFLAGSCD	E602 E603	00000000 00000000
ABINCS	780A	01110110		EP2FIFOIRQ EP4FIFOIRQ EP6FIFOIRQ EP8FIFOIRQ	E651 E653 E655 E657	00000000 00000000 00000000 00000000
ABINIE	780B	00000000		EP2FIFOIE EP4FIFOIE EP6FIFOIE EP8FIFOIE	E650 E652 E654 E656	00000000 00000000 00000000 00000000
ABINIRQ	780C	XXXXXXXX		EP2FIFOIRQ EP4FIFOIRQ EP6FIFOIRQ EP8FIFOIRQ	E651 E653 E655 E657	00000000 00000000 00000000 00000000
AOUTDATA	780E	XXXXXXXX		EP2FIFOBUF EP4FIFOBUF EP6FIFOBUF EP8FIFOBUF	F000 F400 F800 FC00	XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX

FX register	Address	Default Value		FX1 register	Address	Default Value
AOUTBC	780F	00000000		EP2FIFOBCH EP2FIFOBCL EP4FIFOBCH EP4FIFOBCL EP6FIFOBCH EP6FIFOBCL EP8FIFOBCH EP8FIFOBCL	E6AB E6AC E6AD E6AE E6AF E6B0 E6B1 E6B2	00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
AOUTPF	7810	10100000		EP2FIFOPFH EP2FIFOPFL EP4FIFOPFH EP4FIFOPFL EP6FIFOPFH EP6FIFOPFL EP8FIFOPFH EP8FIFOPFL	E630 E631 E632 E633 E634 E635 E636 E637	10001000 00000000 10001000 00000000 00001000 00000000 00001000 00000000
AOUTPFPIN	7811	11000000		PINFLAGSAB PINFLAGSCD	E602 E603	00000000 00000000
BOUTDATA	7813	XXXXXXXX		EP2FIFOBUF EP4FIFOBUF EP6FIFOBUF EP8FIFOBUF	F000 F400 F800 FC00	XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX
BOUTBC	7814	00000000		EP2FIFOBCH EP2FIFOBCL EP4FIFOBCH EP4FIFOBCL EP6FIFOBCH EP6FIFOBCL EP8FIFOBCH EP8FIFOBCL	E6AB E6AC E6AD E6AE E6AF E6B0 E6B1 E6B2	00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
BOUTPF	7815	10100000		EP2FIFOPFH EP2FIFOPFL EP4FIFOPFH EP4FIFOPFL EP6FIFOPFH EP6FIFOPFL EP8FIFOPFH EP8FIFOPFL	E630 E631 E632 E633 E634 E635 E636 E637	10001000 00000000 10001000 00000000 00001000 00000000 00001000 00000000
BOUTPFPIN	7816	11000000		PINFLAGSAB PINFLAGSCD	E602 E603	00000000 00000000
ABOUTCS	7818	01010010		EP2FIFOFLGS EP4FIFOFLGS EP6FIFOFLGS EP8FIFOFLGS	E6A7 E6A8 E6A9 E6AA	00000010 00000010 00000110 00000110
ABOUTIE	7819	00000000		EP2FIFOIE EP4FIFOIE EP6FIFOIE EP8FIFOIE	E650 E652 E654 E656	00000000 00000000 00000000 00000000
ABOUTIRQ	781A	XXXXXXXX		EP2FIFOIRQ EP4FIFOIRQ EP6FIFOIRQ EP8FIFOIRQ	E651 E653 E655 E657	00000000 00000000 00000000 00000000
ABSETUP	781C	00000000		IFCONFIG EP2FIFOCFG EP4FIFOCFG EP6FIFOCFG EP8FIFOCFG	E601 E618 E619 E61A E61B	10000000 00000101 00000101 00000101 00000101
ABPOLAR	781D	00000000		FIFOPINPOLAR	E609	00000000

FX register	Address	Default Value		FX1 register	Address	Default Value
ABFLUSH	781E	XXXXXXXX		FIFORESET	E604	XXXXXXXX
WFSELECT	7824	11100100		GPIFWFSELECT	E6C0	11100100
IDLE_CS	7825	10000000		GPIFIDLECS	E6C1	10000000
IDLE_CTLOUT	7826	11111111		GPIFIDLECTL	E6C2	11111111
CTLOUTCFG	7827	00000000		GPIFCTLCFG	E6C4	00000000
GPIFADRL	782A	00000000		GPIFADRL	E6C5	00000000
AINTC	782C	00000001		GPIFTCB3 GPIFTCB2 GPIFTCB1 GPIFTCB0	E6CE E6CF E6D0 E6D1	00000000 00000000 00000000 00000001
AOUTTC	782D	00000001		GPIFTCB3 GPIFTCB2 GPIFTCB1 GPIFTCB0	E6CE E6CF E6D0 E6D1	00000000 00000000 00000000 00000001
ATRIG	782E	XXXXXXXX		EP2GPIFFLGSEL EP2GPIFTRIG EP4GPIFFLGSEL EP4GPIFTRIG EP6GPIFFLGSEL EP6GPIFTRIG EP8GPIFFLGSEL EP8GPIFTRIG	E6D2 E6D4 E6DA E6DC E6E2 E6E4 E6EA E6EC	00000000 XXXXXXXX 00000000 XXXXXXXX 00000000 XXXXXXXX 00000000 XXXXXXXX
BINTC	7830	00000001		GPIFTCB3 GPIFTCB2 GPIFTCB1 GPIFTCB0	E6CE E6CF E6D0 E6D1	00000000 00000000 00000000 00000001
BOUTTC	7831	00000001		GPIFTCB3 GPIFTCB2 GPIFTCB1 GPIFTCB0	E6CE E6CF E6D0 E6D1	00000000 00000000 00000000 00000001
BTRIG	7832	XXXXXXXX		EP2GPIFFLGSEL EP2GPIFTRIG EP4GPIFFLGSEL EP4GPIFTRIG EP6GPIFFLGSEL EP6GPIFTRIG EP8GPIFFLGSEL EP8GPIFTRIG	E6D2 E6D4 E6DA E6DC E6E2 E6E4 E6EA E6EC	00000000 XXXXXXXX 00000000 XXXXXXXX 00000000 XXXXXXXX 00000000 XXXXXXXX
SGLDATH	7834	XXXXXXXX		XGPIFSGLDATH	E6F0	XXXXXXXX
SGLDATLTRIG	7835	XXXXXXXX		XGPIFSGLDATLX	E6F1	XXXXXXXX
SGLDATLNTRIG	7836	XXXXXXXX		XGPIFSGLDATLNOX	E6F2	XXXXXXXX
READY	7838	00XXXXXX		GPIFREADYCFG GPIFREADYSTAT	E6F3 E6F4	00000000 00XXXXXX
ABORT	7839	XXXXXXXX		GPIFABORT	E6F5	XXXXXXXX
GENIE	783B	00000000		GPIFIE	E660	00000000
GENIRQ	783C	00000XXX		GPIFIRQ	E661	000000XX
OUTD	7841	XXXXXXXX		IOD	B0	XXXXXXXX
PINSD	7842	XXXXXXXX				
OED	7843	00000000		OED	B5	00000000
OUTE	7845	XXXXXXXX		IOE	B1	XXXXXXXX
PINSE	7846	XXXXXXXX				
OEE	7847	00000000		OEE	B6	00000000

FX register	Address	Default Value		FX1 register	Address	Default Value
PORTSETUP	7849	00000000				
IFCONFIG	784A	00000000		IFCONFIG	E601	10000000
PORTACF2	784B	00000000		IFCONFIG	E601	10000000
PORTCCF2	784C	00000000				
DMASRCH	784F	00000000				
DMASRCL	7850	00000000				
DMADESTH	7851	00000000				
DMADESTL	7852	00000000				
DMALEN	7854	00000001				
DMAGO	7855	XXXXXXXX				
DMABURST	7857	00000100				
DMAEXTIFO	7858	XXXXXXXX				
INT4IVEC	785D	01000000		INT4IVEC	E667	10000000
INT4SETUP	785E	00000000		INTSETUP	E668	00000000
WFDESC(0)	7900	XXXXXXXX		WAVEDATA	E400	XXXXXXXX
WFDESC(127)	797F					
OUT7BUF	7B40	XXXXXXXX		EP2FIFOBUF	F000	XXXXXXXX
IN7BUF	7B80	XXXXXXXX		EP4FIFOBUF	F400	XXXXXXXX
OUT6BUF	7BC0	XXXXXXXX		EP6FIFOBUF	F800	XXXXXXXX
IN6BUF	7C00	XXXXXXXX		EP8FIFOBUF	FC00	XXXXXXXX
OUT5BUF	7C40	XXXXXXXX				
IN5BUF	7C80	XXXXXXXX				
OUT4BUF	7CC0	XXXXXXXX				
IN4BUF	7D00	XXXXXXXX				
OUT3BUF	7D40	XXXXXXXX				
IN3BUF	7D80	XXXXXXXX				
OUT2BUF	7DC0	XXXXXXXX				
IN2BUF	7E00	XXXXXXXX				
OUT1BUF	7E40	XXXXXXXX		EP1OUTBUF	E780	XXXXXXXX
IN1BUF	7E80	XXXXXXXX		EP1INBUF	E7C0	XXXXXXXX
OUT0BUF	7EC0	XXXXXXXX		EP0BUF	E740	XXXXXXXX
IN0BUF	7F00	XXXXXXXX				

FX register	Address	Default Value		FX1 register	Address	Default Value
OUT8DATA	7F60	XXXXXXXX		EP2FIFOBUF	F000	XXXXXXXX
OUT9DATA	7F61	XXXXXXXX		EP4FIFOBUF	F400	XXXXXXXX
OUT10DATA	7F62	XXXXXXXX		EP6FIFOBUF	F800	XXXXXXXX
OUT11DATA	7F63	XXXXXXXX		EP8FIFOBUF	FC00	XXXXXXXX
OUT12DATA	7F64	XXXXXXXX				
OUT13DATA	7F65	XXXXXXXX				
OUT14DATA	7F66	XXXXXXXX				
OUT15DATA	7F67	XXXXXXXX				
IN8DATA	7F68	XXXXXXXX				
IN9DATA	7F69	XXXXXXXX				
IN10DATA	7F6A	XXXXXXXX				
IN11DATA	7F6B	XXXXXXXX				
IN12DATA	7F6C	XXXXXXXX				
IN13DATA	7F6D	XXXXXXXX				
IN14DATA	7F6E	XXXXXXXX				
IN15DATA	7F6F	XXXXXXXX				
OUT8BCH	7F70	XXXXXXXX		EP2BCH	E690	00000XXX
OUT8BCL	7F71	XXXXXXXX		EP2BCL	E691	XXXXXXXX
OUT9BCH	7F72	XXXXXXXX		EP4BCH	E694	000000XX
OUT9BCL	7F73	XXXXXXXX		EP4BCL	E695	XXXXXXXX
OUT10BCH	7F74	XXXXXXXX		EP6BCH	E698	00000XXX
OUT10BCL	7F75	XXXXXXXX		EP6BCL	E699	XXXXXXXX
OUT11BCH	7F76	XXXXXXXX		EP8BCH	E69C	000000XX
OUT11BCL	7F77	XXXXXXXX		EP8BCL	E69D	XXXXXXXX
OUT12BCH	7F78	XXXXXXXX				
OUT12BCL	7F79	XXXXXXXX				
OUT13BCH	7F7A	XXXXXXXX				
OUT13BCL	7F7B	XXXXXXXX				
OUT14BCH	7F7C	XXXXXXXX				
OUT14BCL	7F7D	XXXXXXXX				
OUT15BCH	7F7E	XXXXXXXX				
OUT15BCL	7F7F	XXXXXXXX				
CPUCS	7F92	00000010		CPUCS	E600	00000010
PORTACFG	7F93	00000000		PORTACFG	E670	00000000
PORTBCFG	7F94	00000000		IFCONFIG (1:0)	E601	00
PORTCCFG	7F95	00000000		PORTCCFG	E671	00000000
OUTA	7F96	00000000		IOA	80	XXXXXXXX
OUTB	7F97	00000000		IOB	90	XXXXXXXX
OUTC	7F98	00000000		IOC	A0	XXXXXXXX
PINSA	7F99	XXXXXXXX				
PINSB	7F9A	XXXXXXXX				
PINSC	7F9B	XXXXXXXX				
OEA	7F9C	00000000		OEA	B2	00000000
OEB	7F9D	00000000		OEB	B3	00000000
OEC	7F9E	00000000		OEC	B4	00000000

FX register	Address	Default Value		FX1 register	Address	Default Value
ISOERR	7FA0	XXXXXXXX		USBERRIE	E662	00000000
ISOCTL	7FA1	0000X000				
ZBCOUT	7FA2	XXXXXXXX				
I2CS	7FA5	000XX000		I2CS	E678	000XX000
I2DAT	7FA6	XXXXXXXX		I2DAT	E679	XXXXXXXX
IVEC	7FA8	00000000		INT2IVEC	E666	00000000
IN07IRQ	7FA9	00000000		EPIRQ	E65F	00000000
OUT07IRQ	7FAA	XXXXXXXX				
USBIRQ	7FAB	XXXXXXXX		USBIRQ	E65D	00000000
IN07IEN	7FAC	00000000		EPIE	E65E	00000000
OUT07IEN	7FAD	00000000				
USBIEN	7FAE	00000000		USBIE	E65C	00000000
USBBAV	7FAF	XXX0XX00		BREAKPT	E605	00000000
BPADDRH	7FB2	00000000		BPADDRH	E606	XXXXXXXX
BPADDRL	7FB3	00000000		BPADDRL	E607	XXXXXXXX
EP0CS	7FB4	00001000		EP0CS	E6A0	10000000
IN0BC	7FB5	XXXXXXXX		EP0BCH EP0BCL	E68A E68B	XXXXXXXX XXXXXXXX
IN1CS	7FB6	00000000		EP1INCS	E6A2	00000000
IN1BC	7FB7	XXXXXXXX		EP1INBC	E68F	0XXXXXXX
IN2CS	7FB8	00000000		EP2CS EP4CS EP6CS EP8CS	E6A3 E6A4 E6A5 E6A6	00101000 00101000 00000100 00000100
IN2BC	7FB9	XXXXXXXX		EP2BCH EP2BCL EP4BCH EP4BCL EP6BCH EP6BCL EP8BCH EP8BCL	E690 E691 E694 E695 E698 E699 E69C E69D	00000XXX XXXXXXXX 000000XX XXXXXXXX 00000XXX XXXXXXXX 000000XX XXXXXXXX
IN3CS	7FBA	00000000		EP2CS EP4CS EP6CS EP8CS	E6A3 E6A4 E6A5 E6A6	00101000 00101000 00000100 00000100
IN3BC	7FBB	XXXXXXXX		EP2BCH EP2BCL EP4BCH EP4BCL EP6BCH EP6BCL EP8BCH EP8BCL	E690 E691 E694 E695 E698 E699 E69C E69D	00000XXX XXXXXXXX 000000XX XXXXXXXX 00000XXX XXXXXXXX 000000XX XXXXXXXX
IN4CS	7FBC	00000000		EP2CS EP4CS EP6CS EP8CS	E6A3 E6A4 E6A5 E6A6	00101000 00101000 00000100 00000100

FX register	Address	Default Value		FX1 register	Address	Default Value
IN4BC	7FBD	XXXXXXXX		EP2BCH EP2BCL EP4BCH EP4BCL EP6BCH EP6BCL EP8BCH EP8BCL	E690 E691 E694 E695 E698 E699 E69C E69D	00000XXX XXXXXXXX 000000XX XXXXXXXX 00000XXX XXXXXXXX 000000XX XXXXXXXX
IN5CS	7FBE	00000000		EP2CS EP4CS EP6CS EP8CS	E6A3 E6A4 E6A5 E6A6	00101000 00101000 00000100 00000100
IN5BC	7FBF	XXXXXXXX		EP2BCH EP2BCL EP4BCH EP4BCL EP6BCH EP6BCL EP8BCH EP8BCL	E690 E691 E694 E695 E698 E699 E69C E69D	00000XXX XXXXXXXX 000000XX XXXXXXXX 00000XXX XXXXXXXX 000000XX XXXXXXXX
IN6CS	7FC0	00000000		EP2CS EP4CS EP6CS EP8CS	E6A3 E6A4 E6A5 E6A6	00101000 00101000 00000100 00000100
IN6BC	7FB1	XXXXXXXX		EP2BCH EP2BCL EP4BCH EP4BCL EP6BCH EP6BCL EP8BCH EP8BCL	E690 E691 E694 E695 E698 E699 E69C E69D	00000XXX XXXXXXXX 000000XX XXXXXXXX 00000XXX XXXXXXXX 000000XX XXXXXXXX
IN7CS	7FC2	00000000		EP2CS EP4CS EP6CS EP8CS	E6A3 E6A4 E6A5 E6A6	00101000 00101000 00000100 00000100
IN7BC	7FC3	XXXXXXXX		EP2BCH EP2BCL EP4BCH EP4BCL EP6BCH EP6BCL EP8BCH EP8BCL	E690 E691 E694 E695 E698 E699 E69C E69D	00000XXX XXXXXXXX 000000XX XXXXXXXX 00000XXX XXXXXXXX 000000XX XXXXXXXX
OUT0BC	7FC5	XXXXXXXX		EP0BCH EP0BCL	E68A E68B	XXXXXXXX XXXXXXXX
OUT1CS	7FC6	00000010		EP1OUTCS	E6A1	00000000
OUT1BC	7FC7	XXXXXXXX		EP1OUTBC	E68D	0XXXXXXX
OUT2CS	7FC8	00000010		EP2CS EP4CS EP6CS EP8CS	E6A3 E6A4 E6A5 E6A6	00101000 00101000 00000100 00000100

FX register	Address	Default Value		FX1 register	Address	Default Value
OUT2BC	7FC9	XXXXXXXX		EP2BCH EP2BCL EP4BCH EP4BCL EP6BCH EP6BCL EP8BCH EP8BCL	E690 E691 E694 E695 E698 E699 E69C E69D	00000XXX XXXXXXXX 000000XX XXXXXXXX 00000XXX XXXXXXXX 000000XX XXXXXXXX
OUT3CS	7FCA	00000010		EP2CS EP4CS EP6CS EP8CS	E6A3 E6A4 E6A5 E6A6	00101000 00101000 00000100 00000100
OUT3BC	7FCB	XXXXXXXX		EP2BCH EP2BCL EP4BCH EP4BCL EP6BCH EP6BCL EP8BCH EP8BCL	E690 E691 E694 E695 E698 E699 E69C E69D	00000XXX XXXXXXXX 000000XX XXXXXXXX 00000XXX XXXXXXXX 000000XX XXXXXXXX
OUT4CS	7FCC	00000010		EP2CS EP4CS EP6CS EP8CS	E6A3 E6A4 E6A5 E6A6	00101000 00101000 00000100 00000100
OUT4BC	7FCD	XXXXXXXX		EP2BCH EP2BCL EP4BCH EP4BCL EP6BCH EP6BCL EP8BCH EP8BCL	E690 E691 E694 E695 E698 E699 E69C E69D	00000XXX XXXXXXXX 000000XX XXXXXXXX 00000XXX XXXXXXXX 000000XX XXXXXXXX
OUT5CS	7FCE	00000010		EP2CS EP4CS EP6CS EP8CS	E6A3 E6A4 E6A5 E6A6	00101000 00101000 00000100 00000100
OUT5BC	7FCF	XXXXXXXX		EP2BCH EP2BCL EP4BCH EP4BCL EP6BCH EP6BCL EP8BCH EP8BCL	E690 E691 E694 E695 E698 E699 E69C E69D	00000XXX XXXXXXXX 000000XX XXXXXXXX 00000XXX XXXXXXXX 000000XX XXXXXXXX
OUT6CS	7FD0	00000010		EP2CS EP4CS EP6CS EP8CS	E6A3 E6A4 E6A5 E6A6	00101000 00101000 00000100 00000100
OUT6BC	7FD1	XXXXXXXX		EP2BCH EP2BCL EP4BCH EP4BCL EP6BCH EP6BCL EP8BCH EP8BCL	E690 E691 E694 E695 E698 E699 E69C E69D	00000XXX XXXXXXXX 000000XX XXXXXXXX 00000XXX XXXXXXXX 000000XX XXXXXXXX

FX register	Address	Default Value		FX1 register	Address	Default Value
OUT7CS	7FD2	00000010		EP2CS EP4CS EP6CS EP8CS	E6A3 E6A4 E6A5 E6A6	00101000 00101000 00000100 00000100
OUT7BC	7FD3	XXXXXXXX		EP2BCH EP2BCL EP4BCH EP4BCL EP6BCH EP6BCL EP8BCH EP8BCL	E690 E691 E694 E695 E698 E699 E69C E69D	00000XXX XXXXXXXX 000000XX XXXXXXXX 00000XXX XXXXXXXX 000000XX XXXXXXXX
SUDPTRH	7FD4	XXXXXXXX		SUDPTRH	E6B3	XXXXXXXX
SUDPTRL	7FD5	XXXXXXXX		SUDPTRL	E6B4	XXXXXXX0
USBCS	7FD6	00000100		USBCS	E680	X0000000
TOGCTL	7FD7	XXXXXXXX		TOGCTL	E683	X0000000
USBFRAMEL	7FD8	XXXXXXXX		USBFRAMEL	E685	XXXXXXXX
USBFRAMEH	7FD9	XXXXXXXX		USBFRAMEH	E684	00000XXX
FNADDR	7FDB	XXXXXXXX		FNADDR	E687	0XXXXXXX
USBPAIR	7FDD	0X000000				
IN07VAL	7FDE	01010111		EP1OUTCFG EP1INCFG EP2CFG EP4CFG EP6CFG EP8CFG	E610 E611 E612 E613 E614 E615	10100000 10100000 10100010 10100000 11100010 11100000
OUT07VAL	7FDF	01010101		EP1OUTCFG EP1INCFG EP2CFG EP4CFG EP6CFG EP8CFG	E610 E611 E612 E613 E614 E615	10100000 10100000 10100010 10100000 11100010 11100000
INISOVAL	7FE0	00000111		EP1OUTCFG EP1INCFG EP2CFG EP4CFG EP6CFG EP8CFG	E610 E611 E612 E613 E614 E615	10100000 10100000 10100010 10100000 11100010 11100000
OUTISOVAL	7FE1	00000111		EP1OUTCFG EP1INCFG EP2CFG EP4CFG EP6CFG EP8CFG	E610 E611 E612 E613 E614 E615	10100000 10100000 10100010 10100000 11100010 11100000
FASTXFR	7FE2	XXXXXXXX				
AUTOPTRH	7FE3	XXXXXXXX		AUTOPTRH1 AUTOPTRH2	9A 9D	00000000 00000000
AUTOPTRL	7FE4	XXXXXXXX		AUTOPTRL1 AUTOPTRL2	9B 9E	00000000 00000000
AUTODATA	7FE5	XXXXXXXX		XAUTODAT1 XAUTODAT2	E67B E67C	XXXXXXXX XXXXXXXX
SETUPDAT	7FE8	XXXXXXXX		SETUPBUF	E6B8	XXXXXXXX

FX register	Address	Default Value		FX1 register	Address	Default Value
OUT8ADDR	7FF0	XXXXXXXX		EP2CFG	E612	10100010
OUT9ADDR	7FF1	XXXXXXXX		EP4CFG	E613	10100000
OUT10ADDR	7FF2	XXXXXXXX		EP6CFG	E614	11100010
OUT11ADDR	7FF3	XXXXXXXX		EP8CFG	E615	11100000
OUT12ADDR	7FF4	XXXXXXXX				
OUT13ADDR	7FF5	XXXXXXXX				
OUT14ADDR	7FF6	XXXXXXXX				
OUT15ADDR	7FF7	XXXXXXXX				
IN8ADDR	7FF8	XXXXXXXX				
IN9ADDR	7FF9	XXXXXXXX				
IN19ADDR	7FFA	XXXXXXXX				
IN11ADDR	7FFB	XXXXXXXX				
IN12ADDR	7FFC	XXXXXXXX				
IN13ADDR	7FFD	XXXXXXXX				
IN14ADDR	7FFE	XXXXXXXX				
IN15ADDR	7FFF	XXXXXXXX				
				UART230	E608	00000000
CPUCS [7:4]	7F92	0000		REVID	E60A	00000001
USBCS [bit 7]	7FD6	0		WAKEUPCS	E682	XX000101

Summary

This application note discusses the migration of CY7C64613 based design to the new CY7C6471314 EZ-USB® FX1™ based design and the considerations associated with the migration.

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Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	3183810	SSJO	2/28/2011	Created spec number for the application note to be added to spec system.
*A	4306517	PRJI	03/12/2014	Added Summary. Updated to new template. Completing Sunset Review.
*B	5652761	GAYA	03/07/2017	Obsolete document. Updated to new template. Completing Sunset Review.

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