

# GPIF II Designer - Quick Start Guide



## 1. Introduction

Welcome to GPIF II Designer - a software tool to configure the processor port of EZ-USB FX3 to connect to any external device. This application generates programmable register values in the form of a "C" program header file that can be readily integrated with the firmware application code using the FX3 firmware API framework. GPIF II Designer also provides a set of readily usable designs of standard and popular interfaces. The user can modify few parameters of such designs to customize the predefined design to suit to the users target environment. A state machine simulator displays the timing of the implemented interface.

GPIF II Designer is part of the FX3 Software Development Kit. This document provides a quick start guide for using GPIF II Designer.

## 2. Installation

GPIF II Designer is delivered as part of FX3 Software Development Kit. Download *FX3SDKSetup.exe* (Please contact your Cypress Marketing representative to get the latest version).

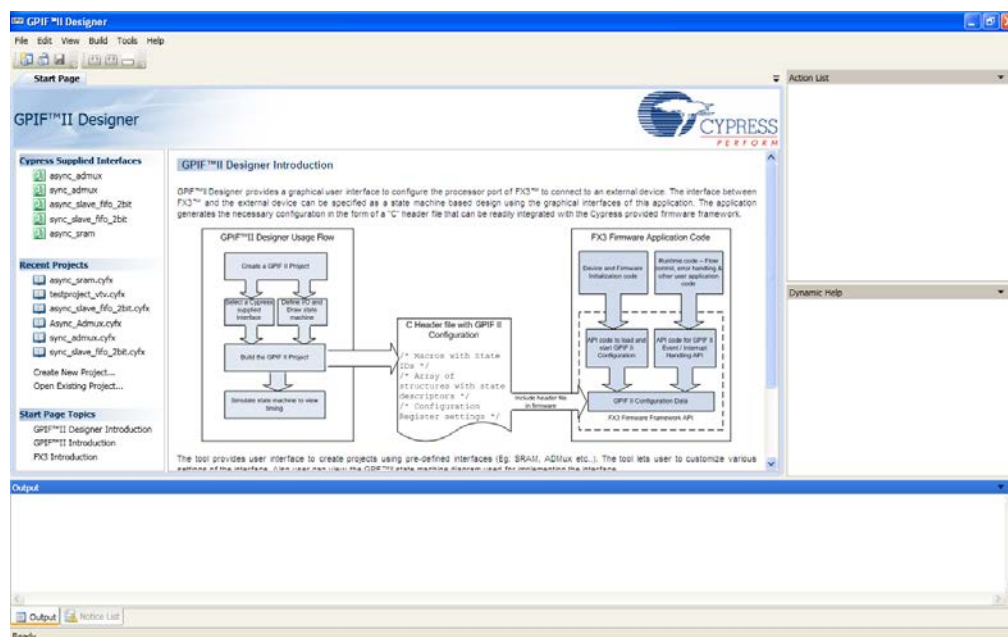
To install:

1. Run *FX3SDKSetup.exe*. Specify the Destination Path and click **[Next]**.
2. Follow instructions and click **[Next]** till the last window with **[Finish]**. The user can select the type of installation. Typical installation installs FX3 firmware framework with documentation, Eclipse, GPIF II Designer, and USB Suite for 32 bit. The user can select the required software using the Custom type of Installation.
3. Default path of installation for GPIF II Designer executable is at *C:\Program Files\Cypress\EZ-USB FX3 SDK\1.0\bin*.

## 3. Starting the Application

After the Installation, GPIF II designer application can be started from the *Cypress* folder on the Programs menu, that is, Click *Start > All Programs > Cypress > GPIF II Designer > GPIF II Designer*. This brings up the Welcome (start) page of GPIF II Designer as shown in [Figure 1](#).

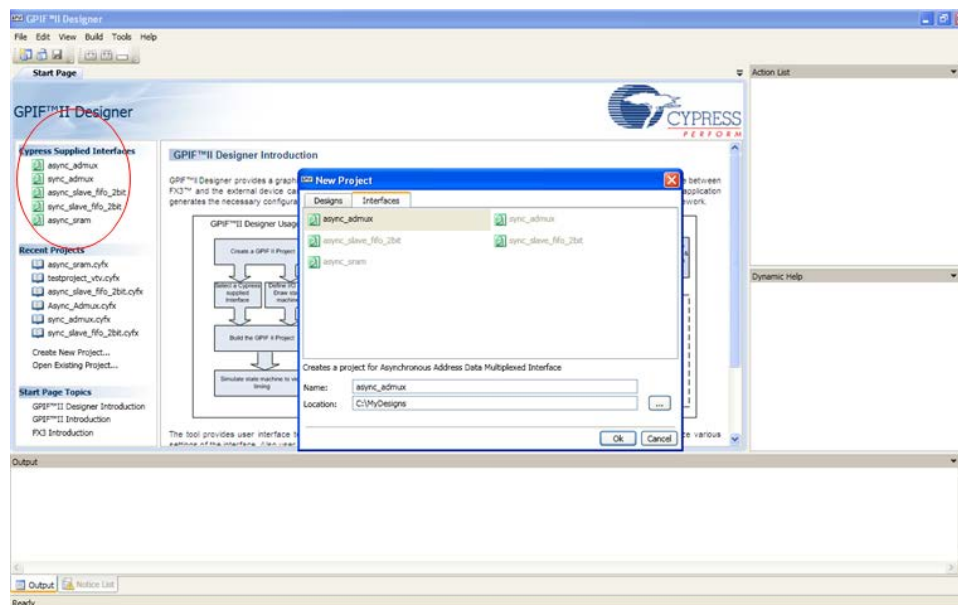
Figure 1. GPFI II Designer Start Page



#### 4. Using a Cypress Supplied Interface

GPFI II Designer provides a library of standard and popular Interfaces that can be readily used. These specially parameterized and predefined Interfaces are known as Cypress supplied Interfaces. One of the Cypress supplied Interface listed on the start page can be selected if it matches the target interface requirements.

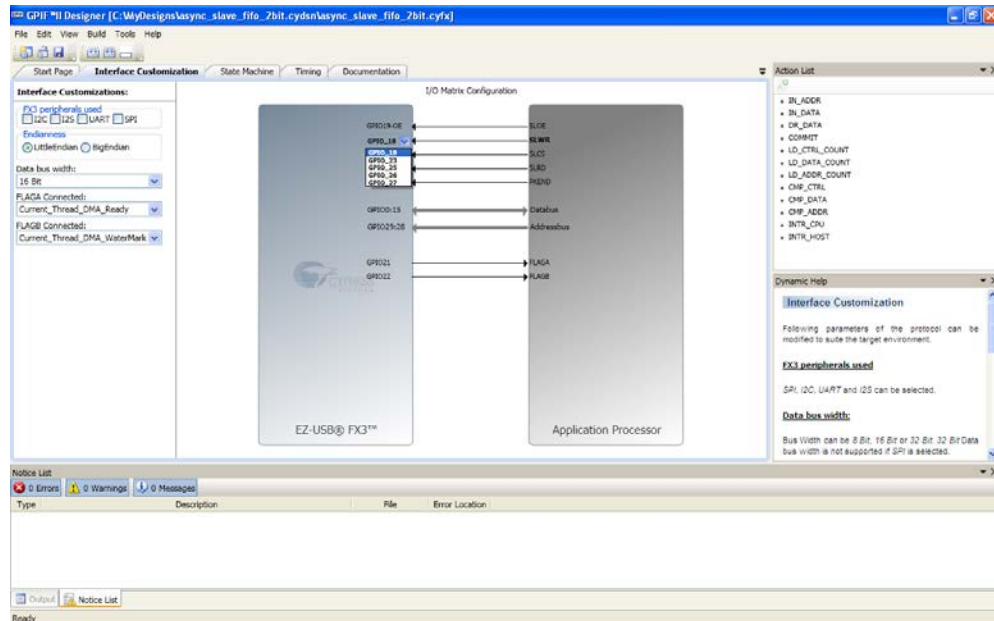
Figure 2. Start Page Showing Cypress Supplied Interfaces



The start page provides links to open Cypress supplied Interfaces. The user can click on the Interface to create a copy of the interface project for use. A graphical interface will prompt the user to enter a folder location of choice to copy the project as shown in [Figure 2](#). Enter a name for the project and the location on disk.

Once the project is created, the Interface customization window is displayed. This window provides a graphical view of the P-port external interface. The left pane shows the available customizations for the Interface opened as shown [Figure 3](#).

**Figure 3. Interface Customization Page**

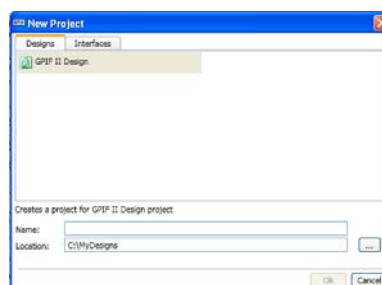


User can modify the parameters listed on left pane. Also for some of the signals the GPIO assignment can be modified by clicking on the GPIO label on the FX3.

## 5. Designing a GPIF II Interface

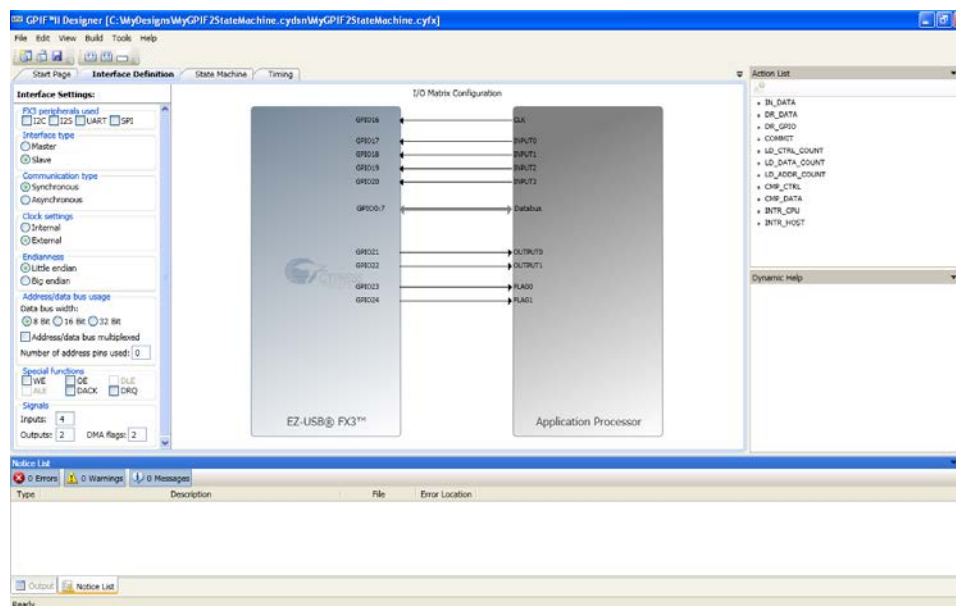
The user can define the required interface on the processor port of FX3 by entering a state machine. One can start a new project or use one of the example projects and modify. To create a new project, use the “New Project” command from the File menu. Enter a name for the project and select the location of the project to be saved on disk.

**Figure 4. New Project Dialog Box**



Once the project is created the Interface Definition Window is displayed. Enter the Interface Settings using the left pane menus. Use function key - F1 to popup detailed help.

**Figure 5. Interface Definition Window**

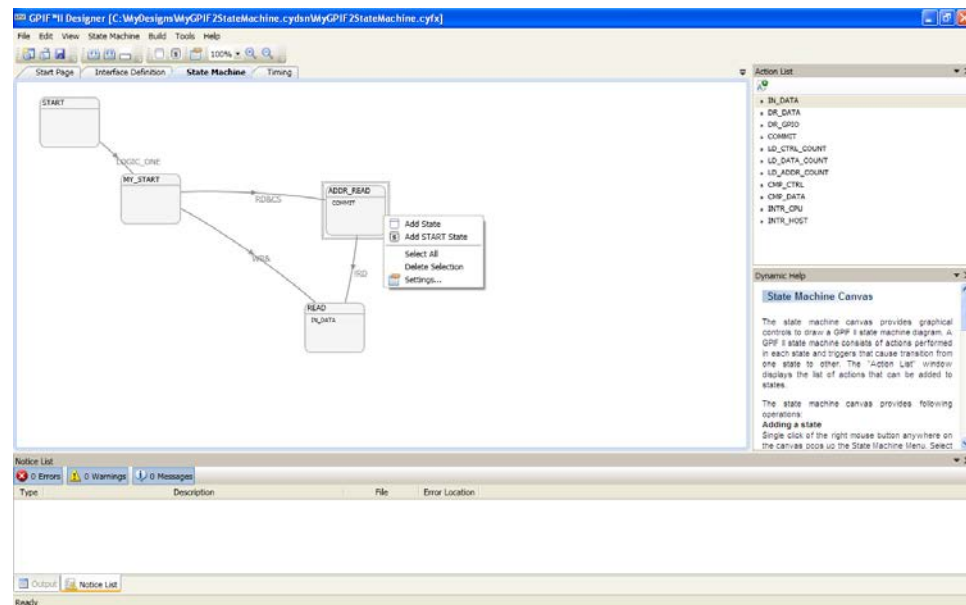


The Interface Definition Window allows users to define the I/O level external interface. The central pane of this window displays the graphical view of the FX3 P-port interface. All settings related to Interface are arranged with selectable options on the left pane. It is recommended to complete the Interface definition settings before drawing the state machine diagram.

The graphical view of FX3 external interface displays the input and output signals along with the address data bus based on the selections made by the user on the left pane. The user can double click on the signal line to bring a dialog box to configure the signal settings. Each signal can be assigned with a user defined alpha numeric name string. The tool automatically assigns an available GPIO to each signal. This assignment of a GPIO to a signal can also be modified by double clicking on the signal. The pin (GPIO) assignment to each signal also can be modified by clicking on each the GPIO label provided along with the signal. Note that signals with special functions can be modified.

After defining the Interface move to the state machine canvas using the tab on top left part of the centre pane. Add states from “Add State” command from the menu displayed with the right click of mouse. Populate each state with required actions from the menu on the right pane. Draw transitions between states and define the transition equation by double clicking on the transition line.

**Figure 6. State Machine Canvas**



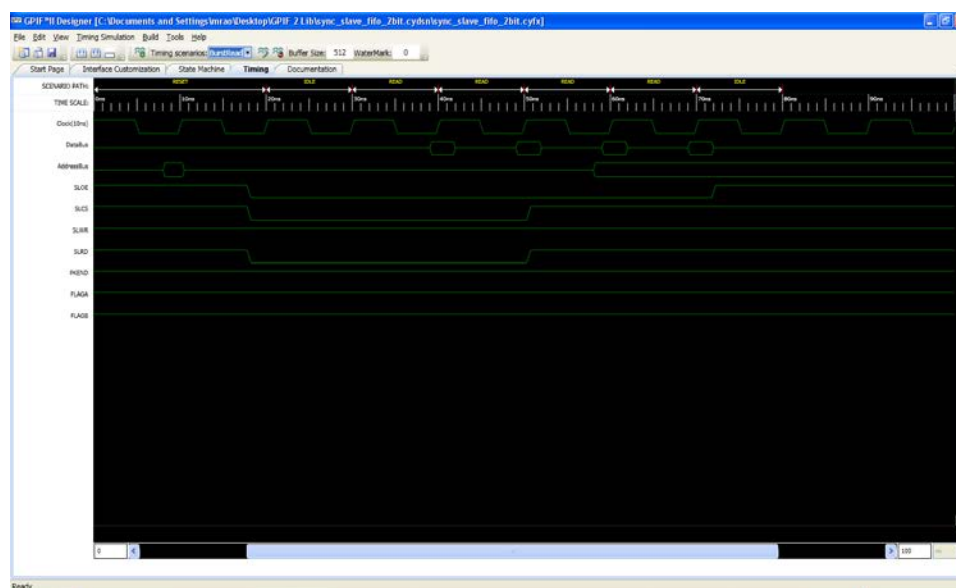
After defining the interface using the state machine use the "Build Project" command to generate the code that can be integrated to the FX3 firmware application. Code is generated a "C" header file under the project folder. The header file by default is named *cyfxgpiif2config.h*, which can be modified using the "Build Settings" command on the "Build" menu.

## 6. State Machine Simulation to View Timing Diagram

GPIF II Designer converts the state machine diagram (along with the interface settings) entered by the user to an Interface implementation of the processor port of FX3. The state machine thus corresponds to a digital signal interface. The relative timing of the signals will be definite and can be represented as a timing diagram. The relative timing of the input and output signals of a state machine implementation can be simulated in the form a timing diagram using the Timing Window.

Follow these steps to perform timing analysis:

1. Complete the Interface settings and state machine diagram. The project should be buildable without errors.
2. Select the state machine path to simulate timing and save it as Timing Scenario. The toolbar icon to create Timing Scenario is provided on the top strip of the Timing Window. The user can enter a unique name to identify the scenario. A path of the state machine can be traversed by selecting the state names appearing on the menu provided.
3. Load a timing scenario from the list. The list of saved timing scenarios is available for load on the top pane of the Timing window. The input and output signals are displayed with the minimum setup and hold time requirements as per the state machine implementation.

**Figure 7. Timing Display Using State Machine Simulator**

## 7. Integrating the Generated Header File

The generated header file contains data structures that are compliant with the EZ-USB FX3 firmware framework API. The user needs to copy the generated header file into the firmware application folder and include it in the source file. The firmware application needs to call appropriate GPIF II APIs to load and start the state machine.

A sample code snippet that configures the GPIF II interface is shown as follows.

```
/* Load the configuration into the GPIF registers. CyFxFxGpifConfig is
defined in the GPIF II designer generated header file. GpifProjName
will be replaced by the name of the users GPIF II Project name */
status = CyU3PGpifLoad (&GpifProjName_CyFxFxGpifConfig);
if (status != CY_U3P_SUCCESS)
    return status;

/* Start the operation of the GPIF II state machine. Both
GPIFPROJNAME_START and GPIFPROJNAME_ALPHA_START are defined in the
header file. */
status = CyU3PGpifSMStart (GPIFPROJNAME_START,
GPIFPROJNAME_ALPHA_START);
if (status != CY_U3P_SUCCESS)
    return status;
```

## 8. Getting Help

A comprehensive user manual explaining the usage of the tool is available on “..\GPIFII Designer\documentation” folder under the installation folder (by default the installation folder is **C:\Program Files\Cypress\**). A context sensitive help is available from the tool. The context sensitive help provides information on tool usage as well as on interfacing with the FX3 firmware. A help topic corresponding to the window on focus can be launched by pressing the function key [F1]. The help pages launched can be navigated as follows:

- Use the Contents tab to view all of the help topics in a structured table of contents
- Select Topics from the Help menu to open this help system
- Use the Index tab to find and view key topics alphabetically
- Use the Search tab to find specific topics by keywords

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