

# 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. You can modify a few parameters of such designs to customize the predefined design to suit your 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 enables you to start 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).

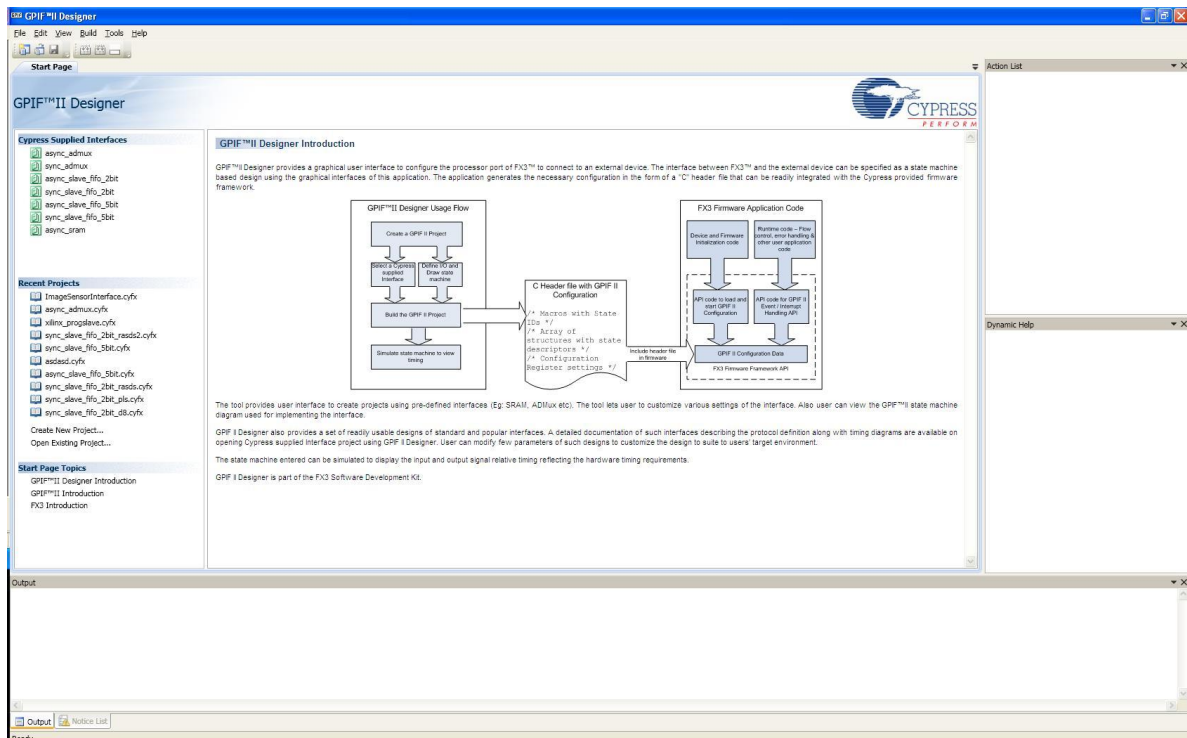
Follow these steps to install GPIF II Designer:

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

### 3. Starting the Application

After the installation, you can start GPIF II Designer applications 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](#).

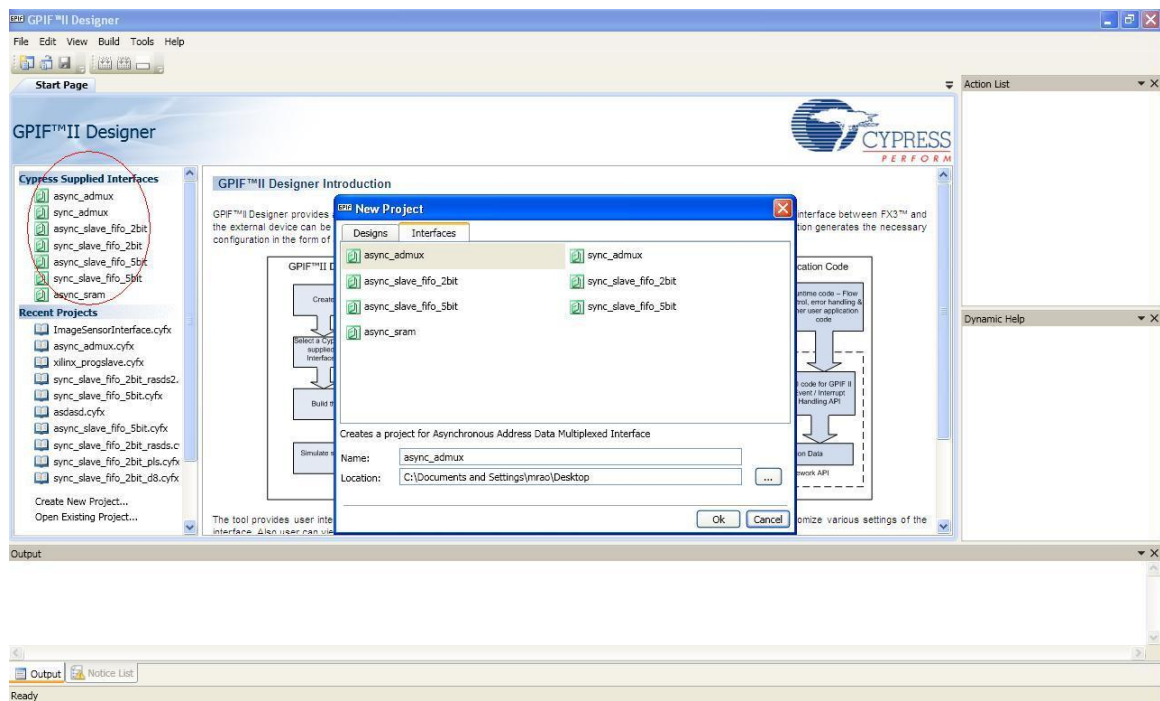
**Figure 1. GPIF II Designer Start Page**



## 4. Using a Cypress Supplied Interface

GPIF 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. You can select one of the Cypress supplied interfaces listed on the start page if it matches the target interface requirements.

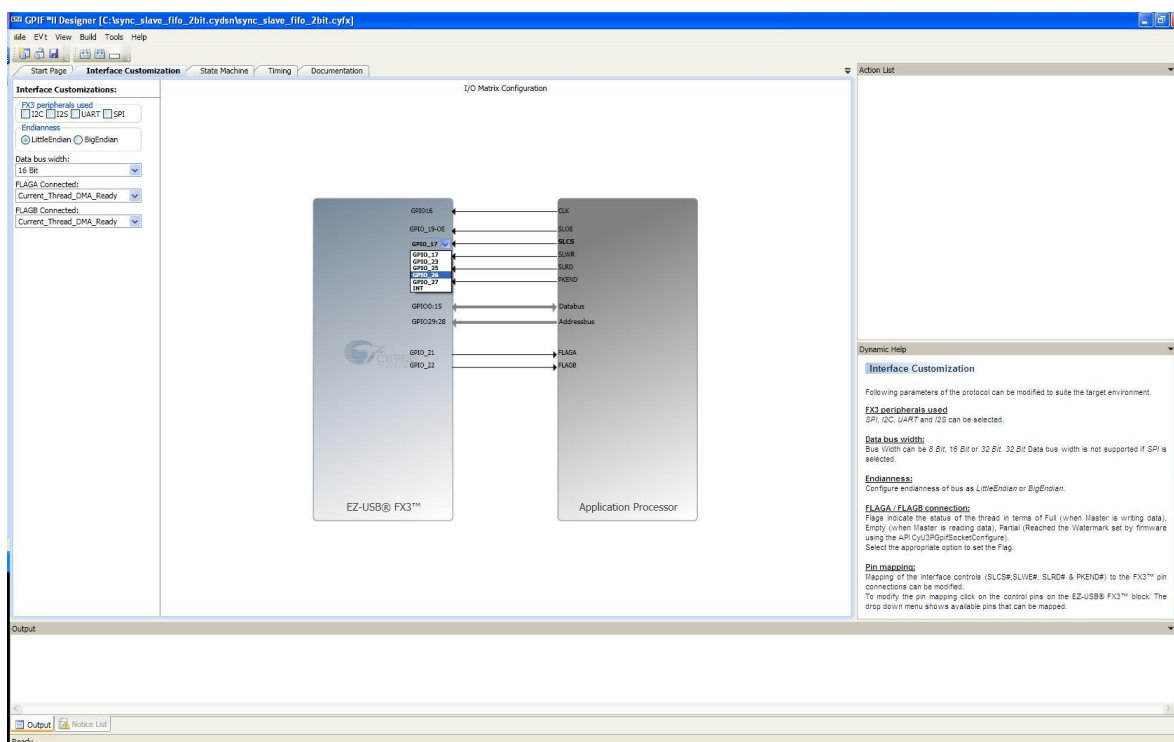
**Figure 2. Start Page Showing Cypress Supplied Interfaces**



The start page provides links to open Cypress supplied Interfaces. You can click on the interface to create a copy of the interface project for use. A graphical interface will prompt you 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.

After 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

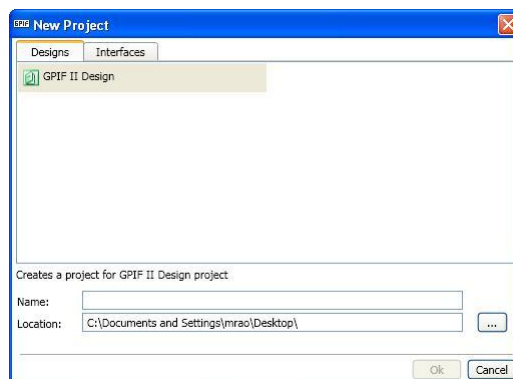


You can modify the parameters listed on the left pane. Moreover, for some of the signals, you can modify the GPIO assignment by clicking on the GPIO label on the FX3.

## 5. Designing a GPiF II Interface

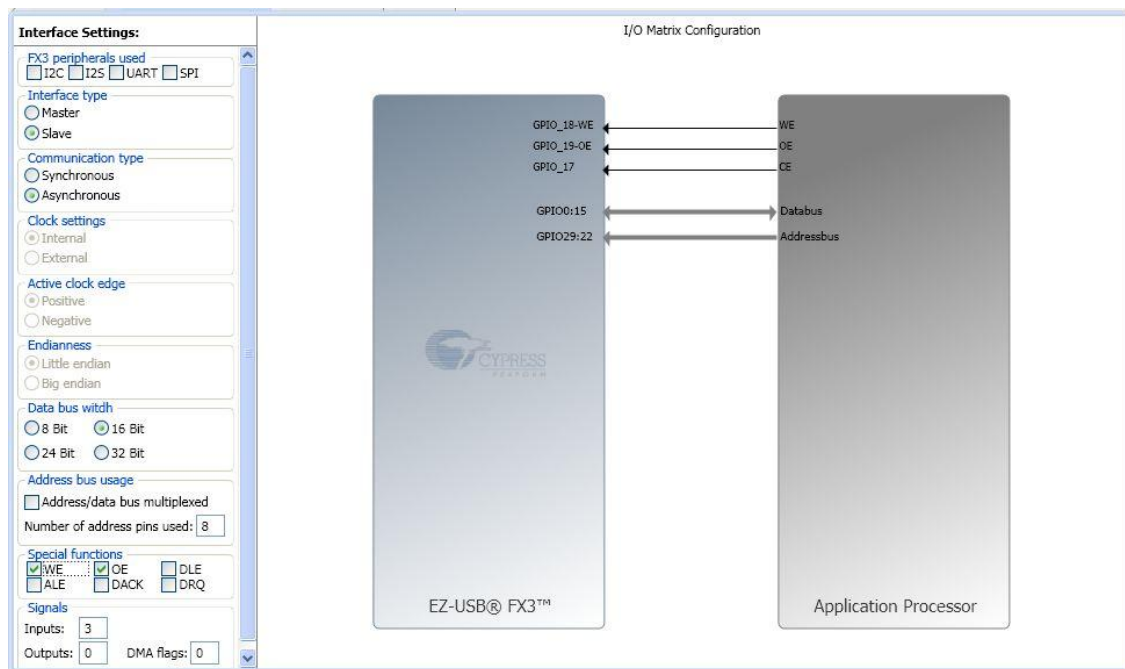
You can define the required interface on the processor port of FX3 by entering a state machine. You can start a new project or use one of the example projects and modify. To create a new project, use the **New Project** command from the **File** menu. Enter a name for the project and select the location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

Figure 4. New Project Dialog Box



After the project is created the Interface Definition Window is displayed. Enter the Interface Settings using the left pane menus. Use the function key [F1] for detailed help.

**Figure 5. Interface Definition Window**

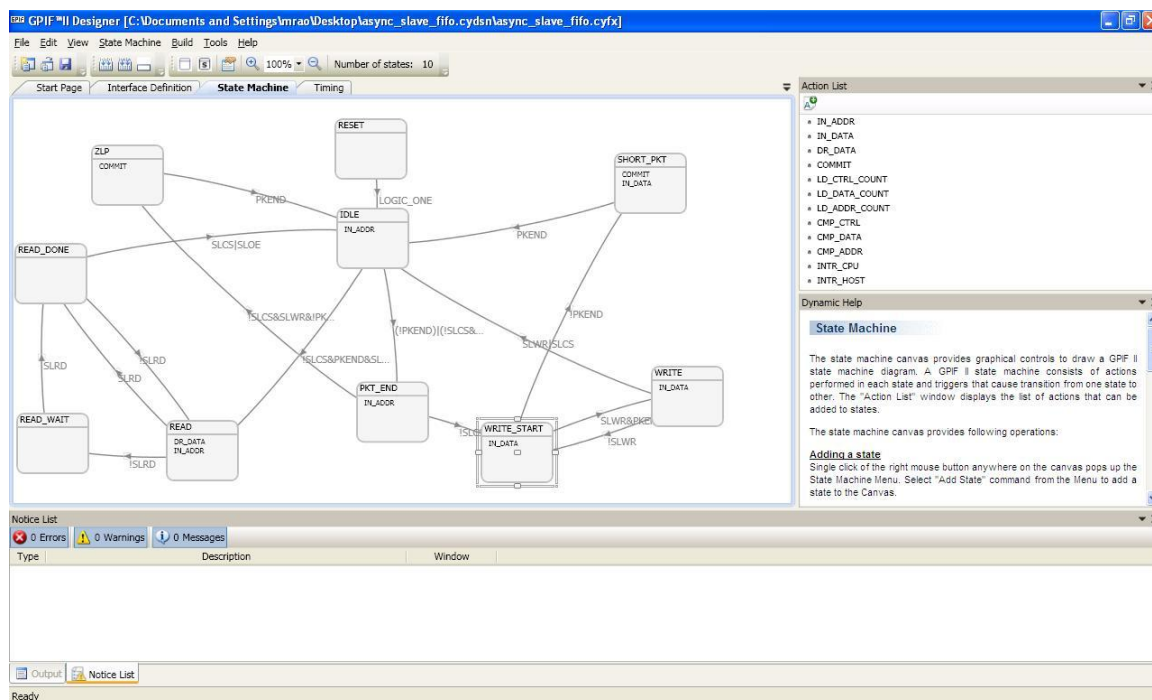


The Interface Definition Window allows you to define the I/O level external interface. The central pane of this window displays the graphical view of the FX3 P-port interface. All settings related to Interface are arranged with selectable options on the left pane. Cypress recommends that you complete 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 your selections on the left pane. You 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 alphanumeric 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 with the signal. Note that the signals with special functions can be modified.

After you define the interface, move to the state machine canvas using the tab on the top left part of the centre pane. Add states from the **Add State** command from the menu displayed with the right-click of the mouse. Populate each state with the 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. The code is generated in a "C" header file under the project folder. The header file is named *cyfxgpi2config.h* by default, which you can modify using the **Build Settings** command in the **Build** menu.

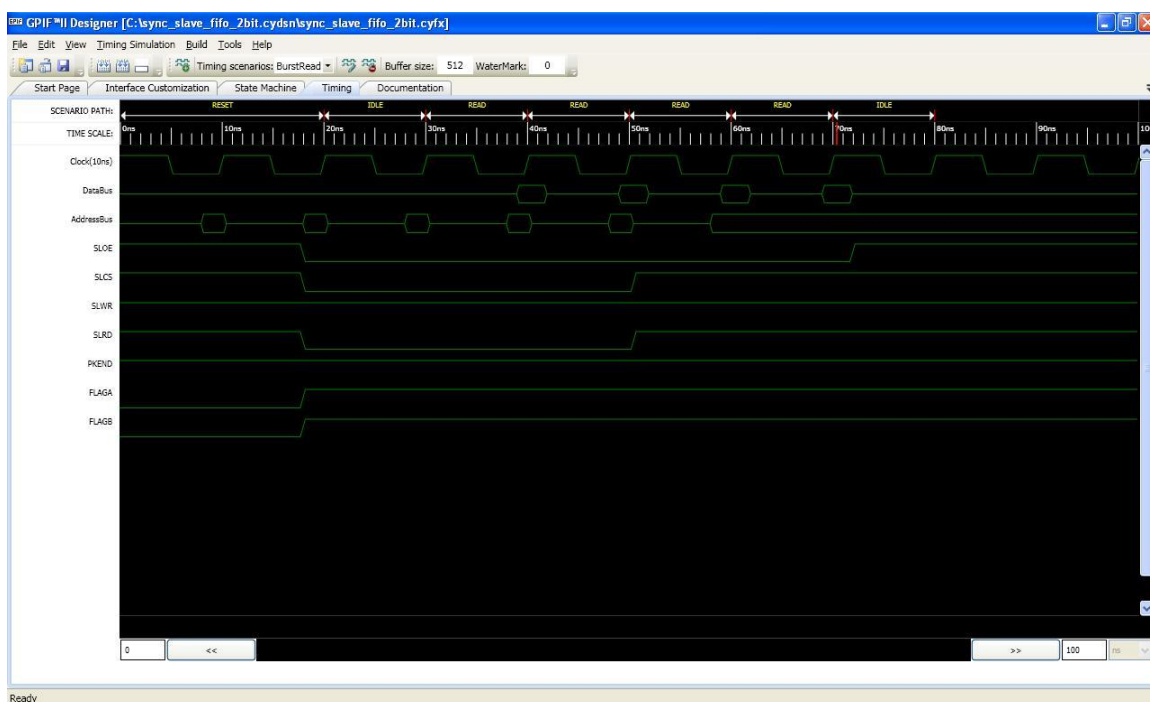
## 6. State Machine Simulation to View Timing Diagram

GPFI II Designer converts the state machine diagram (along with the interface settings) that you enter 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 a timing analysis:

1. Complete the interface settings and state machine diagram. The project should build without errors.
2. Select the state machine path to simulate the timing and save it as a Timing Scenario. The toolbar icon to create a Timing Scenario is provided on the top strip of the Timing Window. You can enter a unique name to identify the scenario. You can traverse a path of the state machine by selecting the state names appearing on the provided menu.
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 according to the state machine implementation.

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



## 7. Integrating the Generated Header File

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

A sample code snippet that configures the GPIF II interface is:

```
/* Load the configuration into the GPIF registers. CyFxGpifConfig 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 = CyU3PgipifLoad (&GpifProjName_CyFxGpifConfig);
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 = CyU3PgipifSMStart (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 at the `..\GPIFII Designer\documentation` folder under the installation folder (the default installation folder is `C:\Program Files\Cypress\`). A context-sensitive help is available from the tool. The context sensitive help provides information about the tool usage and about interfacing with the FX3 firmware. You can launch a help topic corresponding to the current window by pressing the function key [F1]. Navigate the help pages launched 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.

© Cypress Semiconductor Corporation, 2012-2013. The information contained herein is subject to change without notice. Cypress Semiconductor Corporation assumes no responsibility for the use of any circuitry other than circuitry embodied in a Cypress product. Nor does it convey or imply any license under patent or other rights. Cypress products are not warranted nor intended to be used for medical, life support, life saving, critical control or safety applications, unless pursuant to an express written agreement with Cypress. Furthermore, Cypress does not authorize its products for use as critical components in life-support systems where a malfunction or failure may reasonably be expected to result in significant injury to the user. The inclusion of Cypress products in life-support systems application implies that the manufacturer assumes all risk of such use and in doing so indemnifies Cypress against all charges.

GPIF and EZ-USB are trademarks or registered trademarks of Cypress Semiconductor Corporation. All other trademarks or registered trademarks referenced herein are property of the respective corporations.

Any Source Code (software and/or firmware) is owned by Cypress Semiconductor Corporation (Cypress) and is protected by and subject to worldwide patent protection (United States and foreign), United States copyright laws and international treaty provisions. Cypress hereby grants to licensee a personal, non-exclusive, non-transferable license to copy, use, modify, create derivative works of, and compile the Cypress Source Code and derivative works for the sole purpose of creating custom software and or firmware in support of licensee product to be used only in conjunction with a Cypress integrated circuit as specified in the applicable agreement. Any reproduction, modification, translation, compilation, or representation of this Source Code except as specified above is prohibited without the express written permission of Cypress.

Disclaimer: CYPRESS MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARD TO THIS MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Cypress reserves the right to make changes without further notice to the materials described herein. Cypress does not assume any liability arising out of the application or use of any product or circuit described herein. Cypress does not authorize its products for use as critical components in life-support systems where a malfunction or failure may reasonably be expected to result in significant injury to the user. The inclusion of Cypress' product in a life-support systems application implies that the manufacturer assumes all risk of such use and in doing so indemnifies Cypress against all charges.

Use may be limited by and subject to the applicable Cypress software license agreement.