



# **CY3633**

## **WirelessUSB™ LS Gaming**

### **DVK User's Guide**

Version 1.1

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Version 1.1.

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# WirelessUSB™ LS Gaming DVK User's Guide

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## **1.0 Introduction**

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The WirelessUSB LS CY3633 Gaming DVK is an add-on to the WirelessUSB LS CY3632 DVK. The Gaming DVK is intended to serve the gaming industry by providing example wireless solutions for the XBOX and PlayStation2 (PS2) gaming platforms.

The contents of this DVK combine with the CY3632 DVK to provide a hardware/firmware solution for XBOX and PS2 gaming platforms. Refer to the CY3632 Users's Guide for a list of basic hardware components that will be required to use the additional components supplied with the Gaming DVK. The Gaming DVK provides the following components:

- USB Hub Adapter board with a pre-programmed CY7C65113 USB chip
- XBOX USB Adapter cable (PN 300-11840)
- CY8C27643 PSoC™ pre-programmed adapter board (labeled "XBOX G") to provide XBOX Game Controller functionality
- CY8C27643 PSoC™ pre-programmed adapter board (labeled "PS2 G") to provide PS2 Game Controller functionality
- CY8C27643 PSoC™ pre-programmed adapter board (labeled "PS2 D") to provide PS2 receiver dongle functionality
- PlayStation interface cable (PN 300-11841) for connecting the PS2 receiver to the PS2 game console
- Plastic joystick knobs
- CD-ROM
- Printed documentation

**Hardware items that are required from the standard CY3632 WirelessUSB LS DVK, which are not included in the CY3633 WirelessUSB LS Gaming DVK are:**

- Platform Board PDC-9075 (assembly 121-07500\*G) with joysticks and potentiometers installed
- Platform Board PDC-9075 (assembly 121-07501\*E) without joysticks or potentiometers installed
- Two Radio Modules (PDC-9163)
- Standard USB cable (PN 140xc2)

The following diagram shows the contents of the CY3633 WirelessUSB LS Gaming DVK.

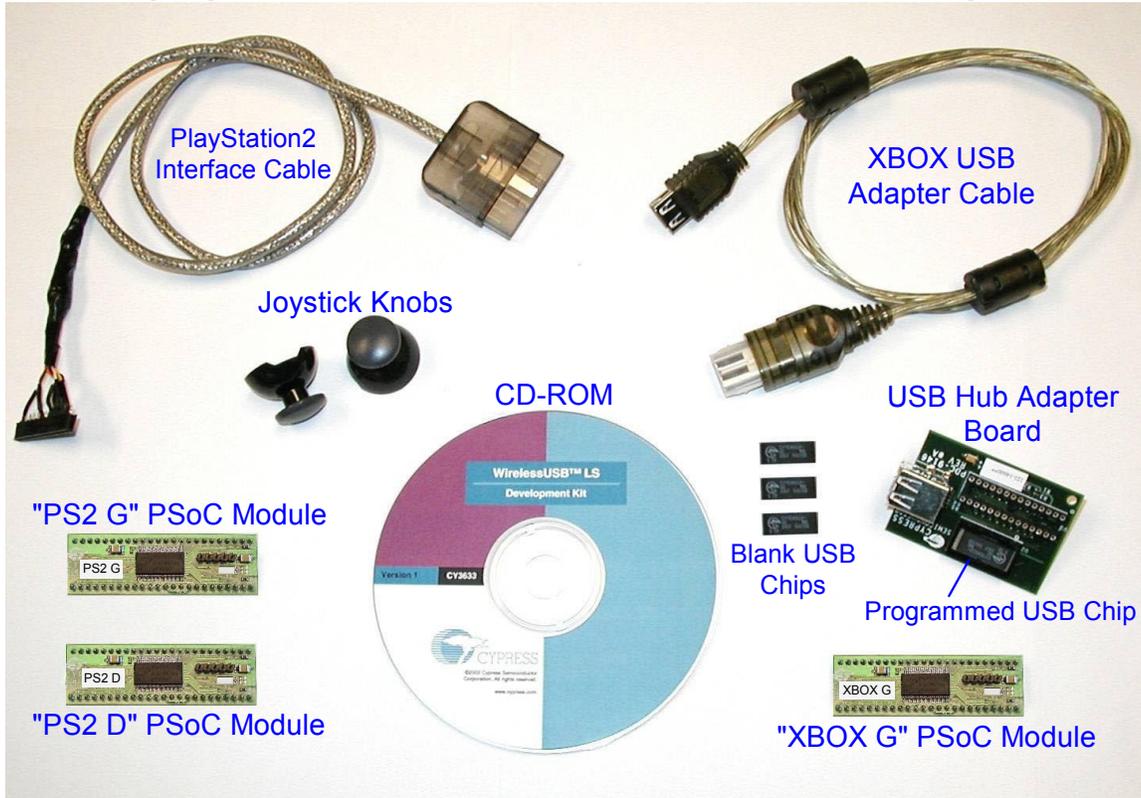


Figure 1. WirelessUSB LS Gaming DVK Kit Contents

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## 2.0 Quick Start Using the Pre-programmed Chips

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Out of the box, the Gaming DVK is ready to support both the XBOX and PlayStation2 gaming platforms.

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### 2.1 XBOX Quick Start Guide

The XBOX system consists of two Platform Boards (PDC-9075): One is used for the XBOX Dongle and the other is used for the XBOX Game Controller.

- Dongle - Assembly 121-07501\*E (the assembly number is printed on a white sticker near the DC power jack) has the USB Hub Adapter Board piggy-backed onto socket U2A, and there are no potentiometers or joysticks loaded on the board.
- Game Controller - Assembly 121-07500\*G has the PSoC device labeled "XBOX G" installed into socket U3.

The hardware setup for operating the XBOX gaming system is shown in Figure 2.

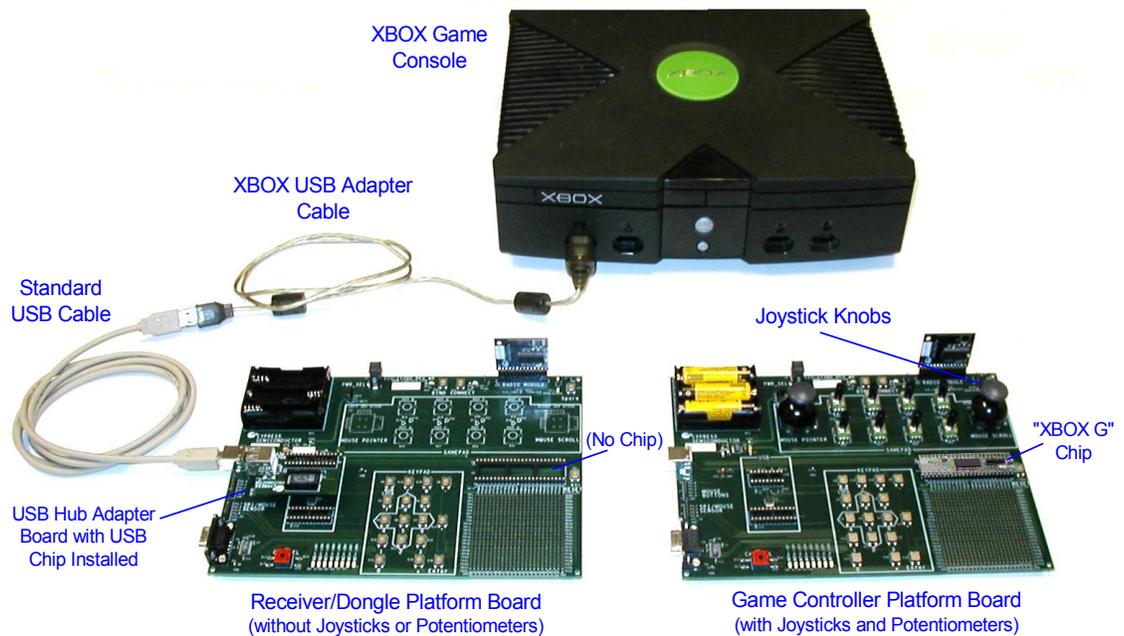


Figure 2. XBOX System Hardware Configuration

A close-up of the receiver dongle is shown Figure 3. The XBOX USB Adapter Cable along with a standard USB cable are used to interface the Platform Board to the XBOX Console. Power for the receiver is provided by the XBOX USB interface. Note: The Platform Board and the standard USB cable are supplied with the standard CY3632 WirelessUSB LS DVK (they are not included in the CY3633 WirelessUSB LS Gaming DVK).

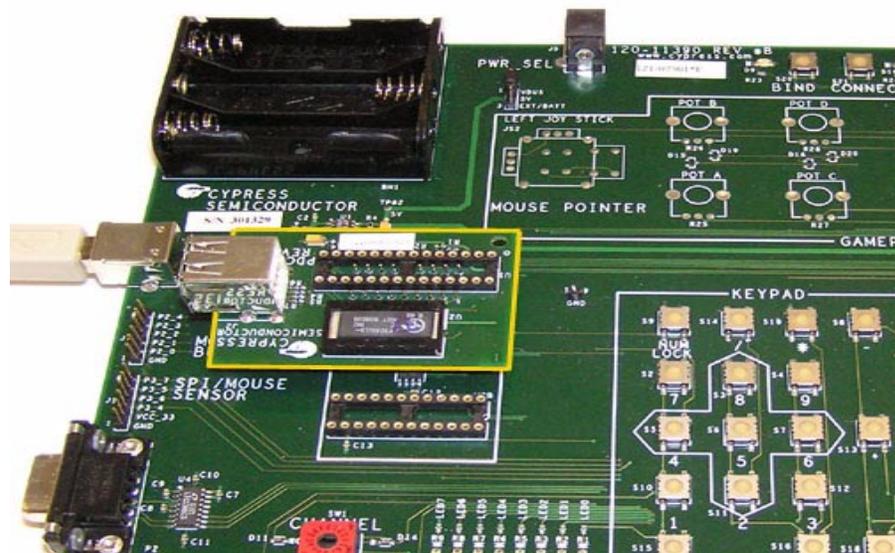


Figure 3. USB Hub Adapter Board installed into Platform Board (XBOX Receiver Dongle)

The Game Controller has a PSoC™ device labeled “**XBOX G**” installed into socket U3 of the Platform Board. The Game Controller can be powered with batteries or the provided power supply connected to J5 (DC power jack).

To configure the XBOX system, perform the following steps:

1. Power on the XBOX game console and load any XBOX game.
2. Install the USB Hub Adapter board as shown in Figure 3 above and ensure that the radio module is installed in P1 correctly.
3. Connect the XBOX USB Adapter Cable to any of the four game ports on the XBOX Console.
4. Attach the “A” end of the standard USB cable to the other end of the XBOX USB Adapter cable.
5. Connect the “B” end of the standard USB cable into Platform Board connector J3.
6. Verify that header J2 has pins 1 and 2 connected, which selects VBUS as the power source for the board.
7. On the Game Controller board, verify that the radio and the proper PSoC™ adapter board are installed on the board before power is supplied to the assembly. Verify that all eight potentiometers, POT A-H, are turned fully counterclockwise.
8. If batteries are used as the power source, then install them now or plug in the DC power supply if batteries are not being used. Only one or the other can be used at a time. Ensure that header J2 has pins 2 and 3 connected. This selects the battery or external DC power source.
9. Perform the binding procedure described in Section 2.3.

The figure below shows the PSoC Adapter Board that is used to adapt the 48-pin SSOP PSoC to the 48-DIP socket on the platform board.

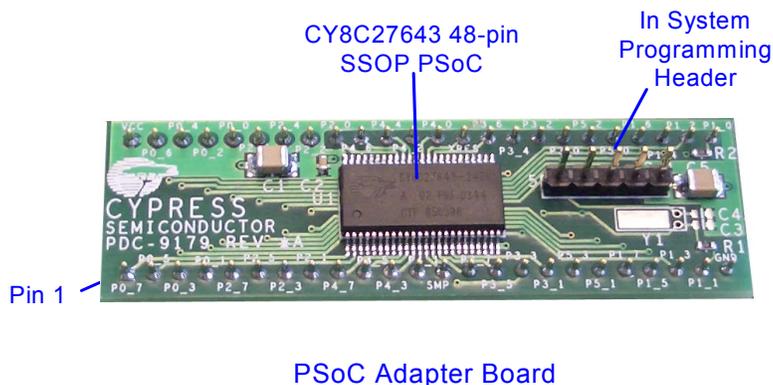


Figure 4. PSoC Adapter Board Assembly

The mapping of the XBOX Game Controller joysticks, analog buttons, and digital buttons on the Platform Board is shown in Figure 5. The eight potentiometers on the Platform Board act as analog buttons, where clockwise rotation behaves as a depressed button, while fully counterclockwise rotation behaves as a released button. The push-buttons that make up the Platform Board keypad area are used for the Game Controller digital buttons as shown in the figure. Pressing the 'Mode' button will cause the 'Right Joy button' to activate the 'R Trigger' function in order to facilitate first person shooter games. The 'Connect' LED flash rate will increase when in the button swap mode. 'Reset Factory' is used to clear all of the stored auto bind parameters and should be used whenever the radio module has been replaced. See Section 2.3 for more details.

Left Joy + Left Joy button	White	Black	X	Y	Right Joy + Right Joy button
	L Trigger	R Trigger	A	B	

"Gamepad" area of Platform Board

Num Lock	/	*	- <b>Reset Factory</b>
7 <b>Up + Left</b>	8 <b>Up</b>	9 <b>Up + Right</b>	
4 <b>Left</b>	5	6 <b>Right</b>	+ <b>Start + Back</b>
1 <b>Down + Left</b>	2 <b>Down</b>	3 <b>Down + Right</b>	
0 <b>Select</b>		. <b>Start</b>	Enter <b>Mode</b>

"Keypad" area of Platform Board

Figure 5. XBOX Joysticks, Analog Buttons, and Digital Buttons

## 2.2 PlayStation2 Quick Start Guide

The PlayStation2 system hardware configuration is shown in Figure 6.

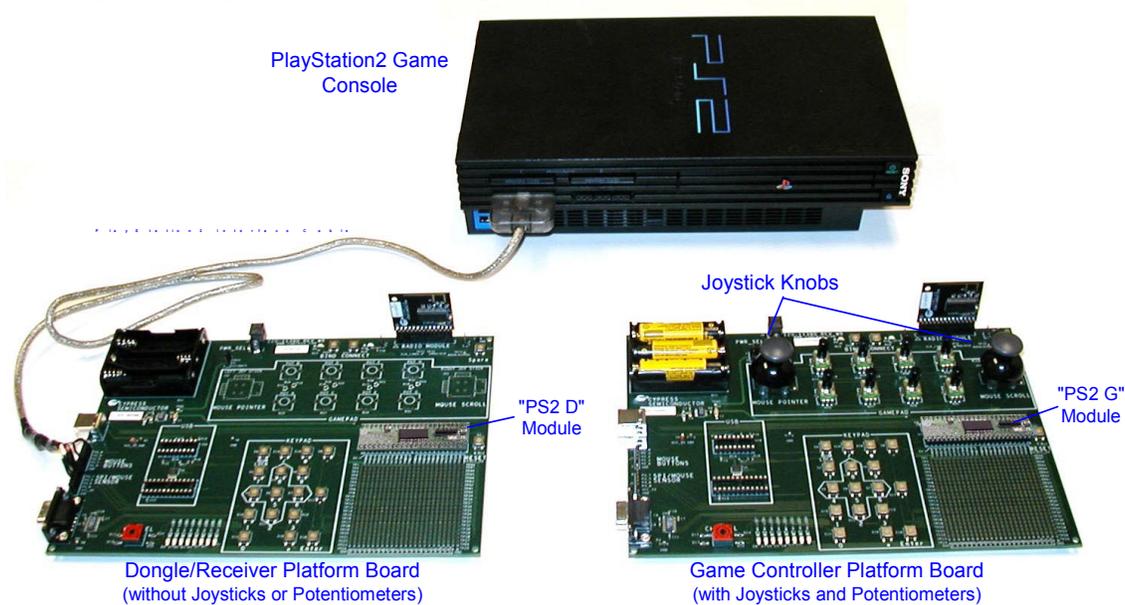


Figure 6. PlayStation2 System Hardware Configuration

The PlayStation2 gaming system uses the Platform Board assembly (121-07501\*E) as the receiver dongle. The PSoC chip labeled “PS2 D” should be installed in chip socket U3 of the receiver dongle Platform Board. The PlayStation interface cable is used to interface the receiver Platform Board assembly to the PS2 game console. The PS2 provides power through this cable to the receiver assembly.

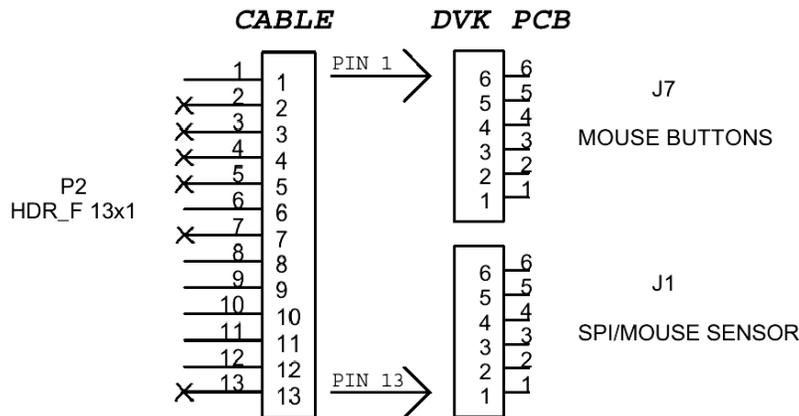


Figure 7. PS2 Interface Cable Connection Diagram

The PlayStation2 Game Controller is supported by the Platform Board assembly (121-07500\*G) with the PSoC™ device labeled “**PS2 G**” installed into socket U3. The Game Controller can be powered with batteries or with the provided DC power supply connected to J5.

To configure the PS2 system, perform the following steps:

1. Turn the PlayStation2 console power ON and load any game.
2. Connect the PS2 Interface Cable to one of the two game controller ports on the PS2 Console.
3. Connect the other end of PS2 interface Cable to Platform Board, bridging connectors J1 and J7. Pin1 of the cable must be connected to Pin6 of header J7 as shown in Figure 7.
4. On the Game Controller board, verify that the radio and the proper PSoC™ adapter board are installed on the board before any power is supplied to the assembly. Verify that all eight potentiometers, POT A-H, are turned fully counterclockwise.
5. If batteries are to be used as the power source for the Game Controller, then install them now. Otherwise, plug in the DC power supply. Only one or the other can be used at a time. Ensure pins 2 and 3 of header J2 are connected so that the batteries or external DC adapter are selected as the power source.
6. Perform the binding procedure described in Section 2.3.

The mapping of the PS2 Game Controller joysticks, analog buttons, and digital buttons on the Platform Board are shown in Figure 8. The eight potentiometers on the platform board act as analog buttons, where clockwise rotation behaves as a depressed button, while fully counterclockwise rotation behaves as a released button. The push-buttons that make up the Platform Board keypad area are used for the Game Controller digital buttons as shown in the figure. The ‘Mode’ button will cause the ‘Right Joy button’ to activate the ‘R1’ function in order to facilitate first person shooter games. The ‘Connect’ LED flash rate will increase when in the button swap mode. ‘Reset Factory’ is used to clear all of the stored auto bind parameters and should be used whenever the radio module has been replaced. See Section 2.3 for more details. The ‘Analog’ button is used to switch the game controller from an analog controller to a digital controller.

Left Joy + Left Joy button	L2	R2	Square	Triang.	Right Joy + Right Joy button
	L1	R1	X	O	

"Gamepad" area of Platform Board

Num Lock	/	*	-
7 Up + Left	8 Up	9 Up + Right	Reset Factory
4 Left	5 Analog	6 Right	+ Start + Back
1 Down + Left	2 Down	3 Down+ Right	
0 Select		.	Enter Mode

"Keypad" area of Platform Board

*Figure 8. PS2 Joysticks, Analog Buttons, and Digital Buttons*

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## 2.3 Auto-Bind Operation

Out of the box, both gaming systems are configured to auto-bind. Additionally, the Game Controller is enabled to sleep if the connection is lost. Binding is performed by simultaneously pushing the Bind button on both the receiver Platform Board and the Game Controller Platform Board. The Bind button is located at the top of the Platform Board close to the radio module.

After power has been applied to both the receiver and controller as described in Section 2.1 and Section 2.2, perform the following steps:

1. On the Game Controller, press any button on the keypad to wake up the controller.
2. Once the controller is awake, press and release the Bind buttons on both boards simultaneously. Observe that the red Bind LED is on.
3. The receiver and controller will then attempt to bind and establish a connection.
4. If the Bind procedure is successful, the Connect LED on the Game Controller will begin to blink.
5. If the Bind LED stays on for more than approximately 10 seconds, that indicates that the Bind was unsuccessful. Reset both boards, by pressing the reset button located just to the right of U3, and then go to step 1 to try again.

If successful, the binding process only needs to be done once. The settings are saved in FLASH memory, and the connection will automatically be re-established when the system is powered up.

**PS2 configuration only:** If for some reason the radio module is replaced with another radio module, the FLASH memory will need to be reset in order for the auto bind parameters to be regenerated correctly based on the new radio ID. To reset the FLASH memory Press and hold the '-' (Reset Factory) button while pressing and releasing the reset button 'S1' located next to U3. This procedure should be done on both the dongle and the game controller. The bind process previously described will then need to be performed.

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## **2.4 Game Controller Calibration Process**

For optimal performance, the Game Controller's analog inputs must be calibrated. When the Game Controller goes through the calibration process, it will memorize the unique characteristics of the potentiometers and joysticks ensuring that the full range of resolution will be obtained. The calibration constants are stored in the PSoC™ FLASH memory and will be loaded every time the system is used.

Calibration is initiated by pressing and holding the Enter key at the same time that the Game Controller power is turned ON. The Bank of LEDs (LED0-LED7) will display the raw output of the channel being calibrated in 8-bit binary format. Calibration requires each potentiometer and joystick to be exercised over its full range of movement. The potentiometers must be turned fully clockwise and counter clockwise. The joysticks must be moved fully left and right (X-direction) and up and down (Y-direction). To advance the calibration process to the next potentiometer or joystick after exercising the current channel, press the Up key on the keypad. Channels are calibrated in the following order (observe the silk-screen labels for each input device):

1. RIGHT JOY STICK (X-direction)
2. LEFT JOY STICK (X-direction)
3. POT B
4. POT D
5. RIGHT JOY STICK (Y-direction)
6. LEFT JOY STICK (Y-direction)
7. POT A
8. POT C
9. POT F
10. POT H
11. POT E
12. POT G

Pressing the '8' key after calibrating the last channel causes the calibration factors to be stored into FLASH and the Game Controller will return to the connected state.

## **3.0 XBOX Firmware Development**

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Firmware development for the XBOX gaming platform requires two different firmware development systems: receiver dongle and Game Controller. The receiver dongle uses the CY7C65113 USB HUB chip and requires the CY3654-P03 development system. The Game Controller uses a PSoC and requires the PSoC ICE-4000 and PSoC Designer development system.

### **3.1 XBOX Receiver Dongle Firmware Development**

The development environment for the CY7C65113 chip is provided by the CY3654-PO3 Development Platform. More information about the CY3654-P03 development kit can be found at [www.cypress.com](http://www.cypress.com) (Click on the USB Full-Speed Peripherals link → Developer Kits → CY3654 + CY3654-P03).

#### **3.1.1 Software Requirements**

The following two tools are required for XBOX firmware development. The XBOX Receiver Dongle Firmware can only be compiled with CYASM.EXE V1.96 which is provided in this kit.

- CYASM.EXE (Cypress Assembler provided in this kit)
- CYDB.EXE (Debugger included in CY3654 Development Kit)

The WirelessUSB LS XBOX receiver firmware is written in M8 assembly language. The Cypress assembler (CYASM.EXE) is needed to assemble the firmware. The CYASM assembler is included in the *Software* directory of the CD-ROM that is shipped with this kit. All other software (except Hyper Terminal) can be downloaded from the Cypress web site at [www.cypress.com](http://www.cypress.com).

#### **3.1.2 Software Setup**

The software setup is described in following online documents:

- CYASM Assembler User's Guide
- CYDB Reference Guide and CYDB User's Guide

The source firmware must be copied from the DVK CD-ROM onto the local disk maintaining the directory structure.

#### **3.1.3 Compiling**

The XBOX build file (xbox.bat) includes a command to assemble the XBOX firmware. This command only runs under the MS-DOS prompt.

- xbox.bat (CYASM.EXE -b XBOX.ASM)

The assembler (CYASM.EXE) generates the following files:

- xbox.hex
- xbox.lst
- xbox.rom

### 3.1.4 Using the USB Chip Emulator

The CY3654 and the CY3654-PO3 personality board together form the complete in-circuit emulator (ICE) for the CY7C65113 USB Hub. Figure 9 shows the complete development system. The following steps describe this configuration

- Remove the CY7C65113 chip from socket U2 on the USB Hub Adapter Board (PDC-9146) by pressing down on the black portion and sliding it away from the on-board USB connectors.
- Connect the ICE Target Adapter into socket U1 of the USB Hub Adapter board (PDC-9146).
- Install the USB Hub Adapter Board into socket U2A of the PDC-9075 Platform Board.
- Install the WirelessUSB LS Radio Module (PDC-9163) into header P1 of the PDC-9075 Platform Board.
- Plug the 12.0V AC adapter into connector J9 of the CY3654 Development Platform.
- Run CYDB.EXE (Please refer to the CYDB software Setup).
- Connect the XBOX USB Adapter Cable to one of the game ports on the XBOX console.
- Connect the other end of the USB Adapter Cable to the “A” end of the standard USB cable.
- Connect the “B” end of the standard USB cable to connector J3 on the PDC-9075 Platform Board.
- From the CYDB menu, download the file ‘xbox.hex’ into the emulator (refer to the CY3654 User’s Guide for more details)

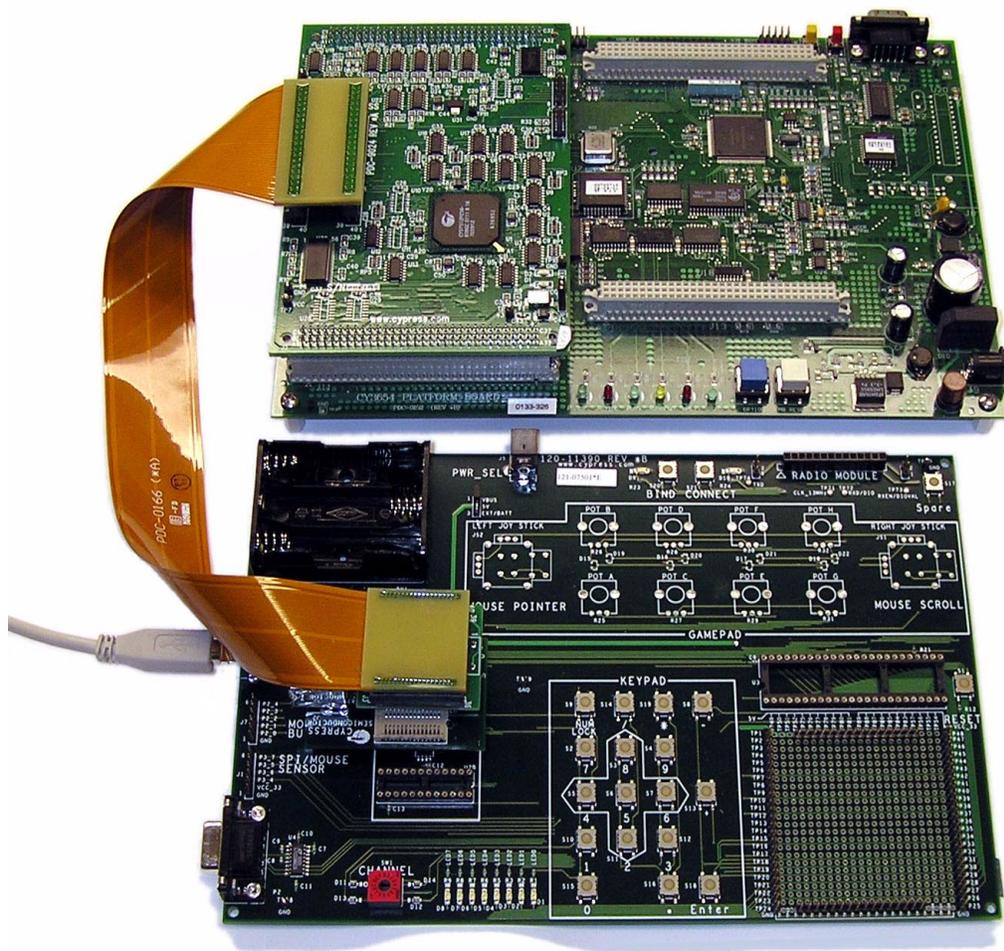


Figure 9. Emulator Board Connected to the Platform Board

### 3.1.5 Programming

The CY7C65113 chip is a One Time Programmable (OTP) chip. There are a wide range of programming vendors that support this chip. Contact the manufacturer of your programmer to learn about its capability. The Hi-Lo programmer can be used to program the CY7C65113. More information on the Hi-Lo programmer can be found at [www.cypress.com](http://www.cypress.com) (Click on the USB Full-Speed Peripherals link → Developer Kits → Cypress full-speed USB M8 Series Hi-Lo Programmer CY3649-xxxV). The Kit includes:

- Cypress USB Programmer For Starter (CY3649-xxxV)
- Adapter Base (CY3083-SC28)
- Matrix Card (CY3083-04)

### 3.1.6 XBOX Memory Unit Support

The stacked HUB ports on the USB Hub Adapter board are used as memory expansion ports, similar to those found on standard wired XBOX game controllers. In order to interface standard XBOX peripherals to the stacked USB connector, a custom adapter cable must be made (this cable is not included in the Gaming DVK). Please refer to the *XBOX Memory Unit Cable Assembly* drawing in the **Hardware** folder on the included CD-ROM for detailed assembly instructions if you require this cable.

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## 3.2 Game Controller Firmware Development

As noted earlier, development for the PSoC device requires the PSoC ICE-4000. The ICE and other associated development peripherals can be found at Cypress MicroSystems' website at [www.cypressmicro.com](http://www.cypressmicro.com). This document assumes that the reader is familiar with the tool. The PSoC Microcontroller Basic Development Kit (CY3205-DK) provides the PSoC ICE-4000 In-Circuit Emulator for developing and debugging (with breakpoint and trace support) of PSoC application code. The PDIP Pod Kit (CY3206-PI) provides programming and emulation support for the 48-pin DIP package used on the PDC-9075 Platform Boards. Also note that the 48 pin adapter boards can be programmed like an actual chip and they also include the ability for ISSP programming. Refer to Cypress MicroSystems application note AN2066a for additional information.

### 3.2.1 Hardware Configuration For Controller Firmware Development

Figure 10 shows the complete development environment.

- Connect the ICE Pod into socket U3 of the Platform Board (PDC-9075).
- Connect the CAT5e cable between the ICE Pod and the ICE-4000.
- Plug the 5.0V DC adapter into connector J5 of the PDC-9075 board.

The figure below shows the connections required for Game Controller firmware development.

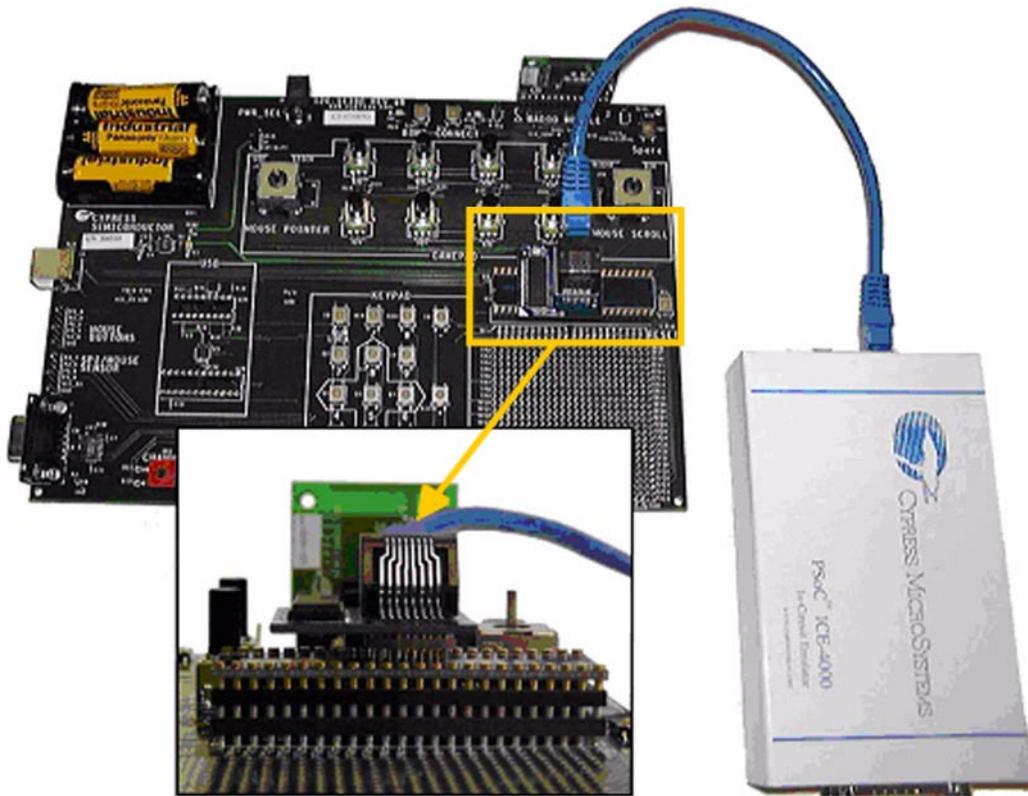


Figure 10. Game Controller Hardware Configuration for Firmware Development

### 3.2.2 Compiling and Programming

Copy the Game Controller files along with the lib directory located under the WirelessUSB LS Gaming DVK directory to a directory on your hard-drive. The steps below are required after copying the files from CD-ROM in the *Software* directory to the local hard-drive.

1. Change the file attributes for all of the source files to read/write before proceeding
2. Launch PSoC™ Designer by double clicking on the project file 'gamecontroller.soc'
3. It is important that the pod does not provide power to the development system hardware. Make sure that Project/Settings/Debugger page is configured for "Pod uses external power only".
4. Click **Config -> Generate Application** to build the complete application.
5. In the file /Lib/ADCINCVR\_1INT.asm add the following between lines 37 & 38:  
" \_ADCINCVR\_1\_bSampC:". Refer to section 5.1 in the release notes. This must be added every time the application is generated.
6. Click **Build -> Start Debug** to compile the code and prepare for debugging
7. Click **Debug -> Connect** in order to establish communication with the PSoC ICE-4000.
8. Click **Debug -> Download to Emulator** in order to load the code image to the emulator pod.

9. You are now ready to begin executing and debugging firmware.

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## **4.0 PlayStation2 Firmware Development**

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Firmware development for the PS2 Dongle (Receiver) and Game Controller is very similar to the XBOX Game Controller development as noted in section 3.2. Both the receiver dongle and Game Controller use the PSoC Designer development system. Information regarding the PSoC development environment can be found at Cypress MicroSystems' website at [www.cypressmicro.com](http://www.cypressmicro.com). The PSoC Microcontroller Basic Development Kit (CY3205-DK) provides the PSoC ICE-4000 In-Circuit Emulator for development and debugging (with breakpoint support) of PSoC application code. The PDIP Pod Kit (CY3206-PI) provides programming and emulation support for the 48-pin DIP package used on the PDC-9075 Platform Boards, (socket U3).

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### **4.1 PS2 Receiver Firmware Development**

The code for the receiver is located under the PSDongle directory. The configuration process is similar to the process listed in Section 3.2.1.

- Connect the ICE Pod into socket U3 of the Platform Board (PDC 9075).
- Connect the CAT5e cable between the ICE Pod and the ICE-4000.
- Plug the 5.0V DC adapter into connector J5 of the PDC-9075 board.
- Copy the Game Controller files along with the lib directory located under the WirelessUSB LS Gaming DVK directory from the CD-ROM to your local hard-drive.

The steps below are required after copying the files from CD-ROM in the *Software* directory to the local hard-drive.

1. Change the file attributes for all of the source files to read/write before proceeding
2. Launch PSoC™ Designer by double clicking on the project file 'psdongle.soc'
3. It is important that the pod does not provide power to the development system hardware. Make sure that Project/Settings/Debugger page is configured for "Pod uses external power only".
4. Click **Config -> Generate Application** to build the complete application.
5. Click **Build -> Start Debug** to compile the code and prepare for debugging
6. Click **Debug -> Connect** in order to establish communication with the PSoC ICE-4000.
7. Click **Debug -> Download to Emulator** in order to load the code image to the emulator pod.
8. You are now ready to begin executing and debugging firmware.

---

### **4.2 PS2 Game Controller Firmware Development**

The firmware for the PS2 Game Controller is located in the *Firmware\PSoC\GameController* directory on the CD-ROM. The PS2 Game Controller firmware is the same code base as used for the XBOX game controller. The only difference is that the "#define PS2" line in the main.h header file must be enabled to switch the Game Controller to PS2 support.

Please refer to section 3.2 for information on developing Game Controller firmware.

<b>Revision</b>	<b>Date</b>	<b>Changes</b>
1.0	12/22/03	Initial Release
1.1	4/24/04	Second revision. Added PSoC adapter module photos and descriptions.