XENSIV™ Game Controller

User Guide

About this document

Scope and purpose

The purpose of this document is to outline the functionality and configuration of the XENSIV™ Game Controller. It offers a brief summary of its various features and instructions for connecting the controller to a personal computer.

Intended audience

This document is designed for customers who have purchased the gaming controller, as well as for solution providers, system integrators, application developers, and product marketers interested in assessing and testing the performance of the Infineon products integrated within the gaming controller.

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1 Introduction

The wireless XENSIV™ Bluetooth® Game Controller integrates advanced Infineon products for an innovative game controller design. Leveraging XENSIV™ magnetic position sensors, the joysticks deliver exceptional precision without succumbing to sensor drift over extended usage. XENSIV™ Hall switch triggers, capacitive CAPSENSE™ buttons, CAPSENSE™ presence detection, and a SPIDER+ rumble driver are all seamlessly integrated with the PSoC6 BLE microcontroller to implement a low power, plug & play game controller.



Figure 1 XENSIV™ Game Controller

1.1 Features and benefits

The XENSIV™ Game Controller offers several advantages that enhance the gaming experience. One notable feature is the use of magnetic joysticks, which are equipped with magnetic 3D position sensors to prevent drift even after extensive use, resulting in a longer lifespan compared to traditional controllers.
Upon establishing a connection to a personal computer or smartphone, the device automatically configures as a human interface device, eliminating the need for manual configuration or driver installation. Furthermore, the controller utilizes Bluetooth® Low Energy and advanced capacitive presence detection to extend its battery life.
The inclusion of an on-board PSoC™6 debugger and a highly customizable shield design facilitates easy integration of individual software and hardware, providing flexibility for customization. Additionally, all design files will be made available online, enabling users to personalize the XENSIV™ game controller according to their preferences.
Equipped with an onboard display, the XENSIV™ Game Controller provides various settings and monitoring capabilities, including joystick monitoring, connection details and configurations, as well as battery status information.

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1.2 Product highlights

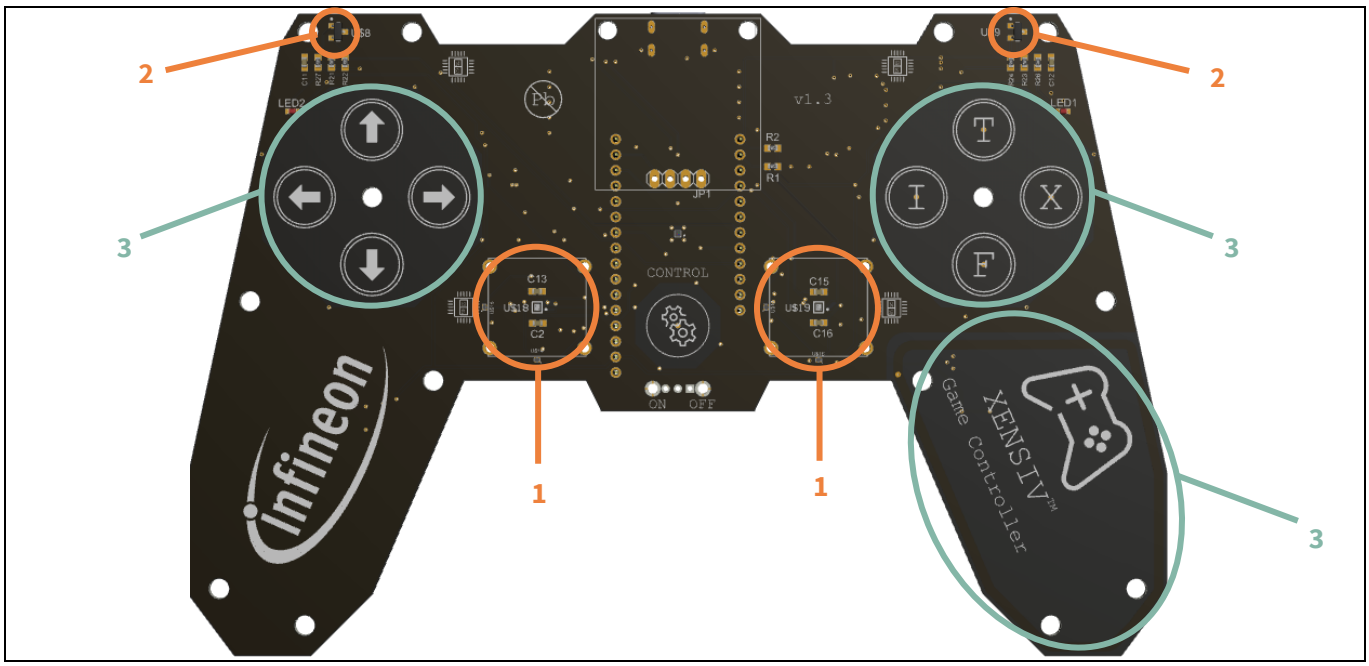


Figure 2 XENSIV™ Game Controller – Infineon products on printed circuit board frontside

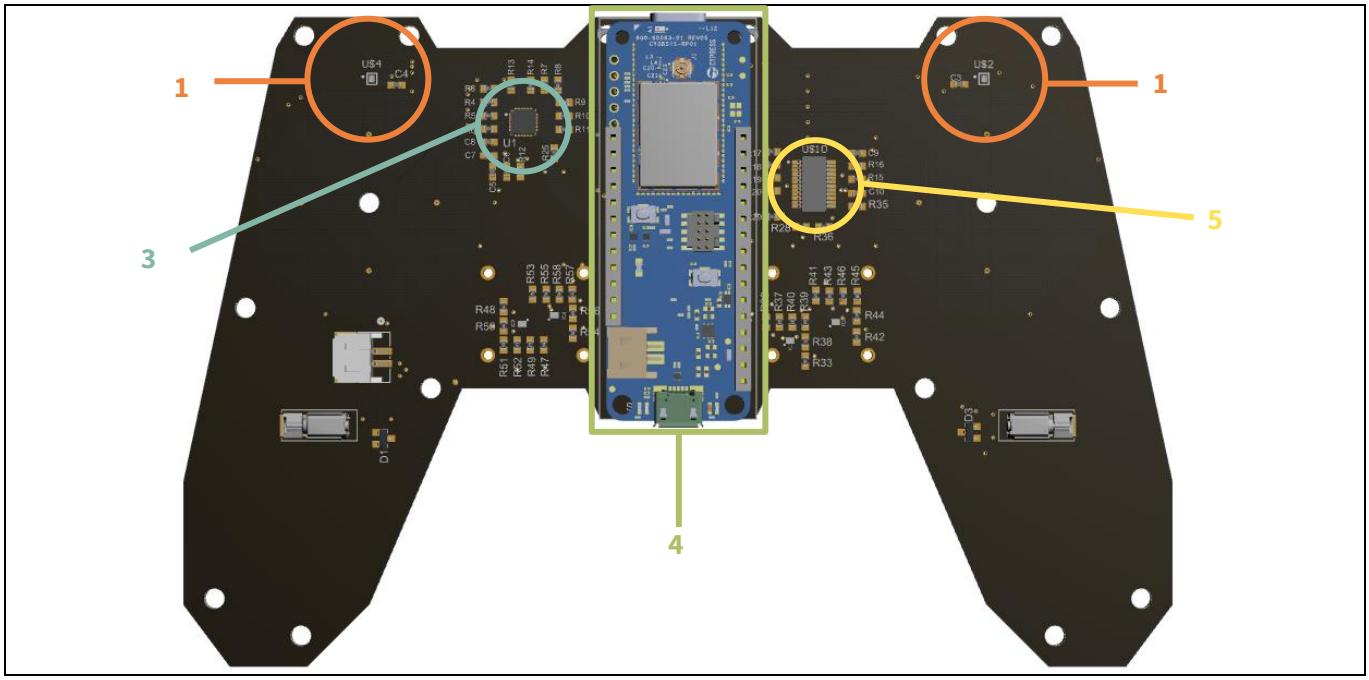


Figure 3 XENSIV™ Game Controller – Infineon products on printed circuit board backside

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Table 1 Product list from figure 2 and figure 3

Number in figure	Product name	Function in game controller
1	TLV493D-A2BW magnetic 3D sensor	Joysticks and rotary riggers
2	TLV4964-2M magnetic switch	Linear triggers
3	CY8CMBR3116 CAPSENSE™ MBR3	Buttons and proximity detection
4	CYSBSYSKIT-DEV-01 PSoC™6 MCU	MCU and BLE transceiver module
5	TLE75008ESD SPIDER+	Multichannel LED and motor driver

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2 Setup and connection guide

This section offers concise instructions for connecting the XENSIV™ Game Controller to an end device, as well as troubleshooting common errors that may arise during the connection process.

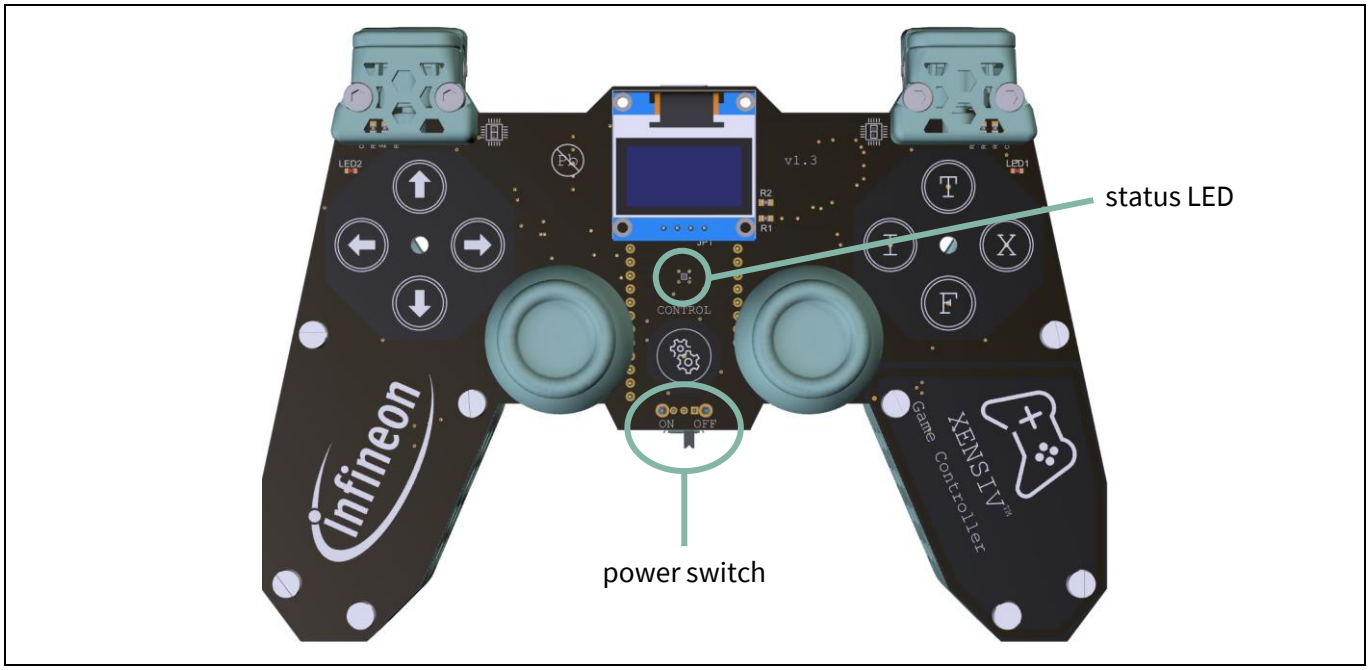


Figure 4 Power switch and status LED

2.1 Connecting to an end device

Upon initial connection to a personal computer, the XENSIV™ Game Controller can be activated by toggling the power switch. Once the blue status LED on the front side of the PCB begins to blink, the game controller enters pairing mode to search for a compatible device.
Access the Bluetooth® settings on your personal computer or smartphone and authorize the XENSIV™ Game Controller for pairing. Upon successful pairing, the green status LED will illuminate. In the event of a failed connection establishment or an inability to find a compatible device for pairing, the red status LED will illuminate.
Following the initial pairing, the connection key is stored in the onboard flash memory of the PSoC™6 microcontroller board. Subsequently, the game controller will automatically attempt to connect to the recognized end device using the corresponding key.

2.2 Troubleshoot connection complications

This chapter intends to give solution approaches to common connection complications.

2.2.1 Multiple recognized end devices within range

Once the XENSIV™ Game Controller has been successfully paired with an end device, the connection key is stored in the onboard flash memory of the PSoC™6 microcontroller board, facilitating swift reconnection. However, in scenarios where the game controller is within range of multiple recognized end devices, it may attempt to connect to a different device than intended, causing potential confusion.

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To address this situation, users have the option to delete all connection keys by accessing the main menu and selecting “Delete connections”.

2.2.2 Pairing of multiple XENSIV™ Game Controllers to a single end device

In version v1.2 and below every XENSIV™ Game Controller is assigned the same identification. If an end device has already been paired with a XENSIV™ Game Controller, it will endeavor to establish a connection with all other XENSIV™ Game Controllers using the same connection key, potentially leading to a connection error. As a result, in these versions, each end device is limited to a single paired connection with a XENSIV™ Game Controller. Introducing a new XENSIV™ Game Controller necessitates the deletion of the connection associated with the previous one.
Starting from version v1.3, each XENSIV™ Game Controller is equipped with a unique identification, effectively eliminating the previously mentioned issue.

2.3 Charging, debugging and flashing the XENSIV™ Game Controller

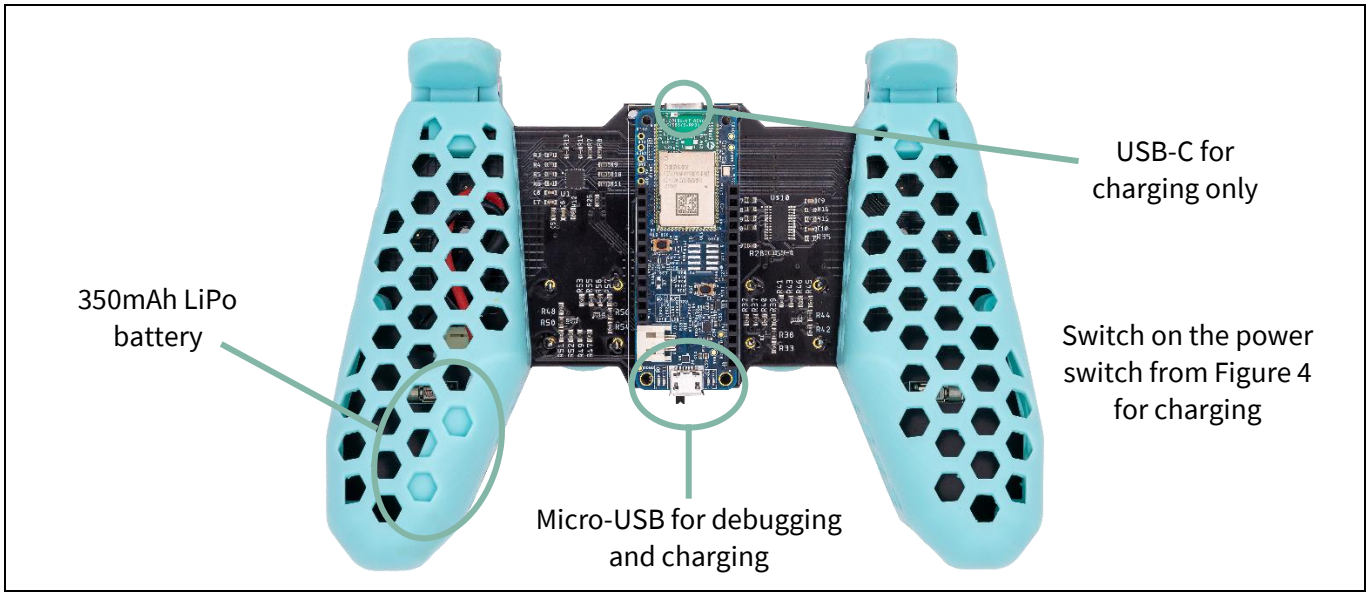


Figure 5 Charging and debugging USB ports

2.3.1 USB connections and charging

The XENSIV™ Game Controller features two distinct USB ports. The micro-USB port, depicted in Figure 5, connects to the on-board debugger of the PSoC™6 board and is utilized for flashing and debugging the software. Additionally, this port can power the board and the entire gaming controller. The USB-C port also connects to the power line, but it cannot be used for flashing or debugging.
To charge the battery, ensure the power switch shown in Figure 4 is turned on. This connects the battery management system of the game controller to the Lithium Polymer battery for both USB charging methods.

2.3.2 Debug and flash microcontroller with customized software

After connecting the gaming controller to a personal computer via the micro-USB port, the ModusToolbox™ software can be used, in conjunction with software from the Infineon GitHub repository, to customize the game controller’s software. Software updates for the game controller will be announced via the Infineon Developer Community & Support Forum.

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3 On-board menu for control options and information

Table 2 Menu buttons

	Control button – (De-)Activate display and show/exit menu
	Right – “enter” selected menu item or entry
	Left – leave submenu or “back”
	Up – navigate through menu
	Down – navigate through menu

The XENSIV™ Game Controller displays a startup sequence on the 0.96” OLED screen each time it is powered on. After the startup sequence, pressing the control button (refer to Table 2) in the center of the controller activates the menu. While the menu is activated, all buttons listed in Table 2 are deactivated for the human interface protocol, meaning their states are no longer transmitted to the host device.
The menu includes several items that can be navigated using the “Up” and “Down” buttons. The “Right” button allows users to select an item and enter the corresponding submenu. Within submenus, the “Right” button functions as a submit button, while the “Left” button is used to exit the submenu.
The main menu items provide general information and control options for the XENSIV™ Game Controller. Table 3 provides a brief description of all menu items.

Table 3 Main menu items

Information	Status and Bluetooth® information
Battery	Battery voltage and state of charge
Joystick monitor	Real-time joystick value visualization
Joystick calibration	Recalibration of joystick offset, linearization and maximum tilt
Delete connections	Delete all paired Bluetooth® connection information from flash
Vibration control	Deactivate and activate the haptic vibration feedback
Presence detection	Activate and deactivate human presence detection – deep sleep mode not yet fully implemented in v1.3[1]

[1] The presence detection feature is functional in version v1.3, with the display indicating the human presence state changes. However, the presence state is not yet integrated with the energy-saving or deep sleep modes of all associated ICs and the microcontroller.

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Glossary

BLE
Bluetooth® Low Energy

IC
Integrated Circuit

LED
Light emitting diode

MCU
Microcontroller unit

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Revision history

Document revision	Date	Description of changes
Revision 1.0	2024-07-16	Initial release
Revision 1.1	2024-08-20	Solved unique BT identification issues; description for USB charging and debugging; inserted menu usage description

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Email:

erratum@infineon.com

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