

Document information

Info	Content
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Abstract	uWand Calypso 03 datasheet

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1 Introduction

The uWand® acts as a universal remote control, giving users true pointing control over all devices in the room. Since the uWand is optical-based, you can use 3D gestures to navigate a graphical user interface on the TV screen or a picture frame in an intuitive and lean-back manner.

The uWand® Calypso 03 is build upon the foundation of the Calypso platform. It addresses the wish for miniaturization of the beacon design of the receiver. It does this by using a single reference optical IR reference in combination with a 3-axis accelerometer. A 2.4 GHz proprietary RF link is used for an, under all circumstances, reliable bidirectional connection to the receiver located in the dongle. The link conveys the pointer coordinates (x , y and rotation round z -axis), key events and control data. The receiver exposes a USB interface that implements amongst others an HID mouse, HID keyboard and HID MCE interface. One GPIO channel is available for an optional sensor or actuator in the remote, for example force feedback (vibration). The build-in analogue 3-axis accelerometer is also exposed on the USB HID interface for use in external applications. Below a picture of the uWand remote, note that up to 48 keys can be supported although in this example only 3 are used.



Fig 1. uWand remote

The receiver is shown in figure 2, here it takes the shape of a USB dongle, the actual required pcb size is 14 x 47 mm. The offered interface is either low speed USB or UART. The device can easily be integrated into a TV screen or a set-top-box.



Fig 2. uWand receiver

1.1 Key features

- Direct pointing delivers most intuitive usage
 - Cursor appears where pointed at.
 - No drift effects as experienced with accelerometer & gyro solutions
- Most preferred way of pointing; consistently ranked highest in consumer tests
 - Comparable to a multi-touch screen experienced from a distance
- Philips proprietary and patented algorithms deliver:
 - Smoothest cursor movement, adjustable
 - Tremor cancellation algorithms
- Robust methods to handle optical disturbances
- High resolution for precise and well controlled movements
- Extended pointer coordinates like rotation around the z-axis are reported for a true 3D experience
- Meets operating range specs of traditional remote control
- Uses robust Radio Frequency (RF) communication link
- Native Human Interface Device (HID) messages for pan and rotation that work with multi-touch systems such as Windows® 7
- Ultra small form factor for easy integration

1.2 Application area

- TV remote control
- 3D mouse
- Game controller
- Media center controller
- Virtual reality input device

2 System diagram

The system is derived from the uWand Calypso platform. This platform is based upon TI's CC2430 RF transceiver. The diagram below, figure 3, shows the key components in the system for both the remote system and the receiver part containing the LED beacons. A key difference with the Calypso 01/02 products is the mandatory accelerometer and the absence of the second IR beacon.

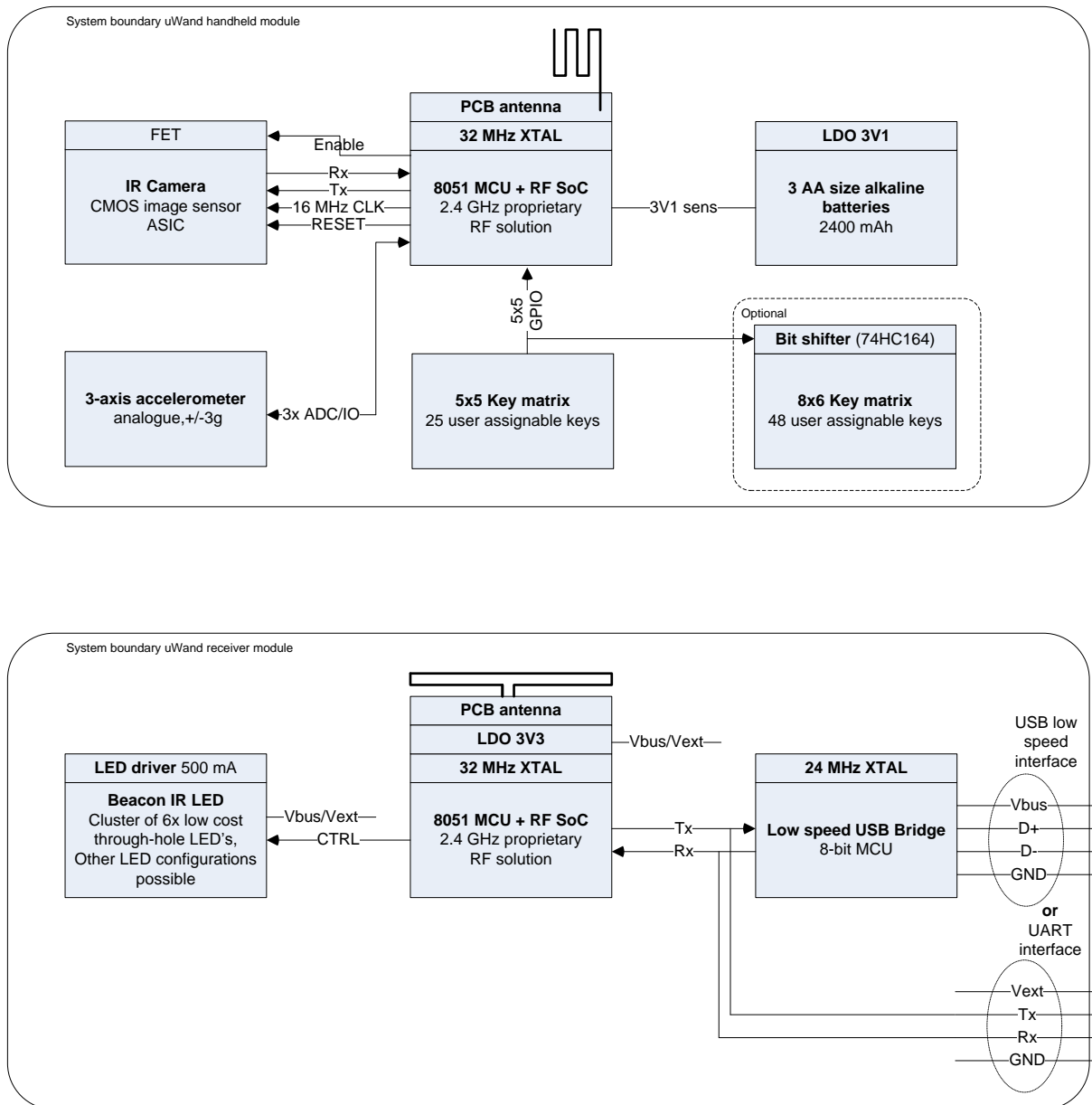


Fig 3. uWand system

3 Key specifications

The table below summarizes the key characteristics of the uWand system being comprised of the Pointer (the handheld or remote) and the receiver (the module connected to the host system over the USB link).

Pointer				
Optical range	Angle from center of LED receiver bar	In a straight line	+/- 30 deg	+/-45 deg
	Distance from screen	5 m	4 m	3 m
Pointing resolution	x-, y-axis are mapped to a plane 1024 * 576, actual precision is scaled up in the API; rotation round the z-axis or <i>tilt</i> has a resolution of 2° degrees			
Current consumption	Pointing 26 ¹ mA			
	Standby 10 µA			
Power supply	3 AA size alkaline batteries			
Standby time	2.5 years			
Pointing time	giving 90 hours of continuous use from 3 AA alkaline batteries			
Keyboard/buttons	5 x 5 or 8 x 6 key matrix user assignable ² keys			
Interface	1 configurable GPIO channel that either is used as digital input or output or analogue input (10 bit). The data can be accessed via the HID USB interface			

Receiver	
Interface	Low speed USB, captive cable. Absolute pointing coordinates: x,y in HID mouse API; z axis and tilt in HID feature reports, HID MCE control, Windows® 7 Touch compatible native HID messages for pan and rotation, relative pointing coordinates for game applications in HID mouse API and raw GPIO data: 4 channels@60Hz
Data rate	1.5 Mbit/s
Power supply	Powered over USB connector
Current consumption	350 mA @ 5V ³

Table 1. Pointer and receiver specifications

¹ Using the next generation camera module. 46 mA using the current module.

² I.e. mapped on the HID keyboard interface. These buttons may be assigned any scan code supported by the USB HID specification.

³ Optionally the USB interface can be replaced by a full duplex UART and separate supply

uWand system		
RF link	2.4 GHz proprietary RF link using IEEE 802.15.4 PHY and MAC in combination with a proprietary protocol stack	
RF Range	0 – 15 m indoors	
Frequency agility	A policy is implemented using RSSI monitoring in combination with channel hopping. This provides robustness against disturbance sources as other RF devices, microwaves, Wi-Fi (802.11) sources et cetera.	
Pairing	Devices are paired 1:1. Devices may be unpaired using a switch on the receiver or key combination on the handheld device or a USB HID message from the host system	
Latency	RF	< 10 ms
	System latency ⁴	< 40 ms

Table 2. Key specifications

⁴ As measured from the optical input on the camera toward availability as a USB HID report.

4 Contact information

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5 Legal information

5.1 Definitions

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Notice is herewith given that the subject device uses one or more of the following patents and that each of these patents may have corresponding patents in other jurisdictions.

Philips has been awarded a number of patents on the technology used in the uWand offering in Europe, Asia and the United States. These patents cover the position calculations using IR sources and a handheld IR camera, the robustness improvements using modulated IR beacons and the smoothing methods a.o.

5.4 Trademarks

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