

# Pericom's USB Switch Training August 2014

# Introduction

## Purpose:

- Introduce Pericom's USB Switch products

## Objectives:

- USB Switch Basics
- Overview of Pericom USB products
- Discuss typical applications

# USB Basics

## What is USB?

Universal Serial Bus (USB) is an industry standard developed in the mid-1990s that defines the cables, connectors and communications protocols used in a bus for connection, communication, and power supply between computers and electronic devices

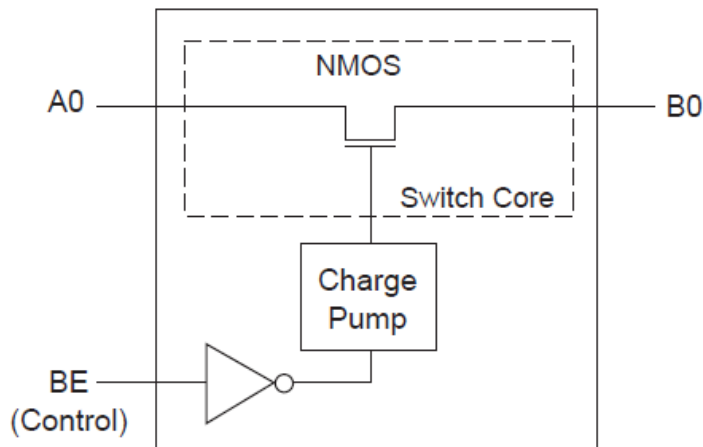
## Versions:

Type	Data rate
USB 1.1 (Low Speed)	1.5 Mbits/sec
USB 1.1 (Full Speed)	12 Mbits/sec
USB 2.0 (High Speed)	480 Mbits/sec
USB 3.0 (Super Speed)	5 Gbits/sec

# USB Switch Basics

## What is a USB switch?

- A USB switch (Mux/De-Mux) is a bidirectional device that selects one of several input USB signals (D+/D- (USB 2.0) or Tx+,Tx-/Rx+,Rx- (USB 3.0) and forwards the selected input into a single line or vice versa.
- Pericom's USB switch uses the NMOS gate with charge pump which helps to increase the voltage at the gate to avoid output voltage clamp caused by the threshold



The NMOS Switch with a charge pump on the gate

## Advantages:

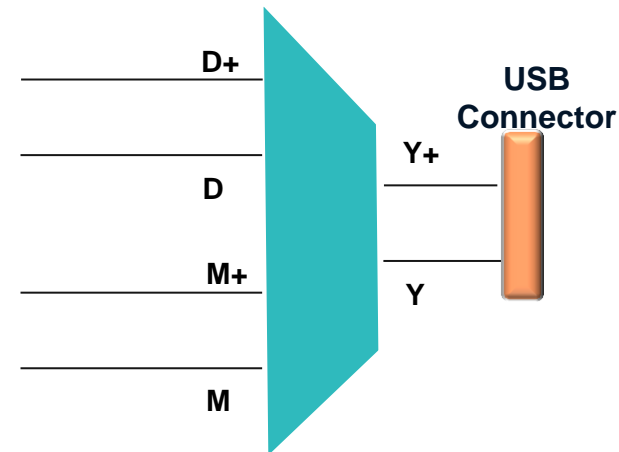
- Wider Vcc range
- Rail to rail output voltage without clamp
- Low Coff & Con
- Suitable for hot swap and hot plug applications

# USB 2.0 Switch Overview

## Value Proposition

- Broadest portfolio in the industry
- Supports USB 2.0(HS, FS, LS)
- High bandwidth up to 1.5GHz
- Low Ron: 4Ω & Con: 5pF
- Offers 5V over voltage protection

**Applications:** PC/Notebooks, Tablets, POS/Card readers, Smart phones, Automotive, PND, etc



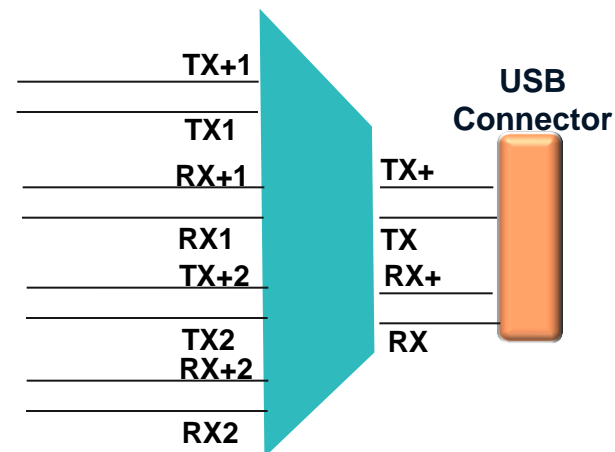
	PI3USB102G	PI3USB14A	PI3USB223 (USB+Audio)	PI3USB32	PI3USB221
No of Channels	2	4	2	1	2
3dB Bandwidth	1.0GHz	0.815GHz	1.5GHz	1.2GHz	1.1GHz
Ron	4Ω	5Ω	2.5Ω	5Ω	6Ω
Con	6pF	8pF	9pF	5pF	6pF
Xtalk Loss	-29dB	-35dB		-55dB	-40dB
Isolation Loss	-28dB	-35dB	-35dB	-30dB	-41dB
Package	10 TQFN/UQFN	16 QSOP/TSSOP	10 UQFN	8 TQFN	10 TDFN/TLLGA

# USB 3.0 Switch Overview

## Value Proposition

- Broadest portfolio in the industry
- Supports USB3.0 , USB 2.0(HS, FS, LS)
- High bandwidth up to 8GHz
- Best insertion loss (1dB) and return loss (29dB)

**Applications:** PC/Notebooks, Tablets, POS/Card readers, Smart phones, Automotive, PND, etc.



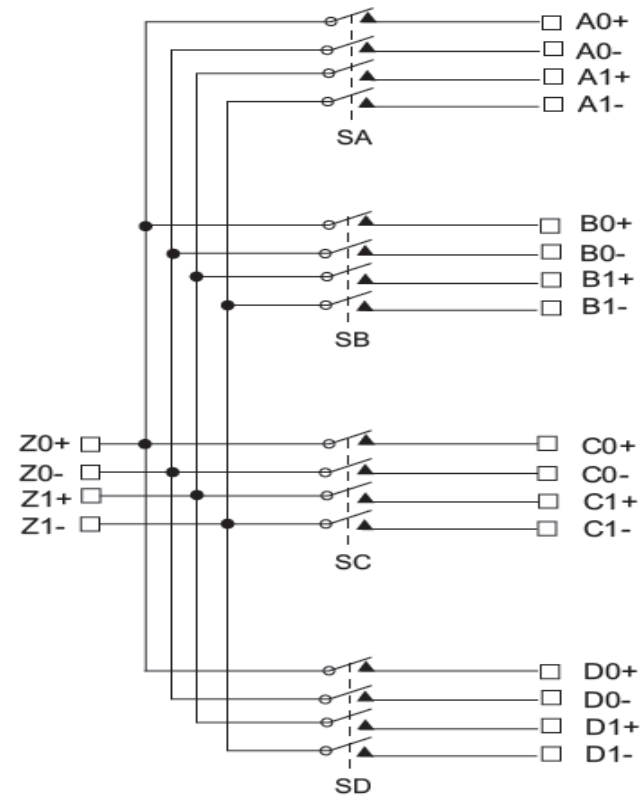
	PI3USB304	PI3USB302A	PI3USB3102	PI2USB3212	PI2USB4122
No of Channels	Dual Channel ; 2:1	2	2 Channel-USB3 2 Channel-USB 2	2	4
3dB BW	8GHz	4GHz	4.7GHz	4.1GHz	2.6GHz
Insertion Loss	-1dB	-1dB	-1.7dB	-2.0dB	-3.0dB
Return Loss	-29dB	-23.3dB	-16dB	-15dB	
Xtalk Loss	-37dB	-33dB	-25dB	-41dB	-40dB
Isolation	-25dB	-27dB	-25dB	-22dB	-23dB
Package	42TQFN	20TQFN	32 TQFN	28TQFN	42TQFN

# New USB Switch Release in 2014

## PI2USB4122 Key Features

Features	Values
Supports	USB 3.0 & PCIe 2.0
3db bandwidth	2.6 GHz
Insertion Loss (@2.5GHz)	-3.0dB
Low Isolation (@2.5GHz)	-25dB
Low Xtalk (@2.5GHz)	-40dB
Low Isolation Loss (@3GHz)	-23dB
Low Xtalk Loss(@3GHz)	-23dB
Package	42 TQFN

## Block Diagram



## Status

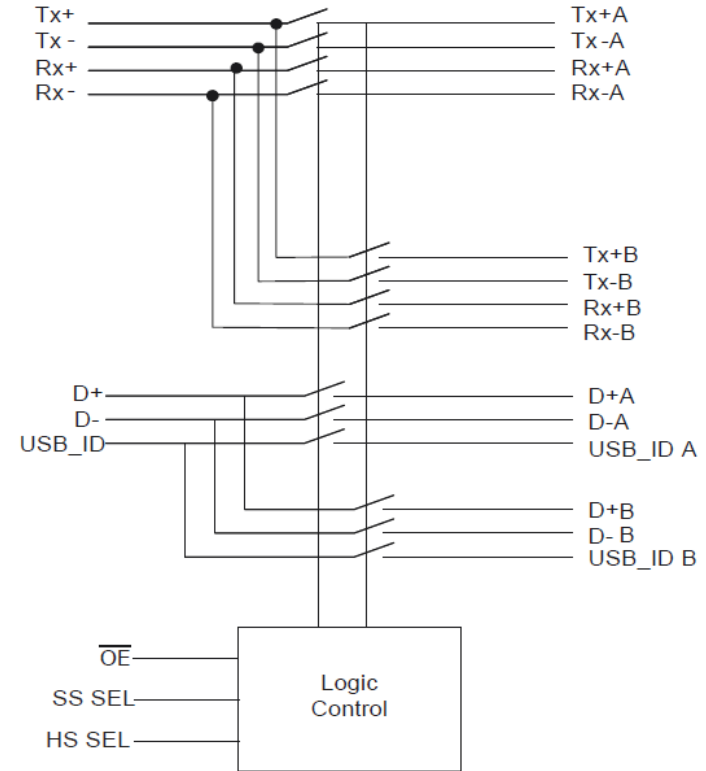
Available in production

# Featured Product USB 3.0 & USB 2.0 Combo Switch

## PI3USB3102 Key Features

Features	Values
Supports	USB 3.0, USB 2.0
3db bandwidth	4.7GHz
Insertion Loss (@2.5GHz)	-1.7dB
Low Return Loss(@2.5GHz)	-16dB
Low Xtalk Loss (@2.5GHz)	-25dB
Low Isolation Loss (@2.5GHz)	-25dB
Package	32TQFN

## Block Diagram



## Status

Available in production

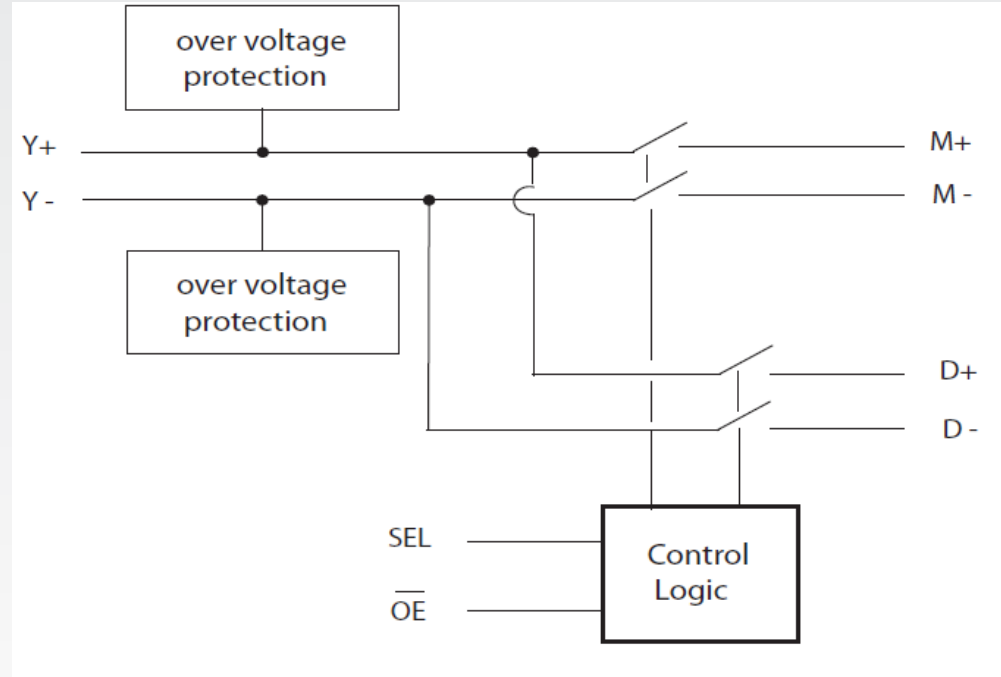


# Featured Product USB 2.0 Switch

## PI3USB102G Key Features

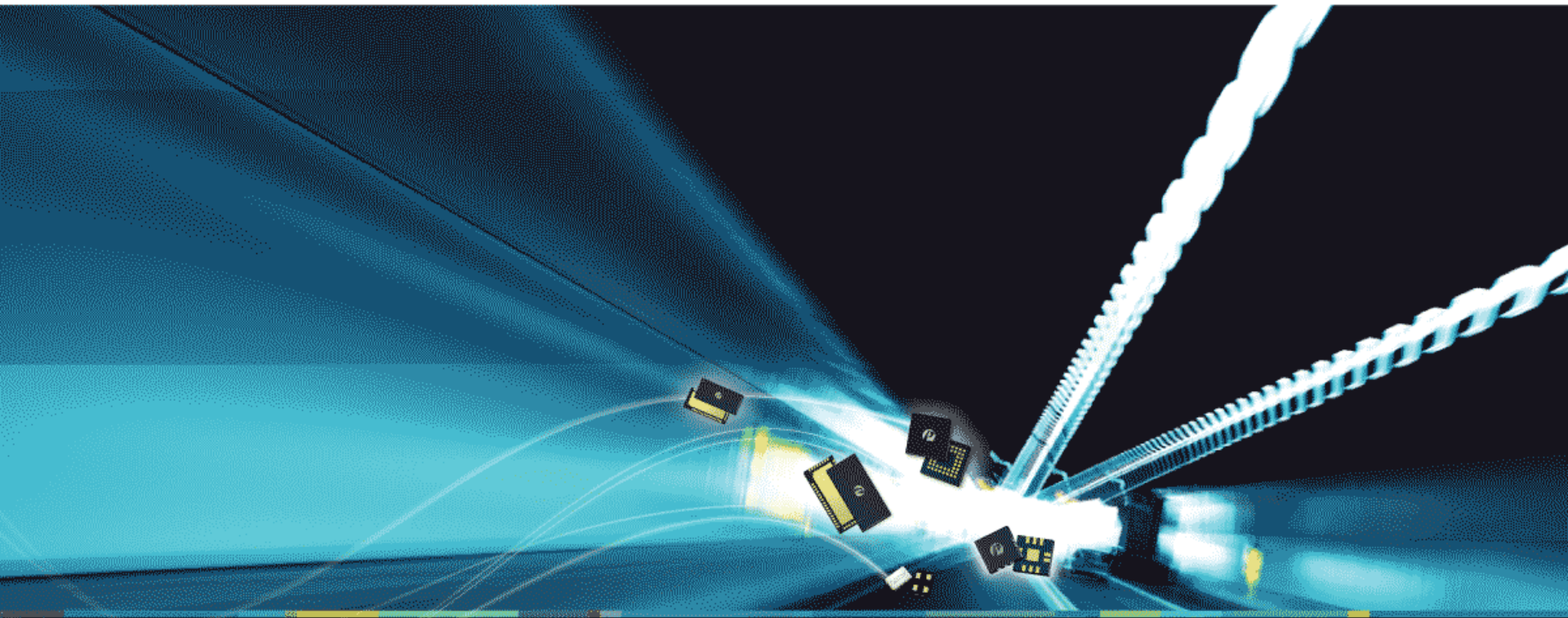
Features	Values
Supports	USB 2.0
3db bandwidth	1GHz
Low Xtalk Loss(@2.5GHz)	-29dB
Low Isolation Loss (@2.5GHz)	-28dB
ESD	8kV
Ron	4Ω
Con	6pF
Package	10 TQFN

## Block Diagram



## Status

Available in production



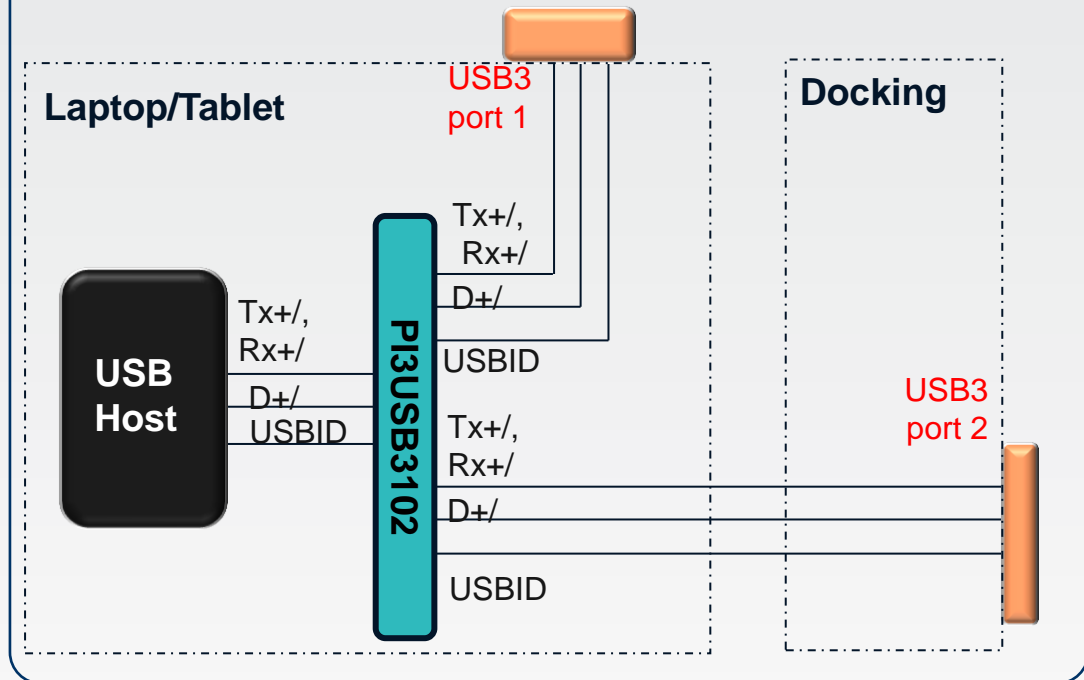
# USB Switch Applications

# USB 3 solution for NB Docking

## PI3USB3102 Key Features

Features	Values
Supports	USB 3.0, USB 2.0
3db bandwidth	4.7GHz
Insertion Loss (@2.5GHz)	-1.7dB
Return Loss (@2.5GHz)	-16dB
Low Xtalk (@2.5GHz)	-25dB
Low Isolation (@2.5GHz)	-25dB
ESD Tolerance	2kV HBM
Package	32 TQFN

## Functional Block Diagram



## Functional Description

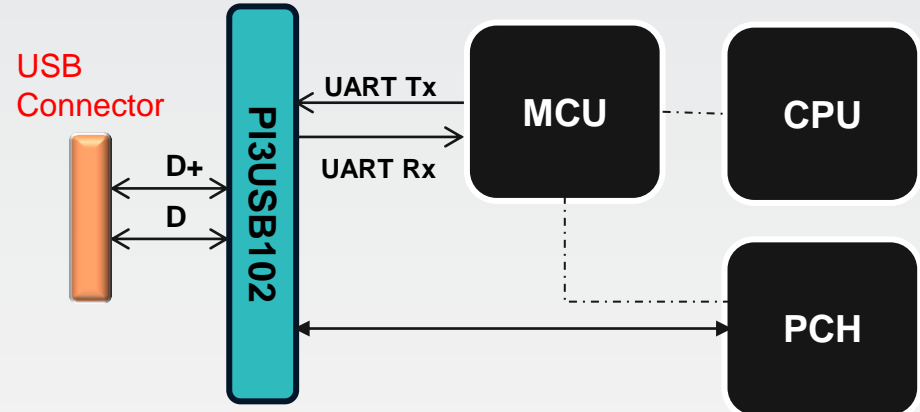
USB 3.0 Switch is used in a Notebook Docking application to switch between the USB port on the laptop and the USB connector on the docking station so it's being shared.

# USB 2 solution for Debug Path

## PI3USB102 Key Features

Features	Values
Supports	USB 2.0 (HS, FS)
3db bandwidth	810 MHz
Ron	4Ω
Con	5.5pF
Low Xtalk (@2.5GHz)	-33dB
Low Isolation (@2.5GHz)	-40dB
ESD Tolerance	8kV
Package	10 TQFN 10 UQFN

## Functional Block Diagram



## Functional Description

USB102 informs the MCU when the external device mouse/keyboard/ is

- Plugged out
- Plugged in
- Going from suspend to wake

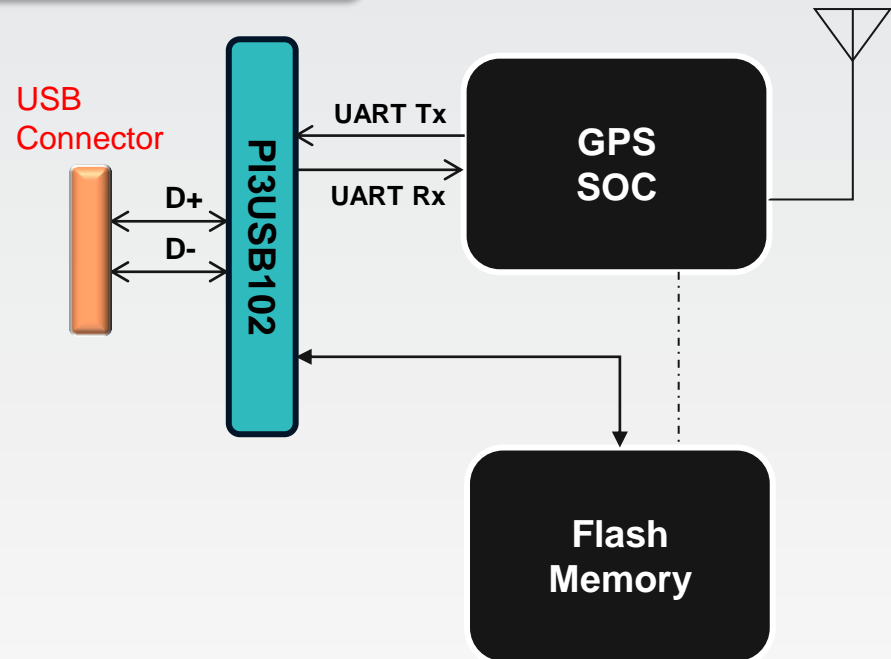
Once the MCU understands this, it can then determine what the device is and if it is a debug dongle, the MCU can go into debug mode.

# USB 2 (PI3USB102) solution for GPS

## PI3USB102 Key Features

Features	Values
Supports	USB 2.0 (HS, FS)
3db bandwidth	810 MHz
Ron	4Ω
Con	5.5pF
Low Xtalk (@2.5GHz)	-33dB
Low Isolation (@2.5GHz)	-40dB
ESD Tolerance	8kV
Package	10 TQFN 10 UQFN

## Functional Block Diagram



## Functional Description

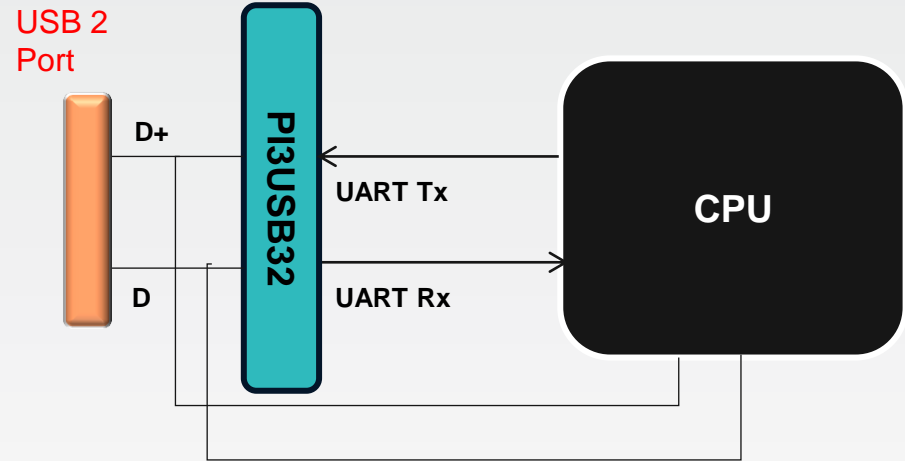
USB 2 switch is used to select data path between FLASH memory for map data (consumer) or debug data from the CPU (manufacturing)

# USB 2 solution for POS

## PI3USB32 Key Features

Features	Values
Supports	USB 2.0 (HS, FS, LS)
3db bandwidth	1220MHz
Ron	6Ω
Con	6pF
Low Xtalk (@2.5GHz)	-55dB
Low Isolation (@2.5GHz)	-30dB
ESD Tolerance	7kV
Package	8 TQFN

## Functional Block Diagram



## Functional Description

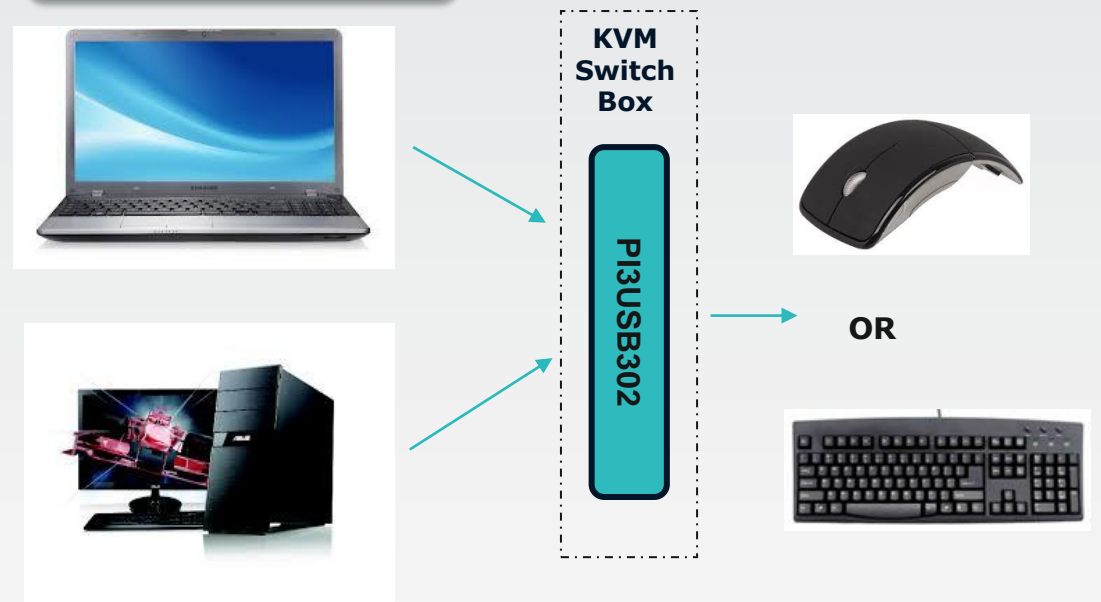
USB 2 1 port switch is used in a POS system for debug purpose

# USB 2 solution for KVM Switches

## PI3USB3102 Key Features

Features	Values
Supports	USB 3.0, USB 2.0
3db bandwidth	4.7GHz
Insertion Loss (@2.5GHz)	-1.7dB
Return Loss (@2.5GHz)	-16dB
Low Xtalk (@2.5GHz)	-25dB
Low Isolation (@2.5GHz)	-25dB
ESD Tolerance	2kV HBM
Package	32 TQFN

## Functional Block Diagram



## Functional Description

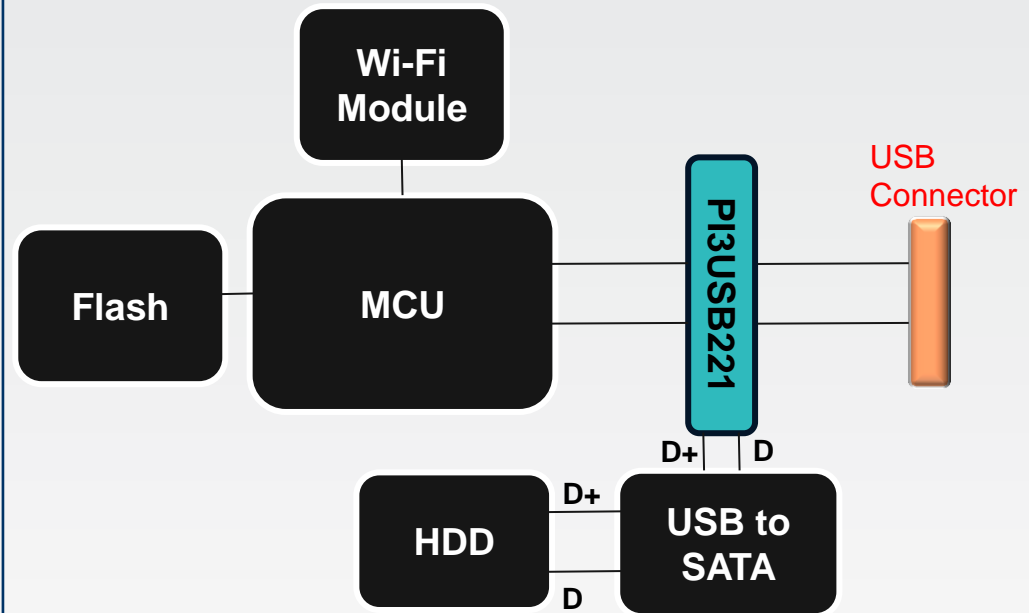
As indicated in the above diagram a USB switch allows a USB device (keyboard or mouse) to select between two USB host system or share a USB host system between two USB devices.

# USB 2 solution for Wi-Fi Storage

## PI3USB221 Key Features

Features	Values
Supports	USB 2.0
3db bandwidth	1.1GHz
Ron	6Ω
Con	6pF
Low Xtalk (@2.5GHz)	-40dB
Low Isolation (@2.5GHz)	-41dB
ESD Tolerance	8kV
Package	10 TDFN

## Functional Block Diagram



## Functional Description

USB 2 switch is used in a Wi-Fi storage to either transform data from HDD to the devices connect via Wi-Fi module or device connected via USB port

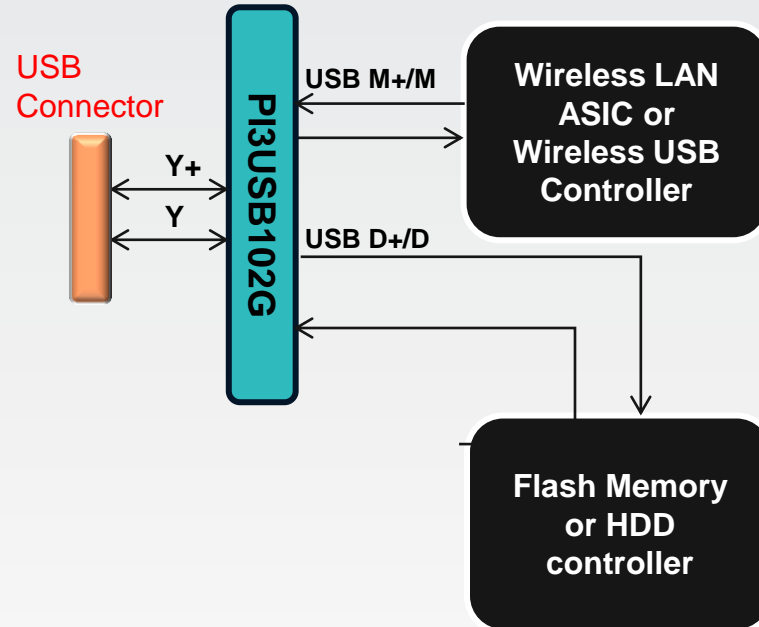


# USB 2 solution for Wireless LAN Adapters

## PI3USB102G Key Features

Features	Values
Supports	USB 2.0 (HS, FS)
3db bandwidth	1000 MHz
Ron	4Ω
Con	6pF
Low Xtalk (@2.5GHz)	-29dB
Low Isolation (@2.5GHz)	-28dB
ESD Tolerance	8kV
Package	10 TQFN

## Functional Block Diagram



## Functional Description

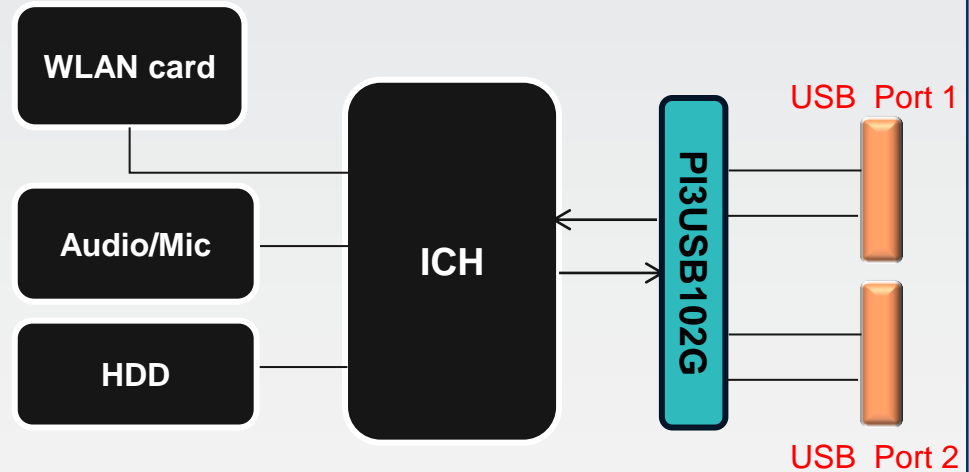
Wireless LAN adaptors come along with a USB flash drive. The USB switch is used to switch between wireless LAN & the flash memory

# USB 2 solution for Embedded PC

## PI3USB102G Key Features

Features	Values
Supports	USB 2.0 (HS, FS)
3db bandwidth	1000 MHz
Ron	4Ω
Con	6pF
Low Crosstalk	-29dB
Low Isolation	-28dB
ESD Tolerance	8kV
Package	10 TQFN

## Functional Block Diagram



## Functional Description

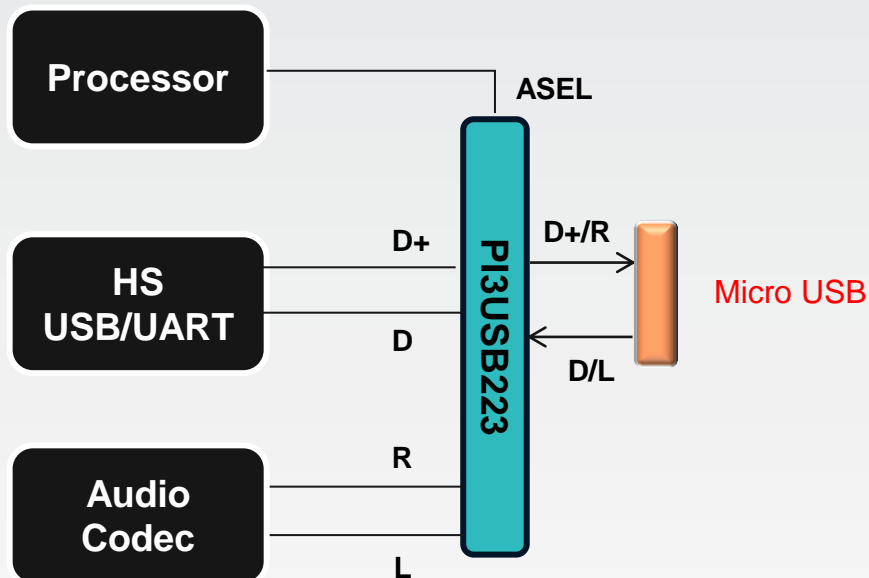
Embedded PC uses multiple USB ports to enable connectivity to various peripherals such as external hard disk

# USB 2 solution for Audio switching in Portable Systems

## PI3USB223 Key Features

Features	Values
Supports	USB 2.0/Audio
3db bandwidth	1500 MHz
Ron	2.5Ω
Con	6pF
THD+N	0.02%
Low Xtalk (@2.5GHz)	-80dB
Low Isolation (@2.5GHz)	-35dB
Package	10 UQFN

## Functional Block Diagram



## Functional Description

Many portable system use a single port to pass either USB data or audio signal. USB223 is equipped with Vbus detection circuitry to immediately switch to USB mode. It also features internal resistors on the audio path to reduce clicks & pops heard during output

# Summary

- **Pericom has broader portfolio of USB switches over competition**
  - Supports USB 3.1, USB 3.0 & USB 2.0 (HS, FS, LS)
  - Offers PCIe & USB combo switch, USB & MHL combo switch and USB && audio combo switch
- **Pericom offers better performance over competition**
  - Supports highest bandwidth of 10.6GHz
  - Lower Insertion loss: -0.8dB (@2.5GHz)
  - Lower Return loss: -28dB (@2.5GHz)
  - Lower Crosstalk: -33dB (@2.5GHz)
  - Lower Isolation : - 25dB(@2.5GHz)
  - Lower Ron & Con: 4Ω & 6pF
  - Offers over voltage protection: 5V
  - Smaller footprint specifically designed for PC/Notebook segment
- **Pericom offers excellent field support:**
  - Offers evaluation boards for quick sample testing & performance evaluation
  - Ensure quick samples turn around
  - Offers application engineering support to review schematic and recommendation for routing high speed signals
  - Offer dedicated customer service for order processing, pricing support, delivery support, etc.

## USB 3.0 REDRIVERS™

For Ultra Mobility Applications

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with Analog Components

Industry's Tightest Stability  
32.768 KHz Xtal Oscillator

**Latest News:** [Pericom to Attend IDF SF Sept 9 2-014 — Sep 9, 2014](#)



### Products

- Clock and Timing ICs
- Crystals and Crystal Oscillators
- Home Appliance
- Interface Logic
- PCIe Switch
- PCIe / PCI Bridges
- Power Management IC
- ReDriver / Repeater / Signal Conditioners
- Signal Switch IC / Multiplexers
- UART
- Video Decoder
- Part Cross Reference

### Protocols

- Bluetooth / WiFi
- DDR Technology
- Ethernet
- Fibre Channel
- InfiniBand
- LVDS
- PCI and PCIe Technology
- SATA / SAS Technology
- USB Technology
- Video Technology
- XAUI
- SRIO

### Applications

- Automotive
- Computer and Peripheral
- Digital Media
- Embedded
- Networking and Telecom
- Server and Storage
- Ultra Mobility & Wireless
- Application Notes

### Product Demos



Switch between DisplayPort and HDMI port using a single video switch



Restore signal quality with our USB 3.0 ReDriver

## Applications

- [Automotive](#) »
- [Computer and Peripheral](#) »
- [Digital Media](#) »
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## Applications

Pericom is committed to providing innovative product solutions to meet your application needs. We deliver the expertise vital to today's designs for major markets such as consumer, communications, computing, core storage, connectivity and display technologies. Pericom supplies essential solutions for the timing, switching, bridging and conditioning of high-speed signals required by today's ever-increasing speed and bandwidth demanding applications like computers, digital video, embedded systems, networking, telecom, server, storage, ultra mobility and wireless technologies.



See Pericom's PC & Notebook Segment Solutions



### Automotive

Today, semiconductors are an integral part of modern automobiles. A typical car may have up to 100 electronic control units (ECU) embedded in its many systems, which include its engine, transmission, to its active safety system all the way to its in-car passenger comfort and infotainment system. Pericom has designed a wide range of products that can be integrated in to any and all of these systems, from timing devices to USB controllers. [More »](#)



### Computer and Peripheral

Pericom products are found in nearly every Notebook in the world. Our broad selections of high-speed next-generation devices are excellent match for this rapidly growing market. These solutions are essential in managing signal integrity and system efficiency through , timing, and routing within the desktop PC, notebook PC, docking station, and various peripherals. [More »](#)



### Digital Media

Digital Media standards such as DVI (Digital Video Interface), HDMI (High definition multimedia interface), and DP (DisplayPort).



The End

Thank You