



# USB251x Family



High-Performance, Low-Power, Small Footprint USB 2.0 Hub Controller Family for PC, Embedded and Consumer Applications

SMSC's USB251x is a family of versatile, cost-effective and power-efficient USB 2.0 hub controllers. Leveraging SMSC's innovative MultiTRAK™ technology that delivers industry-leading data throughput in mixed-speed USB environments, the USB251x family is designed for applications that demand low power and a small footprint without compromising on performance. Well-suited for consumer and mobile applications, all members of the USB251x family are available in space-saving packages. The common 36-pin package shared among all USB251x controllers measures only 6x6mm and provides an ultra small footprint for space-constrained designs while allowing scalable port expansion from two to four ports. Over 30 programmable features, including SMSC's unique PortMap, PortSwap, TrueSpeed and PHYBoost are designed to aid system designers in simplifying PCB layout and optimizing bill-of-material cost.

## Highlights

- Up to 60% space savings compared to previously available devices
- 40% savings in power consumption vs. prior SMSC devices
- On-chip ±8KV HBM ESD protection for reducing BOM and cost
- Enhanced OEM configuration - 30+ programmable options via 12C EEPROM or SMBUS
- Designed to meet -40° to 85°C industrial-temp requirements
- Available in 2/3/4-port versions to serve a wide range of applications

## Target Applications

- Mobile PC Docking Stations
- LCD Monitors/TVs
- PC Motherboards
- Gaming Consoles
- Multi-function Printers
- Cable/DSL Modems
- Set-top Boxes
- DVD/CD-ROM/DVR
- HDD Enclosures
- Keyboards
- KVM Switches
- Server Front Panels
- Point-of-Sale (POS) Terminals
- IP Telephony
- Automobile/Home Audio Systems
- Industrial

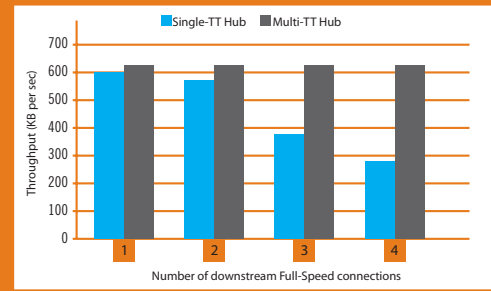
## Features and Benefits

FEATURES	BENEFITS
MultiTRAK Technology	Dedicated transaction translator (TT) for EVERY downstream port provides best-in-class performance
PortMap	Flexible port mapping and port disable sequence supports multiple-SKU platform designs
PortSwap	Programmable USB differential-pair pin locations ease PCB design by aligning USB signal traces directly to connectors
TrueSpeed	USB host/device connection speed indicator provides visual feedback on USB Hi/Full/Low-Speed connectivity
PHYBoost	Programmable USB transceiver drive strength for recovering signal integrity due to compromised system environment
Footprint compatibility	Common pin-out 2/3/4-port hubs in a 36QFN package enables flexible port expansion options without PCB redesign
On-chip Power-on reset (POR)	Provides proper power-on reset and saves BOM cost
Integrated 3.3V to 1.8V regulator	Only a single 3.3V supply required
Extended operating temperature	Available industrial-temp grade SKUs to support systems requiring extended operating temperature of -40° to 85°C

## SMSC MultiTRAK™ Technology

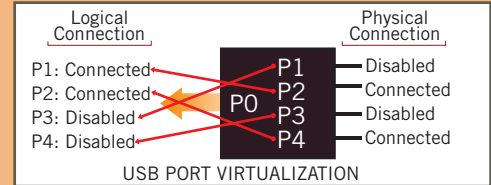
MultiTRAK utilizes a dedicated TT per port to maintain consistent Full-Speed data throughput regardless of the number of active downstream connections. MultiTRAK outperforms conventional USB 2.0 hubs with a single TT in USB Full-Speed data transfers by up to 100%\*, effectively doubling the amount of data throughput for every downstream port.

\*with a minimum of four Full-Speed bulk mass storage devices on a 4-port hub



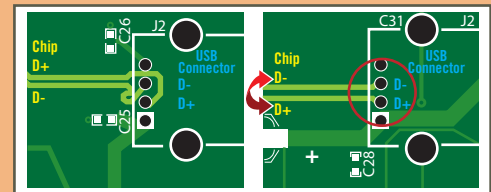
## PortMAP

PortMap provides flexible port mapping and disable sequences. The downstream ports of USB251x hubs can be reordered or disabled in any sequence to support single-platform, multiple-SKU systems in managing component population options. For any port that is disabled, the USB251x automatically reorders the remaining ports to match the USB host controller's port numbering scheme.



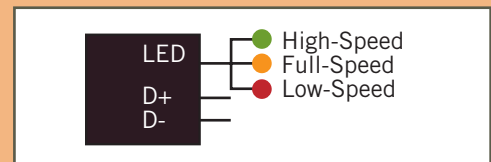
## PortSWAP

PortSwap adds per-port programmability to USB differential-pair pin locations. PortSwap allows direct alignment of USB signals (D+/D-) to connectors avoiding uneven trace length or crossing of the USB differential signals on the PCB.



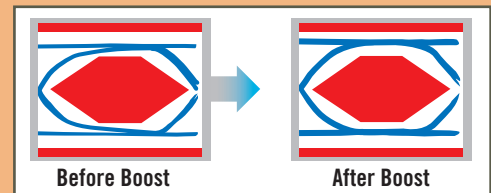
## TrueSPEED

TrueSpeed is a USB host/device port status indicator to provide visual feedback on connection speed. Per-port, three-color LED drivers indicate the speed of connected USB host and devices – Hi-Speed (480 Mbps), Full-Speed (12 Mbps) and Low-Speed (1.5 Mbps).



## PHYBOOST

PHYBoost enables programmable four-level USB signal drive strengths in downstream port transceivers. PHYBoost attempts to restore USB signal integrity that has been compromised by system level variables such as poor PCB layout, long cables, etc. The graphics at the right show an example of Hi-Speed USB eye diagrams before (PHYBoost at 0%) and after (PHYBoost at 12%) signal integrity restoration in a compromised system environment.



## Which USB251x Family Member Is Right For Your Design?

	USB2512	USB2512i	USB2513	USB2513i	USB2514	USB2514i
# Downstream Ports	2	2	3	3	4	4
MultiTRAK Technology			✓	✓	✓	✓
PortMap	✓	✓	✓	✓	✓	✓
PortSwap	✓	✓	✓	✓	✓	✓
TrueSpeed			✓	✓	✓	✓
PHYBoost	✓	✓	✓	✓	✓	✓
I2C/SMBus	✓	✓	✓	✓	✓	✓
-40° to 85°C		✓		✓		✓
36QFN (6x6x0.9 mm)	✓	✓	✓	✓	✓	✓
48QFN (7x7x0.85mm)			✓	✓	✓	✓
RoHS compliant	✓	✓	✓	✓	✓	✓

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