

# Sine On™

An Analog Product Catalog

4Q 2003

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## Industry's first 1394b-compliant devices for multimedia home networking

### TSB17BA1 and TSB41BA3



Get samples, datasheets, app reports and 3rd party support tools at:

[www.ti.com/sc/device/partnumber](http://www.ti.com/sc/device/partnumber)

Replace **partnumber** in URL with TSB17BA1 or TSB41BA3

The TSB17BA1 and TSB41BA3 1394b (FireWire®) chip set was designed to enable connection over the longer cable lengths required for home networking applications. Working together, these devices allow for the transfer of large amounts of audio and video data over lengths up to 100 meters of Cat5 cable.

#### Key Features:

- Power-down features conserve energy in battery-powered applications
- Low-power modes; 3.3-V supply

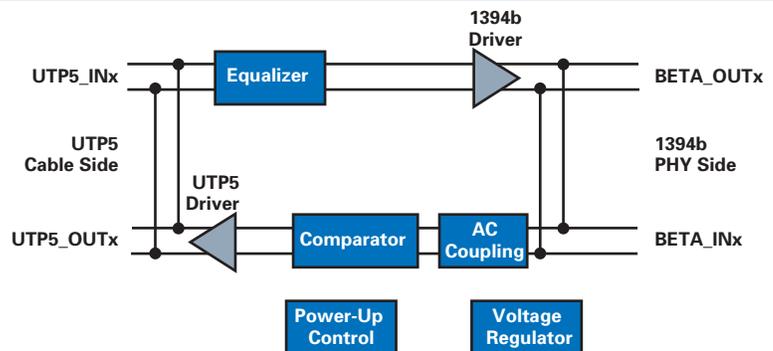
#### TSB17BA1:

- Supports provisions of IEEE 1394b-2002 at s100b signaling rates
- 1394b single-port transceiver enables 100-Mbps signals to be transmitted and received across up to 100 meters of Cat5 cable
- Price: \$2.50 (1K qty.)

#### TSB41BA3:

- Three-port PHY provides three fully backward-compatible, bilingual 1394b cable ports at up to 400 Mbps
- Increase communication distances up to 100 meters of Cat5, GOF or POF cabling
- Price: \$6.50 (1K qty.)

#### Functional Block Diagram



#### Applications include:

- Home networking equipment
- Digital TVs
- Set-top boxes
- DVHS, DVD, and CD players

**1394 FireWire®**

**1394b solutions for high-speed data transfer**

**TSB81BA3 and TSB82AA2**



Get samples, datasheets, app reports and 3rd party support tools at [www.ti.com/sc/device/partnumber](http://www.ti.com/sc/device/partnumber)

Replace **partnumber** in URL with TSB81BA3 or TSB82AA2

The 1394b-compliant TSB81BA3 and TSB82AA2 chip set enables speeds up to 800 Mbps, allowing fast download of large amounts of data.

**Key Features:**

- Backward-compatible with 1394a devices

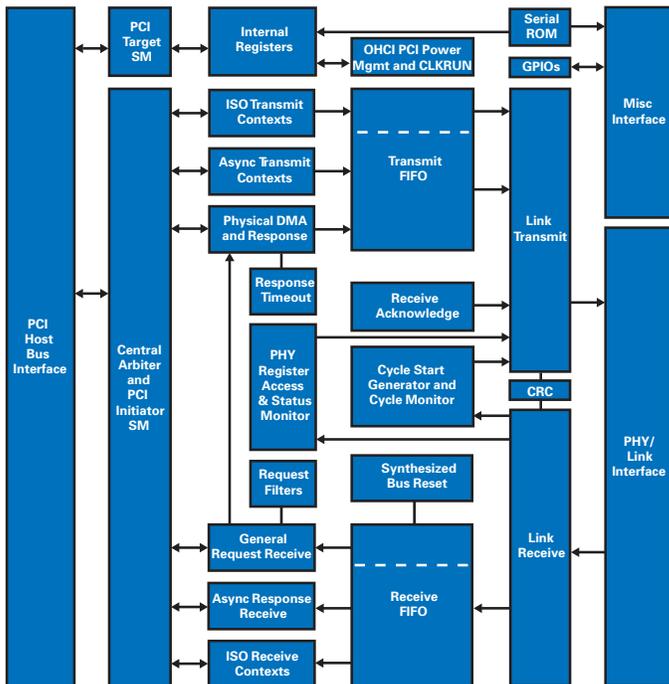
**TSB81BA3:**

- Provides the digital and analog transceiver functions needed to implement a 3-port node in a cable-based 1394 network

**TSB82AA2 (OHCI-Lynx):**

- Provides the throughput and bandwidth to move data efficiently and quickly between the PCI and 1394 buses with 800-Mbps serial bus data rates
- Price: \$7.80 (TBS81BA3 and TSB82AA2, 1K qty.)

**TSB81BA3 Block Diagram**



**Applications include:**

- Video-on-demand
- Backing up a RAID array
- Any application requiring high-speed data transmission

**PCI CardBus**

**Industry's first CardBus controllers to integrate 1394, Flash, and SmartCard**

**PCI7x20**

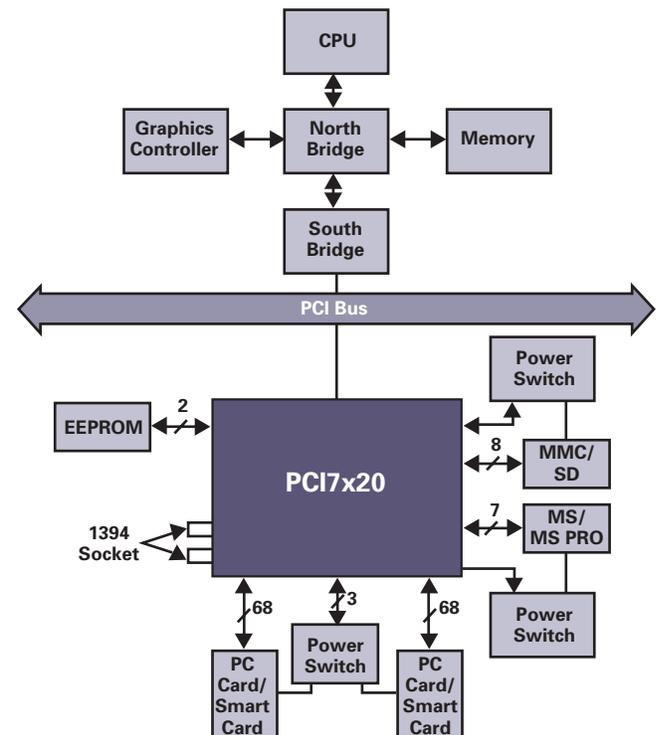


Get samples, datasheets and 3rd party support tools at [www.ti.com/sc/device/PCI7x20](http://www.ti.com/sc/device/PCI7x20)

The PCI7x20 family of CardBus controllers integrates 1394, Flash media, and SmartCard functionality, providing multimedia, security and e-commerce functions with increased speed and convenience. Users can switch among Flash media types and/or SmartCards without the hassle or cost of active adapters or external readers.

Device Options							
Device	CardBus Slots	Integrated 1394	Smart-Card	Flash Media	Voltage (V)	D3 Cold Wake	Package
PCI6420	2	No	No	Yes	3.3	Yes	288-ball BGA
PCI6620	2	No	Yes	Yes	3.3	Yes	288-ball BGA
PCI7410	1	Yes	No	Yes	3.3	Yes	209-ball BGA
PCI7420	2	Yes	No	Yes	3.3	Yes	288-ball BGA
PCI7510	1	Yes	Yes	No	3.3	Yes	209-ball BGA
PCI7610	1	Yes	Yes	Yes	3.3	Yes	209-ball BGA
PCI7620	2	Yes	Yes	Yes	3.3	Yes	288-ball BGA

**PCI7620 Block Diagram**



**Applications include:**

- Laptops
- Small PCs

**PCI CardBus**

# CardBus and FireWire® controllers integrated in a single device

## PCI4510/4520



Get samples, datasheets, app reports and 3rd party support tools at [www.ti.com/sc/device/partnumber](http://www.ti.com/sc/device/partnumber)

Replace partnumber in URL with PCI4510 or PCI4520

The PCI4510 controller provides full CardBus and IEEE 1394a (FireWire) functionality in a single package, saving components, board space, and routing and manufacturing costs for corporate and consumer notebook PCs.

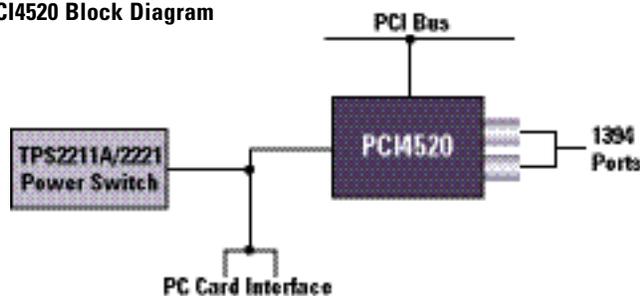
**Key Features**

- Integrates a single-slot CardBus controller, 1394 OHCI 1.1 link layer controller, and two-port, 400-Mbps 1394a physical layer; the PCI4520 adds a dual-slot CardBus controller
- Compliant with PC Card Standard 8.0, PCI Bus Power Management Interface Spec 1.1, Advanced Configuration and Power Interface Spec 2.0, and PCI Local Bus Spec rev. 2.2
- 1.8-V core logic and 3.3-V I/O cells with internal voltage regulator to generate 1.8-V core V<sub>CC</sub>
- PCI interfaces compatible with 3.3-V and 5-V environments
- Supports PC card or CardBus with hot insertion and removal
- Packaging: Space-saving, 209-ball BGA and 208-lead, low-profile QFP (PCI4510); 257-ball BGA (PCI4520)

Product	Pricing <sup>1</sup>
PCI4510	7.96
PCI4520	9.15

<sup>1</sup>Suggested resale price in U.S. dollars in quantities of 1,000

**PCI4520 Block Diagram**



**Applications include:**

- Corporate and consumer notebook PCs
- Legacy-free PCs
- Small form-factor desktop PCs

**USB Peripherals**

# USB-to-serial bridge

## TUSB3410



Get samples, datasheets, EVMs, app reports and 3rd party support tools at: [www.ti.com/sc/device/TUSB3410](http://www.ti.com/sc/device/TUSB3410)

The TUSB3410 provides an easy way to move your serial-based legacy device to a fast, flexible USB interface by bridging between a USB port and an enhanced UART serial port. The TUSB3410 contains all the necessary logic to communicate with the host computer using the USB bus.

**Key Features:**

- USB full-speed-compliant: data rate of 12 Mbps
- 8052 microcontroller with 16 kbytes of RAM that can be loaded from the host or from external onboard memory via an I<sup>2</sup>C bus
- Integrated, enhanced UART features including:
  - Programmable software/hardware flow control
  - Automatic RS-485 bus transceiver control, with and without echo
  - Software-selectable baud rate from 50 to 921.6 kbaud
  - Built-in, two-channel DMA controller for USB/UART bulk I/O
- An evaluation module can jump-start your USB development, or you can use it as a complete USB-to-RS-232 converter

Product	Pricing <sup>1</sup>
TUSB3410	2.50

<sup>1</sup>Suggested resale price in U.S. dollars in quantities of 1,000

**TUSB3410 Data Flow**



**Applications include:**

- Legacy-free PCs
- Any serial device requiring upgrade to a USB interface

## Universal Bus Transceiver

### 8-bit UBT with two bus transceivers

#### SN74VMEH22501



Get samples, datasheets and app reports at:  
[www.ti.com/vme](http://www.ti.com/vme)

The SN74VMEH22501 8-bit Universal Bus Transceiver (UBT) with two bus transceivers provides incident wave switching on the VMEbus backplane to enable data signaling rates of up to 40 Mbps—an 8x improvement over the VME64 standard.

#### Key Features:

- Extends life of the VMEbus
- Referenced by 2eSST VITA1.5 spec
- Backward compatibility with existing VME infrastructure
- Provides incident wave switching
- Increased noise immunity
- Up to an 8x improvement on achievable performance when coupled with 2eSST
- Full live insertion capability with pre-charge
- Up to 40 Mbps on a standard 21-slot VME backplane

Product	Pricing <sup>1</sup>
SN74VMEH22501	2.75

<sup>1</sup>Suggested resale price in U.S. dollars in quantities of 1,000

VME Backplane Evolution							
Date	Topology	Protocol	Data Bits Per Cycle	Data Transfer Per Clock Cycle	Per System (Mbps)	Frequency (MHz)	
						Backplane	Clock
1981	VME bus IEEE-1041	BLT	32	1	40	10	10
1989	VME64	MBLT	64	1	80	10	10
1995	VME64x	2eVME	64	2	160	10	20
1997	VMEH22501	2eSST	64	2-No Ack	160-320	10-20	20-40

#### Applications include:

- Telecom
- Networking

## RS-232 Transceivers

### 1-Mbps RS-232 transceivers

#### SN65C32xx and SN75C32xx



Get samples, datasheets, EVMs, app reports and software tools at:  
[www.ti.com/sc/device/partnumber](http://www.ti.com/sc/device/partnumber)

Replace **partnumber** in URL with number in product table below

SN65C32xx and SN75C32xx series transceivers are industrial and commercial temperature range, pin-compatible, 1 Mbps speed upgrades to the MAX3221/3222/3223/3232/ 3238/3243 single-supply RS-232 products.

#### Key Features:

- Internal charge pump produces  $\pm 5$  V to  $\pm 10$  V (typical RS-232 driver output) from a single 3-V to 5.5-V supply
- RS-232 bus pin ESD protection exceeds  $\pm 15$  kV (during power-down) using Human Body Model
- 3-V to 5.5-V operation
- Accepts 5-V logic input with 3.3-V supply
- Designed to meet or exceed the requirements of the EIA/TIA-232-E standard, in use for over 10 years
- Industrial ( $-40^{\circ}$  C to  $85^{\circ}$  C) and commercial ( $0^{\circ}$  C to  $70^{\circ}$  C) temperature range

Product	Pricing <sup>1</sup>
SN65C3221-	2.38
SN75C3221-	1.94
SN65C3222-	3.24
SN75C3222-	2.81
SN65C3223-	2.81
SN75C3223-	2.38
SN65C3232-	3.02
SN75C3232-	2.79
SN65C3238-	3.24
SN75C3238-	2.81
SN65C3243-	3.46
SN75C3243-	2.59

<sup>1</sup>Suggested resale price in U.S. dollars in quantities of 1,000

Part #	TX/RX Configuration				Features			
	# Drivers	# Receivers	# Wake-up Receivers	Receive Disabled	Shutdown	Wake-Up	Auto-Power Down	3-State
SNx5C3221	1	1	1	x	x	x	x	x
SNx5C3222	2	2	0	x	x			x
SNx5C3223	2	2	2	x	x	x	x	x
SNx5C3232	2	2	0					
SNx5C3238	5	3	0	x	x	x	x	x
SNx5C3243	3	5	5	x	x	x	x	x

#### Applications include:

- Battery-powered systems
- PDAs and palmtop PCs
- Notebooks and laptops
- Hand-held equipment

**RS-485 Transceivers**

## RS-485 transceivers with receiver equalization and extended common-mode

### SN65HVD2x



Get samples, datasheets, EVMs, app reports and software tools at: [www.ti.com/sc/device/SN65HVD2x](http://www.ti.com/sc/device/SN65HVD2x)

SN65HVD2x family transceivers feature receiver equalization and extended common-mode, more than double TIA/EIA-485 requirements, in addition to high ESD protection and true fail safe. They are ideally suited for long-cable networks and other applications where the environment is too harsh for ordinary transceivers.

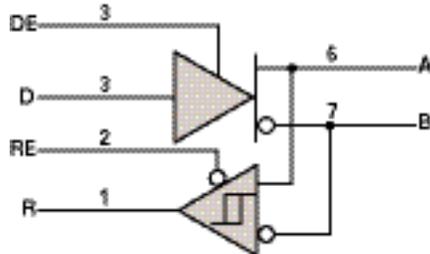
**Key Features:**

- Common-mode voltage range (-20 V to 25 V) more than doubles TIA/EIA-485 requirement
- Receiver equalization on HVD23 and HVD24
- Reduced unit-load for up to 256 nodes
- Bus I/O protection to over 16 kV HBM
- Failsafe receiver for open-circuit, short-circuit and idle-bus conditions
- Low standby supply current: 1  $\mu$ A max
- More than 100 mV receiver hysteresis
- Combine a 3-state differential driver and a differential receiver, which operate from a single 5-V power supply

Device Options					
Product	V <sub>CC</sub>	ESD	Data Rate	Unit Load	Pricing <sup>1</sup>
HVD20	5	16	25 Mbps	1/2	1.93
HVD21	5	16	5 Mbps	1/8	1.93
HVD22	5	16	500 Kbps	1/8	1.93
HVD23	5	16	25 Mbps	1/2	2.32
HVD24	5	16	3 Mbps	1/8	2.32

<sup>1</sup>Suggested resale price in U.S. dollars in quantities of 1,000

**SN65HVD2x Block Diagram**



- Applications include:**
- Long cable solutions
  - Factory automation
  - Security networks
  - Building HVAC
  - Severe electrical environments
  - Electrical power inverters
  - Industrial drives
  - Avionics

## Low-power RS-485 transceiver SN65HVD3082E and SN75HVD3082E



Get samples, datasheets, app reports and software tools at: [www.ti.com/sc/device/partnumber](http://www.ti.com/sc/device/partnumber)  
Replace **partnumber** in URL with SN65HVD3082E or SN75HVD3082E

The SN65HVD3082E and SN75HVD3082E are half-duplex transceivers designed for RS-485 data bus networks. With controlled output transition times, these devices are suitable for signaling rates up to 200 kbps over long twisted-pair cables. When in the inactive shutdown mode, the supply current drops to a few nanoamps, making these devices ideal for power-sensitive applications.

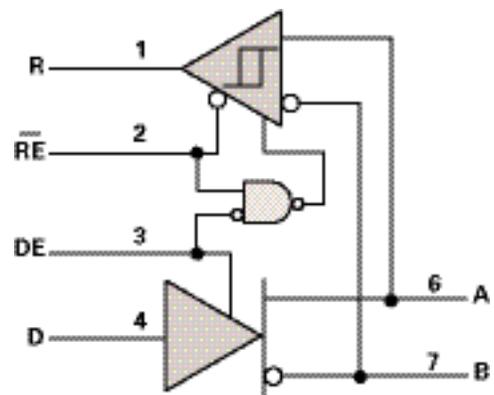
**Key Features:**

- Meet or exceed the requirements of the TIA/EIA-485A Standard
- Low quiescent power:
  - < 0.3-mA active mode
  - 1-nA shutdown mode
- Driver outputs optimized for low EMI at signaling rates up to 200 kbps
- 1/8 unit load—up to 256 nodes on a bus
- Bus pin ESD protection exceeds 16 kV
- Industry-standard SN75176 footprint
- Failsafe receiver (bus open, bus shorted, bus idle)

Product	Pricing <sup>1</sup>
SN65HVD3082ED, EDR, EP	0.56
SN75HVD3082ED, EDR, EP	0.51

<sup>1</sup>Suggested resale price in U.S. dollars in quantities of 1,000

**SN65(75)HDD3082 Block Diagram**



- Applications include:**
- Energy meter networks
  - Building automation networks
  - Battery-powered applications
  - Telecommunications equipment
  - Power inverters
  - Industrial automation
  - Industrial process control

## RS-485 Transceivers

## 5-V CAN transceiver

## SN65HVD251



Get samples, datasheets, EVMs, app reports and software tools at:  
[www.ti.com/sc/device/SN65HVD251](http://www.ti.com/sc/device/SN65HVD251)

The SN65HVD251 is intended for use in applications employing the CAN serial communication physical layer in accordance with the ISO11898 standard. Designed for operation in especially harsh environments, the device features cross-wire, over-voltage and loss of ground protection to  $\pm 36$  V.

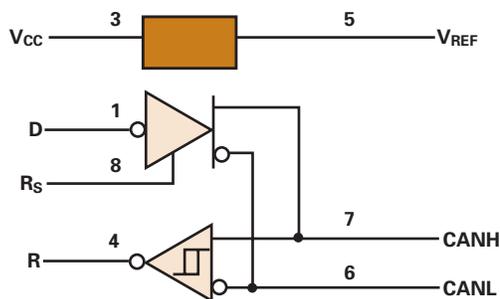
## Key Features

- Drop-in improved replacement for the PCA82C250 and PCA82C251
- Bus-fault protection of  $\pm 36$  V
- Meets or exceeds the requirements of ISO11898
- Designed for signaling rates (1) up to 1 Mbps
- High input impedance allows up to 120 SN65HVD251 nodes on a bus
- Bus pin ESD protection exceeds 12 kV HBM
- Unpowered node does not disturb the bus
- Low current standby mode: 200  $\mu$ A typical
- Thermal shutdown protection
- Glitch-free power-up and power-down bus protection for hot-plugging

Product	Pricing <sup>1</sup>
SN65HVD251D, DR	0.82

<sup>1</sup>Suggested resale price in U.S. dollars in quantities of 1,000

## SN65HVD251 Block Diagram



## Applications include:

- CAN data buses
  - DeviceNet™ data buses
  - Smart Distributed Systems (SDS™)
- Industrial automation
- SAE J1939 standard data bus interface
- NMEA 2000 standard data bus interface
- ISO 11783 standard data bus interface

## M-LVDS Transceivers

## Multipoint-LVDS for backplanes and cables

## SN65MLVD200/201/202/203/204/205/206/207



Get samples, datasheets, EVMs and app reports at:  
[www.ti.com/sc/device/partnumber](http://www.ti.com/sc/device/partnumber)

Replace [partnumber](#) in URL with SN65MLVD200, SN65MLVD201, SN65MLVD202, SN65MLVD203, SN65MLVD204, SN65MLVD205, SN65MLVD206 or SN65MLVD207

This is the industry's first family of single-line transceivers compliant with the Multipoint Low-Voltage Differential Signaling (M-LVDS) specification TIA/EIA-899. TI's new SN65MLVD20x series of M-LVDS line circuits provides signals at speeds up to 100 MHz and up to 32 devices.

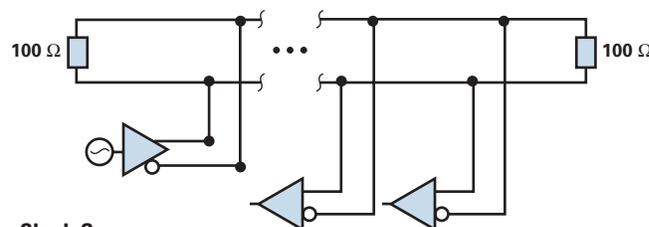
## Key Features:

- Half power, 10x speed of RS-485
- Complies with M-LVDS Standard (TIA/EIA-899)—also supported by alternative vendors
- Supports wired-OR configuration—ideal for control lines
- Hot-plugging capability enhances reliability and robustness
- Controlled rise times for longer stub lengths

Product	Pricing <sup>1</sup>
SN65MLVD200, 202, 204, 205	1.84
SN65MLVD201, 203, 206, 207	2.10

<sup>1</sup>Suggested resale price in U.S. dollars in quantities of 1,000

## M-LVDS for Clock Distribution Over a Backplane



Clock Source  
 e.g., 8 kHz, 19 MHz ...  $x < 100$  MHz

## Applications include:

- Clock distribution
- Base station control and databus
- Synchronization signals

**LVDS/LVPECL/CML-to-CML Translator**

**LVPECL/CML/LVDS repeaters/ translators and crosspoint switches**

**SN65LVDS100/101, SN65CML100, SN65LVDS122/125 and SN65LVCP23**



Get samples, datasheets and EVMs:

[www.ti.com/sc/device/partnumber](http://www.ti.com/sc/device/partnumber)

Replace **partnumber** in URL with SN65LVDS100, SN65LVDS101, SN65CML100, SN65LVDS122, SN65LVDS125 or SN65LVCP23

These high-speed repeaters/translators and crosspoint switches feature internal differential signal paths for very low pulse and channel-to-channel skews.

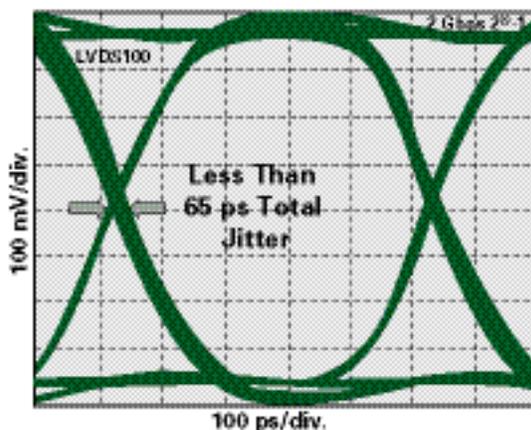
**Key Features:**

- Total jitter: < 65 ps
- Pulse skew: < 50 ps
- All devices accept LVDS, CML, and LVPECL inputs
- 1:1 Translator repeaters:
  - LVDS100 with LVDS output
  - LVDS101 with LVPECL output
  - CML100 with CML output
- Crosspoints:
  - LVDS122 2x2 - LVDS output
  - LVDS125 4x4 - LVDS output
  - LVCP23 2x2 - LVPECL output

Product	Pricing <sup>1</sup>
SN65CML100D, DR, DGK, DGKR	2.52

<sup>1</sup>Suggested resale price in U.S. dollars in quantities of 1,000

**Eye Pattern of LVDS100**



**Applications include:**

- CML/LVPECL-to-LVDS translator
- LVDS/CML-to-LVPECL translator
- 2x2 Crosspoint and 2:1 mux
- 4x4 Crosspoint and 4:1 muxes

**LVDS SerDes Transmitter**

**10:1 LVDS transmitter**

**SN65LV1023A and SN65LV1224A**



Get samples, datasheets and app reports at:

[www.ti.com/sc/device/partnumber](http://www.ti.com/sc/device/partnumber)

Replace **partnumber** in URL with SN65LV1023A or SN65LV1224A

The SN65LV1023A serializer and SN65LV1224A deserial-izer are a 10-bit SerDes chipset designed to transmit and receive serial data over LVDS differential backplanes at equivalent parallel word rates from 10 MHz to 66 MHz. The A revision supports a data rate range from 100 Mbps to 660 Mbps and features improved latency.

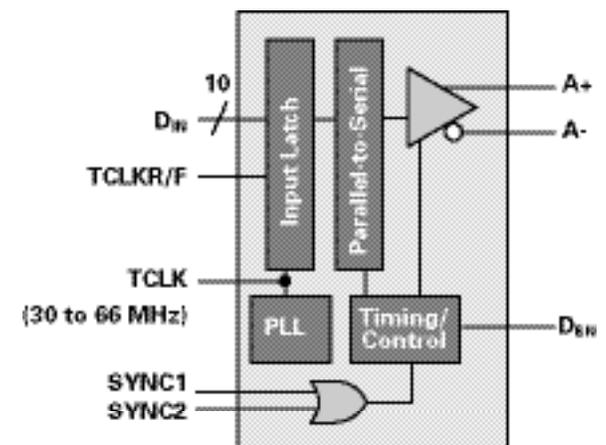
**Key Features:**

- Chipset (SerDes) power consumption <450 mW (typ) at 66 MHz
- Synchronization mode for faster lock
- Lock indicator
- No external components required for PLL
- Low-cost, 28-pin SSOP package
- Industrial temperature qualified: T<sub>A</sub> = -40° C to 85° C
- Programmable edge trigger on clock
- Flow-through pinout for easy PCB layout

Product	Pricing <sup>1</sup>
SN65LV1023ADB, DBR	5.20
SN65LV1224A	5.20

<sup>1</sup>Suggested resale price in U.S. dollars in quantities of 1,000

**SN65LV1023A Block Diagram**



**Applications include:**

- Wireless infrastructure equipment
- Point-to-point bus extension
- Video links
- End printing systems
- Datacom line card links

## TI Worldwide Technical Support

### Internet

**TI Semiconductor Product Information Center Home Page**  
support.ti.com

**TI Semiconductor KnowledgeBase Home Page**  
support.ti.com/sc/knowledgebase

### Product Information Centers

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Taiwan 0800-006800  
Thailand 001-800-886-0010  
Fax 886-2-2378-6808  
Email tiasia@ti.com  
Internet support.ti.com/sc/pic/asia.htm

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**Sine On** AN ANALOG  
PRODUCT CATALOG  
*this issue:*  
**Interface**