Product Bulletin

Serial Gigabit Transceiver Family

Texas Instruments' (TI) Serial Gigabit Transceivers provide high-performance, low-power physical layer solutions for optical networking, telecommunications, data communications, wireless infrastructure, and data transmission applications.

The following are highlights from this growing family:

- TI's portfolio of general-purpose, backplane Serializer/Deserializer (SerDes) devices are easy to implement, with low-power requirements and robust built-in testability.
- Gigabit Ethernet/Fibre Channel products feature low-power, high-performance IEEE 802.3z compliant SerDes (Serializer/ Deserializer), along with ultra-small form factors.

- TI's CMOS-based line of inter-face devices supports serial data rates up to 10.3 Gbps/channel. It features one of the industry's first full-production 10-Gigabit Ethernet backplane SerDes (XGMII to XAUI).
- The SONET family of integrated, CMOS-based transceivers for OC-3 to OC-40-based applications features multi-rate SerDes that incorporate MUX, deMUX and CDR functions.
- Industry-compatible LVDS SerDes devices provide high-performance serial solutions for next-generation systems.
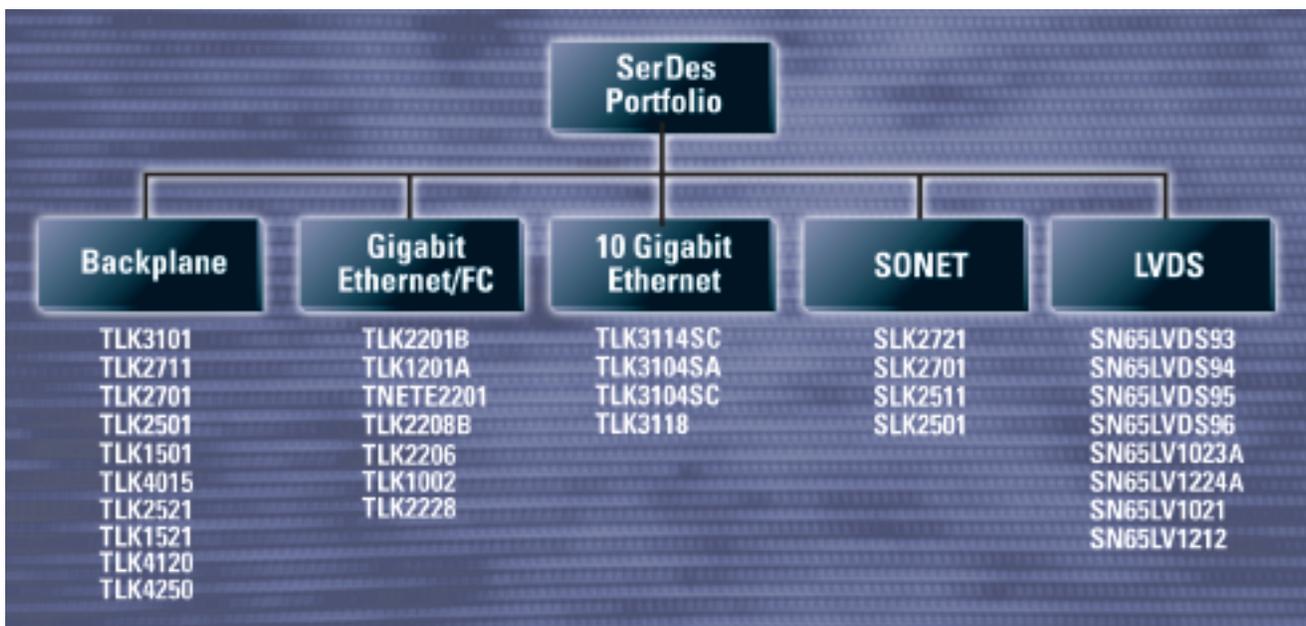
Key Benefits
- Ultra-low-power operation at multi-gigabit data rates
- Onboard PRBS generation and verification for easy link testing
- Broad range of devices support standards such as Gigabit Ethernet, 10-Gigabit Ethernet, Fibre Channel, XGMII, XAUI and SONET
- Compatible with TI's ASIC library SerDes functions

NEW *TLK2208, TLK2206*
Octal/HEX Gigabit Ethernet Transceiver

NEW *SN65LV10xx, 12xx*
LVDS-based SerDes
for speeds 100 to 660 Mbps

NEW *TLK3118*
XGMII to XAUI
with redundancy

SerDes Portfolio				
Backplane	**Gigabit Ethernet/FC**	**10 Gigabit Ethernet**	**SONET**	**LVDS**
TLK3101	TLK2201B	TLK3114SC	SLK2721	SN65LVDS93
TLK2711	TLK1201A	TLK3104SA	SLK2701	SN65LVDS94
TLK2701	TNETE2201	TLK3104SC	SLK2511	SN65LVDS95
TLK2501	TLK2208B	TLK3118	SLK2501	SN65LVDS96
TLK1501	TLK2206			SN65LV1023A
TLK4015	TLK1002			SN65LV1224A
TLK2521	TLK2228			SN65LV1021
TLK1521				SN65LV1212
TLK4120				
TLK4250				

BACKPLANE SERDES

TLK1501, TLK2501, TLK2701, TLK2711, TLK3101

The SerDes devices provide a 16-to-1 function with supported data rates from 600 Mbps to 3.125 Gbps and feature built-in 8B/10B encoding/decoding for easier design. The high-speed signals have embedded clocking for off-board cable links up to 10 meters. In addition, built-in testability features include pseudo-random bit stream (PRBS) generation and verification as well as internal loop back.

TLK2521, TLK1521, TLK4250, TLK4120

The TLK2521 is an 18:1/1:18 SerDes device for general purpose point-to-point links. The device supports 1- to 2.5-Gbps (TLK1521 0.5 to 1.3 Gbps) data rates with low power dissipation. The 18-bit parallel interface provides flexibility in terms of interfacing with FPGA and ASIC solutions where standard 16- and 32-bit buses are not used or needed. In addition, the TLK2521 offers built-in high-speed equalization which allows for greater signal integrity when driving long links over copper media such as backplane or cable.

The TLK4250 is a four-channel version of the TLK2521. The TLK4120 is a four-channel version of the TLK1521.

TLK4015

The TLK4015, a quad version of the TLK1501, supports an effective serial interface speed of 0.6 to 1.5 Gbps per channel.

GIGABIT ETHERNET/ FIBRE CHANNEL

TLK1201, TLK2201, TLK1002, TNETE2201

This family of Gigabit Ethernet and Fibre Channel-compliant transceivers requires 8B/10B encoded data on the parallel side. The devices run in either normal 10-bit (TBI) mode or a reduced 5-bit mode, which clocks in data on the rising and falling clock edges. The TLK1201 supports data rates of 0.6 to1.3 Gbps, while the TLK2201 supports data rates of 1.0 to 1.6 Gbps.

The TLK2201 is also available in an industrial temperature version and an ultra-small 5 mm x 5 mm MicroStar Junior™ BGA package intended for high-port density applications where board space is limited.

The TLK1002 is a dual-channel Gbps Ethernet signal conditioner for cleaning Gbps Ethernet/FC serial data streams.

TLK2208B, TLK2206, TLK2228

The TLK2208B is the third-generation Gigabit Ethernet transceiver from TI, combining high port density and ultra-low-power in a small form factor footprint. Based on the IEEE 802.3z 1000-Mbps Ethernet specification, the TLK2208B provides eight channels of Gigabit Ethernet for high-speed, full-duplex, point-to-point data transmission. This device features selectable 8B/10B encoding/decoding and two data sampling modes—Multiplex and Nibble—that enable a reduced pin count for interfacing to MAC, ASIC or FPGA. Its primary application is to provide building blocks for developing point-to-point baseband data transmission over controlled impedance media of 50 Ω.

The TLK2208B performs the data encoding, decoding, serialization, deserialization, clock recovery and clock-tolerance compensation functions for a physical-layer interface device. Each channel operates from 1.0 to 1.3 Gbps, providing a maximum total aggregated data bandwidth of 8.32 Gbps over a copper or optical media interface.
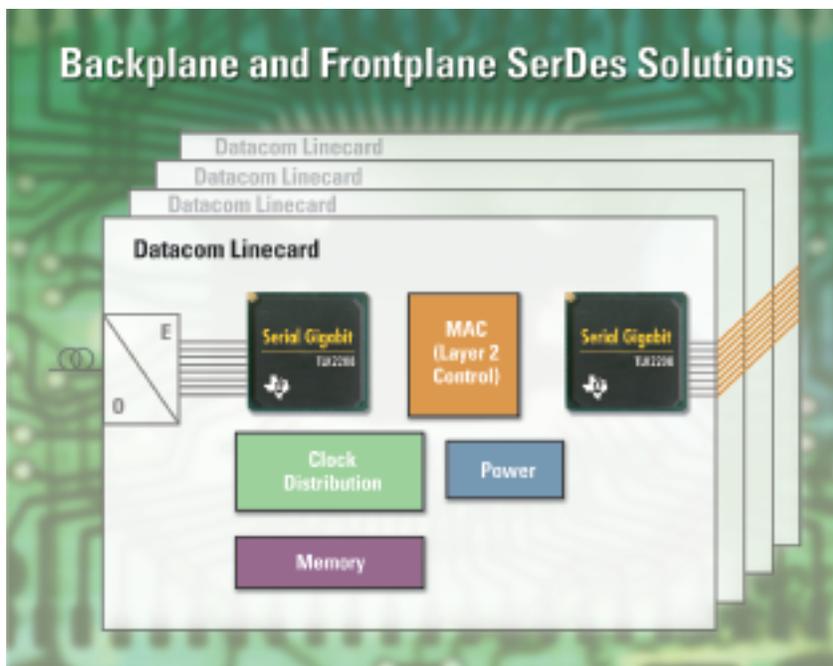
The TLK2206 is a six-channel Gigabit Ethernet transceiver. The TLK2206 supports both 4/5-bit RTBI as well as 8/10-bit parallel interface using DDR clocking.

The TLK2228 is an eight-channel Gbps Ethernet transceiver with RTBI and RGMII support.

10 GIGABIT ETHERNET

TLK3104SA, TLK3114SA/SB/SC

The TLK3114SC, a four-channel transceiver, accepts inputs on four selectable 10/8-bit SSTL2/HSTL parallel-side interfaces and drives four channels of LVPECL signaling (XAUI-serial side) at 3.125 Gbps/channel. The TLK3114SC operates in 10-Gigabit Ethernet (IEEE 802.3ae compliiant)

Backplane and Frontplane SerDes Solutions

Datacom Linecard
Datacom Linecard
Datacom Linecard

Datacom Linecard

Serial Gigabit TLK2208
MAC (Layer 2 Control)
Serial Gigabit TLK2208
Clock Distribution
Power
Memory

mode and supports an aggregate bandwidth of 12.5 Gbps at approximately 750 mW/channel. A flexible, quad serial transceiver for 10-Gigabit Ethernet backplane applications, the TLK3114SA/SB/SC delivers high-speed, bi-directional, point-to-point data transmission to provide up to 10 Gbps of data transmission capacity. Low power and pin compatible with the TLK3114SC quad serial transceiver, the device supports an operating range of serial data rates from 2.5 Gbps to 3.125 Gbps/channel (IEEE 802.3ae compliant).

TLK3104SC

The TLK3104SC, a four-channel transceiver, accepts low voltage differential signaling (LVDS), 622 Mbps inputs on 20 channels and compatible signaling at 3.125 Gbps (XAUI). It supports an aggregate bandwidth of 12.5 Gbps at approximately 750 mW/channel.

TLK3118

A flexible, redundant XAUI serial transceiver, the TLK3118 is compliant to the 10 Gbps Ethernet XAUI specification. It provides high-speed, bidirectional, point-to-point data transmissions with up to 12.75 Gbps raw data transmission capacity. The primary application is backplanes and front panel connections requiring redundant 10 Gbps connections over controlled impedance media of approximately 50 Ω, where the TLK3118 performs the parallel-to-serial and serial-to-parallel conversion as well as clock recovery functions for a physical layer interface.

Additionally, the TLK3118 provides two complete XGXS/PCS functions defined in Clause 47/48 of the IEEE P802.3ae 10-Gbps Ethernet standard. The serial transmitter is implemented using differential current mode logic with integrated termination resistors.

10-Gigabit Ethernet Application

300-Pin MSA
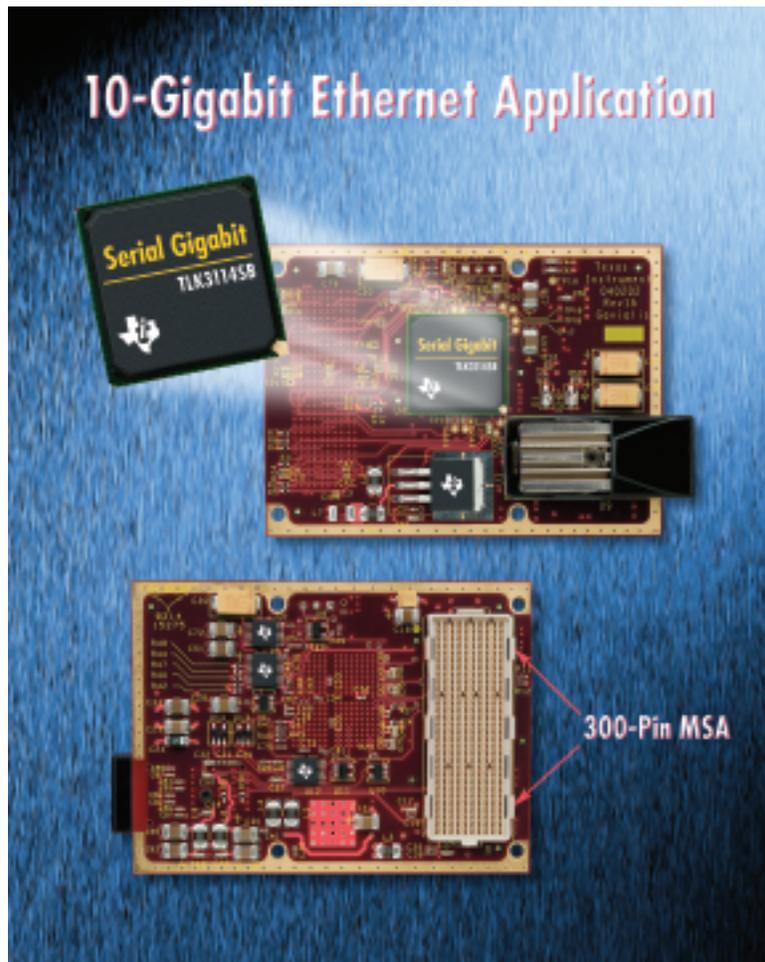
Configured as a redundant XAUI transceiver or a full-duplex XAUI re-timer, the TLK3118 supports a 32-bit data path, 4-bit control and 10-Gigabit Media Independent Interface (XGMII) to the protocol device.

SONET

SLK2501, SLK2511, SLK2701, SLK2721

The SLK2xxx family of multirate SONET transceivers with integrated clock and data recovery supports data rates of OC-3/12/24/48 and Gigabit Ethernet payloads. The SLK2701 and SLK2721 also feature support for FEC data rates. Additionally, the SLK2721 is optimized for jitter tolerance. The entire family of devices features auto-rate detection, local and remote loop back and PRBS generation and verification.

LVDS DEVICES

SN65LVDS9x Family

The SN65LVDS9x family of devices is a three- or four-channel point-to-point transmitter and receiver pair that supports up to 1.365/1.820 Gbps of data throughput. It accepts 21/28 LVTTL inputs and outputs three or four LVDS lines in parallel with a clock signal. Potential applications include video transmission over copper cable or backplanes, as well as wireless infrastructure backplanes.

SN65LV1021/1023A (TX) and SN65LV1212/1224A (RX) Chipsets

This TX/RX family of devices provides backplane solutions between 100-660 Mbps. With a 10-bit LVTTL parallel side I/O and a high-speed LVDS serial side I/O, the chipset operates at low power (250-400 mW) and is industrial-temperature qualified.

3

Backplane Application

Transceiver — SN65LV1021 or SN65LV1023A

Receiver — SN65LV1212 or SN65LV1224A
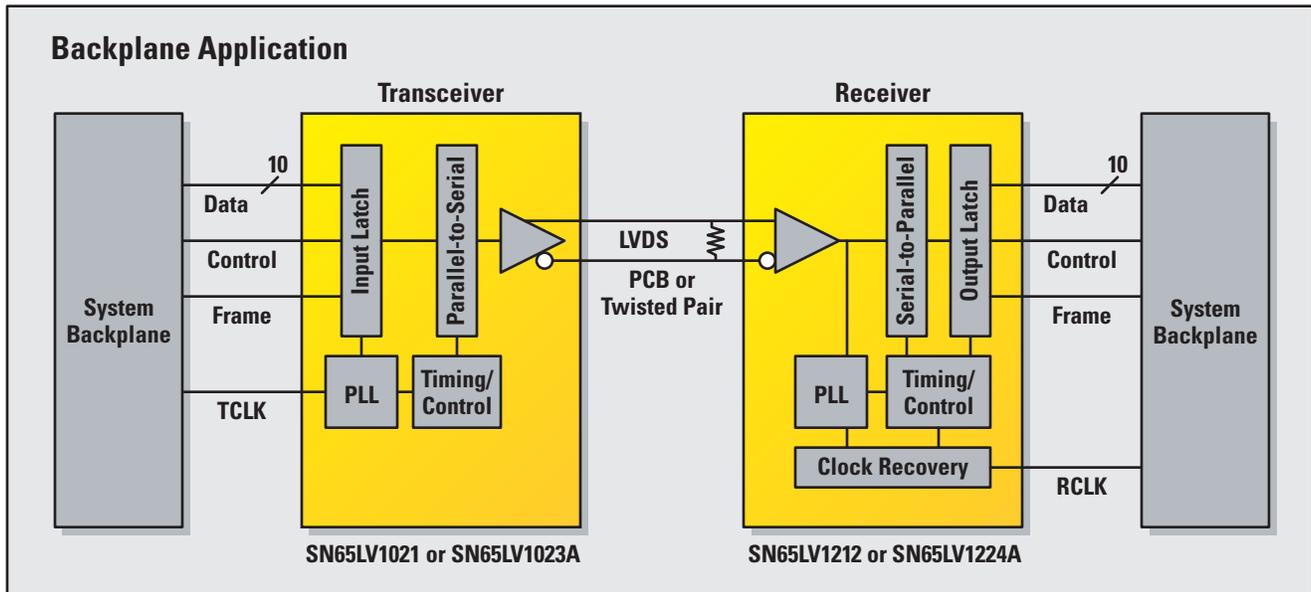
For More Information

TI's Serial Gigabit Transceiver family combines low-power dissipation and multi-gigabit transmission speeds for today's most advanced systems. For more information about serial gigabit samples, datasheets, application reports and EVMs, please contact your local TI field sales representative or visit:

www.ti.com/serialgigabit

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Hong Kong	800-96-5941
Indonesia	001-803-8861-1006
Korea	080-551-2804
Malaysia	1-800-80-3973
New Zealand	0800-446-934
Philippines	1-800-765-7404
Singapore	800-886-1028
Taiwan	0800-006800
Thailand	001-800-886-0010
Fax	886-2-2378-6808
Email	tiasia@ti.com
	ti-china@ti.com
Internet	support.ti.com/sc/pic/asia.htm

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B111103

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TEXAS INSTRUMENTS

SLLT164D

Serial Gigabit Transceiver Family

Key Specifications

	Function	Data Rate	Serial I/F	Parallel I/F	Power	Special Features	Price[4]
TLK1501	Single-Ch. 16:1 SerDes	0.6-1.5 Gbps	1 CML[2]	16 LVTTL	200 mW	Built-In Testability	8.00
TLK2501	Single-Ch. 16:1 SerDes	1.6-2.5 Gbps	1 CML[2]	16 LVTTL	300 mW	Built-In Testability	12.00
TLK2701	Single-Ch. 16:1 SerDes	1.6-2.5 Gbps	1 CML[2]	16 LVTTL	300 mW	Built-In Testability and K Character Control	12.00
TLK2711	Single-Ch. 16:1 SerDes	1.6-2.5 Gbps	1 VML[3]	16 LVTTL	350 mW	MicroStar Junior™ BGA Packaging	12.00
TLK3101	Single-Ch. 16:1 SerDes	2.5-3.125 Gbps	1 VML[3]	16 LVTTL	350 mW	Built-In Testability	16.00
TLK1201A	Single-Ch. 10:1 Gigabit Ethernet Xcvr Gbps	0.6-1.3	1 LVPECL	10 LVTTL	200 mW	Industrial Temperature	3.95
TLK2201	Single-Ch.	1.0-1.6 Gbps	1 LVPECL	10 LVTTL	200 mW	JTAG; 5-Bit DDR mode	3.95
TLK2201I	Single-Ch. 10:1 Gigabit Ethernet Xcvr	1.2-1.6 Gbps	1 LVPECL	10 LVTTL	200 mW	JTAG; 5-Bit DDR mode, Industrial Temperature Qualified	4.74
TLK2201JR	Single-Ch. 10:1 Gigabit Ethernet Xcvr	1.0-1.6 Gbps	1 LVPECL	10 LVTTL	200 mW	MicroStar Junior 5 mm x 5 mm LGA	3.95
TLK1002	Two-ch. Gigabit Signal Ethernet Conditioner	1.0-1.3 Gbps	2 VML	N/A	<300 mW	High Input Jitter Tolerance < .75 UI	Preview
TLK2521	Single-ch. 18:1 SerDes	1.0-2.5 Gbps	1 VML	18 LVTTL	<550 mW	Low Power and Built-In Equalization	18.00
TLK1521	Single-ch. 18:1 SerDes	0.6-1.3 Gbps	1 VML	18 LVTTL	<350 mW	Low Power and Built-In Equalization	10.00
TLK4120	Four-Ch. 18:1 Serdes	0.5-1.3 Gbps	4 VML	18 LVTTL	<350 mW	Four-Channel Version of TLK1521	24.00
TLK4250	Four-Ch. 18:1 Serdes	1.0-2.5 Gbps	4 VML	18 LVTTL	<550 mW	Four-Channel Version of TLK2521	28.00
TLK2208B	Eight-Ch. of 10:1 Gigabit Ethernet Xcvr	1.0-1.3 Gbps	8 CML	4/5-Bit/Ch (Nibble DDR Mode), 8/10-Bit/Ch (Multiplex Ch Mode)	1 W	JTAG, MDIO Supported	30.00
TLK2228	Eight-Ch. Gigabit Xcvr	1.0-1.3 Gbps	8 VML	RMGII/RTBI	<1.5 W	JTAG, MDIO Supported	Preview
TLK2206	Six-Ch. 16:1 Gigabit Ethernet Xcvr	1.0-1.3 Gbps	6 VML	4/5-Bit RTBI or 8/10-Bit DDR Channel Mode	<1 W	MDIO Supported	20.00
TLK3104SA	Four-Ch. of 10/8:1 Xcvr	2.5-3.125 Gbps	4X 3.125 Gbps LVPECL (XAUI)	4X 10/8-Bit SSTL/HSTL	700 mW/ch.	JTAG; Programmable Preemphasis and XAUI I/F	55.00
TLK3104SC	Four-Ch. of 4.1: Xcvr	3.0-3.125 Gbps	4X LVPECL	20X622 LVDS Lines	700 mW/ch.	JTAG, 8b/10b On/Off	120.00
TLK3114SC	Four-Ch. of 10/8:1: Xcvr	2.5-3.125 Gbps	4X 3.125 Gbps LVPECL (XAUI) (XGMII)	4X 10/8-Bit SSTL/HSTL	600 mW/ch.	IEEE 802.3ae Backplane Transceiver Compliant	55.00
TLK3118	Four ch. 10/8:1 Xcvr w/ (XAUI) Full Redundancy	2.5-3.125 Gbps/ch.	4X 3.125 LVPECL (XAUI)	8/10 HSTLx4 (XGMII)	<2 W	Full Redundancy for Four Channels (XAUI)	Web
TLK4015	Four-Ch. of 16:1 Xcvr	0.6-1.5 Gbps/ch.	4X CML	16 LVTTL/ch.	1 W	Four-Channel Version of TLK1501	28.00
SLK2501/2511	Single-ch. 4:1 Multirate SONET Xcvr with CDR	OC-3/12/24/48	1 LVPECL	4X622 LVDS	900 mW	Auto-Rate Detection, Local and Remote Loop Back	40.00
SLK2701/2721	Single-ch. 4:1 Multirate SONET Xcvr with CDR	OC 3/12/24/48	PECL	4 x LVDS	900 mW	FEC Rate Compatible, SLK2721 is Optimized for Jitter Tolerance	40.00
SN65LVDS93/94	Four-Ch. 28:4 TX/RX Chipset	140-455 Mbps/ch.	4 LVDS	28 LVTTL	250 mW/chip	Supports Up to 1.82 Gbps Throughout	3.73
SN65LVDS95/96	Three-Ch. 21:3 TX/RX Chipset	140-455 Mbps/ch.	4 LVDS	28 LVTTL	250 mW/chip	Supports Up to 1.82 Gbps Throughout	3.73
SN65LV1021/1212	Single-Ch. 10:1 TX/RX Chipset	100-400 Mbps	1 LVDS	10 LVTTL	<400 mW total	Low Power Solution	5.00
SN65LV1023/1024[1]	Single-Ch. 10:1 TX/RX Chipset	300-660 Mbps	1 LVDS	10 LVTTL	<400 mW total	Low Power Solution	5.20

[1] 'A' revision will support 100 to 660 Mbps   [2] CML (Current Mode Logic)   [3] VML (Voltage Mode Logic)   [4] Suggested resale price in U.S. dollars in quantities of 1,000   Preview devices listed in blue.

R E A L   W O R L D   S I G N A L

2004

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Package Overview

80-ball MicroStar Junior™ BGA
TLK2201 Jr
TLK2711 Jr
(GQE)

64-pin VQFP PowerPAD™
TLK1201
TLK1501
TLK2201
TLK2251
TLK2501
TLK2701
TLK2711
TLK3101
(RCP)

289-pin PBGA
TLK2208
TLK3104SA/SB
TLK3104SC
TLK3114SA
TLK4015
(GNT)

100-pin VQFP PowerPAD
SLK2501
SLK2511
SLK2511
SLK2721
(PZP)
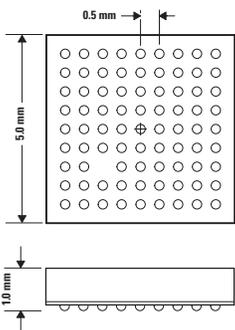
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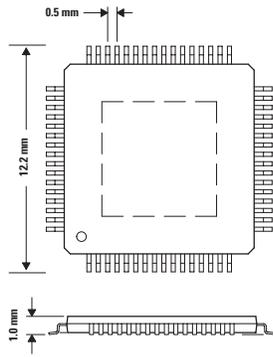
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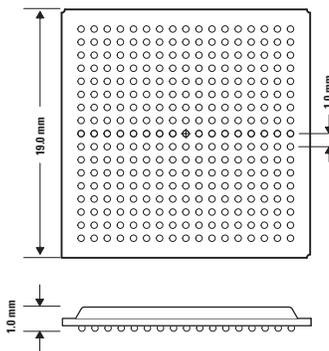
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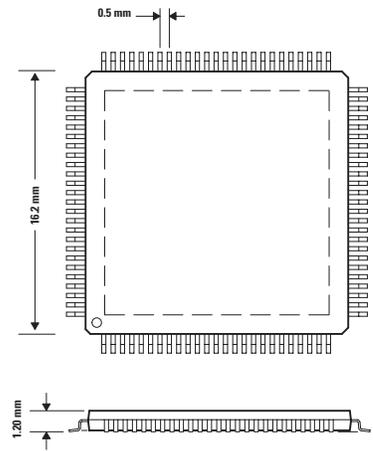
Pitch: 0.5mm
Height: 1.2mm (max)
Footprint: 262.4mm^2 (max)

PROCESSING™

TEXAS INSTRUMENTS