

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 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 interface 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-192 based applications features multi-rate SerDes that incorporate MUX, de-MUX and CDR functions.
- Industry-compatible LVDS SerDes devices provide high-performance serial solutions for next-generation systems.

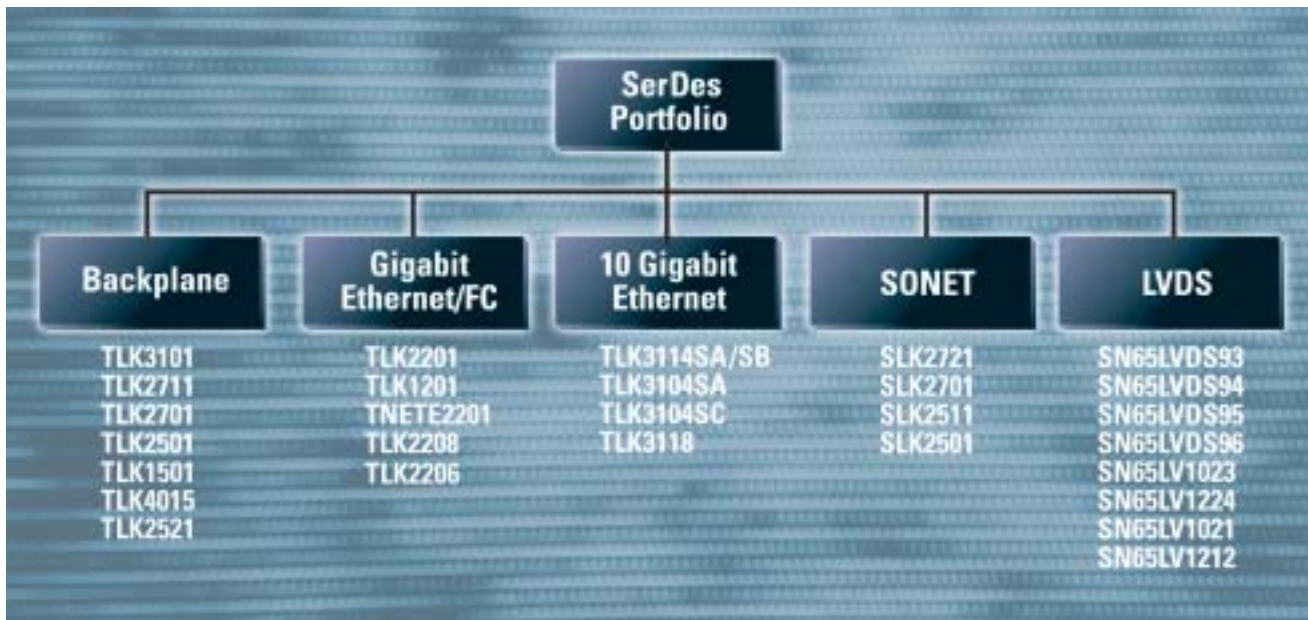
Key Benefits

- Ultra-low-power operation at multi-gigabit data rates
- Onboard PRBS generation and verification for easy link testing
- Broad range of devices supporting standards such as Gigabit Ethernet, 10-Gigabit Ethernet, Fibre Channel, XGMII, XAUI and SONET
- Compatible with TI's ASIC library SerDes functions

NEW **TLK2208**
Octal Gigabit Ethernet Transceiver

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

NEW **TLK3118**
XGMII to XAUI with redundancy



BACKPLANE SERDES

TLK1501/TLK2501/TLK2701/ TLK2711/TLK3101

The serializer/deserializer (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

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 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.

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/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 to 1.3 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 and power are limited. Testability features such as JTAG and PRBS generation and verification are built in.

TLK2208/TLK2206

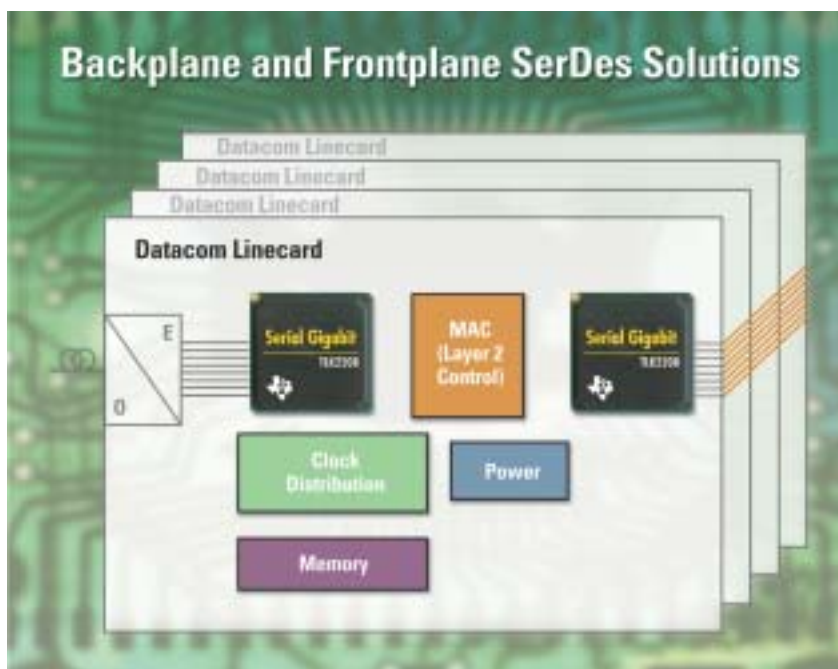
The TLK2208 is the third-generation Gigabit Ethernet transceiver from TI, combining high port density and ultra-low-power in a small form factor footprint. Based on the IEEE 802.3z 1000-Mbps Ethernet specification, the TLK2208 provides 8 channels of Gigabit Ethernet for high-speed, full-duplex, point-to-point 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 base-band data transmission over controlled impedance media of 50 Ω. The TLK2208 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.

10 GIGABIT ETHERNET

TLK3104SA/TLK3114SA/SB

The TLK3104SA, 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 TLK3104SA operates in 10-Gigabit Ethernet (IEEE 802.3ae draft 2.0 compliant) 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 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 TLK3104SA 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, bi-directional, 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 draft standard. The serial transmitter is implemented using differential current mode logic with integrated termination resistors. 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 multi-rate 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 3- or 4-channel point-to-point transmitter and receiver pair that supports up to 1.365/1.820 Gbps of data throughput. It accepts 21/28 LVTTTL 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.

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

This TX/RX family of devices provides backplane solutions between 100-660 Mbps. With a 10-bit LVTTTL 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.

Serial Gigabit Transceiver Family

Key Specifications

	Function	Data Rate	Serial I/F	Parallel I/F	Power	Special Features
TLK1501	Single-ch. 16:1 SerDes	0.6-1.5 Gbps	1 CML ¹	16 LVTTTL	200 mW	Built-in testability
TLK2501	Single-ch. 16:1 SerDes	1.6-2.5 Gbps	1 CML ¹	16 LVTTTL	300 mW	Built-in testability
TLK2701	Single-ch. 16:1 SerDes	1.6-2.5 Gbps	1 CML ¹	16 LVTTTL	300 mW	Built-in testability and K character control
TLK2711	Single-ch. 16:1 SerDes	1.6-2.5 Gbps	1 VML ²	16 LVTTTL	350 mW	MicroStar Jr.™ BGA packaging
TLK3101	Single-ch. 16:1 SerDes	2.5-3.125 Gbps	1 VML ²	16 LVTTTL	350 mW	Built-in testability
TLK1201	Single-ch. 10:1 Gigabit Ethernet Xcvr Gbps	0.6-1.3	1 LVPECL	10 LVTTTL	200 mW	Industrial temperature
TLK2201	Single-ch.	1.0-1.6 Gbps	1 LVPECL	10 LVTTTL	200 mW	JTAG; 5-bit DDR mode
TLK2201I	Single-ch. 10:1 Gigabit Ethernet Xcvr	1.2-1.6 Gbps	1 LVPECL	10 LVTTTL	200 mW	JTAG; 5-bit DDR mode, industrial temp. qualified
TLK2201JR	Single-ch. 10:1 Gigabit Ethernet Xcvr	1.0-1.6 Gbps	1 LVPECL	10 LVTTTL	200 mW	MicroStar Jr.™ 5mm x 5mm LGA
TLK2521	Single-ch. 18:1 SerDes	1.0-2.5 Gbps	1 VML	18 LVTTTL	<550 mW	Low Power and built-in equalization
TLK2208	Eight-ch. of 10:1 Gigabit Ethernet Xcvr	1.0-1.3 Gbps	8 VML	4/5-bit/ch (Nibble DDR Mode), 8/10-bit/ch (Multiplex ch Mode)	1 W	JTAG, MDIO supported
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
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 pre-emphasis and XAUI I/F
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
TLK3114SA/SB	Four-ch. of 10/8:1: Xcvr	2.5-3.125 Gbps	4X 3.125 Gbps LVPECL (XAUI)	4X 10/8-bit SSTL/HSTL (XGMII)	600 mW/ch.	IEEE 802.3ae backplane transceiver Draft 2.1 compliant
TLK3118	Four ch. 10/8:1 Xcvr w/ full redundancy	2.5-3.125 Gbps/ch.	4x3.125 LVPECL (XAUI)	8/10 HSTLx4 (XGMII)	<2 W	Full redundancy for four channels
TLK4015	Four-ch. of 16:1 Xcvr	0.6-1.5 Gbps/ch.	4 CML	16 LVTTTL/ch.	1 W	Four-channel version of TLK1501
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
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
SN65LVDS93/94	Four-ch. 28:4 TX/RX chipset	140-455 Mbps	4 LVDS	28 LVTTTL	250 mW/chip	Supports up to 1.82 Gbps throughout
SN65LVDS95/96	Four-ch. 21:3 TX/RX chipset	140-455 Mbps	4 LVDS	28 LVTTTL	250 mW/chip	Supports up to 1.82 Gbps throughout
SN65LV1021/1212	Single-ch. 10:1 TX/RX chipset	100-400 Mbps	1 LVDS	10 LVTTTL	<400 mW total	Low power solution
SN65LV1023/1024 ³	Single-ch. 10:1 TX/RX chipset	300-660 Mbps	1 LVDS	10 LVTTTL	<400 mW total	Low power solution

¹CML (Current Mode Logic) ²VML (Voltage Mode Logic) ³'A' revision will support 100 to 660 Mbps

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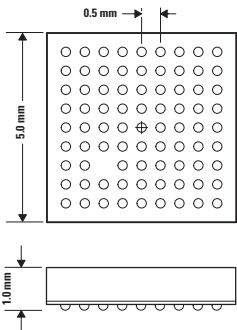
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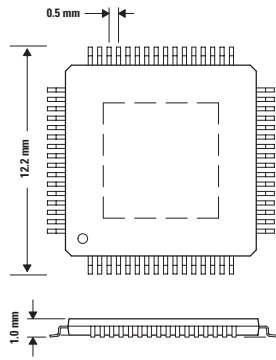
Package Overview

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



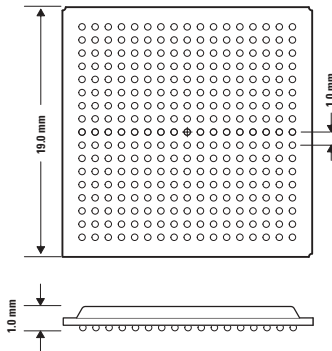
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Height: 1mm (max)
Footprint: 26mm² (max)

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



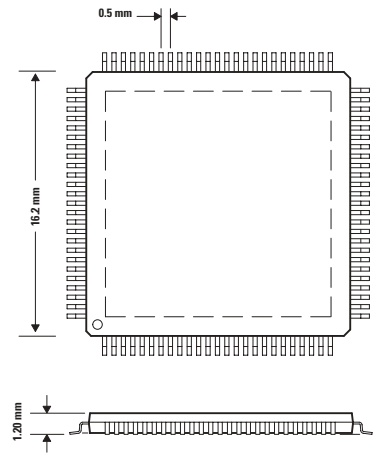
Pitch: 0.5mm
Height: 1mm (max)
Footprint: 148mm² (max)

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

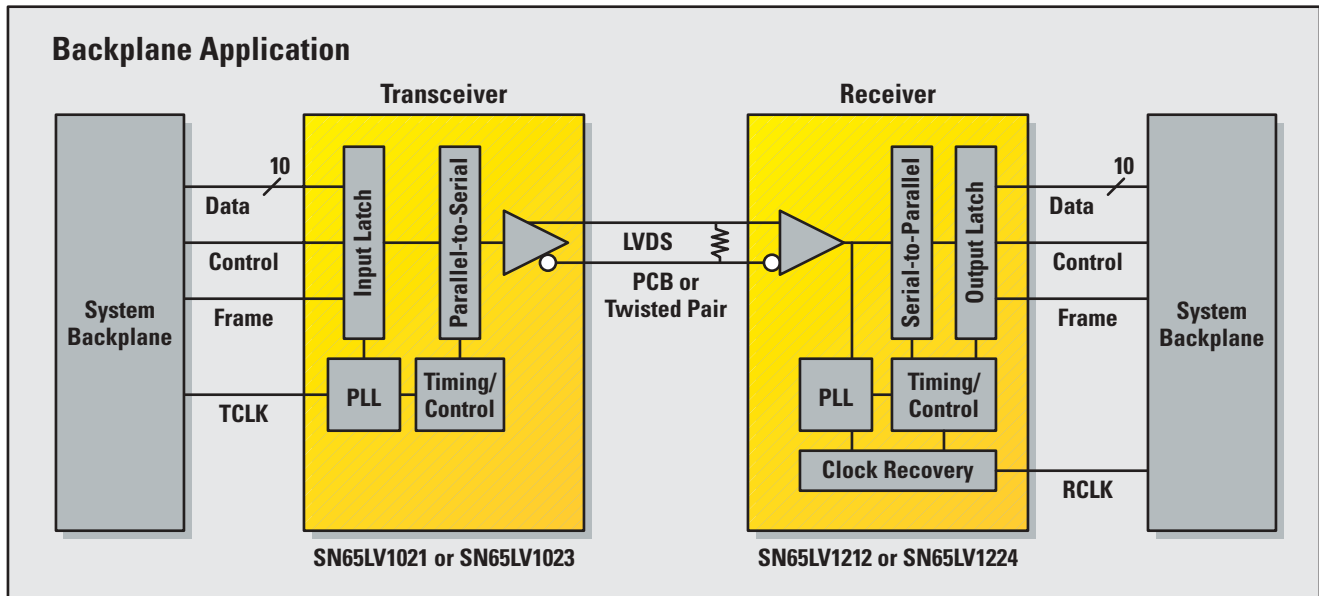


Pitch: 1.0mm
Height: 2mm (max)
Footprint: 368mm² (max)

100-pin VQFP PowerPAD
 SLK2501
 SLK2511
 SLK2511
 SLK2721
 (PZP)



Pitch: 0.5mm
Height: 1.2mm (max)
Footprint: 262.4mm² (max)



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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