QUAD-CHANNEL XAUI/10GBASE-KR TRANSCEIVER

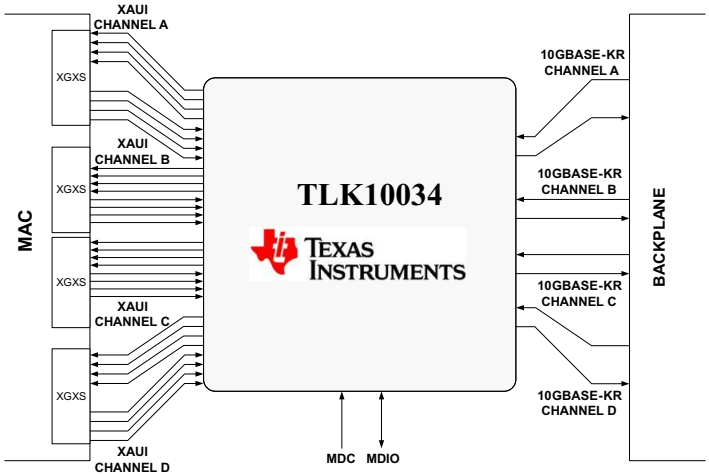
Check for Samples: TLK10034

FEATURES

- Quad Channel Multi-Rate Transceiver
- Supports 10GBASE-KR, XAUI, and 1GBASE-KX Ethernet Standards
- Supports all CPRI and OBSAI Data Rates up to 10 Gbps
- Supports Multi-Rate SERDES Operation with up to 10.3125Gbps Data Rate on the High Speed Side and up to 5Gbps on the Low Speed Side
- Differential CML I/Os on Both High Speed and Low Speed Sides
- Interface to Backplanes, Passive and Active Copper Cables, or SFP+ Optical Modules
- Selectable Reference Clock per Channel with Multiple Output Clock Options
- Loopback Capability on Both High Speed and Low Speed Sides
- Supports Data Retime Operation
- Supports PRBS, CRPAT, CJPAT, High- /Low-/Mixed-Frequency Patterns, and KR Pseudo-Random Pattern Generation and Verification, Square-Wave Generation
- Two Power Supplies: 1.0V, and 1.5 or 1.8V Nominal
- No Power Supply Sequencing Requirements
- Transmit De-emphasis and Receive Adaptive Equalization to Allow Extended Backplane/Cable Reach on Both High Speed and Low Speed Sides
- Programmable Transmit Output Swing on Both High Speed and Low Speed Sides
- Loss of Signal (LOS) Detection
- Supports 10G-KR Link Training, Forward Error Correction, Auto-Negotiation
- Jumbo Packet Support
- JTAG; IEEE 1149.1 /1149.6 Test Interface
- Industry Standard MDIO Clause 45 and 22 Control Interfaces
- 65nm Advanced CMOS Technology
- Industrial Ambient Operating Temperature (–40°C to 85°C)
- Power Consumption: 825mW per Channel (Nominal)
- Device Package: 19mm x 19mm, 324-pin PBGA, 1-mm Ball-Pitch

APPLICATIONS

- 10GBASE-KR Compliant Backplane Links
- 10 Gigabit Ethernet Switch, Router, and Network Interface Cards
- 10 Gigabit Ethernet Blade Servers
- Proprietary Cable/Backplane Links
- High-Speed Point- to-Point Transmission Systems



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of the Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

Copyright © 2012, Texas Instruments Incorporated

DESCRIPTION

The TLK10034 is a quad-channel multi-rate transceiver intended for use in high-speed bi-directional point-to-point data transmission systems. This device supports three primary modes. It can be used as a XAUI to 10GBASE-KR transceiver, as a general-purpose 8b/10b multi-rate 4:1, 2:1, or 1:1 serializer/deserializer, or can be used in 1G-KX mode.

While operating in the 10GBASE-KR mode, the TLK10034 performs serialization of the 8B/10B encoded XAUI data stream presented on its low speed (LS) side data inputs. The serialized 8B/10B encoded data is presented on the high speed (HS) side outputs in 64B/66B encoding format. Likewise, the TLK10034 performs deserialization of 64B/66B encoded data streams presented on its high speed side data inputs. The deserialized 64B/66B data is presented in 8B/10B format on the low speed side outputs. Link Training is supported in this mode as well as Forward Error Correction (FEC) for extended length applications.

While operating in the General Purpose SERDES mode, the TLK10034 performs 2:1 and 4:1 serialization of the 8B/10B encoded data streams presented on its low speed (LS) side data inputs. The serialized 8B/10B encoded data is presented on the high speed (HS) side outputs. Likewise, the TLK10034 performs 1:2 and 1:4 deserialization of 8B/10B encoded data streams presented on its high speed side data inputs. The deserialized 8B/10B encoded data is presented on the low speed side outputs. Depending on the serialization/deserialization ratio, the low speed side data rate can range from 0.5Gbps to 5Gbps and the high speed side data rate can range from 1Gbps to 10Gbps. 1:1 retime mode is also supported but limited to 1Gbps to 5Gbps rates.

The TLK10034 also supports 1G-KX (1.25Gbps) mode with PCS (CTC) capabilities. This mode can be enabled via software provisioning or via auto negotiation. If software provisioning is used, data rates up to 3.125 Gbps are supported.

Both low speed and high speed side data inputs and outputs are of differential current mode logic (CML) type with integrated termination resistors.

The TLK10034 provides flexible clocking schemes to support various operations. They include the support for clocking with an externally-jitter-cleaned clock recovered from the high speed side. The device is also capable of performing clock tolerance compensation (CTC) in 10GBASE-KR and 1G-KX modes, allowing for asynchronous clocking.

The TLK10034 provides low speed side and high speed side loopback modes for self-test and system diagnostic purposes.

The TLK10034 has built-in pattern generators and verifiers to help in system tests. The device supports generation and verification of various PRBS, High, Low, Mixed, CRPAT long/short, CJPAT, and KR pseudo-random test patterns and square wave generation. The types of patterns supported on the low speed and high speed side are dependent on the operational mode chosen.

The TLK10034 has an integrated loss of signal (LOS) detection function on both high speed and low speed sides. LOS is asserted in conditions where the input differential voltage swing is less than the LOS assert threshold.

In the 10GBASE-KR mode, the lane alignment for each channel is achieved through the standard XAUI lane alignment scheme. In the General Purpose SERDES mode the low speed side lane alignment for each channel is achieved through a proprietary lane alignment scheme. The upstream link partner device needs to implement the lane alignment scheme for the correct link operation. Normal link operation resumes only after lane alignment is achieved.

The four TLK10034 channels are fully independent. They can be operated with different reference clocks, at different data rates, and with different serialization/deserialization ratios.

The low speed side of the TLK10034 is ideal for interfacing with an FPGA or ASIC capable of handling lower-rate serial data streams. The high speed side is ideal for interfacing with remote systems through optical fibers, electrical cables, or backplane interfaces. The TLK10034 supports operation with SFP and SFP+ optical modules, as well as 10GBASE-KR compatible backplane systems.

Copyright © 2012, Texas Instruments Incorporated

PHYSICAL CHARACTERISTICS

Block Diagram

Various interfaces of the TLK10034 device are shown in Figure 1 for Channel A. The implementation of all four channels is identical. The block diagrams for the transmit and receive data paths are shown in Figure 2. This low-power transceiver consists of two serializer/deserializer (SERDES) blocks, one on the low speed side and the other on the high speed side. The core logic block that lies between the two SERDES blocks carries out all the logic functions including channel synchronization, lane alignment, 8B/10B and 64B/66B encoding/decoding, as well as test pattern generation and verification.

The TLK10034 provides a management data input/output (MDIO) interface as well as a JTAG interface for device configuration, control, and monitoring. Detailed description of the TLK10034 pin functions is provided in TLK10034 data manual.

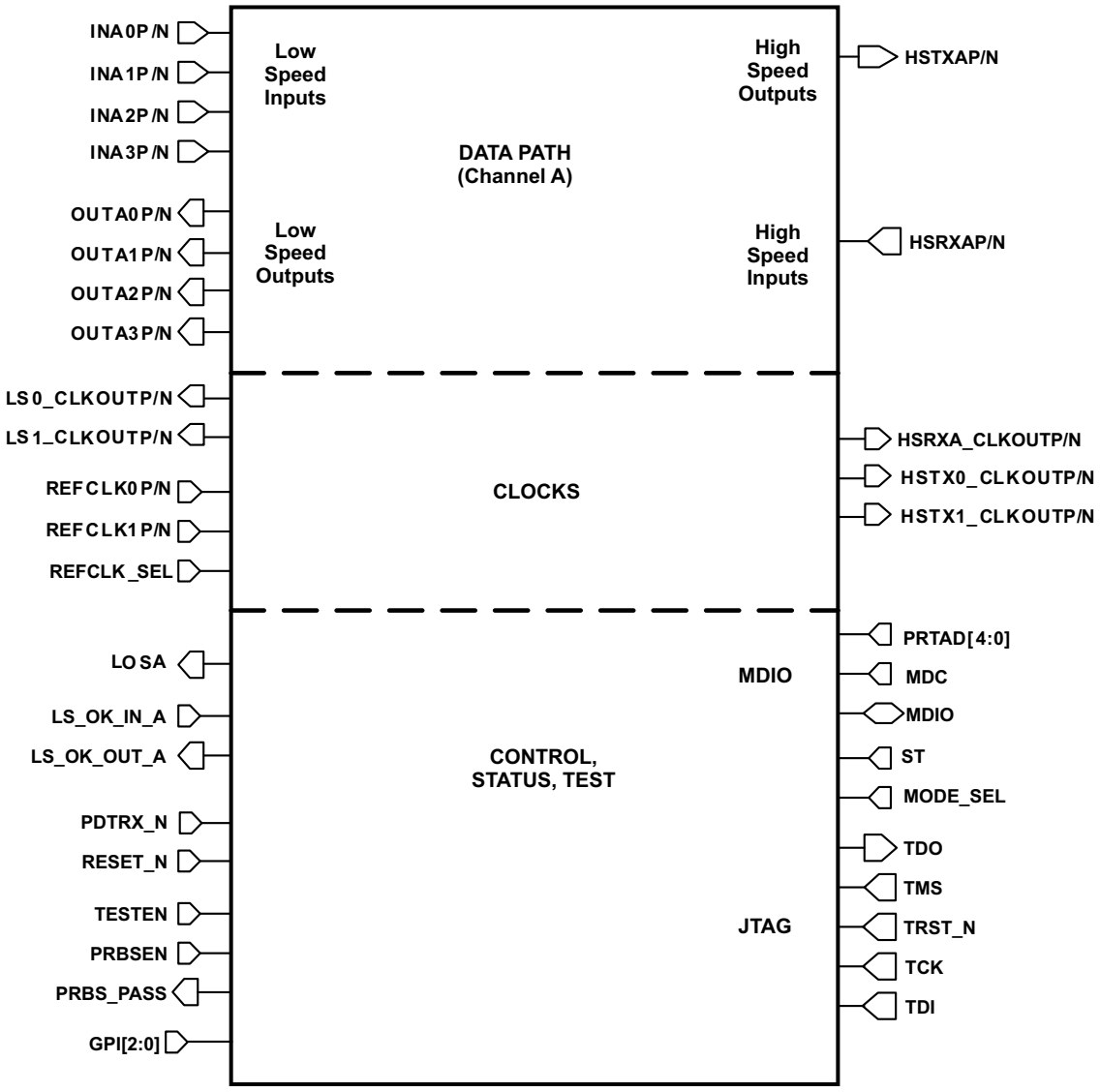


Figure 1. TLK10034 Interfaces

Copyright © 2012, Texas Instruments Incorporated

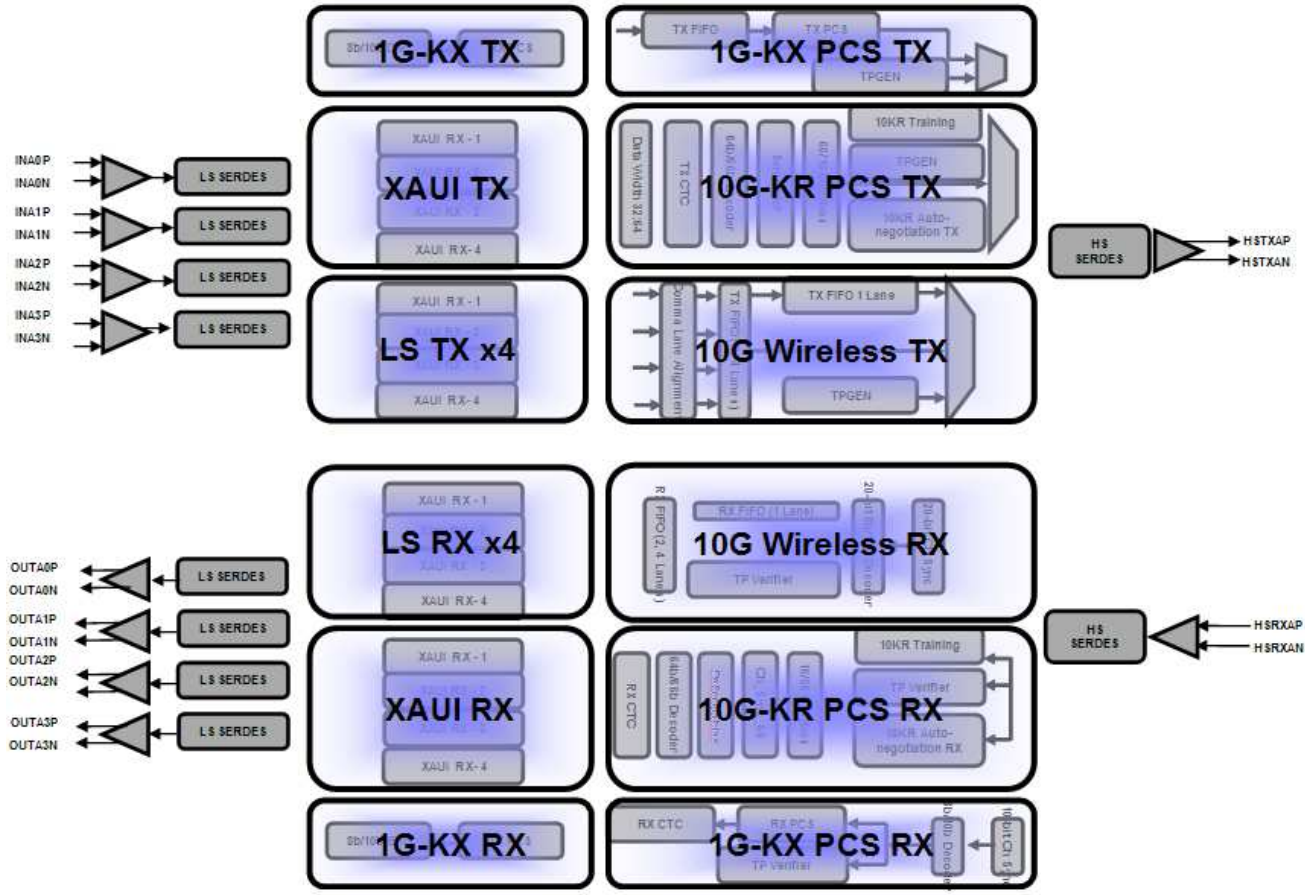


Figure 2. A Simplified One Channel Block Diagram of the TLK10034 Data Paths

Copyright © 2012, Texas Instruments Incorporated

Request Complete Data Manual at:

TLK10034_inquiries@list.ti.com

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/ Ball Finish	MSL Peak Temp (3)	Samples (Requires Login)
TLK10034AAJ	ACTIVE	FCBGA	AAJ	324	84	Green (RoHS & no Sb/Br)	SNAGCU	Level-4-260C-72 HR	

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

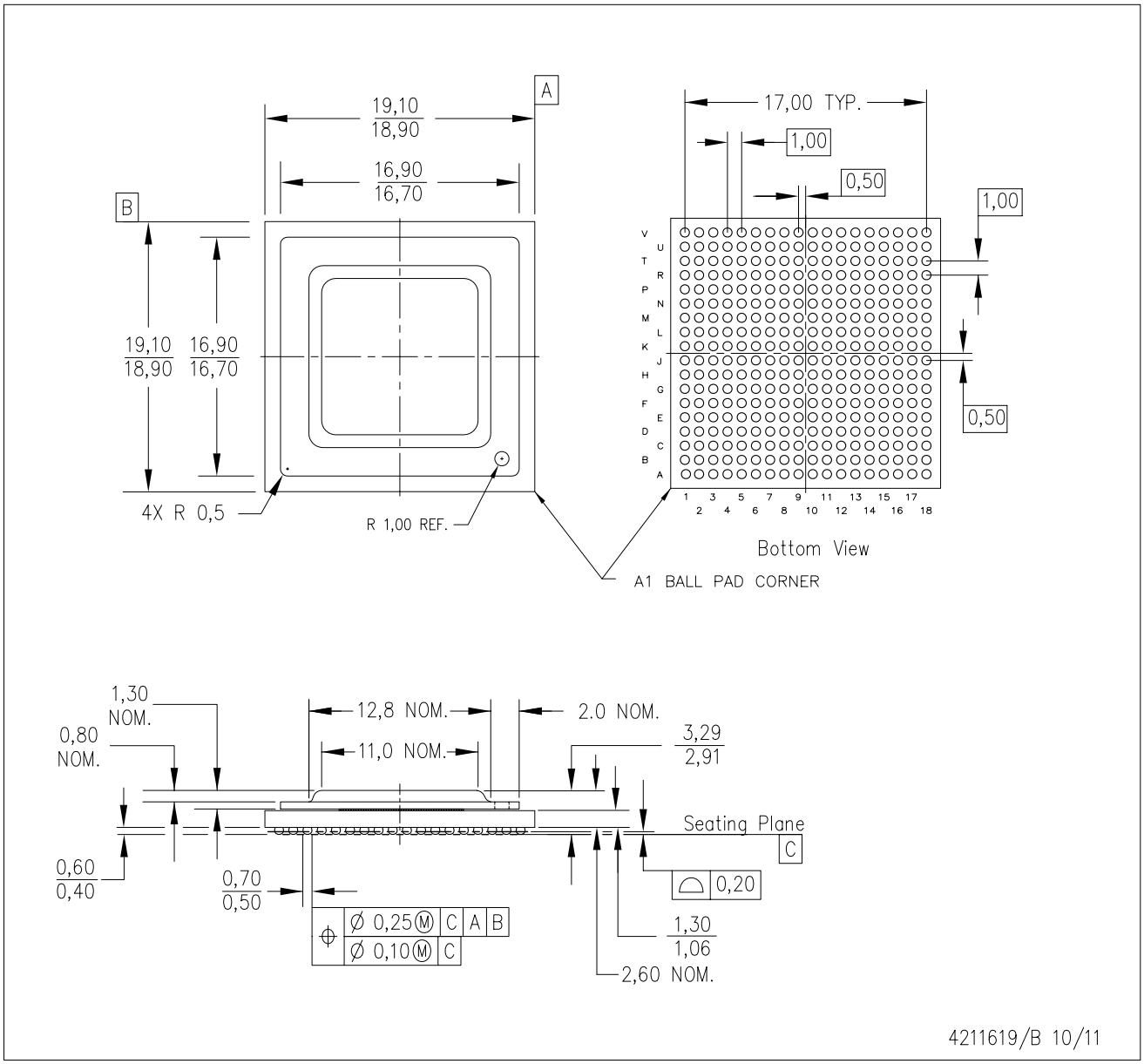
(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

AAJ (S–PBGA–N324) PLASTIC BALL GRID ARRAY



NOTES:
A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M–1994.
B. This drawing is subject to change without notice.
C. Flip chip application only.
D. Pb–free die bump and solder ball.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46C and to discontinue any product or service per JESD48B. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as “components”) are sold subject to TI’s terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI’s terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers’ products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers’ products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have ***not*** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components which meet ISO/TS16949 requirements, mainly for automotive use. Components which have not been so designated are neither designed nor intended for automotive use; and TI will not be responsible for any failure of such components to meet such requirements.

Products		**Applications**	
Audio	www.ti.com/audio	Automotive and Transportation	www.ti.com/automotive
Amplifiers	amplifier.ti.com	Communications and Telecom	www.ti.com/communications
Data Converters	dataconverter.ti.com	Computers and Peripherals	www.ti.com/computers
DLP® Products	www.dlp.com	Consumer Electronics	www.ti.com/consumer-apps
DSP	dsp.ti.com	Energy and Lighting	www.ti.com/energy
Clocks and Timers	www.ti.com/clocks	Industrial	www.ti.com/industrial
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Security	www.ti.com/security
Power Mgmt	power.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com		
OMAP Mobile Processors	www.ti.com/omap	**TI E2E Community**	e2e.ti.com
Wireless Connectivity	www.ti.com/wirelessconnectivity		

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2012, Texas Instruments Incorporated