

# iceLynx-Micro IEEE 1394a-2000 Consumer Electronics Solution

#### **FEATURES**

- 1394 Features
  - Integrated 400 Mbps 3-port PHY
  - Compliant with IEEE 1394-1995 and IEEE 1394a-2000 standards
  - Supports bus manager functions and automatic 1394 self-ID verification.
  - Separate Async Ack FIFO decreases the ack-tracking burden on in-CPU and ex-CPU
- DTLA Encryption Support for MPEG2-DVB, DSS, DV, and Audio (TSB43CA43A and TSB43CA42 Only)
  - Two M6 baseline ciphers (one per HSDI port)
    - Content key generation from exchange key
  - AKE acceleration features in hardware
    - Random Number Generator
    - Secure Hash Algorithm, Revision 1 (SHA-1)
  - Other AKE acceleration features
    - Elliptical curve digital signature algorithm (EC-DCA) both signature and verification
    - Elliptical curve Diffie-Hellman (EC-DH), first phase value and shared secret calculation
    - 160-bit math functions
- High Speed Data Interface (HSDI)
  - Two configurable high speed data interfaces support the following audio and video modes:
    - MPEG2-DVB interface
    - MPEG2-DSS interface
    - DV codec interface
    - IEC60958 interface
    - Audio DAC interface
    - SACD interface
- External CPU Interface
  - 16-bit parallel asynchronous I/O-type
  - 16-bit parallel synchronous I/O-type
  - 16-bit parallel synchronous memory type

- Internal ARM7
  - 50-MHz operating frequency
  - 32-bit and thumb (16-bit) mode support
  - UART included for communication
  - 256K bytes of program memory included on chip
  - ARM JTAG included for software debug
- Data Buffers
  - Large 16.5K byte total FIFO
  - Programmable data/space available indicators for buffer flow control
- Hardware Packet Formatting for the Following Standards
  - DVB MPEG2 transport stream (IEC61883-4)
  - DSS MPEG2 transport stream per standard
  - DV Stream (IEC 61883-2) SD-DV
  - Audio over 1394 (IEC 61883-6)
  - Audio Music Protocol (version 1.0 and enhancements)
  - Asynchronous and asynchronous stream (as defined by IEEE 1394)
- Additional Features
  - PID filtering for transmit function (up to 16 separate PIDs per HSDI)
  - Packet insertion two insertion buffers per HSDI
  - 11 general-purpose inputs/outputs (GPIOs)
  - Interrupt driven to minimize CPU polling.
  - Single 3.3-V supply
  - JTAG interface to support post-assembly scan of device I/O – boundary scan



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.

**SLLA211-JUNE 2006** 



### **DESCRIPTION**

The iceLynx-Micro (consumer electronics link with integrated microcontroller and physical layer (PHY)) is a high performance 1394 link-layer device designed as a total solution for digitally interfacing advanced audio/video consumer electronics applications. The device is offered in both a DTCP encryption/decryption version (TSB43CA43) and TSB43CA42) and a non-DTCP encryption/decryption version (TSB43CB43).

In addition to supporting transmit and receive of MPEG2 and DSS formatted transport streams with encryption and decryption, the iceLynx-Micro supports the IEC 61883-6 and audio music protocol standards for audio format and packetizing and asynchronous and asynchronous stream (as defined by 1394).

The device also features an embedded ARM7TDMI microprocessor core with access to 256K bytes of internal program memory. The ARM7 is embedded to process 1394 specific transactions, thus significantly reducing the processing power required by the host CPU and the development time required by the user. The ARM7 is accessed from the 16/1-bit host CPU interface, from a UART communication port, or from a JTAG debug port.

The iceLynx-Micro integrated 3-port PHY allows the user enhanced flexibility as two additional devices can be utilized in a system application. The PHY's speeds are capable of running at 100 Mbps, 200 Mbps, or 400 Mbps. The PHY follows all requirements as stated in the IEEE 1394-1995 and IEEE 1394a-2000 standards.

The TSB43CA43A and TSB43CA42 version of iceLynx-Micro incorporates two M6 baseline ciphers (one per HSDI port) per the 5C specification to support transmit and receive of MPEG2 formatted transport streams with encryption and decryption. The TSB43CB43 version of iceLynx-Micro is identical to the TSB43CA43A without implementation of the encryption/decryption features. The TSB43CB43 device allows customers that do not require the encryption/decryption features to incorporate iceLynx-Micro without becoming DTLA licensees. Both devices support the IEC 61883-6 and audio music protocol standards for audio format and packetizing.

#### NOTE:

This product is for high-volume CE applications only. For a complete datasheet or more information contact support@ti.com.

6-Jan-2013

#### **PACKAGING INFORMATION**

Orderable Device	Status	Package Type	_		Package Qty	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Samples
	(1)		Drawing			(2)		(3)	(Requires Login)
TSB43CA42GGW	OBSOLETE	BGA MICROSTAR	GGW	176		TBD	Call TI	Call TI	
TSB43CA42PGF	ACTIVE	LQFP	PGF	176	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	
TSB43CA42PGFG4	ACTIVE	LQFP	PGF	176	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	
TSB43CA42ZGW	ACTIVE	BGA MICROSTAR	ZGW	176	126	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR	
TSB43CA43AZGW	OBSOLETE	BGA MICROSTAR	ZGW	176		TBD	Call TI	Call TI	
TSB43CB43APGF	ACTIVE	LQFP	PGF	176	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	
TSB43CB43APGFG4	ACTIVE	LQFP	PGF	176	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 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



## **PACKAGE OPTION ADDENDUM**

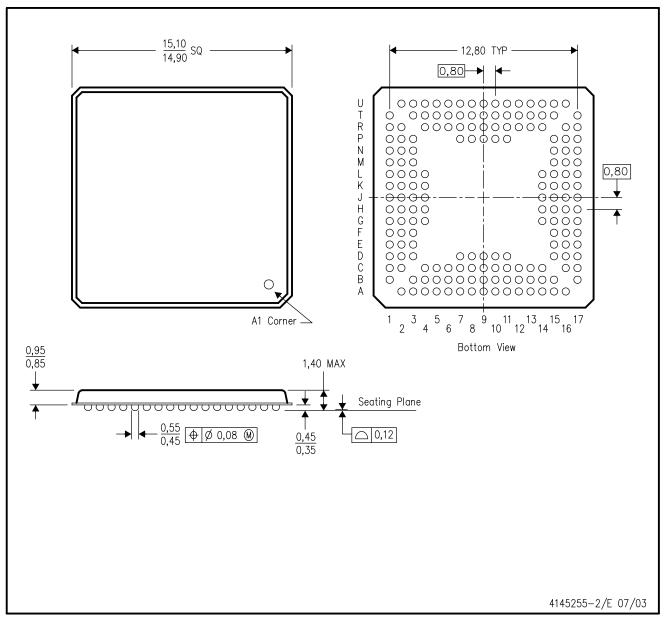
6-Jan-2013

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.

## GGW (S-PBGA-N176)

## PLASTIC BALL GRID ARRAY



NOTES: A. All linear dim

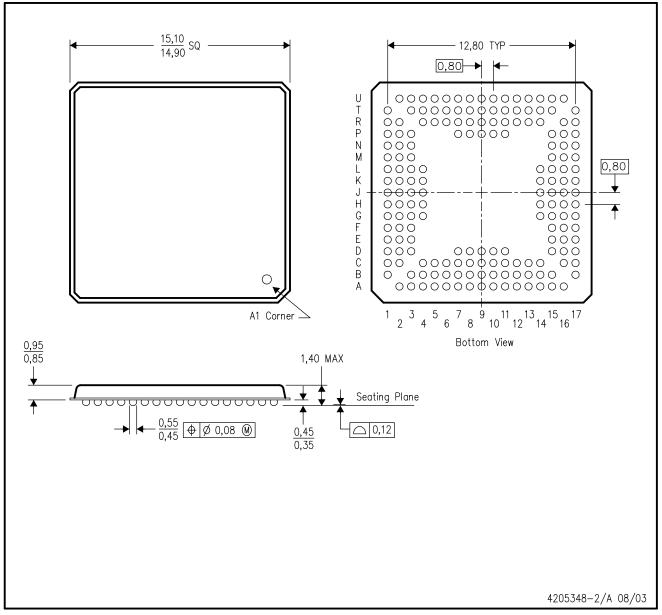
- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. MicroStar BGA™ configuration

MicroStar BGA is a trademark of Texas Instruments.



## ZGW (S-PBGA-N176)

## PLASTIC BALL GRID ARRAY



NOTES:

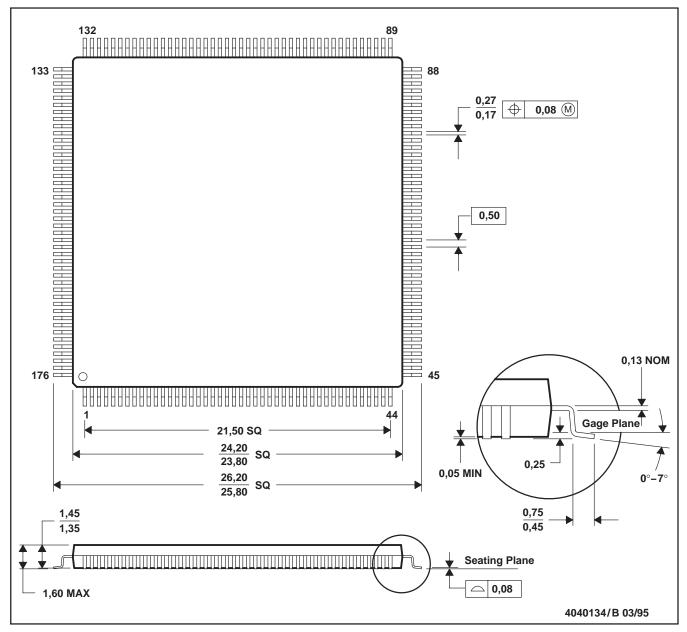
- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. MicroStar BGA™ configuration
- D. This package is lead-free.

MicroStar BGA is a trademark of Texas Instruments.



### PGF (S-PQFP-G176)

### PLASTIC QUAD FLATPACK



NOTES: A. All linear dimensions are in millimeters.

- B. This drawing is subject to change without notice.
- C. Falls within JEDEC MO-136

#### 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 JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. 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 as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

#### **Products Applications**

power.ti.com

Audio www.ti.com/audio Automotive and Transportation www.ti.com/automotive Communications and Telecom **Amplifiers** amplifier.ti.com 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 **Energy and Lighting** dsp.ti.com 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.ti.com Logic Security www.ti.com/security 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

Power Mgmt

**OMAP Applications Processors** www.ti.com/omap **TI E2E Community** e2e.ti.com

Wireless Connectivity www.ti.com/wirelessconnectivity