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TSB43CA43A
TSB43CB43A
TSB43CA42
SLLA211−JUNE 2006

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.

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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 (TSB43CA43A 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.

PACKAGING INFORMATION

Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/Ball Finish	MSL Peak Temp [3]
TSB43CA42GGW	ACTIVE	BGA MICROSTAR	GGW	176	126	TBD	SNPB	Level-3-220C-168 HR
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	PREVIEW	BGA MICROSTAR	ZGW	176	126	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR
TSB43CA43AGGW	ACTIVE	BGA MICROSTAR	GGW	176		TBD	Call TI	Call TI
TSB43CA43APGF	ACTIVE	LQFP	PGF	176		TBD	Call TI	Call TI
TSB43CA43AZGW	PREVIEW	BGA MICROSTAR	ZGW	176	126	TBD	Call TI	Call TI
TSB43CB43APGF	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 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.

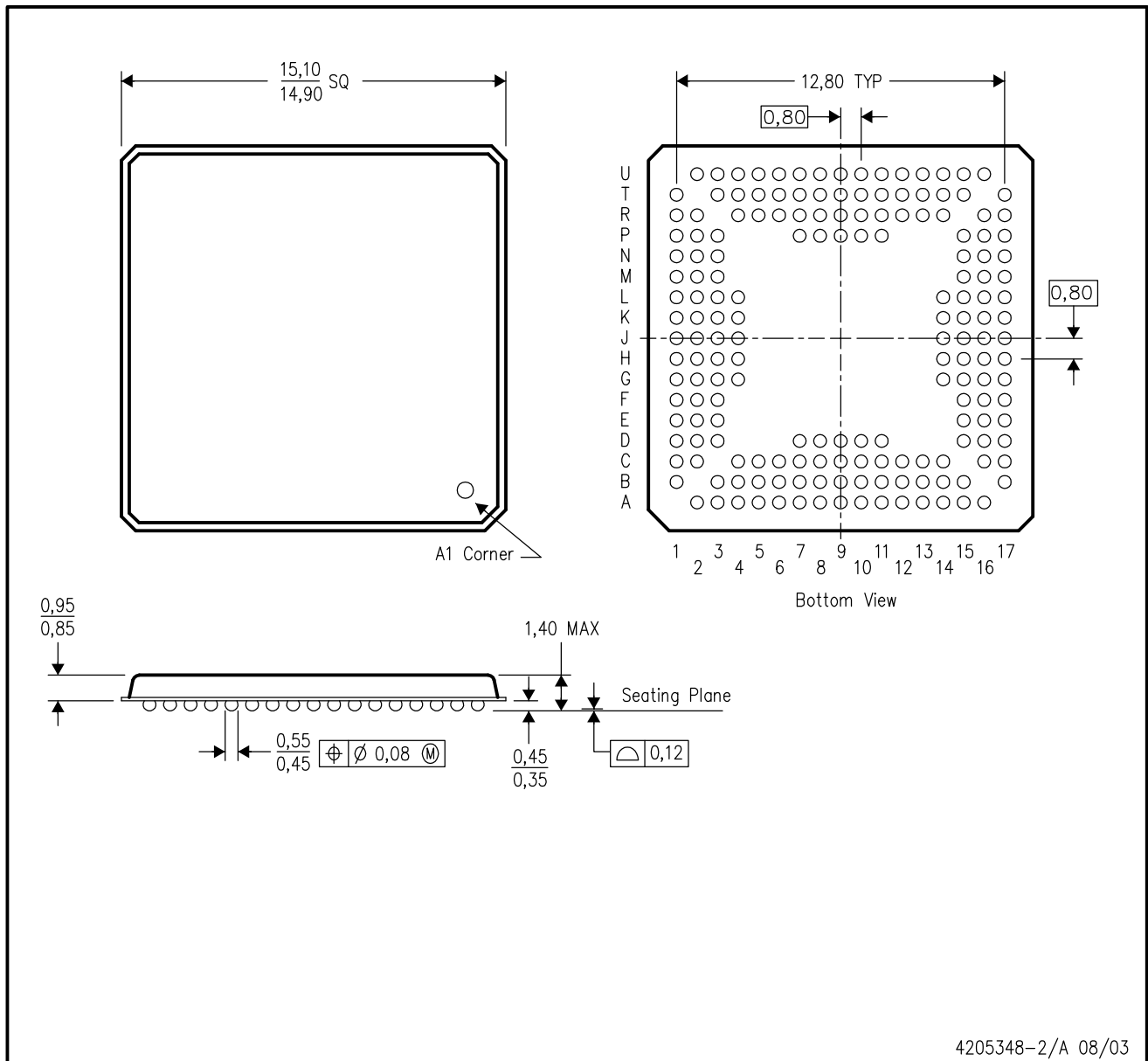## GGW (S–PBGA–N176)   PLASTIC BALL GRID ARRAY
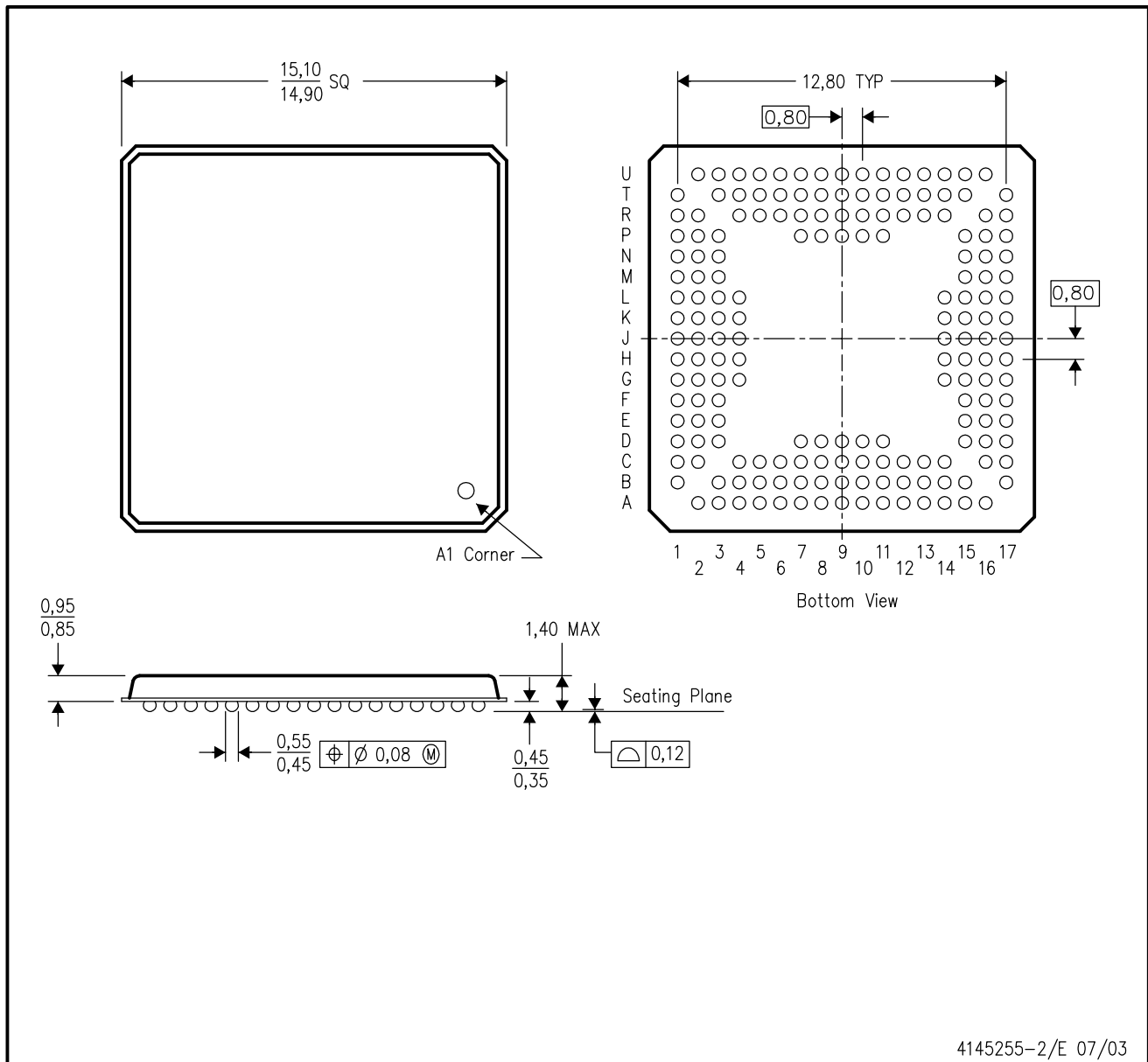
$\dfrac{15,10}{14,90}$ SQ

12,80 TYP

0,80

0,80

U T R P N M L K J H G F E D C B A

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

Bottom View

A1 Corner

$\dfrac{0,95}{0,85}$

1,40 MAX

Seating Plane

$\dfrac{0,55}{0,45}$ ⊕ ⌀ 0,08 Ⓜ

$\dfrac{0,45}{0,35}$

◺ 0,12

4145255–2/E 07/03

NOTES: 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.

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ZGW (S–PBGA–N176)　　　　　PLASTIC BALL GRID ARRAY

$\frac{15,10}{14,90}$ SQ

12,80 TYP

0,80

0,80

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G
F
E
D
C
B
A

1　3　5　7　9　11　13　15　17
　2　4　6　8　10　12　14　16

Bottom View

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$\frac{0,95}{0,85}$

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$\frac{0,55}{0,45}$　⊕ ⌀ 0,08 Ⓜ

$\frac{0,45}{0,35}$

△ 0,12

4205348–2/A 08/03

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.

IMPORTANT NOTICE