

3.3-V IEEE 1394-1995 Backplane PHY

FEATURES

- Provides a Backplane 1394 Environment That Supports an Asynchronous Transfer Rate of 50 or 100 Mbits/s Across 2 Etches
- Single 3.3-V Supply Operation With 5-V Tolerance on the Transceiver Receive Interface
- Allows Utilization of 3-State Drivers as Well as Open-Collector Drivers
- Software Compatible With the TSB14CO1APM
- Enhanced Compatibility With the 1394 Cable Link Layer. Compatible With 1394–1995 and 1394a–2000 Link Layers; PHY/link Interface is 1394a Compliant¹
- Supports Provisions of IEEE 1394–1995²³
- Extensive Testability and Debug Functions Added. Expanded Register Set Including Automatic Saving of ID and Priority for Last Node Winning Arbitration
- 100 MHz or 50 MHz Oscillator Provides Transmit, Receive Data, and Link Layer Controller (LLC) Clocks
- Logic Performs System Initialization Arbitration Functions. Encode And Decode Functions Included for Data-Strobe Bit Level Encoding. Incoming Data Resynchronized to Local Clock.
- Operates Over the Extended Temperature Ranges of 0°C to 70°C (no suffix), –40°C to 85°C (I suffix), and –40°C to 105°C (T suffix)
- Packaged in the Very Compact 48-Pin 7 x 7 x 1 mm PFB Package

- (1) IEEE Std 1394a–2000, *IEEE Standard for a High Performance Serial Bus – Amendment 1*
- (2) IEEE Std 1394–1995, *IEEE Standard for a High Performance Serial Bus*
- (3) Implements technology covered by one or more patents of Apple Computer, Inc. and ST Microelectronics.

DESCRIPTION

The TSB14AA1A (TSB14AA1A refers to all three devices: TSB14AA1A, TSB14AA1AI, and TSB14AA1AT) is the second-generation 1394 backplane physical layer device. It is recommended for use in all new designs instead of the first generation TSB14CO1A. It provides the physical layer functions needed to implement a single port node in a backplane based 1394 network. The TSB14AA1A provides two pins for transmitting, two for receiving, and two pins to externally control the transceivers for data and strobe. In addition to supporting open-collector drivers, the TSB14AA1A can also support 3-state⁽¹⁾ (high-impedance) drivers. The TSB14AA1A is not designed to drive the backplane directly; this function must be provided externally. The TSB14AA1A is designed to interface with a link-layer controller (LLC), such as the TSB12LV01B, TSB12LV32, TSB12LV21B, etc.

The TSB14AA1A requires an external 98.304-MHz reference oscillator input for S100 asynchronous only operation or 49.152-MHz for S50 asynchronous only operation. Two clock select pins (CLK_SEL0, CLK_SEL1) select the speed mode for the TSB14AA1A. For S100 operation, the 98.304-MHz reference signal is internally divided to provide the 49.152-MHz system clock signals used to control transmission of the outbound encoded strobe and data information. The 49.152-MHz clock signal is also supplied to the associated LLC for synchronization of the two chips and is used for resynchronization of the received data. For S50 operation, a 49.152-MHz reference signal is used. This reference signal is internally divided to provide the 24.576-MHz system clock signals for S50 operations.

During packet transmit, data bits to be transmitted are received from the LLC on two parallel paths and are latched internally in the TSB14AA1A in synchronization with the system clock. These bits are combined serially, encoded, and transmitted as the outbound data-strobe information stream. During transmit, the encoded data information is transmitted on TDATA, and the encoded strobe information is transmitted on TSTRB.

(1) 3-State means a driver may drive high, low, or may be placed in a high-impedance state



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.

During packet reception, the data information is received on RDATA and strobe information is received on RSTRB. The received data and strobe information is decoded to recover the received clock signal and the serial data bits, which are resynchronized to the local system clock. The serial data bits are split into two parallel streams and sent to the associated LLC. The PHY-Link interface has been made compliant to IEEE 1394a–2000 including timing and transfer of register 0 to the link-layer automatically after every 1394 bus reset.

The TSB14AA1A is a 3.3 V device that provides LVCMOS level outputs. The TSB14AA1A is an asynchronous only device.

NOTE:

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

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
TSB14AA1AIPFB	Active	Production	TQFP (PFB) 48	250 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-2-260C-1 YEAR	-	TSB14AA1AI
TSB14AA1AIPFB.A	Active	Production	TQFP (PFB) 48	250 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-2-260C-1 YEAR	0 to 70	TSB14AA1AI
TSB14AA1AIPFBG4	Active	Production	TQFP (PFB) 48	250 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-2-260C-1 YEAR	0 to 70	TSB14AA1AI
TSB14AA1AIPFBG4.A	Active	Production	TQFP (PFB) 48	250 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-2-260C-1 YEAR	0 to 70	TSB14AA1AI
TSB14AA1APFB	Active	Production	TQFP (PFB) 48	250 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-2-260C-1 YEAR	0 to 70	TSB14AA1A
TSB14AA1APFB.A	Active	Production	TQFP (PFB) 48	250 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-2-260C-1 YEAR	0 to 70	TSB14AA1A

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

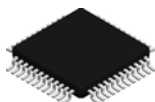
⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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.

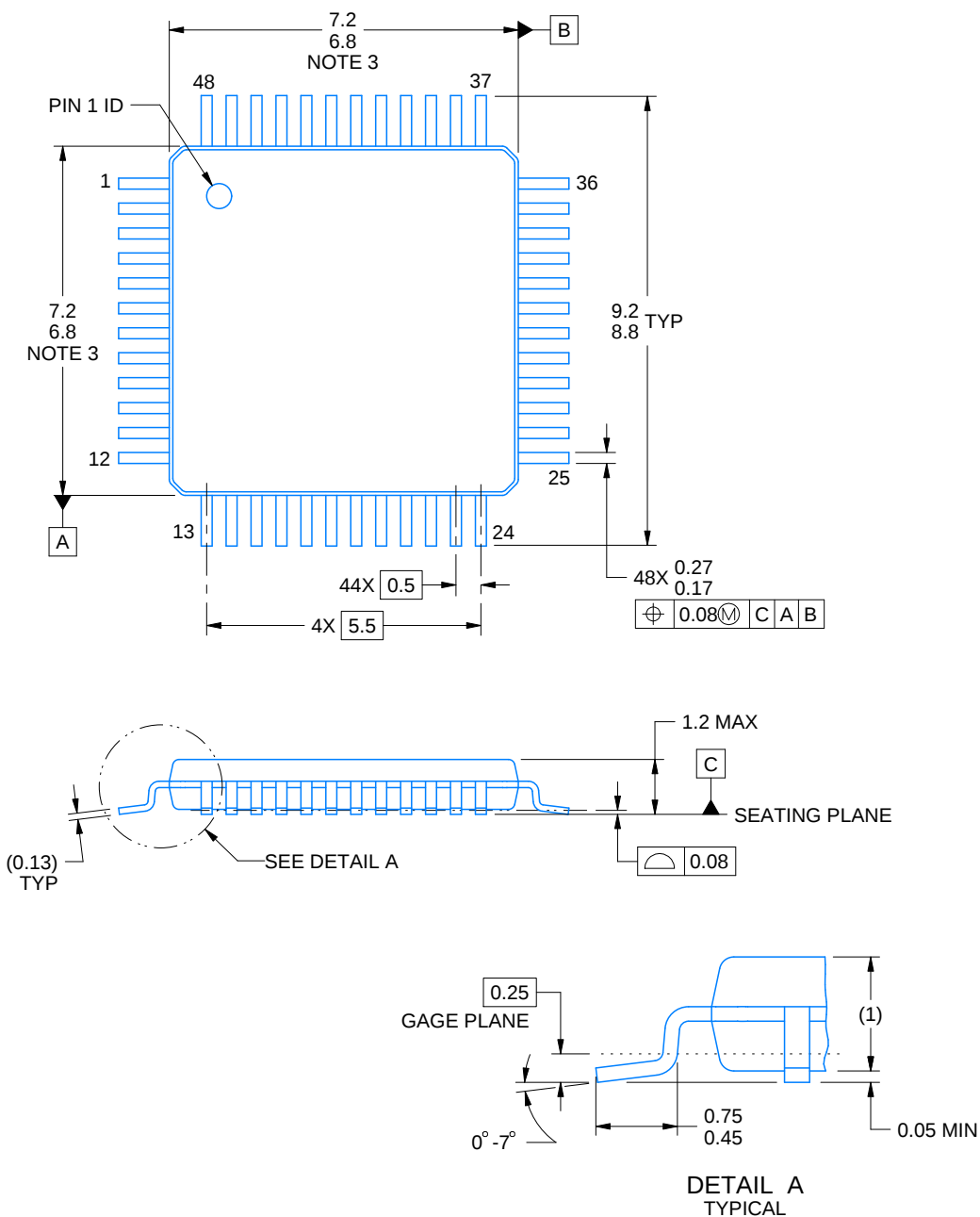
PFB0048A



PACKAGE OUTLINE

TQFP - 1.2 mm max height

PLASTIC QUAD FLATPACK

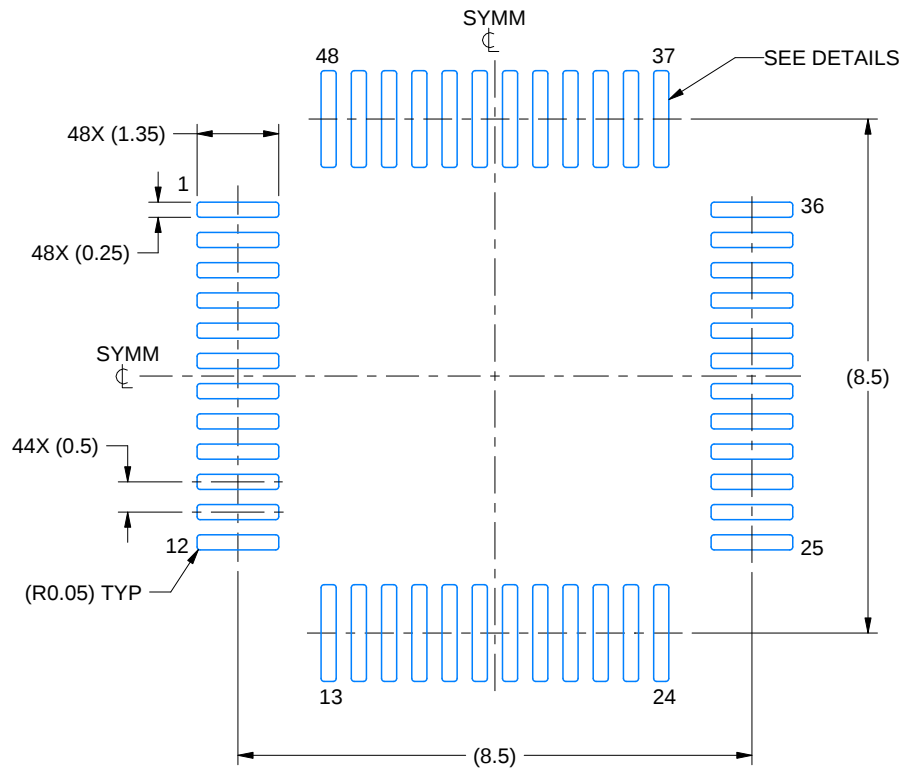


EXAMPLE BOARD LAYOUT

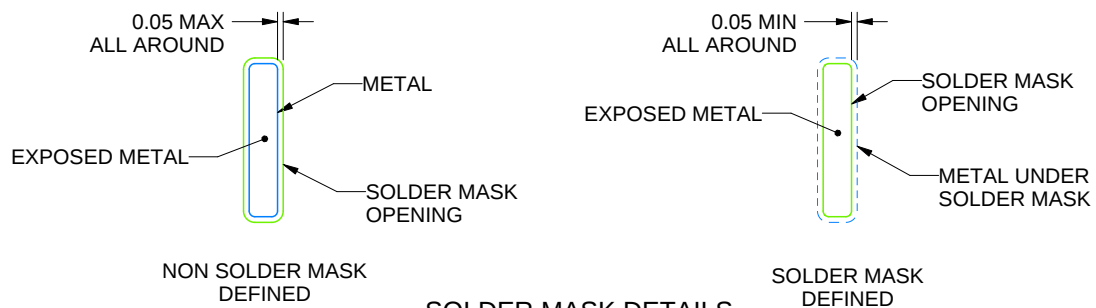
PFB0048A

TQFP - 1.2 mm max height

PLASTIC QUAD FLATPACK



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:8X



SOLDER MASK DETAILS

4215157/A 03/2024

NOTES: (continued)

- Publication IPC-7351 may have alternate designs.
- Solder mask tolerances between and around signal pads can vary based on board fabrication site.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you fully indemnify TI and its representatives against any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#), [TI's General Quality Guidelines](#), or other applicable terms available either on [ti.com](https://www.ti.com) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

TI objects to and rejects any additional or different terms you may propose.

Copyright © 2026, Texas Instruments Incorporated

Last updated 10/2025