# Option Design Using The TURBOchannel Interface ASIC (TcIA)

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**Digital's TRI/ADD Program**

## Overview

- Objectives for the TcIA Test Board
- Test Board characteristics
- Functionality Testing
- Developer's Kit

# Objectives for TcIA Test Board

- Test complete functionality of the TcIA
- Test operation of the TcIA with variable clock speeds
- Establish performance characteristics of the TcIA
- Verify the TcIA Specification
- Alternative strategy to an embedded design

# Architecture of the Test Board

## Functional blocks

- The TcIA
- Transmit engine
- Receive engine
- Oscillator
- ROM
- RAM
- Arbitration engine
- PIO
- LEDS

# Test Board Characteristics

## Physical

- Dimensions
- TcIA Layout

# Important definitions

- **Transmit** is the movement of data **from** the **system to** the **option**, as to a serial line. Thus a transmit DMA operation uses TURBOchannel DMA read transactions.
- **Receive** is the movement of data **from** the **option to** the **system**, as from a serial line. Thus a receive DMA operation uses TURBOchannel DMA write transactions.
- Simple DMA is data transfer to or from sequential memory locations with addresses supplied by the TcIA
- Intelligent DMA is data transfer to or from memory locations by options that supply DMA addresses to the TcIA
- A word is 32 bits wide.
- A half-word is 16 bits wide.

# Transmit Functionality Testing

- Simple DMA
- Intelligent DMA
- Scatter/Gather
- Data sizes
- Unaligned transfers
- Modes of operation
- Page Sizes and Boundaries

# Receive Functionality Testing

- Simple DMA
- Intelligent DMA
- Scatter/Gather
- Data sizes
- Unaligned transfers
- Modes of operation
- Page Sizes and Boundaries

## Concurrency Testing

- PIO and DMA
- Transmit and receive
- Restriction (Pass 2 silicon)

# Test Code

- ROM based
- Menu driven
- Written in "C"
- Code structure

# Developer's Kit

- **Contents**
- **Availability**

## Conclusions

- Found Pass 1 design flaws
- Verified TcIA Specification
- Documented DMA performance
- Exercised all functions
- Achievements

# Availability

**Information on the TcIA and the Test Board is available from:**

Integrated Test Solutions
2352 Main Street, Suite 201
Concord Office Park
Concord, MA 01742

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