Cage Interface Card (CIF)

AXIe Compatible System Module
Complete Infrastructure with Advanced Test Support

AXIe System Module

- Cabled PCI Express interface to test computer
- Switched PCI Express data fabric to all other slots
- Supports 16 slot AXIe 3.1 chassis

Instrument Triggering

- 8 bi-directional PFI triggers with programmable thresholds
- 4 star-distributed internal differential triggers per slot
- Non-blocking connections between PFI and star triggers

Clocking

- 10 MHz on-board VCXO reference frequency
- External clock reference for system coherent frequencies
- 100 MHz clock generation from reference
- 10 MHz and 100 MHz references bussed to all slots

Other Test Features

- Flipper side relay connection to Digital Multi Meter (DMM)
- DMM and DUT site relay connection to AXIe 3.1 calibration and analog buses
- DUT power supplies
- Control Bit drivers for relay control on load boards
- General purpose I2C interface to DUT site
- IPMI Shelf Management and active Fan Control

Optional Digital Synchronization Module

Supports the following across multiple AXI chassis for digital resources:

- Single coherent clock source
- Fail synchronization
- DSTAR and PFI trigger synchronization
- Synchronization for pattern starting, test computer communication, PMU measurements, etc.

Applications

- Digital dominant mixed signal, SOC
- Characterization, wafer sort and final test
- Multi-site, low overhead product solutions

Hardware Description

A CIF system module is required in the hub slot of each AXIe chassis. The CIF provides the following functionality:

- **Communications between the test computer and instruments located within a chassis**

  The CIF interfaces to a single lane PCIe communication cable and implements a PCI Express switched fabric to connect up to fifteen slots in the chassis and to itself for on-board communications.

- **Multiple types of flexible asynchronous instrument triggers**

  The CIF provides eight front panel general purpose external asynchronous Programmable Function Input (PFI) triggers, which can be outputs or inputs with programmable thresholds. It also provides four differential star-distributed triggers to each AXIe slot (DSTAR<A..D>). The module also provides one single clock pulse software trigger, utilizing a 1 MHz clock that can be delayed by 8 bit pre-scaler. Triggering flexibility is achieved through the use of full non-blocking connections between the PFI and star triggers. A dedicated digital sub-system trigger connection allows inter-chassis digital synchronization (with the optional Digital Synchronization Module).

- **Frequency references on one or more chassis backplanes**

  Each CIF creates a 10 MHz reference clock that can be phase locked to an external 10 MHz reference. The 10 MHz reference can be daisy chained to other chassis. A 100 MHz reference is generated from this 10 MHz reference. Both the 10 MHz and 100 MHz references are busses to all slots within the chassis.

- Support for a single DMM (digital multimeter) to be used for instrument calibration within multiple chassis

  A single DMM is required in the test system for calibration of instrumentation. The CIF provides a relay matrix for interconnect between other CIFs in the system, allowing a single DMM connection via the calibration and analog busses.

- AXIe shelf management functions

  Through the use of a Pigeon Point shelf manager plug-in module, the CIF provides AXIe shelf management functions, including power management for all cards in the chassis and chassis cooling management using active fan control.

- Digital synchronization on one or more chassis backplanes.

  Through the use of an optional Digital Synchronization Module (see Figure 1) the CIF supports synchronization and signal distribution to all digital boards within its chassis and up to three additional chassis.

Figure 1 Digital Synchronization Module

Note: Refer to Figure 2, which illustrates the system-level interconnection in the test system.

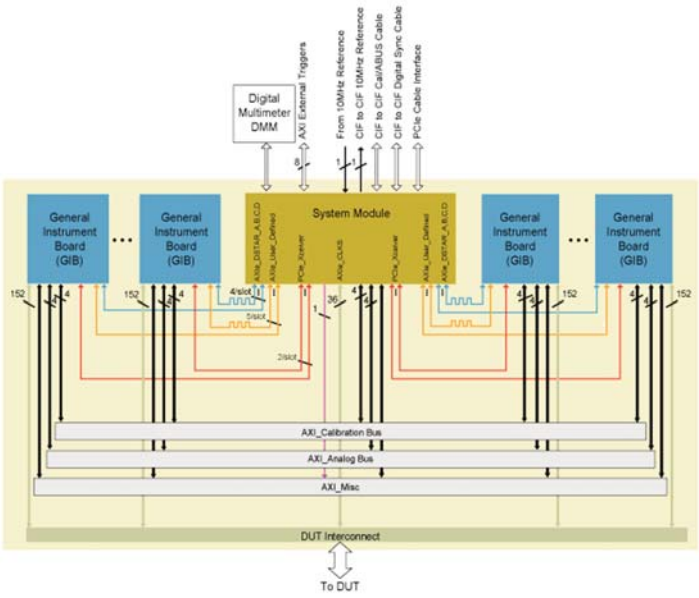

Figure 2 System Module in an AXIe Chassis

Programming

- C++ Instrument Drivers

SPECIFICATION

10 MHZ CLOCK REFERENCE

Frequency Range

10 MHz

Input Impedance

50 Ohm, nominal

Input Coupling

AC

Voltage Range

DC ±20 V

AC 400 mVp-p to 5 Vp-p

Absolute Max Input Voltage

±26 V, max

External Clock Lock Range

10 MHz ± 50 PPM

SHELF MANAGEMENT SUPPORT

I2C Interface

IPMB-A primary interface to shelf manager. Secondary port not provided.

H8 Processor

Renesas H8 processor with FRU E2Prom, Board temperature and board voltage monitoring.

DIGITAL MULTI-METER (DMM), CALIBRATION AND ANALOG BUS INTERFACE

Calibration Bus Interface

(4) wire kelvin connection

Analog Bus Interface

(2) line analog bus with (2) wire kelvin connection

DMM Interface

(6) wire interface on front panel to meter

Relay Matrix

1) Analog Bus to Calibraton Bus

2) Meter to Calibration Bus

3) Analog Bus to external Analog Bus

4) Calibration resistors to Calibration Bus

PCIE INTERFACE

Cable Interface

PCIe Interface (1) single lane cable interface

Connector PCIe cable compliant

Backlane Interface

PCIe xceivers (15) single lane

Sync and Trigger Interface

AXI_PFI[7:0]

Input Characteristics

Frequency Range

DC to 105 MHz

Input Impedance

50 Ohm, nominal or >2 K

Input Coupling

DC

Voltage Level

0 V to +3.6 V

Absolute Max. Input Voltage

-0.4 V to +3.7 V , MAX

Input Threshold

Voltage Level

+0.1 V to +3.5 V

Voltage Resolution

16.8 mV (8 bits)

Error

± 55 mV

Hysteresis

4 mV, typical

Output Characteristics

Frequency Range

DC to 105 MHz

Output Impedance

50 Ohm, typical

Output Coupling

DC

Voltage Level

50 Ohm load

0 V to 1.6 V, typical

Open Circuit

0 V to 3.3 V, typical

Absolute Max. Applied Voltage

0.4 V to +3.7 V, MAX

Output to Output Skew

TBD

DSTAR_A, B, C and D Characteristics

Input/Output Voltage Level

MLVDS

Any DSTAR to any DSTAR

15 nS, typical

Any DSTAR to any PFI

20 nS, typical

Any PFI to any DSTAR

20 nS, typical

CBIT[32:1]

Output

Open Drain with 100 k pullup to +5 V

Maximum Voltage in Off State

50 V Max

Maximum Current in on State

100 mA

On State Output Voltage @ 100 mA

0.7 V

POWER

Input Voltage

-48 V Nom, -53 V to -40 V

Power Dissapation

50 W Typ 170 W Max

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