

AXIe System Module

Complete Infrastructure with Advanced Test Support



AXIe System Module:

- Cable 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 general purpose Bi-Directional PFI front panel triggers with programmable thresholds
- 4 star distributed internal differential triggers per slot
- Full non blocking connections between PFI Triggers and star triggers, allowing flexible triggering

Clocking:

- 10MHz on-board VCXO Reference Frequency
- External clock reference for system coherent frequencies
- 100MHz clock generation from reference
- 10MHz and 100MHz 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
- General purpose 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:

Support the following across multiple AXI chassis for all digital resources:

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

Applications

- Characterization and Validation
- Multi-Site Automated Production Test
- Low Cost Mixed Signal Test

Hardware Description

A System Module is required in the hub slot of each AXI chassis in the test system. The System Module provides:

- The communications hub between the Test Computer and all the instruments located within a chassis.**
 The System Module interfaces to a single lane PCIe communication cable. The System Module implements a PCI Express Switched Fabric to connect up to (15) slots in the chassis and to itself for on-board communications.
- Multiple types of flexible asynchronous instrument triggers.**
 The System Module provides several types of triggers. Eight (8) front panel general purpose external asynchronous Programmable Function Input (PFI) triggers that can be outputs or inputs with programmable thresholds. Four (4) differential triggers that are star-distributed to each AXIe slot (DSTAR<A..D>). One (1) single clock pulse software trigger utilizing a 1 MHz clock that can be delayed by 8 bit pre-scaler. Triggering flexibility is provided 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 Subsystem Module).
- Frequency references on one or more chassis backplanes.**
 Each System Module creates a 10MHz reference clock that can be phase locked to an external 10MHz reference. The 10MHz reference can be daisy chained to other chassis. A 100MHz reference is generated from this 10MHz reference. Both the 10MHz and 100MHz references are busses to all slots within the chassis.
- Support for a single Digital Multi-Meter to be used for instrument calibration within multiple chassis.**
 A single Digital Multi-Meter (DMM) is required in the test system for calibration of instrumentation. The System Module provides a relay matrix for interconnect between other System Modules 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 System Module 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 System Module supports synchronization and signal distribution to all digital boards within its chassis, and up to three additional chassis through a daisy chain connection to their System Modules.

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



Figure 1 Digital Synchronization Module



Programming

- C++ Instrument Drivers

Specifications

10MHz Clock Reference		
	Frequency Range	10MHz
	Input impedance	50 Ohm, nominal
	Input Coupling	AC
	Voltage Range	
	DC	+/-20V
	AC	400mVp-p to 5Vp-p
	Absolute max input voltage	+/-26V, max
	External Clock lock range	10MHz +/- 50PPM
Shelf Management Support		
	I ² C Interface	IPMB-A primary interface to shelf manager. Secondary port not provided.
	H8 Processor	Renesas H8 processor with FRU E ² Prom, Board temperature and board voltage monitoring.
Digital Multi-Meter(DMM), Calibration & 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 & Trigger Interface		
	AXI_PFI[7:0]	
	Input Characteristics	
	Frequency Range	DC to 105MHz
	Input Impedance	50 Ohm, nominal or > 2K
	Input Coupling	DC
	Voltage Level	0V to +3.6V
	Absolute max. input voltage	-0.4V to +3.7V , MAX
	Input Threshold	

	Voltage Level	+0.1V to +3.5V
	Voltage Resolution	16.8mV (8 bits)
	Error	+/- 55mV
	Hysteresis	4mV, typical
Output Characteristics		
	Frequency Range	DC to 105MHz
	Output Impedance	50 Ohm, typical
	Output Coupling	DC
	Voltage Level	
	50 Ohm load	0V to 1.6V, typical
	Open Circuit	0V to 3.3V, typical
	Absolute max. applied voltage	-0.4V to +3.7V, MAX
	Output to Output Skew	TBD
DSTAR_A, B, C & D Characteristics		
	Input/Output Voltage Level	MLVDS
	Any DSTAR to any DSTAR	15nS, typical
	Any DSTAR to any PFI	20nS, typical
	Any PFI to any DSTAR	20nS, typical
CBIT[32:1]		
	Output	Open Drain with 100k pullup to +5V
	Maximum voltage in off state	50V Max
	Maximum current in on state	100mA
	On state output voltage @ 100mA	0.7 V
Power		
	Input Voltage	-48V Nom, -53V to -40V
	Power dissipation	50W Typ 170W Max