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Find the *Molex / Innovative Integration X3-DIO* at our website: *Click HERE*

X3-DIO

v1.3

PCI Express XMC Module with 100 MHz Streaming Digital IO, 1.8M FPGA and 4MB Memory

FEATURES

- Stream digital data to/from memory or disk
- 400 MB/s LVDS capture/playback to SRAM
- 200 MB/s capture to system memory/disk**
- 100 MB/s streaming from system memory
- 64 single-end/32 differential digital IO
- Optional on-card termination
- Xilinx Spartan3A DSP, 1.8M gate FPGA
- 4MB SRAM
- Programmable or external timebase
- Framed, software or external triggering
- Log acquisition timing and events
- 44 bits digital IO on P16
- Power Management features
- PCI Express XMC Module (75x150 mm)
- Use in any PCI Express desktop, compact PCI/PXI, or cabled PCI Express application

APPLICATIONS

- Digital Pattern Generation
- Capture and record digital data
- Custom Digital Interfaces for Remote IO
- Digital Controls

SOFTWARE

- Data Acquisition, Logging and Analysis applications provided
- Windows/Linux Drivers
- C++ Host Tools
- VHDL/MATLAB Logic Tools

** Andale datalogger required for disk storage



DESCRIPTION

The X3-DIO is a PCI Express XMC IO module for high speed digital IO data interfaces featuring 64bits of front-panel digital IO. The digital IO is either single-ended LVCMOS or LVDS differential pairs that is directly connected to the FPGA, for applications such as high speed pattern generation, digital recording, custom IO interfaces and controls.

Flexible trigger methods include counted frames, software triggering and external triggering. The sample rate clock is either an external clock or on-board programmable PLL clock source.

Data acquisition control, signal processing, buffering, and system interface functions are implemented in a Xilinx Spartan3A DSP FPGA, 1.8M gate device. Two 512Kx32 memories are used for data buffering and FPGA computing memory.

The logic can be fully customized using VHDL and MATLAB using the FrameWork Logic toolset. The MATLAB BSP supports real-time hardware-in-the-loop development using the graphical, block diagram Simulink environment with Xilinx System Generator.

The PCI Express interface supports continuous data rates up to 180 MB/s between the module and the host. A flexible data packet system implemented over the PCIe interface provides both high data rates to the host that is readily expandable for custom applications.

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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of the Innovative Integration standard warranty. Production processing does not necessarily include testing of all parameters.

03/02/15

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X3-DIO



This electronics assembly can be damaged by ESD. Innovative Integration recommends that all electronic assemblies and components circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

ORDERING INFORMATION

Product	Part Number	Description
X3-DIO	80178-0	PCI Express XMC Module - with single-ended (LVCMOS) front panel DIO and 1.8 M FPGA with DSP
X3-DIO	80178-1	PCI Express XMC Module - with differential (LVDS) front panel DIO and 1.8 M FPGA with DSP
X3-DIO	80178-1-L1	PCI EXPRESS-PCIe XMC MODULE P/N:80178-1 with differential (LVDS) front panel DIO
X3-DIO	80178-1-L4	PCI EXPRESS-PCIe XMC MODULE P/N:80178-1 with differential (LVDS) front panel DIO
Logic		
X3-DIO FrameWork Logic	55022	Framework Logic support for X3-DIO module
Software		
Linux	54042	Linux for SBC-Linux-ComEx, eInstrument-PC
Windows XP	54043	Windows XP Embedded for SBC-ComEx, eInstrument-PC
Windows XP	54044	Windows XP Pro for SBC-ComEx
Windows Vista	54046	Windows Vista Business for SBC-ComEx
Windows 7	54050	Windows 7 Pro 32-bit
Windows 7	54051	Windows 7 Embedded
Windows 7	54052	Windows 7 Pro 64-bit
Windows 7	54054	Windows 7 Pro 64-bit Embedded
Power		
Power Supply	80200-0	SBC-ComEx, eInstrument-PC Power Supply, DC (8-24V) input, 125W
Power Supply	80200-1	SBC-ComEx, eInstrument-PC Power Supply, AC (110-240) input, 125W, USA/Japan/Korea/Taiwan power cord
Power Supply	80200-2	SBC-ComEx, eInstrument-PC Power Supply, AC (110-240) input, 125W, UK/Australia/India power cord

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Power Supply	80200-3	SBC-ComEx, eInstrument-PC Power Supply, AC (110-240) input, 125W, EU power cord
Cables		
MDR68 cable	65057	IO cable with MDR68 plug on each end, 3 feet length (0.92m)
MMCX to SMA cable	67048G	MMCX to SMA cable
MDR	67067	IO cable with MDR68 plug on each end, 3 feet length (0.92m). Use for differential IO.
MMCX to SMA cable	67084-G	MMCX to SMA cable
X4PCIe cable	67098	Cable x4PCI express, 1 meter
Breakout	80112-1	MDR68-female to screw terminal block
Breakout	80116-0	MDR 68 BREAKOUT CABLE
MDR Cable	80116-1	MDR cable 68-pin and screw terminal block
Adapters		
XMC-PCIe x1 Adapter	80172-0	PCI Express Carrier card for XMC PCI Express modules, x1 lanes
PCIe X1 Cable Adapter	80181-0	Desktop PCI Express X1 Cable Adapter
PCIe X1 Cable Adapter	80186-0	Laptop PCI Express X1 Cable Adapter
XMC to CompactPCI Adapter	80207-0	CompactPCI to XMCe Adapter Board
cPCI-XMCe Adapter	80207-1-L4	cPCI-XMCe Adapter 3U Conduction Cooled
CPEX4	80246-0	X4 PCI Express Cable adapter card
XMC Adapter for 3U OpenVPX	80260-3	VPX-XMC 3U ADAPTER, conduction cooled, without REDI covers for X3 modules
XMC Adapter for 3U OpenVPX	80260-3RC	VPX-XMC 3U ADAPTER, conduction cooled, with REDI covers for X3 modules
XMC Adapter for 3U OpenVPX	80260-3RCA	VPX-XMC 3U ADAPTER, conduction cooled, with REDI covers for X3 modules & assembly
XMC-PCI Adapter	80167	PCI Carrier card for XMC PCI Express modules, 64-bit PCI-X
XMC-cPCI Adapter	80207	3U Compact PCI/PXI Carrier card for XMC PCI Express modules, 64-bit PCI-X
XMC-Cabled PCIe Adapter	90181	Cabled PCI Express Carrier card for XMC PCI Express modules, single-lane.
eInstrument-DAQ Node	90181-0	XMC module carrier with 2.5 Gbps cabled PCI Express link to Host Computer housed in a rugged aluminum enclosure.

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CPEX4 Hub	90241-0	Cabled PCI Express 4-port Hub including chassis
XMC Modules		
X3-Timing	80234-0	MDR cable 68-pin and screw terminal block
X3-Timing	80234-1	XMC Module, 1 ppm crystal, no GPS
X3-Timing	80234-2	PCI Express XMC Module, 500 ppb crystal, with GPS
X3-Timing	80234-3	XMC Module, 1 ppm crystal, w/GPS
Embedded PC Host		
eInstrument PC	90199	Embedded PC XMC host with support for two XMC modules for standalone applications.
Custom Engineering and Consulting Services		
Engineering Services	56004	Software/hardware/firmware development
Technician Services	56005	Mechanical fabrication - Electronics prototyping
Premium Services	56006	Rapid turnaround premium, Engineering or Technician Services (add to base rate)
Visit	56009	Engineer Visit On Site for installation, application assistance, in-house training, custom SW
IP Blocks		
IP-TINY DDS	58003-0	1/3 size of Xilinx DDS with equal SFDR. Net version
IP-TINY DDS	58003-1	1/3 size of Xilinx DDS with equal SFDR, source version
IP-XLFFT	58011-0	Core for 64K to 1M points FFT for 1-D, 2-D signal Netlist undle with hardware
IP-XLFFT	58011-1	Core for 64K to 1M points FFT for 1-D, 2-D signal Netlist
IP-WINDOWING	58012-0	Run-time configurable Hann, Blackman, and Boxcar data windowing functions Netlist bundle with hardware
IP-WINDOWING	58012-1	Run-time configurable Hann, Blackman, and Boxcar data windowing functions Netlist
IP-WINDOWING	58525-0	Netlist version
IP-WINDOWING	58525-1	Source version
VPX		
VPX-COMEX	80271-0	3U VPX CPU Card, Spartan6 Forced Air Cooling, no REDI covers
VPX-COMEX	80271-0-L1	3U VPX CPU Card, Spartan6 Conduction Cooling, no REDI covers
VPX-COMEX	80271-0-L2	3U VPX CPU Card, Spartan6 Conduction Cooling, no REDI covers
VPX-COMEX	80271-0-L3	3U VPX CPU Card, Spartan6 Conduction Cooling, no REDI covers
VPX-COMEX	80271-0R-L0	Intel I7 @ 2.53 GHz, 128GB SSD Card with REDI covers
VPX-COMEX	80271-0R-L1	Intel I7 @ 2.53 GHz, 128GB SSD Card with REDI covers

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VPX-COMEX	80271-0R-L3	Intel I7 @ 2.53 GHz, 128GB SSD Card with REDI covers
RTM-ComEx	80276-0	Rear terminal module for VPX-ComEx
RTM-ComEx	80276-0-L1	Rear terminal module for VPX-ComEx
RTM-ComEx	80276-0-L3	Rear terminal module for VPX-ComEx
VPXI-Extension	90277-0	VPXI-Extension
Media		
DVD	57001	Innovative Integration Installation DVD
Recorders		
Andale Turnkey Logging System	90036-1	2.4 TB RAID0 Array, 700 MB/s
Andale Turnkey Logging System	90036-11	Sustained rates limited to 1600 MB/s
Andale Turnkey Logging System	90036-12	14.4 TB RAID0 Array, 1600 MB/s
Andale Turnkey Logging System	90036-13	9.6 TB RAID0 Array, 1200 MB/s
Andale Turnkey Logging System	90036-14	48 TB RAID0 Array, 2400 MB/s
Andale Turnkey Logging System	90036-2	Sustained rates limited to 300 MB/s
Andale Turnkey Logging System	90036-4	4.8 TB RAID0 Array, 850 MB/s
Andale Turnkey Logging System	90036-5	Sustained rates limited to 850 MB/s
Andale Turnkey Logging System	90036-6	Sustained rates limited to 1000 MB/s
Andale Turnkey Logging System	90036-7	Sustained rates limited to 500 MB/s
Andale Turnkey Logging System	90036-8	14.4 TB RAID0 Array, 2400 MB/s
Andale Turnkey Logging System	90036-9	Sustained rates limited to 1600 MB/s
Systems		
Mezzanine Card	80208-1	Mezzanine card for SBC-ComEx
Mezzanine Card	80242-0	Mezzanine card for eInstrumentPC and SBC-ComEx exposing J16 signals from XMC sites 0 and 1, plus SBC-ComEx baseboard digital I/O signals, 1 ppb stability clock with GPS

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Precision GPS Option	80247-0	Precision GPS Option for eInstrument PC and Atom. Includes Trimble Mini-T GPS receiver, Bullet III antenna and 10 M cable
eInstrument-PC	90199-1	Rackmount Adapter Kit
Low-Power eInstrument-PC	90200-0	90190-0+AC supply+chassis+boot SSD
Performance eInstrument-PC	90200-1	90190-1+AC supply+chassis+boot SSD
Performance ePC	90200-1A	90190-1+AC supply+chassis+boot SSD+VCO 350-460 MHz
Extreme eInstrument-PC	90200-2	90190-2+AC supply+chassis+boot SSD
Extreme eInstrument-PC	90200-3	90190-4+AC supply+chassis, 10-280 MHz SI570 VCO
Extreme eInstrument-PC	90200-5	90190-4+AC supply+chassis, 10-945 MHz SI570 VCO
Extreme eInstrument-PC	90200-6	Extreme eInstrument PC with SBC-ComEx carrier, DC supply, (10-945 MHz SI570 VCO range) I7 dual core at 2.5 Ghz, 4GB RAM and Enclosure for SBC-ComEx and SBC COMEX Power Supply, AC (110-240) input, 125W, USA/Japan/Korea/Taiwan power cord.
Low Power eInstrument ATOM PC	90201-0	90191-0+AC supply+chassis+Flash boot
Extreme eInstrument ATOM PC	90201-1	90191-2+AC supply+chassis+Flash boot
Low Power eInstrument ATOM PC	90201-3	Low-power eInstrument-PC ATOM PC with SBC-ComEx carrier, DC supply, ATOM CPU, 1GB RAM and Enclosure for SBC-ComEx and SBC COMEX Power Supply, DC (12V) input, 125W.
Extreme eInstrument ATOM PC	90201-4	90191-2+AC supply+chassis
Extreme eInstrument ATOM PC	90201-5	Extreme eInstrument ATOM PC with SBC-ComEx carrier, DC supply I7 dual core, 4GB RAM and enclosure for SBC-ComEx plus SBC COMEX power supply, DC (12V) input, 125W.
VPXI-ePC	90271-0	VPXI-ePC
VPXI-ePC	90271-0	VPXI-ePC conduction cooled cooled 3U 1/2 rack OpenVPX 5 expansion slots Rugged Level 1
VPXI-ePC	90271-0	VPXI-ePC conduction cooled cooled 3U 1/2 rack OpenVPX 5 expansion slots Rugged Level 2
VPXI-ePC	90271-0	VPXI-ePC conduction cooled cooled 3U 1/2 rack OpenVPX 5 expansion slots Rugged Level 3
Storage		

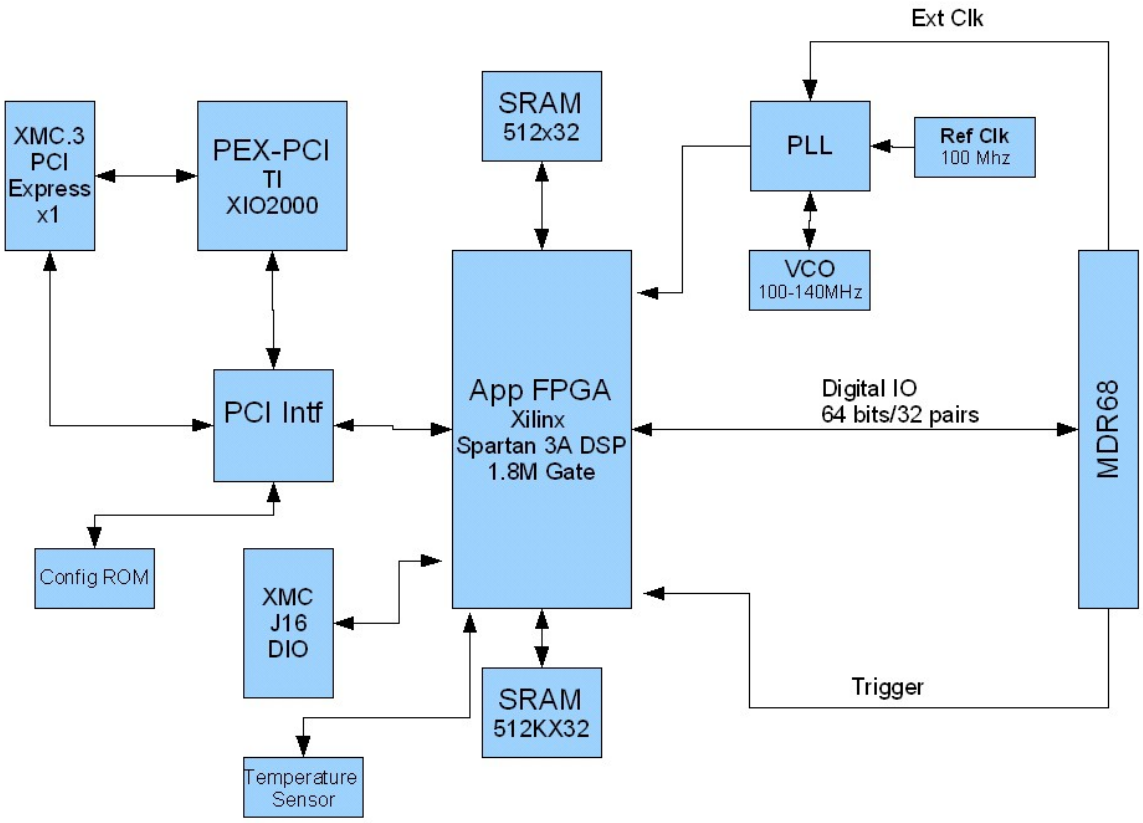
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Hitachi HTS722020K9A300	306019	200GB 7200 RPM SATA 3.0Gb/s Hard Drive
Disk Drive	36028	Solid state disk drive for SBC ComEx - 160 GB
Flash Drive	49016	4 Gigabytes memory USB Embedded
Western Digital Scorpio WD800BEVS	49017-0	80GB 5400 RPM SATA 1.5Gb/s Hard Drive
Flash Drive	49018	16 Gigabytes memory USB Embedded
Hard Disk	80212-0	Hard Disk Drive for SBC COMEX, eInstrument-PC; 200 GB
Hard Disk	80212-1	High Performance Hard Disk Drives for SBC COMEX, eInstrument-PC; two drives, 200 GB each
VelociRaptor WD6000HLHX	80212-3	600GB 10000 RPM 32MB Cache 2.5" Hard Drive
Disk Drive	80263	INTEL SOLID STATE DRIVE V SERIES SNV125-S2BD/30GB 2.5"
GPS		
Tyco A1029-D GPS antenna	68013G	Active, +25dB, 3.3V, SMA cable
GPS RECEIVER MODULE	68015G	Trimble Mini-T, high accuracy, 10 MHz output
GPS Antenna	68016G	Trimble Bullet III, 5V
NavSync CW25	80261	GPS Module for SBC-ComEx
GPS receiver and active antenna	90196-0	GPS receiver and active antenna (P/Ns 68013G + 80261)
GPS receiver and active antenna	90198-0	Trimble Mini-T GPS receiver and active antenna (P/Ns 68015G + 68013G

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X3-DIO

X3-DIO Block Diagram



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X3-DIO

Standard Features

Front Panel Digital IO	
Total Number of Bits	64
Balanced Pairs	32
Signal Standard	LVTTL or LVDS
LVTTL Max Signal Rate	50 MHz
LVDS Max Signal Rate	200 MHz
Current Capability	+/-12 mA (LVTTL)
Termination	LVDS : 100 ohms across pairs LVCMOS : 33 ohms series option
Source	Direct connect to FPGA
Connector	MDR68

FPGA	
Size	1.8M gate equivalent
Flip-Flops	33,280
Multipliers	84
CLB	4160
Block RAMs	84 (1512K bits)
FPGA Device	Xilinx Spartan3A DSP XC3SD1800A-4FGG676C
Configuration	SelectMAP from PCIe interface JTAG during development
Clock Rate	107 MHz system clock
Size	1.8M gate equivalent

Memory	
Size	4 MB total 2 devices @ 512Kx32 each
Type	Synchronous ZBT SRAM
SRAMs	Cypress CY7C1371D-133AXC
Uses	FPGA Buffer Memory FPGA computation memory
Clock Rate	107 MHz

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X3-DIO

Host Interface	
Type	PCI Express; single lane
Sustained Data Rate	200 MB/s module->system memory 100 MB/s system memory->module
Protocol	Packet data
Connector	XMC P15
Interface Standard	PCIe 1.0a; VITA 42.3
Logic Update	In-system reconfiguration

Clocks and Triggering	
Clock Sources	PLL or External 0-200 MHz LVDS 0-50 MHz TTL
PLL Output	4 MHz to 140 MHz
PLL Resolution	1530 Hz
PLL Jitter	<1 ps RMS
PLL Programming	Host programmed via PCIe
PLL Reference	Internal: 100 MHz clock External reference : J16 input
Triggering	External, software, acquire N frame
Decimation	1:1 to 1:4095 in FPGA
Channel Clocking	All channels are synchronous
Multi-card Synchronization	External triggering, clock, and PLL reference are supported.

Acquisition Monitoring	
Alerts	Trigger, Queue Overflow, Channel Over-range, Timestamp Rollover, Temperature Warning, Temperature Failure, PLL Unlocked
Alert Timestamping	15 ns resolution, 32-bit counter

P16 Digital IO	
Total Number of Bits	44
Balanced Pairs	22
Signal Standard	LVTTL/LVDS
Drive	+/-12 mA (LVTTL)
Connector	XMC P16

Power Management	
Temperature Monitor	May be read by the host software
Alarms	Software programmable warning and failure levels
Over-temp Monitor	Disables analog IO power supplies
Power Control	Channel enables and power up enables
Heat Sinking	Conduction Cooling supported. (VITA20 subset)

Physicals	
Form Factor	Single width IEEE 1386 Mezzanine Card
Size	75 x 150 mm
Weight	100g
Hazardous Materials	Lead-free and RoHS compliant

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ABSOLUTE MAXIMUM RATINGS

Exposure to conditions exceeding these ratings may cause damage!

Parameter	Min	Max	Units	Conditions
Supply Voltage, 3.3V to GND	+3.0	+3.6	V	
Analog Input Voltage, Vin+ or Vin- to GND	-0.3	+6	V	
Operating Temperature	0	70	C	Non-condensing, forced air cooling required
Storage Temperature	-65	+150	C	
ESD Rating	-	1k	V	Human Body Model
Vibration	-	5	g	9-200 Hz, Class 3.3 per ETSI EN 300 019-1-3 V2.1.2 (2003-04)
Shock	-	40	g peak	Class 3.3 per ETSI EN 300 019-1-3 V2.1.2 (2003-04)

RECOMMENDED OPERATING CONDITIONS

Parameter	Min	Typ	Max	Units
Supply Voltages	+3.15	+3.3	+3.45	V
	+11	+12	+13	V
Operating Temperature	0		60	C

MTBF

55642 Hours (assuming standard temperature and stress)

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ELECTRICAL CHARACTERISTICS

Over recommended operating free-air temperature range at 0°C to +60°C, unless otherwise noted.

Parameter		Min	Max	Typ	Units	Notes
Single-ended LVCMOS 3.3V (P16 DIO, trigger inputs, front panel DIO using single-ended IO)						
Digital Input Low Threshold		0	0.8	0.5	V	LVCMOS33 IO standard
Digital Input High Threshold		2.0	3.3	2.7	V	LVCMOS33 IO standard
Digital Output High		2.9	3.3	3.2	V	LVCMOS33 IO standard
Digital Input Input Low		0	0.4	0.1	V	LVCMOS33 IO standard
Digital Output Current		+/-10	+/-14	+/-12	mA	LVCMOS33 IO standard, 12 mA standard
Differential LVDS 2.5V (front panel IO using differential, clock input)						
Digital Input Differential		100	600	350	mV	LVDS 25 IO standard, 100 ohm termination
Digital Input Common Mode Range		0.3	2.20	1.20	V	LVDS 25 IO standard, 100 ohm termination
Digital Output Differential		100	600	-	mV	LVDS 25 IO standard, 100 ohm termination
Digital Output Common Mode Range		0.8	1.6	-	V	LVDS 25 IO standard, 100 ohm termination
Power						
Power Consumption	Total			3.5	W	For standard logic, 107 MHz system clock, 100 MHz sample clock, streaming to system, ambient temperature = 24C
	+3.3V Supply			100	mA	
	+12V Supply			16	mA	

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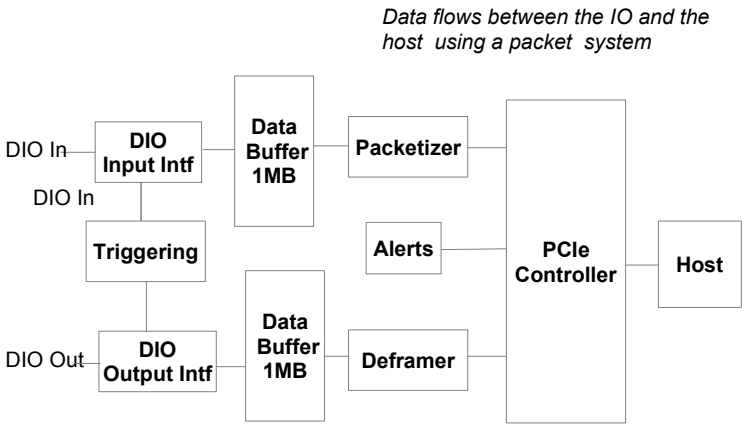
X3-DIO

Architecture and Features

The X3-DIO module support high rate data capture and playback for digital interface, communications, pattern generation and controls applications. The front-panel digital IO supports data capture or playback at 50 MHz single-ended or 200 MHz as differential pairs to memory on the module. The digital IO can be used as 64 single-ended as LVCMOS 3.3V signals with programmable direction or 32 differential pairs as LVDS by programming the application logic to select the IO standard. Standard logic images are provided for 64 LVCMOS bidirectional IO, 32 LVDS inputs, or 32 LVDS outputs. Additional digital IO control bits from the FPGA are mapped to P16 for application control and signaling.

The standard logic can playback and record data for any combination of front panel digital IO bytes. All digital IO is simultaneously sampled/updated using a programmable or external sample clock.

Controls for triggering and clocks allow precise control over the collection of data. Trigger modes include frames of programmable size, external and software. Multiple X3-DIO cards can sample simultaneously using external trigger inputs with synchronized sample clocks. The sample clock can be external or generated from the on-card PLL. The PLL can either use the on-card 100 MHz reference, or can use an external reference. When an external reference is used, the sample clock is synchronous to the reference.



X3-DIO Architecture

The X3 architecture has data buffering and a packet system to the host that provides an efficient and flexible host interface. The data buffer is a 2MB SRAM that is used as a dual-queue FIFO, one queue for incoming DIO data and one for outgoing DIO data. Data to the buffer is transferred to the host using the PCIe controller interface as data packets. The packet data system controls the flow of packets to the host, or other recipient, using a credit-based system managed in cooperation with the host software. The packets may be transmitted continuously for streams of data from the DIO, or as occasional packets for status, controls and analysis results. The data buffering and flow control system delivers high throughput with low latency and complete flexibility for data types and packet sizes to match the application requirements for all types of applications.

The data acquisition process can be monitored using the X3 alert mechanism. The alerts provide information on the timing of important events such as triggering, buffer overrun and thermal overload. Packets containing data about the alert including a system timestamp of the alert, and other information such as current temperature. This provides a precise overview of the data acquisition process by recording real-time events making the X3 modules easier to integrate into larger systems.

Software Tools

Software for data logging and analysis are provided with every X3 module. Data can be logged to system memory at full rate or to disk drives at rates supported by the drive and controller. Triggering and sample rate controls allow you to use the X3 performance in your applications without ever writing code. Innovative software applets include *Binview* which provides data viewing, analysis and import to MATLAB for large data files.

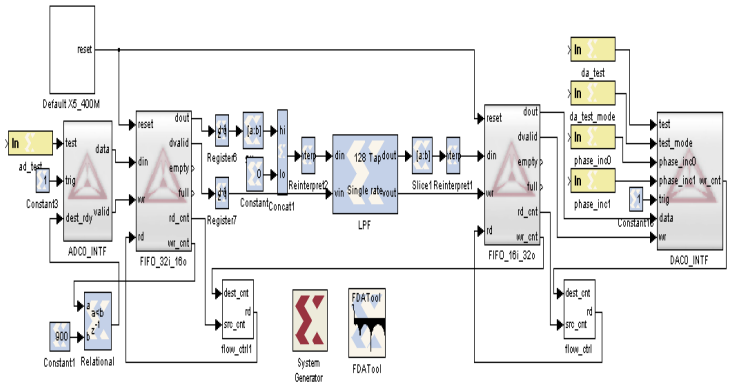
Software development tools for the X3 modules provide comprehensive support including device drivers, data buffering, card controls, and utilities that allow developers to be productive from the start. At the most fundamental level, the software tools

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deliver data buffers to your application without the burden of low-level real-time control of the cards. Software classes provide C++ developers a powerful, high-level interface to the card that makes real-time, high speed data acquisition easier to integrate into applications.

Support for MS Visual C++ is provided. Supported OS include Windows and Linux. For more information, the software tools User Guide and on-line help may be downloaded.

Logic Tools



The X3 module logic in the FPGA may be modified to add high speed DSP, analysis, customized triggering and other unique features. The FrameWork Logic tools provide support for development using RTL and MATLAB. The standard logic provides a hardware interface layer that allows designers to concentrate on adding the application-specific portions of their design. This allows the designer to build upon the Innovative components for packet handling, hardware interfaces and system functions, the Xilinx IP core library, and third party IP. Each design is provided with RTL source for the FrameWork Logic ready for customization, a Xilinx ISE project, and a ModelSim testbench illustrating logic functionality.

The MATLAB Board Support Package (BSP) allows logic development using Simulink and Xilinx System Generator. These tools provide a graphical design environment that integrates the logic into MATLAB Simulink for complete hardware-in-the-loop testing and development. This is an extremely power design methodology, since MATLAB can be used to generate, analyze and display the signals in the logic real-time in the system. Once the development is complete, the logic can be embedded in the FrameWork logic using the RTL tools.

The FrameWork Logic User sales brochure and User Guide more fully detail the development tools.

Applications Information

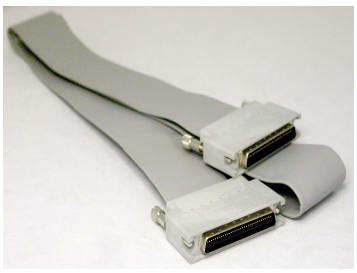
Maximum Data Rates

The maximum data rates supported by the module are limited by the PCI Express transfer rate when the total data rate exceeds 100 MB/s. The PCI Express transfer rate may vary according to the host computer, operating system, and other software that may compete for system memory bandwidth. The X3-DIO module supports 300 MB/s full duplex during bursts, but actual sustained throughput is 200 MB/s module->host and 100 MB/s host->module in typical desktop PCs.

It is important to qualify systems for performance when rates >= 100 MB/s are required.

This rate limitation does not apply to data generated in the FPGA.

Cables



The X3 module family uses a shielded, jacketed 68-wire cable assembly for the front panel IO that provides a high number of connections while preserving signal quality. The pleated copper foil shield is “near coax” in its performance. This cable, plus the use of differential signals and use of ground signals as shields, produce the best results. A screw terminal assembly is available.

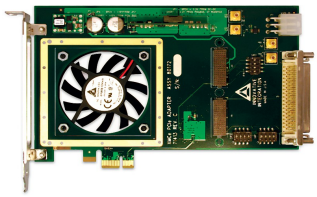
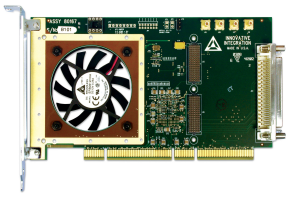
XMC Adapter Cards

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X3-DIO

XMC modules can be used in standard desktop system or compact PCI/PXI using an adapter card. The adapter cards are software transparent.

The X3 module family uses the auxiliary P16 connector for digital IO and additional clock inputs. A total of 44 bits of digital IO, directly connected to the application FPGA, are routed to the rear edge MDR connector as 22 balanced differential pairs supporting LVDS or lower speed single-ended LVCMOS signals. The X3 modules also have a sample clock input and PLL reference input to J16. The cPCI/PXI adapter uses these to connect to system clocks, while the PCIe desktop adapter provides SMB input connectors for system clock inputs.

PCIe-XMC Adapter (80172) x1 PCIe to XMC SMB Clock and trigger inputs 	**PCI-XMC Adapter (80167)** 64-bit, 133 MHz PCI-X host x4 PCIe to XMC 	**Compact PCI-XMC Adapter (80207)** 64-bit, 133 MHz PCI-X host x4 PCIe to XMC PXI triggers and clock support 

Applications that need remote or portable IO can use either the eInstrument PC or eInstrument Node with X3 modules.

eInstrument PC with Dual PCI Express XMC Modules (90199) Windows/Linux embedded PC 8x USB, GbE, cable PCIe, VGA High speed x8 interconnect between modules GPS disciplined, programmable sample clocks and triggers to XMCs 100 MB/s, 400 GB datalogger 12V operation 	**eInstrument DAQ Node – Remote IO using cabled PCI Express (90181)** PCI Express system expansion Up to 7 meter cable electrically isolated from host computer software transparent 

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X3-DIO

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