

# Nutaq $\mu$ Digitizer

FPGA-based, multichannel,  
high-speed DAQ solutions  
PRODUCT SHEET



  
**Nutaq**<sup>®</sup> Defense

QUEBEC

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NEW YORK

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# Nutaq $\mu$ Digitizer

- Supports a wide variety of high-speed I/O A/D and D/A converters
- Benefit from very large DDR3 and HDD storage interfaces
- Pre/post processing enabled through Virtex-6 FPGA framework
- Supports remote GigE access from Windows and Linux
- Supports embedded Linux processor blade with PCIe high speed streaming framework
- Develop applications more quickly with model-based design

$\mu$ Digitizer solutions are customizable, embedded solutions incorporating tremendous FPGA logic, storage interfaces, high-speed multichannel A/D and D/A I/O that can be stacked together to form a complete n channels turnkey DAQ solution.  $\mu$ Digitizers are capable of uplinking and downlinking streams of data to a remote computer running on Linux or Windows through high-speed GigE interfaces. Embedded application is enabled through the addition of a  $\mu$ TCA processor blade (Linux only). In such configuration, up to an 8x PCIe link can be used to stream data on the backplane, enabling shared processing, high speed storage, high speed record/playback from embedded PC application layer.

$\mu$ Digitizers reduce your time to market, bringing the performance you need for a wide range of Multichannel DAQ applications such as:

- SIGINT
- RADAR
- Beamformers
- Medical Imaging (PET-Ultrasound systems)
- Linear accelerators (LLRF systems)
- Aerospace
- Test & Measurement

## FEATURES

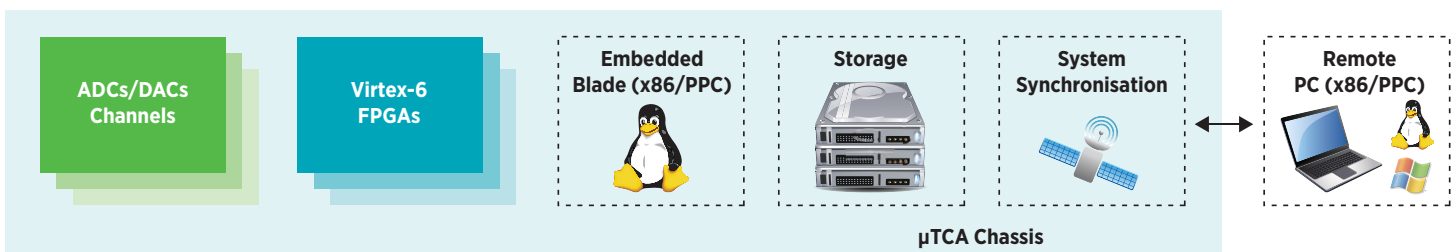
Based on the  $\mu$ TCA architecture,  $\mu$ Digitizers offer limitless channel expansion possibilities and the number of AMC slots necessary to any specific application.

$\mu$ Digitizers also benefit from ultrahigh bandwidth cross-point links between FPGA elements through the  $\mu$ TCA backplane, making it possible to add DSP algorithms that can be simultaneously applied to all system channels—useful in such applications as where multichannel simultaneous phased align processing is required (PET, ultrasound, linear accelerator systems; as example)

## FULLY INTEGRATED SOLUTIONS

$\mu$ Digitizers integrate a complete array of tools and capabilities for added efficiency and ease of use:

- Available FPGA to process, trigger and buffer I/O data
- Complete Nutaq FPGA framework, including embedded Linux MicroBlaze Ethernet/PCIe server
- Real-time PCIe data exchanges between a host device CPU (Linux or Windows) and GigE data streaming tools (Linux only)
- Multichannel recording and playback tools (DAQ applications)
- Local (embedded AMC processor blade) and remote access
- Real-time and hardware-in-the-loop co-simulation with the FPGA
- Seamless integration to the MATLAB/Simulink model-based design flow
- Stand-alone operation, running directly from the flash/HDD memory
- Graphical control applications



## I/O SECTION

Various A/Ds and/or D/A channels can be stacked together to form a complete multichannel DAQ turnkeys system. The following converters are available:

- A/Ds:
  - 250 MSPS, 14-bits, AC or DC Coupled
  - 125 MSPS, 14-bits, AC or DC Coupled
  - 1.25/2.5/5 GSPS, 8-bits, AC Coupled
- D/As:
  - 1 GSPS, 16-bits, AC or DC Coupled

## FPGA SECTION

The Perseus 601X, making up the FPGA section of the  $\mu$ SDR420, is designed around the high-performance Virtex-6, which offers the flexibility tradeoffs between high-performance logic and massive digital signal processing power.

### Features

- Supports LX240T, LX550T, SX315T, and SX475T FPGA devices
- Supports PCIe (1x, 4x and 8x)
- Fabric clock — RX or TX (default 100 MHz PCIe)
- IPMI controller (based on the AVR version of the Pigeon Point AdvancedMC MMC)
  - FPGA and IPMI JTAGs on the Mestor interface

- Includes a complete framework of Virtex-6 interfaces to all the FPGA section's peripherals:
  - High-speed GTX transceivers
  - External memory controllers
  - MicroBlaze instantiation and startup through a Linux kernel running Nutaq's central communication engine (CCE) server application
  - External control through PCIe and GigE
  - APIs and graphical interfaces for remote or local management (such as FPGA application deployment, parameter control and data streaming)

## EMBEDDED PROCESSOR SECTION

The  $\mu$ Digitizer can be equipped with cutting-edge embedded processor options and a complete Linux framework, APIs and application examples.

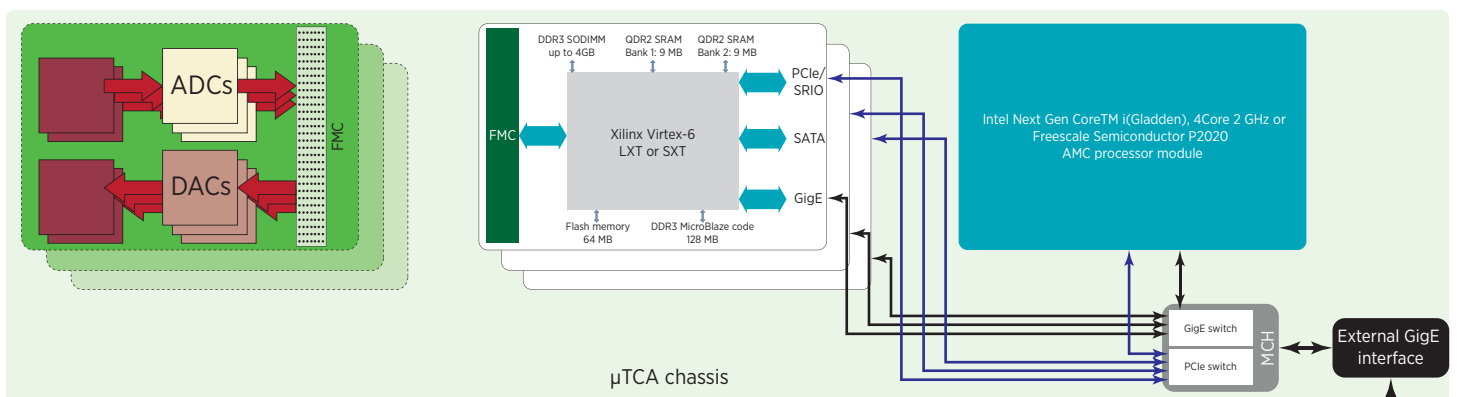
### AMC GPP module options

- Intel Next Gen Core™ i(Gladden), 4Core 2 GHz 16GB DDR-III
- CPU: AMC, Full-Size P2020 1.2 GHz processor

**Note:** SATA and solid-state HDDs are available as options.

## STORAGE SECTION

Various storage options are possible on  $\mu$ TCA systems. Dedicated storage ports are used on the backplane to access disks without interfering with the backplane data ports. Nutaq proposes both standard or solid state SATA-II HDD for such configurations. Other custom configuration available upon request.



### Example—MI125 FMC (Others available)

- 32 channels, 125MSPS, 14-bit ADCs
- Phase aligned channels and phase coherent sampling
- Supports external or on-board low jitter clock
- Versatile and industry-standard VITA 57.1 FMC

### Perseus 6010

- Choice of LXT and SXT Virtex-6 FPGAs
- DDR3 SODIMM interface to upgrade system memory
- 18 MB QDR2 SRAM (18 bits)
- Supports multiple switch fabrics (PCIe, SRIO, XAUI, GigE)

Remote computer running on Windows or Linux



## SPECIFICATIONS

### FPGA

Xilinx Virtex-6 FPGA:

- Perseus 6010: LX240T
- Perseus 6011: LX550T
- Perseus 6012: SX315T
- Perseus 6013: SX475T

### FPGA memory

- Up to 4 GB, 64-bit DDR3 SDRAM SODIMM
- 18 MB QDR2 SRAM (18 bits)—two banks of 9 MB
- 64 MB NOR flash memory (16 bits)—for FPGA images, MicroBlaze boot code and user code
- 128 MB DDR3 SRAM (8 bits)—for MicroBlaze FPGA applications

### High-speed converters

Various A/Ds or D/As converters through Nutaq FMC module portfolio:

- MI125
- ADAC250
- MI250
- ADC5000
- MO1000 (2013)

### Embedded GPP (optional)

#### Intel Next Gen Core™ i(Gladden), 4Core 2 GHz 16GB DDR-III

- CPU: AMC, Full-Size Intel Next Generation Core™ i (Gladden), 4 Core, 2 GHz processor
- Single-width, full-size
- 8MB LLC
- 16 GB DDR-III ECC memory
- 16 GB Flash
- PCIe (Port 4-7)
- Front Panel GigE & USB ports

or

#### CPU: AMC, Full-Size P2020 1.2 GHz processor

- Single-width, full-size
- 4 GB DDR-III ECC memory
- 32Mbytes of NOR Flash
- 256 Mbytes of NAND Flash
- PCIe (Port 4-7)
- Front Panel GigE

### Electrical

- External universal 110/220 V AC (-48 V DC standard telecommunications supply also available. Contact Nutaq for details.)

### Standards compliance

- AdvancedTCA base 3.0 (PICMG 3.0/3.1/3.4/3.5)
- AdvancedMC R2.0 (PICMG AMC.0/AMC.1/AMC.2/AMC.3/AMC.4)
- Support for AdvancedMC R1.0 also available
- QTCA R1.0
- VITA 57.1 FMC HPC
- Hot swap
- IPMI

### Testing and development interfaces

- Mestor interface — FPGA JTAG, IPMI JTAG, mini-B USB serial port, GPIOs)
- Test points
- Jumpers
- Software switches
- USB
- LEDs

### Mechanical

- Depends on configuration

### Power consumption

- Depends on configuration

### Environmental

- Contact Nutaq for details about this specification.

# Nutaq $\mu$ Digitizer

## ORDERING OPTIONS

Other configurations (more channels, different FMCs) are also available on demand. Contact Nutaq for details.

### $\mu$ Digitizer-WXYZ-ABC-DEF-GHJ-K

- **W** = # of ADC channels
- **X** = ADCs Type
  - 0 = 125 MSPS, 14-bit DC
  - 1 = 125 MSPS, 14-bit AC
  - 2 = 250 MSPS, 14-bit DC
  - 3 = 250 MSPS, 14-bit AC
  - 4 = 1.25/2.5/5 GSPS, 8-bit AC
- **Y** = # of DAC channels
- **Z** = DACs Type
  - 0 = 1 GSPS, 16-bit DC
  - 1 = 1 GSPS, 16-bit AC
- **A** = FPGA Type/Size
  - 0 = LX240T Virtex-6 FPGAs
  - 1 = LX550T Virtex-6 FPGAs
  - 2 = SX315T Virtex-6 FPGAs
  - 3 = SX475T Virtex-6 FPGAs
- **B** = FPGA Speed Grade
  - 0 = -1
  - 1 = -2
  - 2 = -3 (only with LX240T or SX315T)
- **C** = DDR3 FPGA SODIMM Size
  - 0 = 1 GB
  - 1 = 4 GB
- **D** = Synchronization options
  - 0 = All converters on-board clocks or External clock provided externally provided by end user
  - 1 = Include uSync board. All converters synchronized by a common sampling clock. GPS disciplined clocks included.
- **E** = Baseband processor options (GPP baseband-network processor)
  - 0 = No GPP, all FPGA boards can be accessed through remote GigE PC. (PCIe backplane streaming not available in such configuration)
  - 1 = Intel Next Gen CoreTM i(Gladden), 4Core 2 GHz 16GB DDR-III (PCIe backplane streaming enabled)
  - 2 = P2020 1.2 GHz 4GB DDR-III (PCIe backplane streaming enabled)
- **F** = Storage options
  - 0 = No HDD. If GPP included (option E), Linux OS installed to on-board flash.
  - 1 = SATA-II Drive Module 500 GB
  - 2 = SATA-II Drive Module 1 TB
  - 3 = SSD SATA-II Drive Module 600 GB (Higher performance & reliability)
  - 4 = SSD SATA-II Drive Module 1.2 TB (Higher performance & reliability)
- **G** = Operating Temperature
  - 0 = Commercial Temp
  - 1 = Industrial Temp\*
- **H** = Development Software
  - 0 = BSDK. Include Host development and FPGA development Framework.
  - 1 = MBDK. Include BSDK + Model-based FPGA development within Simulink and Host co-simulation Simulink tools.
- **J** = Debugging
  - 0 = No debugging tools (Not recommended for application development phase)
  - 1 = Flex Mestor expansion kit to all FPGA boards.
  - 2 = Mestor expansion kit to all FPGA boards (Includes Mestor Breakout Box).\*\*
- **K** = Reserved (set to 0)

\* Contact info@nutaq.com for availability

\*\* Does not fit to all FPGA board configurations. Cannot fit on double-stacked FMCs.

With over 25 years of experience delivering advanced digital signal processing solutions to companies worldwide, Nutaq serves customers across the Americas, Asia, and Europe. Nutaq offers a full range of DSP-FPGA development platforms, as well as product development services. Nutaq works in partnership with such industry leaders as Texas Instruments, The MathWorks, and Xilinx to deliver unsurpassed quality and support to its large OEM customer base, which includes many prestigious names of the consumer electronics, telecommunications, aerospace, and defense fields. In a world where digital signal processing technology is vital to network and wireless communications, audio and video processing, as well as electronic systems in all fields of technology, Nutaq is an ideal partner.

Nutaq products are constantly being improved; therefore, Nutaq reserves itself the right to modify the information herein at any time and without notice.



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