hema electronic

leading technologies

Optronics and sensor systems

Design & Production

Leading technologies for market leaders

hema electronic – a leading company in electronic design specialized on embedded hardware and software solutions based on FPGA and embedded processors.

Our core competences are the design and production of customized vision and sensor boards.

Innovative leaders choose hema electronic for realizing state of the art video, control and feedback systems. We provide design services to the defense and security, transportation, avionics and industrial automation market.

Our clients are using our consistent services starting with consulting, design and verification up to long-term availability over the complete product life cycle to achieve and keep their unique market position.

hema electronic is a family owned company with 40 years experience in electronics and related services. We combine the strength of the German Mittelstand with a strong future oriented strategy of technological leadership.

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hema electronic – the embedded vision expert

Designing and delivering high end customer specific vision applications and systems like

- videostreaming h.264 and h.265
- analog and digital video
- low latency video transmission
- video multiplexing up to 4K
- realtime graphic overlay
- digital videorecording
- intelligent video management unit:
  - Image acquisition
  - Image processing
  - Image transmission
- CMOS sensor technology with HDR imaging up to 170 dB dynamic range
- sensor fusion
- rugged designs for mobile applications
- long-term availability by system design
- obsolescence management

Furthermore we support you with corresponding certifications, special approvals and acceptance tests.

Let us talk about your projects.

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Contents

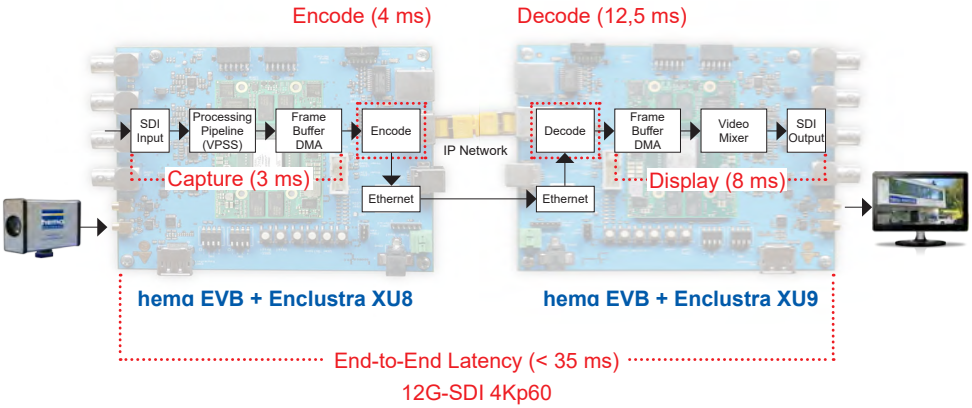
Project design examples

- Ultra Low Latency Streaming
- Rugged Vision Box
- Embedded Vision Platform
- Video Multiplexer/-Distribution
- Digital Videorecorder
- High dynamic range camera
- Medical Vision System

References:

AIRBUS	DAIMLER	SIEMENS
AREVA	DEKRA	STEMMER IMAGING
BMW	HENSOLDT	ThyssenKrupp
CASSIDIAN	KUKA	ZEISS

Ultra Low Latency Streaming



Application	Vehicle control, machine control, video surveillance, real-time video conferencing
Sector	Defence, Security, Industrial Automation
Requirements	Ultra Low Latency Applications (from capture to display in less than 35 msec) Multi-streaming Multi-view Video distribution
Solution	Main Board with FPGA modules h.264/h.265 compressing, 3G-SDI 1080p60, 12G-SDI 4Kp60, SDI Capture + Output OSD
Customer benefit	Fast development by using predefined HW+SW Design Blocks for very short time to market, easy to upgrade
Core competence used	Hard- and software design Rapid prototyping and production by using inhouse facility

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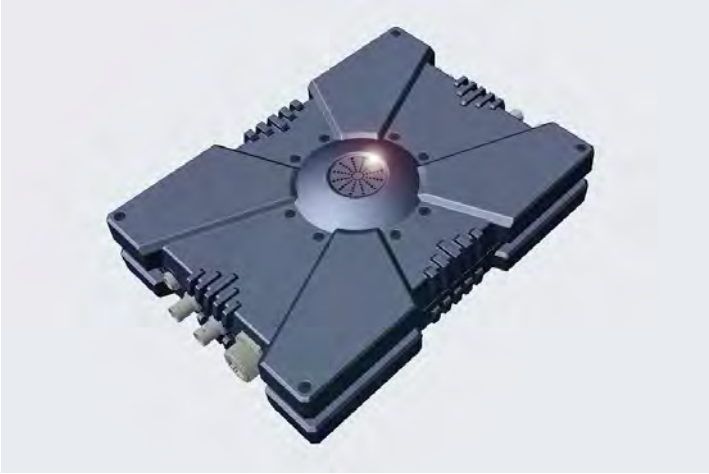
Rugged Vision Box



Application	Ultra Low Latency Video Distribution Unit, Ultra Low Latency Video Streaming Unit
Sector	Defense, Security, Transportation, Surveillance
Requirements	Many video data in, video data processing, many video data out Ultra Low Latency, different interfaces in and out
Solution	Mainboard with different video in / out (digital and / or analog), with one or more FPGA modules, rugged vision box
Customer benefit	Rugged Vision Box according customer needs Extended temperature range Easy to Upgrade with FPGA module technology Long term availability
Core competence used	“Fast lane” engineering by using hema HW and SW design blocks, Box design with partner, rapid prototyping

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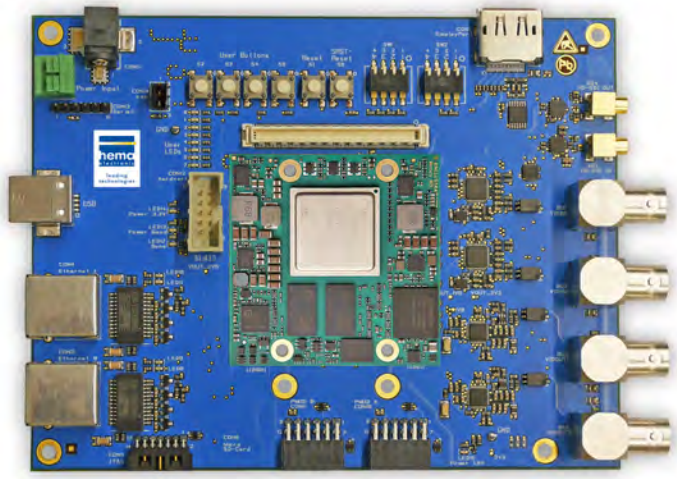
Embedded Vision Platform



Application	Creating product families with optimized basic features by modular design Image processing components Optical measuring systems manufacturing of devices Measurement technology
Sector	Defence Security Automation
Requirements	Basic model with scalable performance in hard- and software Optional interfaces Standard software Test and start up concept
Solution	Mainboard with FPGA modules Design blocks for easy extension
Customer benefit	Long-term available of basic modules with expansion options FPGA modules with integrated software
Core competence used	Hard- and software design Partner network Inhouse production

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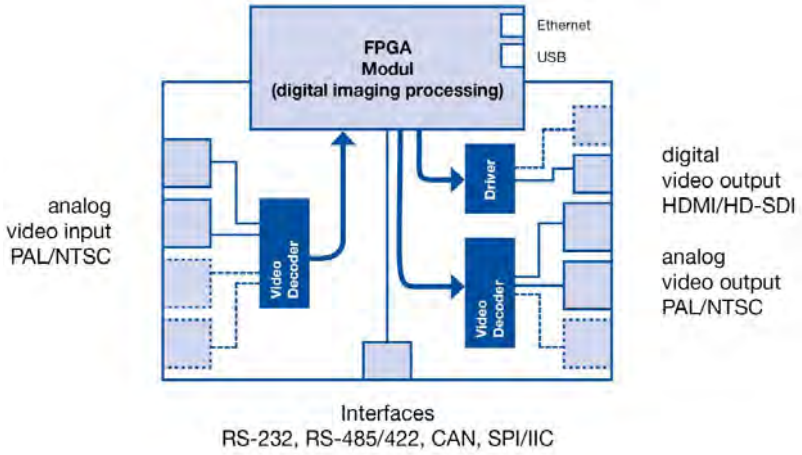
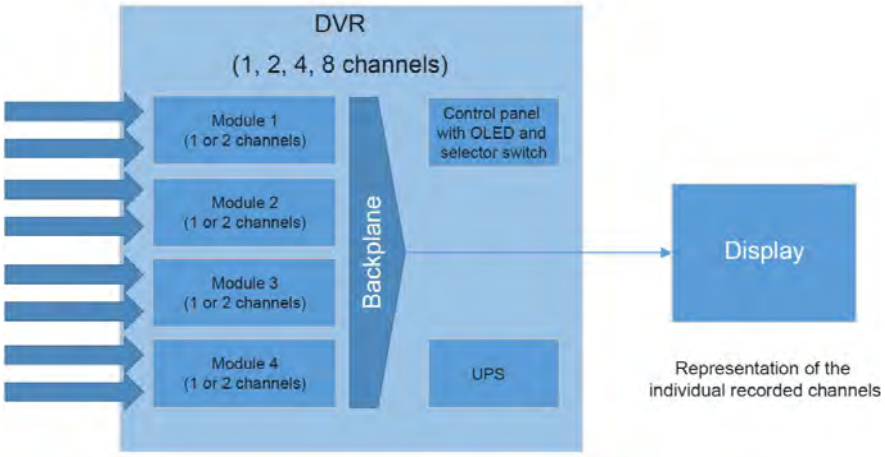
Video-Multiplexer/-Distribution



Application	Technology upgrade for infrastructure installations e.g. video surveillance in public space in the railway technology sector
Sector	Defence, security, building, automation, transportation, surveillance, communication audio/video
Requirements	Distribution and multiplexing of analog and digital video channels in real-time Backward compatible integrable into the stock, latest digital interfaces, use of new software features
Solution	Embedded vision board with FPGA module and analog and digital (video-) interfaces, 8-channel video distribution
Customer benefit	Existing analog (PAL/NTSC) infrastructure can be retained Upgrading existing systems with new functionalities State of the art FPGA solution Modular and scalable in performance and functions Fast implementation through predefined design blocks
Core competence used	FPGA programming, IP cores

Digital Videorecorder



Application	Recording video data for monitoring
Sector	Security Medical Outdoor use
Requirements	Record and play up to 8 video channels in HD
Solution	Digital video electronics with compression and video management software
Customer benefit	Flexible video recording Full-HD video with h.264 codec Rugged design with long-term availability Industrial temperature range
Core competence used	Customization of hardware and software Experience with video systems

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seelector*ICAM HD5*

Reveal what your eyes cannot see!

GiGE VISION
HALCON a product of MVTec

Application	Inline weld inspection
Sector	Industrial Automation
Requirements	100% real-time inspections
Solution	HDR CMOS sensor 170 dB dynamic range, FPGA + DSP signal processing units
Customer benefit	High dynamic range High brightness/low light capability Rugged design
Core competence used	HDR sensor Embedded system design

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Medical Vision System

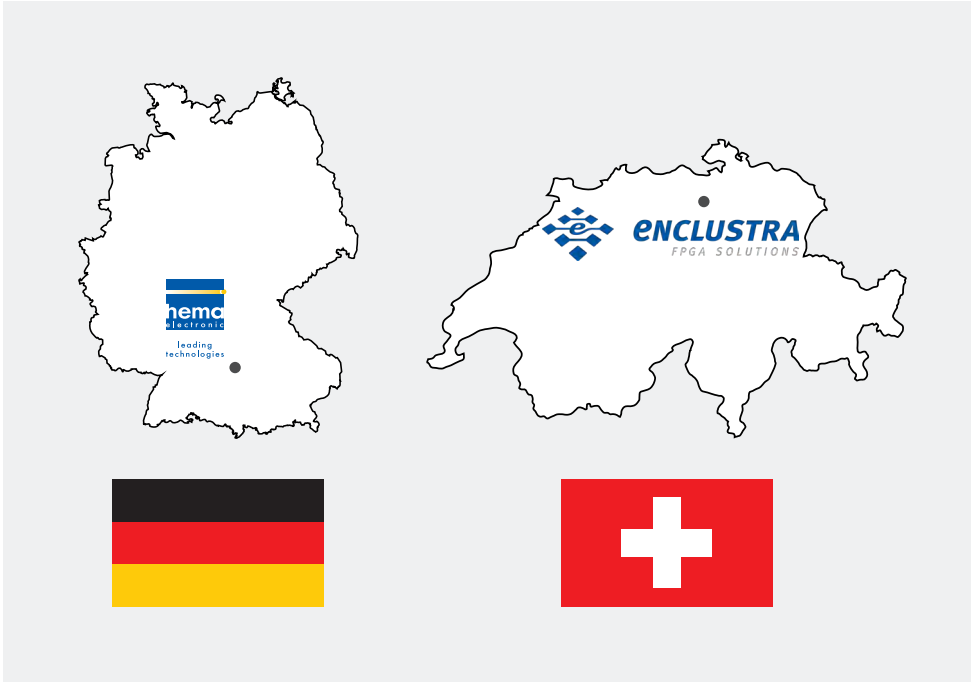
Application	Integrated video management system Control unit for various sensors and cameras
Sector	Medical imaging Endoscopy
Requirements	Integration and combination of multiple camera systems Main unit with scalable performance in hard- and software Interacting video management real-time imaging and processing
Solution	Main board with digital and analog videointerfaces High performance FPGA video processing unit Interchangeable modules
Customer benefit	Longterm availability with options for additional demands in the future FPGA modules with integrated software Interconnection with other industrial components
Core competence used	Hardware design Video management Optronics Assembly production

Swiss-German cooperation: high-tech and expertise for your success

Quicker to market – lasting success

Enclustra, the Swiss FPGA and System-on-Module specialist and hema electronic, expert for embedded systems, vision sensor integration and application development, have developed a common technology platform for FPGA- and SoC-based embedded vision systems. This platform helps to significantly reduce development time, cost and risk for vision systems. Several customer projects have already proven the big advantages of this platform.

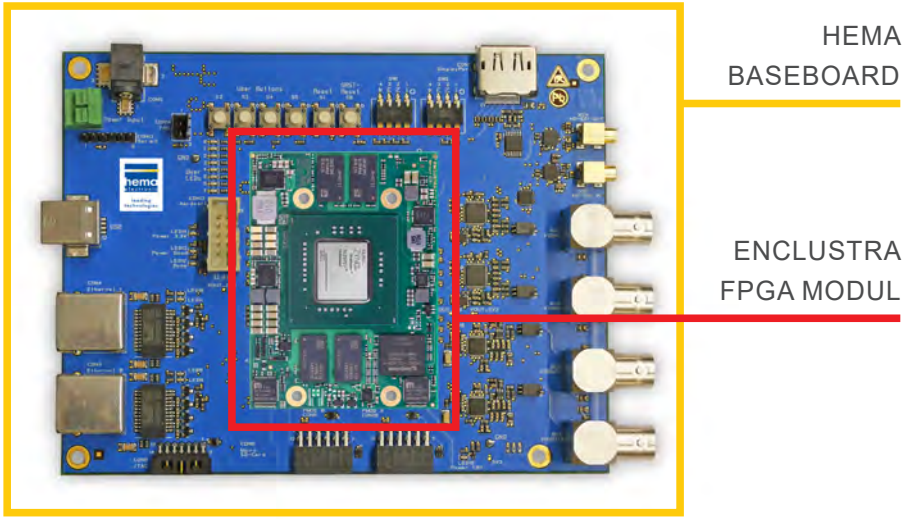
Martin Heimlicher, president and founder Enclustra and Oliver Helzle (right), president hema electronic



Now hema electronic and Enclustra are expanding their cooperation with a new sales office in Aalen, Southern Germany. This allows serving our mutual customers even better due to shorter distances and additional expertise which enable us to support our customer's projects in the European market faster than ever.

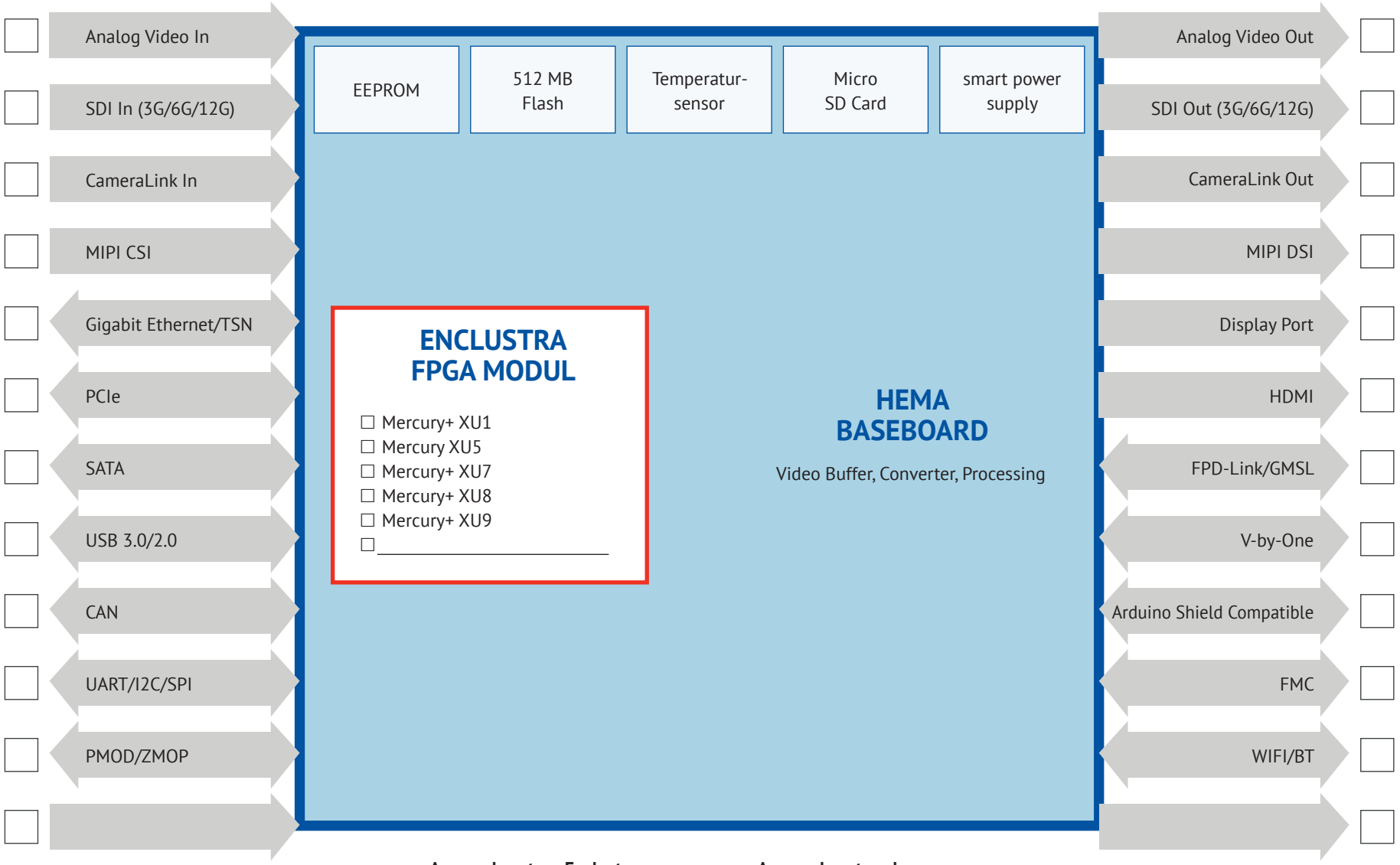
This step is the logical continuation of our ambition to offer our customers the latest and best technology for embedded vision systems based on FPGAs and SoCs. The advantages for customers are the increased range of products offered by both partners, as well as the new possibility to obtain module technology, excellent design services for customer-specific mainboards, software, rapid prototyping as well as corresponding logistics services from a single source.

The two companies will open the new sales office for Enclustra in Germany on May 1st, 2020 at the location of hema electronic in Aalen. From Southern Germany, a strengthened team will then be able to provide even better, more efficient and, above all, faster support for the constantly increasing customer demands and their projects with excellent quality.



ENCLUSTRA FPGA MODULES & HEMA BASEBOARDS

Speed up your product development



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leading technologies

MERCURY+ XU1

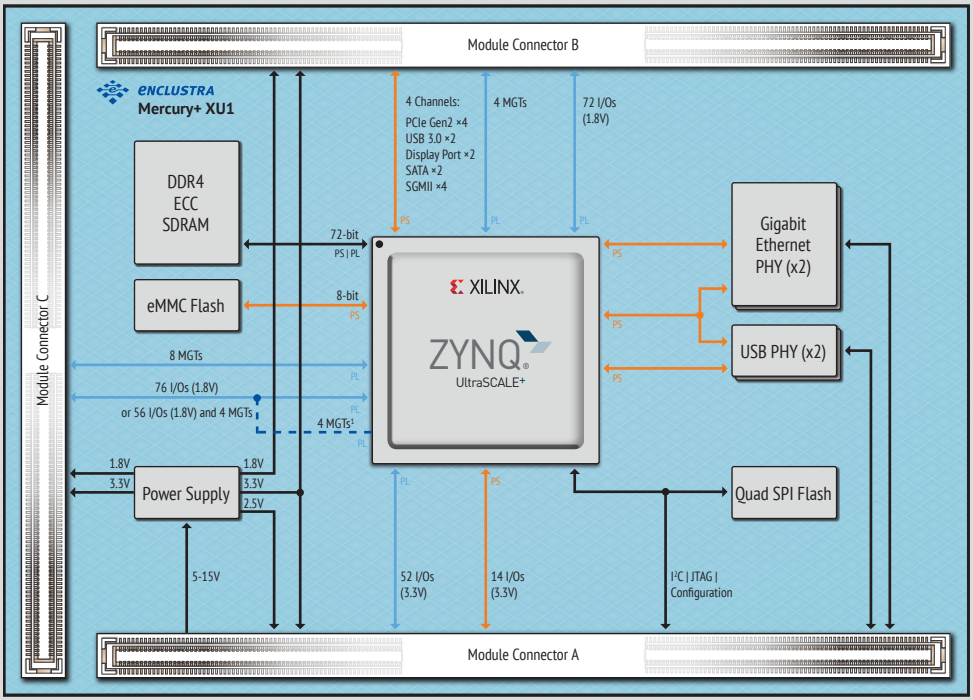
Zynq® UltraScale+™ SoC Module

- Xilinx® Zynq UltraScale+ MPSoC
- ZU6CG/ZU6EG/ZU9EG/ZU15EG devices
- Dual-/Quad-core ARM® Cortex™-A53
- Dual-core ARM Cortex-R5
- Up to 8 GB DDR4 ECC SDRAM (PS side)
- 64 MB QSPI flash
- 16 GB eMMC flash
- PCIe® Gen2 ×4
- Up to 20 × 6/12.5/15 Gbps MGT
- 2 × Gigabit Ethernet
- 2 × USB 2.0/3.0
- Up to 747,000 system logic cells
- 294 user I/Os
- 5–15 V supply
- 74 × 54 mm

OS support:

ME-XU1-6CG-1E-D11E-G1	
1+	€700
100+	€583
10000+	€397
Mercury+ PE1 Kit	€1122

ME-XU1-15EG-2I-D12E	
1+	€1761
100+	€1497
10000+	€1092
Mercury+ PE1 Kit	€2183



1: G1 assembly variant available starting with revision 3.

MARS XU3

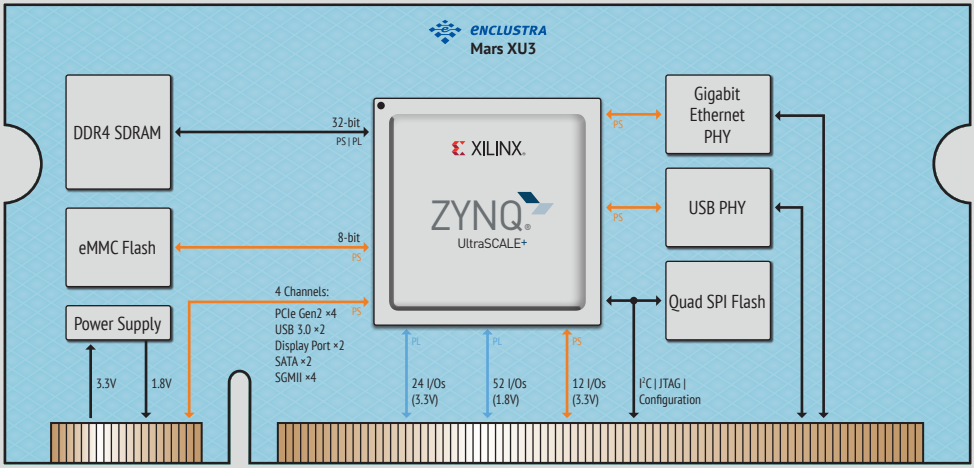
Zynq® UltraScale+™ SoC Module

- Xilinx® Zynq UltraScale+ MPSoC
- ZU2CG/ZU2EG/ZU3EG devices
- Dual-/Quad-core ARM® Cortex™-A53
- Up to 4 GB DDR4 SDRAM
- 16 GB eMMC flash
- 64 MB QSPI flash
- PCIe® Gen2 ×4
- 4 × 5 Gbps MGT
- Gigabit Ethernet
- USB 3.0
- USB 2.0 OTG
- Up to 154,000 system logic cells
- 108 user I/Os
- 67.6 × 30 mm SO-DIMM

OS support:

MA-XU3-2CG-1E-D10	
1+	€235
100+	€208
10000+	€150
Mars ST3 Kit	€385

MA-XU3-3EG-2I-D11	
1+	€415
100+	€364
10000+	€255
Mars ST3 Kit	€565



MERCURY+ XU7/XU8

Zynq® UltraScale+™ SoC Module

- Xilinx® Zynq UltraScale+ MPSoC
- XU7: ZU6EG/ZU9EG/ZU15EG devices
- XU8: ZU4CG/ZU5EV/ZU7EV devices
- Dual-/Quad-core ARM® Cortex™-A53
- Dual-core ARM Cortex-R5
- H.264 / H.265 Video Codec (XU8 EV only)
- Up to 8 GB DDR4 ECC SDRAM (PS side)
- Up to 4 GB DDR4 SDRAM (PL side)
- 16 GB eMMC flash
- 64 MB QSPI flash
- PCIe® Gen3 ×16 (XU8) and PCIe Gen2 ×4
- 20 × 6/12.5/15 Gbps MGT
- 2 × Gigabit Ethernet
- 2 × USB 2.0/3.0
- Up to 747,000 system logic cells
- 236 user I/Os
- 5–15 V supply
- 74 × 54 mm

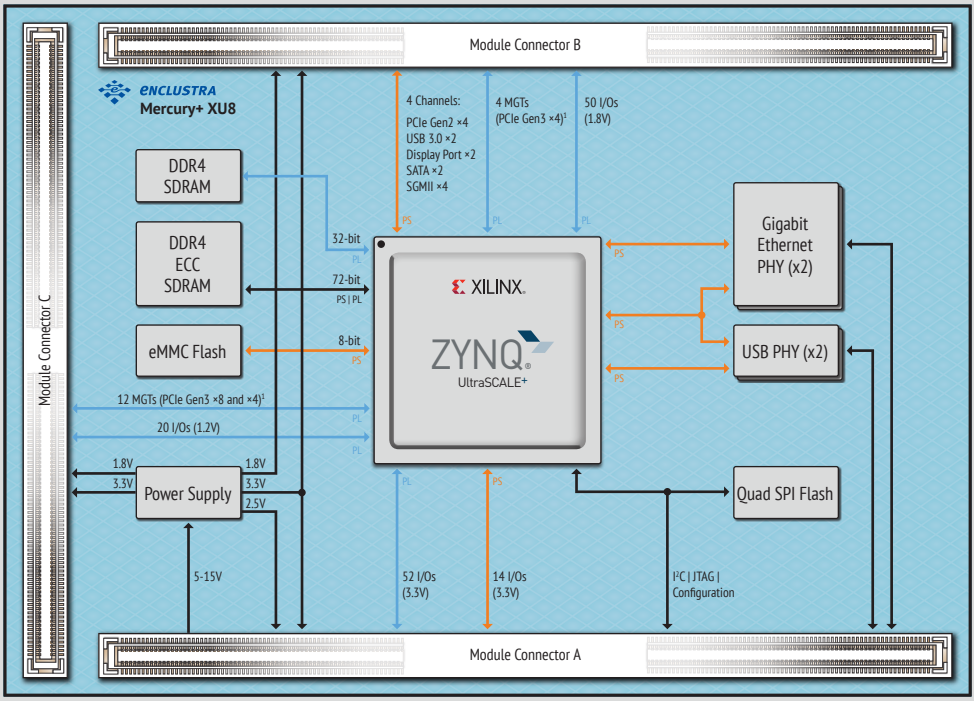
OS support:

ME-XU7-6EG-1I-D11E	
1+	€1110
100+	€908
10000+	€633
Mercury+ PE1 Kit	€1532

ME-XU8-4CG-1E-D11E	
1+	€659
100+	€526
10000+	€359
Mercury+ PE1 Kit	€1081

ME-XU7-15EG-2I-D12E	
1+	€1884
100+	€1564
10000+	€1130
Mercury+ PE1 Kit	€2306

ME-XU8-7EV-2I-D12E	
1+	€1431
100+	€1179
10000+	€840
Mercury+ PE1 Kit	€1853



1: PCIe Gen3 ×16 available at the system level by merging the MGTs from connectors B and C
Mercury+ XU7 features the same characteristics, except for PCIe support on PL side.

MERCURY+ AA1

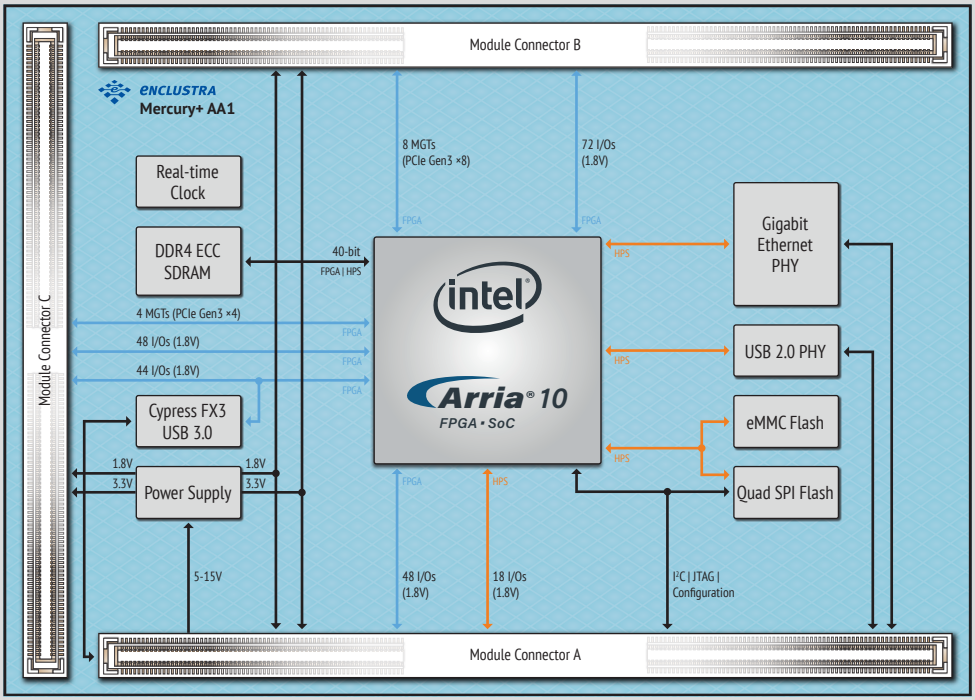
Arria® 10 SoC Module

- Intel® Arria 10 SoC
- Dual-core ARM® Cortex™-A9
- Up to 4 GB DDR4 ECC SDRAM
- 64 MB QSPI flash
- 16 GB eMMC flash
- PCIe® Gen3 ×8, PCIe® Gen3 ×4
- 12 × 10.3125/12.5 Gbps MGT
- USB 3.0 device controller
- USB 2.0 host/device
- Gigabit Ethernet
- Up to 480,000 system logic elements
- 286 user I/Os
- 5–15 V supply
- 74 × 54 mm

ME-AA1-270-3E4-D11E	
1+	€ 519
100+	€ 428
10000+	€ 273
Mercury+ PE1 Kit	€ 941

ME-AA1-480-2I3-D12E	
1+	€ 978
100+	€ 808
10000+	€ 589
Mercury+ PE1 Kit	€ 1400

OS support:



MERCURY XU5

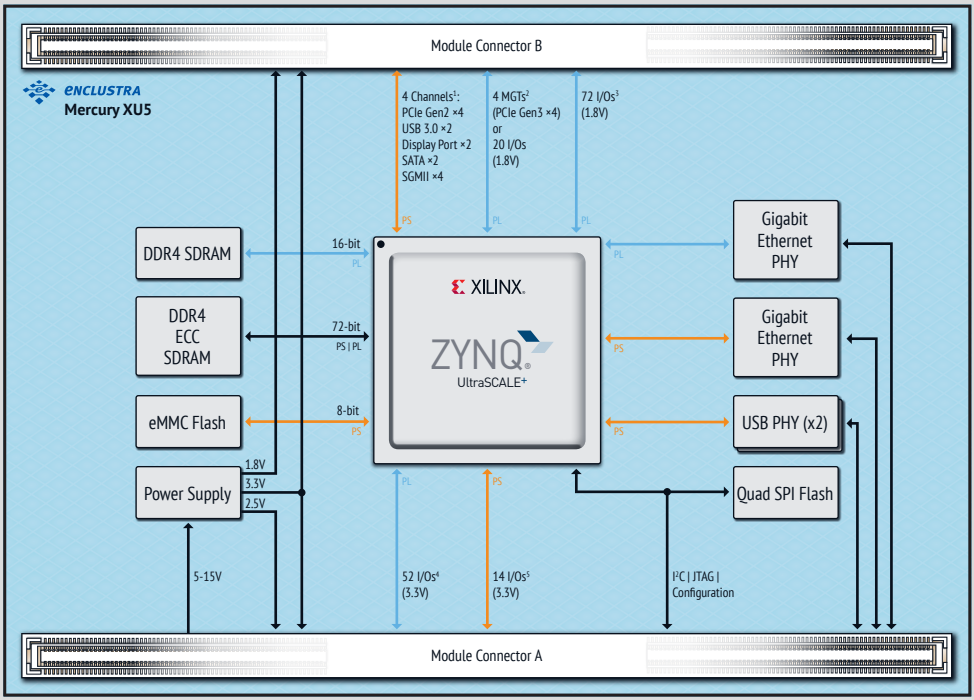
Zynq® UltraScale+™ SoC Module

- Xilinx® Zynq UltraScale+ MPSoC
- ZU2CG/ZU2EG/ZU3EG/ZU4CG/ZU4EV/ZU5EV devices
- Dual-/Quad-core ARM® Cortex™-A53
- Dual-core ARM Cortex-R5
- H.264 / H.265 Video Codec (EV only)
- Up to 8 GB DDR4 ECC SDRAM (PS side)
- Up to 2 GB DDR4 SDRAM (PL side)
- 16 GB eMMC flash
- 64 MB QSPI flash
- PCIe Gen2 ×4
- PCIe Gen3 ×4 (only devices larger than ZU3)
- Up to 8 × 6/12.5 Gbit/sec MGT
- 2 × Gigabit Ethernet
- 2 × USB 2.0/3.0
- Up to 256,000 system logic cells
- 178 user I/Os
- 5–15 V supply
- 56 × 54 mm

OS support:

ME-XU5-2CG-1E-D10H	
1+	€299
100+	€261
10000+	€188
Mercury+ PE1 Kit	€635

ME-XU5-5EV-2I-D12E	
1+	€920
100+	€780
10000+	€556
Mercury+ PE1 Kit	€1256



Example project #2

» Perspective through stereo

Abstract What was once only possible in crime series is now a reality (get your CSI Miami one-liners at the ready): 3D scans of forensic evidence found at crime scenes, recording minute details to be later analyzed from all angles.

One of the main elements of the system is an Enclustra-developed platform which enables the projection of interference patterns and simultaneous recording of stereo video: a compact, cost-effective Mars AX3 module captures the images via two cameras connected to the new Mars EB1 base board via Camera Link. The FPGA firmware running on the Mars AX3 then streams the data to a host PC via Enclustra's FPGA Manager Ethernet IP solution.

The development took place as part of the 3D-Forensics project funded by the EU's Seventh Framework Programme for Research (FP7).

Employed Technologies Xilinx® Artix™-7 | DDR3 SDRAM | Camera Link | Gigabit Ethernet | Xilinx MicroBlaze™ | VHDL | C | C#

Involved Enclustra Services FPGA System Design | FPGA Hardware | FPGA HDL | Embedded Software | Host Computer Software

Involved Enclustra Products Mars AX3 | Mars EB1 | FPGA Manager™ Ethernet

Example project #1

» Five cameras with one FPGA

Abstract The task was to develop a video frame buffer which simultaneously acquires pictures from five cameras and stores them in the memory of an ARM Cortex-A9 processor.

Enclustra's Mars ZX3 SoC module featuring a Xilinx Zynq-7000 SoC device with attached DDR3 SDRAM has been selected for building a protype system. The transfer of the acquired images into the DDR3 memory is handled by the Xilinx Video Direct Memory Access (VDMA) core, which has been properly configured and integrated into the programmable logic (PL) design.

The acquired images are then processed by a Linux application, which runs on both ARM processor cores using a symmetric multiprocessor (SMP) configuration.

Employed Technologies Xilinx® Zynq®-7000 | ARM® Cortex™-A9 | DDR3 SDRAM | MIPI CSI-2 | VHDL | Linux | C

Involved Enclustra Services FPGA System Design | FPGA HDL | Embedded Software

Involved Enclustra Products Mars ZX3

Everything FPGA.

At Enclustra, everything is FPGA.

Our products are used by more than 1200 customers in over 50 countries, and our customer base is growing quickly. We don't develop hardware and IP products only – **we do customer design projects too**; every stage of development, from conception through to bring-up at the customer site. We have more than 15 years of FPGA system design under our belt; break it down a little further and our team of engineers has far in excess of 250 person years of FPGA experience.

Our expertise enables us to create the best experience for our customers. We pride ourselves on the quickest, highest possible quality of service and delivery from the moment you get in touch, to the moment your system starts up in the field for the first time.

Our off-the-shelf SoC & FPGA modules are developed with the aim of simplifying the overall design of your FPGA-based system, thus significantly reducing the time and cost to market.

This catalogue presents our current product and services; if anything piques your interest, don't hesitate to get in touch.

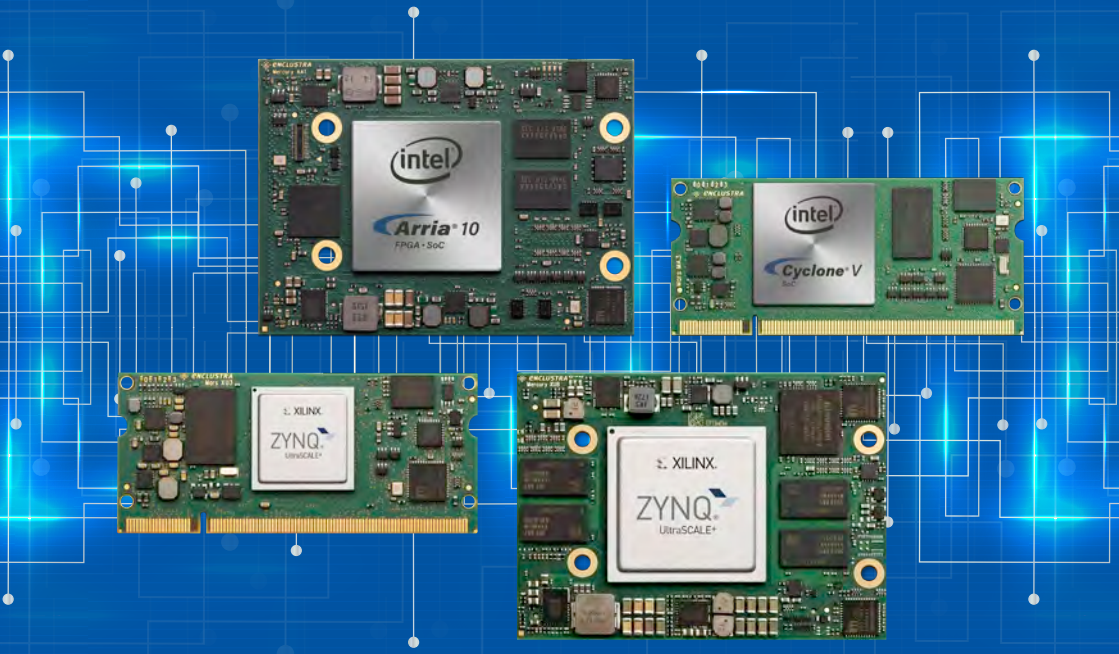
Thanks!

The Enclustra Team.

ENCLUSTRA
FPGA SOLUTIONS

Development and design services

FPGA & SoC modules



Everything FPGA.