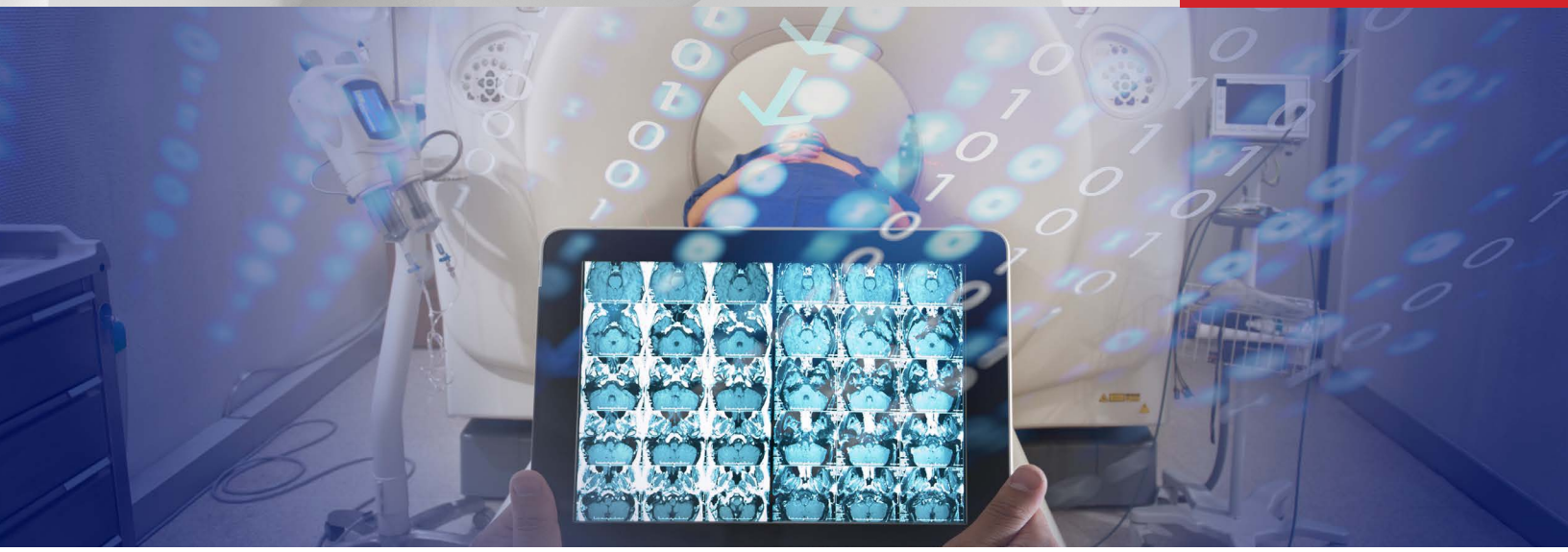
Medical Clinical



Xilinx Medical Clinical Solutions

Xilinx provides compressive solutions for medical devices ranging from small FPGAs to complete integration with our Zynq All Programmable SoCs. The solutions include a wide range of leading devices of FPGAs and SOCs, easy-to-use development tools, drop-in and customizable IP, and risk mitigation techniques. All of our solutions are developed while maintaining the highest medical device standards for regulatory compliance, device longevity, and decreased risk.

XILINX
ALL PROGRAMMABLE™

Device Table

Device Name	Product #	Logic	CPU	MHz	Package Size	IO Counts
Spartan®-6	LX9, LX16, LX25, LX45, LX75	9kLC – 75kLC	Microblaze	80MHz	8x8 – 19x19	132…408
Artix®-7	A15T – A75T	16kLC – 75kLC	Microblaze	100MHz	10x10 – 17x17	250…300
Zynq® All Programmable SoC	7010 – 7045	28kLC – 144kLC	Dual Cortex™ A9 + Neon	1Ghz	13x13 – 19x19	PL: 54…200 PS: 32 or 54
Zynq Ultrascale™ MPSoC	ZU6EG	376kLC	Quad Cortex A53 + Dual Cortex R5	1.3Ghz	31x31	524

Selected Development Kits

Development boards and kits from Xilinx and Xilinx Alliance Members allow customers to explore the advantages of Xilinx FPGA and All Programmable SoCs for medical clinical applications. SOM and modules accelerate the prototyping and deploying in market.

Product Picture	Features	Cost	Source
SP601	Spartan-6 FPGA Evaluation kit featuring the Spartan-6 XC6SLX16 device with 15k LC	$295	**Xilinx** or **Avnet**
AC701	Artix-7 FPGA Evaluation kit featuring the XC7A200T FPGA with 215k LC	$1,295	**Xilinx** or **Avnet**
ZC702	Zyn-7000 All Programmable SoC Evaluation Kit featuring the XC7020 SoC FPGA, dual ARM Cortex A9 CPUs with Artix-7 FPGA with 85k LC	$895	**Xilinx** or **Avnet**
KC705	Kintex-7 FPGA KC705 Evaluation Kit featuring the Kintex-7 325T FGPA with 326kLC	$1,695	**Xilinx** or **Avnet**
Partner Development Kits			
Kit Med 7015	Topic Medical Development Platform featuring XC7015 SoC FPGA, dual ARM® Cortex™ A9 CPUs with Artex-7 FPGA with 74kLC, 10 in. Touch Display and ECG Leads	$250	**Topic** or **Avnet**
Kit Med 7030	Topic Medical Development Platform featuring XC7030 SoC FPGA, dual ARM Cortex A9 CPUs with Kintex-7 FPGA with 350kLC, 10 in. Touch Display and ECG Leads	$4,500	**Topic** or **Avnet**
Xilinx OZ745 Dev Platform	The OZ745 is a video development platform based around the Zynq-7045 All Programmable SoC. The kit includes all the basic components of hardware, design tools, IP, pre-verified reference designs and Board Support Package to rapidly develop video and image processing designs.	Contact Omnitek	**Omnitek**
SOMs			
PicoZed MicroZed MicroZed-SBC	Zynq-7000 based modules, various form factors, compatible migration between different device sizes	Contact Avnet	**Avnet**
SOM-MIAMI-XC7015	Zynq-7015 based module from Topic Embedded Products, for Medical Devices, ISO13485 Certified	$580	**Topic**
SOM-MIAMI-XC7030	Zynq-7030 based module from Topic Embedded Products, for Medical Devices, ISO13485 Certified	$718	**Topic**

IP Libraries for Medical Clinical

Xilinx and Xilinx's Alliance Members offer a wide variety of IP cores and functions that accelerate the design of a Medical devices on Xilinx FPGA and All Programmable SoCs.

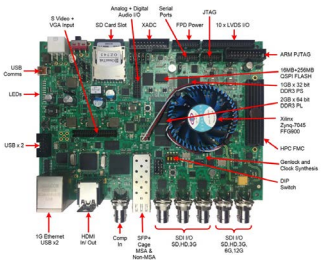
Xilinx	
Multiprotocol Solutions	
Functional Safety	Functional Safety Data Package for ISE1.47 and devices to accelerate and simplify Functional Safety Certification following the IEC 61508 standard
HDMI	**Xilinx HDMI reference design is to connect Video Source and Display and features support for HDMI v1.0 -2.0** ▪ HDMI source (TX) and HDMI sink (RX) ▪ One, two or four pixel-wide video interface ▪ Video resolutions up to UHD @ 60 fps ▪ Video encoding RGB 4:4:4, YUV4:4:4, YUV 4:2:2 and YUV 4:2:0 ▪ Deep color support (24, 30, 36 and 48-bits per pixel) ▪ Support for 3D video (max 1080p)Audio 2 channels (option for 8 channels) ▪ Info frames ▪ Data Display Channel (DDC) ▪ Hot plug / EDID ▪ Optional HDCP support
DisplayPort	**Xilinx Displayport Protocol for up to 5.4Gps video source and display with HDCP support.** ▪ Source (Tx) and Sink (Rx) controllers perform encoding/decoding ▪ SST and MST support ▪ One, two or four pixel-wide main link for up to 4096x2048 monitor resolution, Quad pixel allows user to get up to 600 Mhz Video Pixel clock ▪ Enhanced Color formats for luminance only mode & gray scale video users ▪ Parameterized Bits Per Color ▪ Auto lane rate and width negotiation (1.6 or 2.7 or 5.4 Gbps; 1, 2 or 4 lanes) ▪ HD video and optional de/interlace of secondary audio support up to 8-channel ▪ 8b/10b encoding and scrambling to reduce EMI ▪ DisplayPort Source and sink Reference Designs ▪ Sink and Source SW drivers implementing - Link and Stream policy makers - Topology discovery and management - Payload management and virtual channel mapping - EDID parsing and DPCD ▪ Optional HDCP support
Video Scalar	**Video Scaler converts the video signals from one resolution to another resolution. This core can be used to convert low resolution to high or high resolution to low.** ▪ Coefficients are software programmable ▪ Image size programmable from QCIF to Full HD ▪ Scaling factor: downscale/upscale by min 1 to max 4 independently in vertical and horizontal direction ▪ Video Format: 4:4:4 RGB/YCbCr

Partner IP	
Qdesys Motor Control IP	
Electric Drive IP	**Suite of IP enabling fast FOC implementation in FPGA** ▪ Sensorless FOC ▪ Multi-Axis control for 1-, 2-, 3-, 4-, channel Servo Drives ▪ 20 Full featured motor control IP functions - CLARKE, PARK, PID, ATAN2, SIN/COS, SMO, SVM, RPFM. - IIR (minimal phase) filters - Poly-phase filters for Sigma-Delta sampling frequency improvement ▪ Sinc3 Filters for current acquisition via Sigma-Delta ADC ▪ Data-logging and Analysis ▪ Control and sequencing ▪ Drivers supporting: Bare Metal, Linux, QNX on ARM® Cortex™ A9 on Zynq
Motor Control Manager GUI	The MCM GUI program is a user application program to communicate with the motor control application in a Zynq AP SoC device. Supports API of The Mathworks, SciLab, Visual Basic, C, Labview.
Topic Embedded Products	
Dyplo	**Dyplo is a middleware that allows software developers the ability to quickly connect various processing units and perform dynamic real-time process acceleration in FPGA fabric.** ▪ Sensorless FOC ▪ The next step in data and signal acceleration ▪ Simplified Zynq® development ▪ Out-of-the-box integration of CPU & FPGA ▪ Proven development time reduction of 30% ▪ FPGA programming made software-friendly ▪ Runtime re-use of FPGA fabric ▪ Plug-in IP blocks, zero integration effort ▪ Architectural freedom
Omnitek	
OmniTek Scalable Video Processor	A highly configurable set of IP blocks and optional features that together provide a powerful range of tools for multi-video format conversion and image enhancement for video formats up to 60Hz Ultra HD, with 120Hz Ultra HD output as a further option. ▪ Asynchronous I/O timing ▪ Cadence detector ▪ Chroma resampler ▪ Cropper ▪ Deinterlacer ▪ Detail Enhance ▪ Format Converter ▪ Frame Synchronizer ▪ Frame rate up to 120Hz ▪ Motion and Low-angle adaptive deinterlacing ▪ Resizer (scaler) ▪ Video Graphic Overlay support
HMI	
Xylon	
Operator Panel	IP and reference design for Xilinx Zynq devices implementing an operator panel that enables interaction between humans and machines. Human Machine Interface in 2D/2.5D and 3D (HMI)

Reference Designs

Topic Medical Development Kit / Reference Design

The Development Kit provides you with a complete system to start developing your embedded software application on a Xilinx Zynq SoC and seamlessly integrate your FPGA and CPU functionality. Reference designs in this kit include, Signal Filtering for ECG, MRI Video Processing and more. Demoes and designs include, pre-installed linus BSP and Dyplo®, the operating system extension for FPGA and CPU integration. Kit also has 10in touch screen and 24 channels of ADCs for Biotelemetry.



Omnitek OZ745 Video Development Platform

Xilinx RTVE 3.1 Reference Design

The OZ745 board is delivered with an evaluation reference design (ERD) which recognizes and displays SDI, HDMI and analogue video inputs and displays a test pattern on the SDI and HDMI video outputs. The ERD provides a convenient way to test many of the board's features and gives a skeleton design upon which users can build their own firmware and software applications. Source is provided to allow initial designs to be built up.

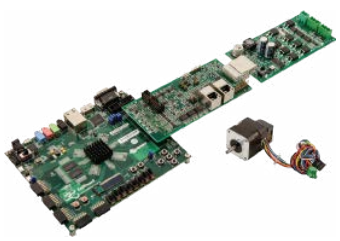
The Reference Design has the OmniTek Scalable Video Processor IP (OSVP) at its core and performs de-interlace and resize of four video inputs, and composites them onto the video output. Control software runs on the ARM processor, which uses a Linux build with Qt graphics support. An OmniTek 2D Graphics IP core provides graphics acceleration. The control software generates a web page which can be hosted locally and composited over the video on the SDI, HDMI or LVDS flat panel display output and controlled via mouse and keyboard. Alternatively, the UI may be hosted on a remote web browser.

The diagram below illustrates the OZ745 OSVP Reference design which runs under Linux and makes use of the Zynq ARM CPU on Omnitek's OZ745 Video Development kit.

Xilnx /Qdesys 3-Level Silicon Cabrbide Reference platform

Basic building blocks:

- Laptop size 10KW 3-Level TNPC (or NPC2 or also 3LT2C) Silicon Carbide Inverter
- Zynq-7000 MicroZed and PicoZed SOM
- RPFM Modulation drives 12 SiC switches allowing extremely low EMI and very low THD
- 6 Temperature probes can be connected to the carrier to monitor the inverter dissipation
- Hardware-in-the-Loop Zynq 1 Gigabit hardened Ethernet port is used for gateway and control connection toward the National instruments lab-studio graphical user interface, residing in a PC. Lab-view, Matlab, SciLab, Microsoft dot net, C ++, and Visual Basic for applications can also communicate by using this interface allowing investigation and further development
- Complete FOC (Field Oriented Control) and SFOC (Sensorless Field Oriented Control) is available in the reference design
- ISM-NET networking module allows connectivity for EtherCAT®, PowerLink, ProfiNET, Ethernet/IP, and all the major industrial networking protocols to control the reference design



Avnet/Xilinx Zynq-7000 All Programmable SoC/Analog Devices Intelligent Drives Kit

Basic building blocks:

- Analog Devices ADFMCMOTCON1- EBZ module
- Drive BLDC / PMSM / Brushed DC / Stepper motors up to 48 V @ 18 A
- AD7401A Isolated 20 MHz Sigma-Delta modulator
- AD8251 Programmable Gain Amplifiers for full-scale current measurement
- ADuM5000/7640 power and digital signal isolation
- Dual Gigabit IEEE1588 Ethernet PHYs for high speed industrial communication
- Xilinx XADC interface for sensored or sensoreless position measurement
- The Mathworks **Simulink HW/SW Codesign Reference design**
- **HDL Reference design** (ADI)

Xilinx Training

Industrial Motor Control Using FPGAs and SoCs
Learn how to implement motor control solutions using Xilinx All Programmable devices. This course requires basic knowledge of motor control; this comprehensive course covers motor control concepts; identifies the challenges in typical motor control solutions such as brushless direct current (DC), stepper, and permanent magnet synchronous motor (PMSM) motor control solutions and then demonstrates motor control techniques in Xilinx FPGAs and SoCs with the help of IPs provided by QDESYS.

Dyplo Introduction Hands-On
In this 1-day hands-on workshop you will learn how to get started using Dyplo®, preparing you for practical project readiness. Step by step you will be guided through the process of building a complete demonstration application using a Zynq® based Miami System on Module.

At the end of the day you will be able to build your own application and get a head-start in maximising your design choices.

Participants will receive a Dyplo® Certificate & Dyplo® Demo License.

If you want to join the Dyplo® Introduction workshop to learn how to get started with Dyplo® you can register on this page for one of the available dates.

Design Tools & Methodologies

SDSoC Development Environment
The SDSoC™ development environment provides a greatly simplified ASSP-like C/C++ programming experience including an easy to use Eclipse IDE and a comprehensive design environment for heterogeneous Zynq® All Programmable SoC and MPSoC deployment. Complete with the industry's first C/C++ full-system optimizing compiler, SDSoC delivers system level profiling, automated software acceleration in programmable logic, automated system connectivity generation, and libraries to speed programming.

Vivado Design Suite
The Vivado® Design Suite delivers a SoC-strength, IP-centric and system-centric, next generation development environment that has been built from the ground up to address the productivity bottlenecks in system-level integration and implementation.

Digital Design Using Vivado IPI
Xilinx has developed a basic functional IP blocks library which can be used to create digital designs in a schematic view. The tutorial and laboratory exercises are created and available for use with the Xilinx University Program supported boards.

Xilinx System Generator
System Generator for DSP™ is the industry's leading high-level tool for designing high-performance DSP systems using Xilinx All Programmable devices. With System Generator for DSP, create production-quality DSP algorithms in a fraction of time compared to traditional RTL.

MathWorks
In recent years, software modeling and simulation tools, such as Simulink from MathWorks, have allowed model-based design to evolve into a complete design flow – from model creation to implementation.

Partner Profiles

NI
National Instruments transforms the way engineers and scientists around the world design, prototype, and deploy systems for test, control, and embedded design applications.

Omnitek
OmniTek is the product division of Image Processing Techniques Ltd., a leading UK consultancy company providing electronics design services to the broadcast, post-production and professional AV industries since 1998.

Qdesys
QDESYS designs, develop and produces industrial embedded systems. Specialized in motor control, control systems, and industrial networking. QDESYS produces original design and custom designs.

Topic Embedded Systems
Topic is Premier Partner of Xilinx. Topic Products offers an ecosystem of embedded acceleration solutions consisting of System on Modules (Miami), carrier boards (Florida), development kits, IP blocks (IPware), Design Services (Dsign) and a unique Dynamic Process Loader (Dyplo).

Xylon
Xylon is an electronic company focused on design of optimized IP cores for Xilinx All Programmable devices and design services that lower production costs and improve efficiency of electronics designers.

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