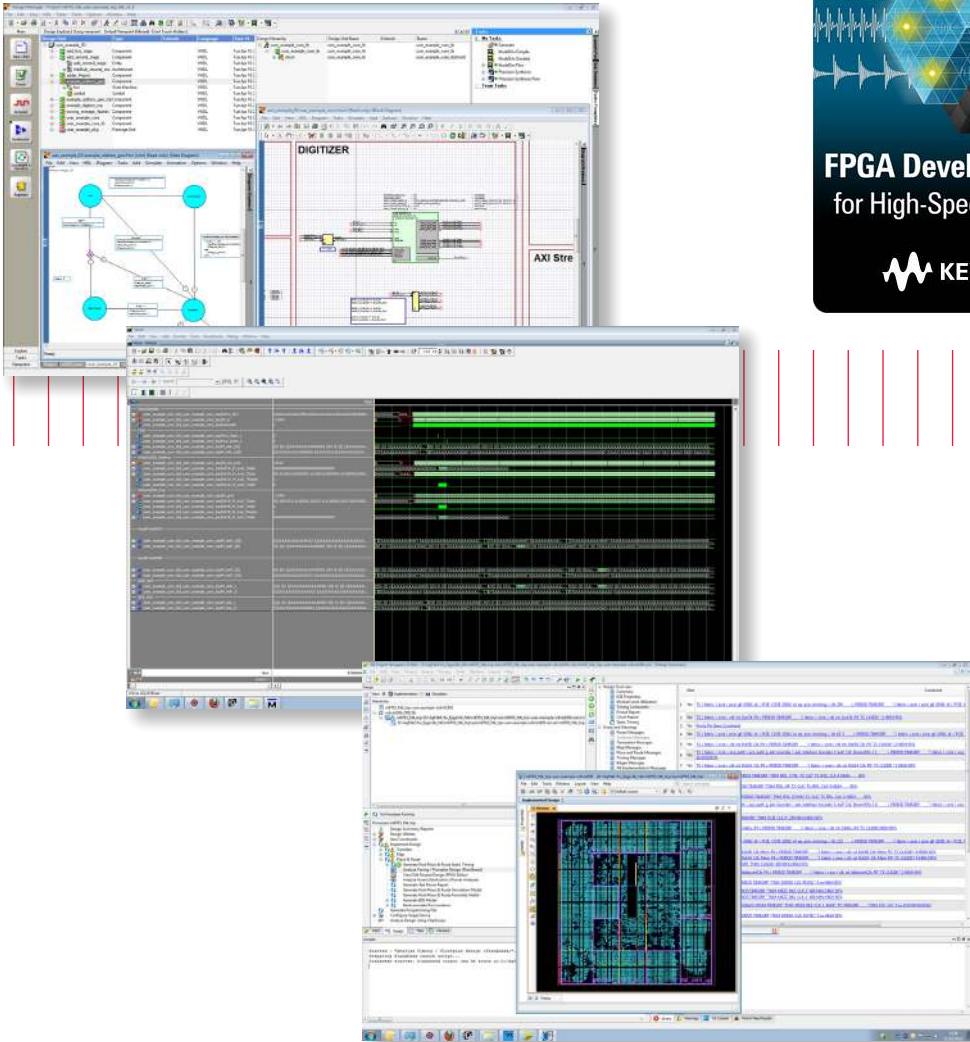


# Keysight U5340A FPGA Development Kit for High-Speed Digitizers



## Helping You Achieve Greater Performance

The FPGA Development Kit is a complete environment for the design, verification and implementation of real-time, user-defined signal-processing algorithms. This software bundle is intended to eliminate all prerequisite design tool flow configuration, effectively reducing up-front investment and minimizing risks.

The FPGA Development Kit combines capabilities to:

Achieve multi GS/s real-time processing on a full digitizer framework by leveraging the full density and speed of the FPGA Shorten your time-to-market with turn-key, easy-to-use development flow and debug

### Key features

The U5340A FPGA Development Kit from Keysight Technologies, Inc.:

- Allows you to integrate your advanced real-time signal processing algorithm within Keysight high-speed digitizers
- Addresses the critical need for repeatable, predictable, and efficient firmware design flow coupled with unprecedented hardware capability
- Allows a direct interface to digitizer hardware elements such as the analog-to-digital converter (ADC), memory resources (DDR3) and host interface (PCIe)

### Create custom real-time processing

With the FPGA Development Kit, you can configure the custom real-time processing area of the FPGA that resides within the Keysight high-speed digitizer. Keysight IP cores that surround the processing area let you access the full power of the digitizer, while maintaining unmatched analog data conversion capabilities.

### Focus on solutions

To help you focus on solution creation and quickly turn ideas into designs, the FPGA Development Kit includes:

- Set of intellectual property (IP) cores
- Library of building blocks, ranging from basic gates to dual-port RAM memories
- Variety of ready-to-use scripts, handling all aspects of the build flow

### Get everything you need

The FPGA Development Kit runs on a Windows host computer, interacts with two embedded engines and communicates with the FPGA in the digitizer module. The embedded Mentor Graphics engine supports design, synthesis, simulation and validation of your algorithms. The embedded Xilinx engine fits your design into the FPGA, and it also provides debug and in-FPGA logic analyzer capabilities.

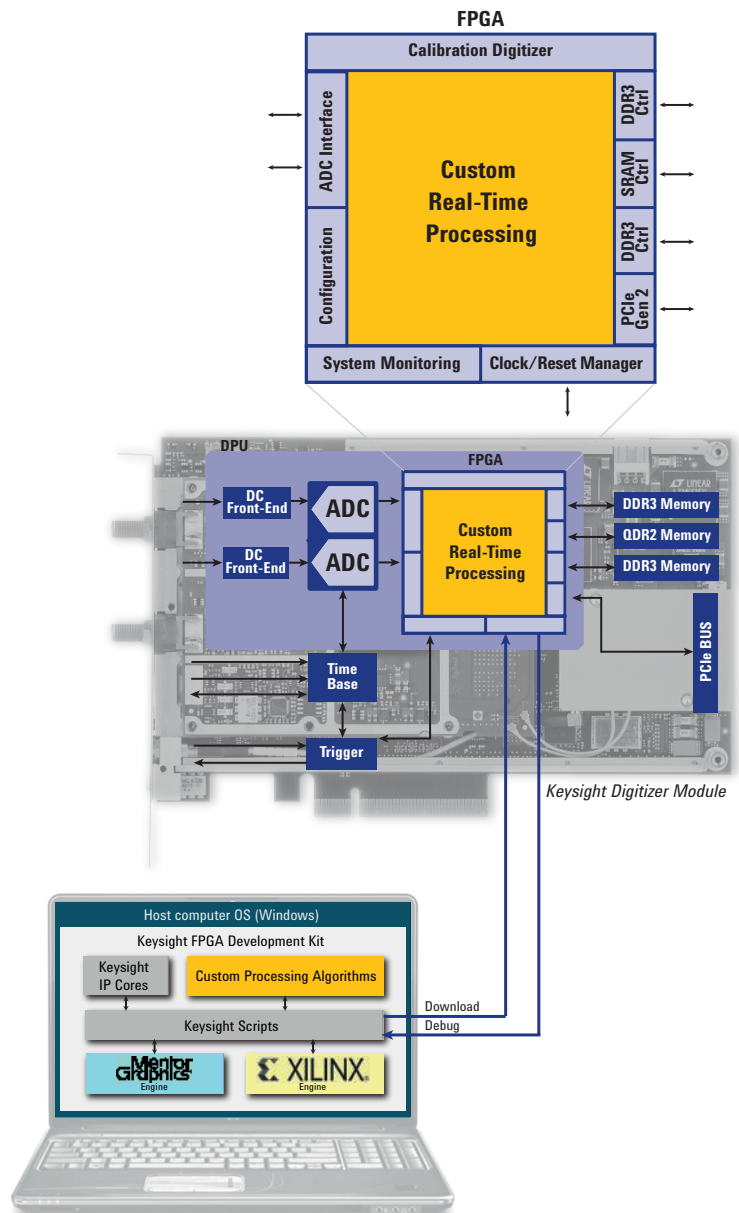


Figure 1. The included Keysight IP cores interface directly to underlying hardware elements. By predefining the placement of the IP cores, the FPGA Development Kit maximizes the space available for your algorithms within the custom real-time processing area.

## Reducing Development Time

### Enhance your design efficiency

Additional elements built into the FPGA Development Kit further reduce development time and help improve your overall design efficiency when compared to a standard FPGA design flow.

We provide an integrated and automated environment with pre-defined capabilities, enabling you to reach the levels of performance needed to implement your real-time processing functions.

The Keysight high-speed digitizer R&D team makes use of these same capabilities to create the firmware built into many of our products.

### Leverage our proven environment

All of these capabilities have been developed, tested and debugged by Keysight, and are being used within off-the-shelf PCIe® based products. You too can achieve the same level of functionality using the FPGA Development Kit, and accelerate your development work as you implement your own algorithms (Figure 2).

### Start faster with a design template

By using the Get Started design example, you can build your first design in just a few hours. The firmware design example provided with the FPGA Development Kit exercises most of the user-accessible interfaces while providing simple real-time processing of sampled data, including a FIR filter. Real-time processed data and raw data from one of the available channels are stored in the on-board memories for later read-out by the host computer.

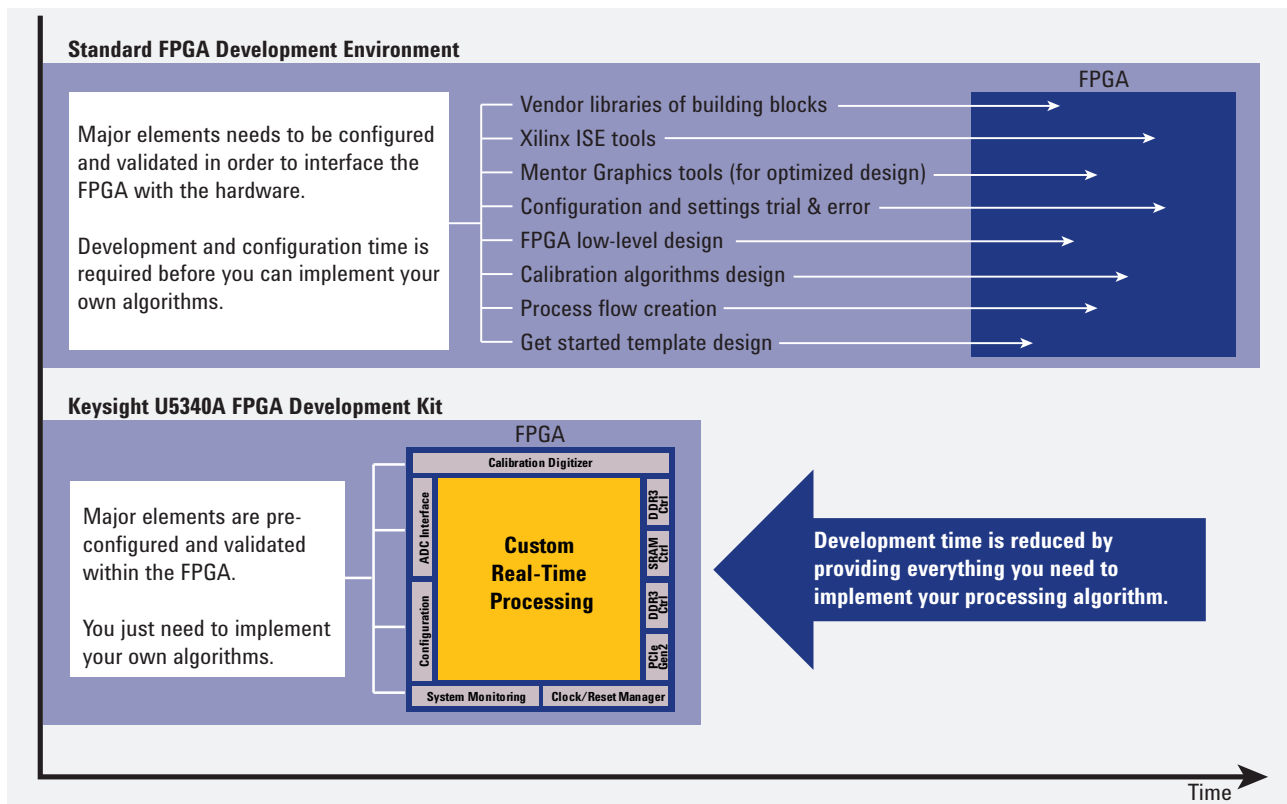


Figure 2. Comparison of FPGA development time: standard versus Keysight FPGA Development Kit.

## Providing the Resources You Need to Succeed

### Keysight U5340A FPGA Development Kit

The FPGA Development Kit ensures fast and efficient creation of advanced algorithms with a framework that includes:

- Script-based development environment
- IP cores database and a library of predefined components
- Functional partitioning with locked floor planning
- Get Started example design
- Embedded calibration digitizer
- Integrated debug facilities
- Specific software API

All these elements are empowered by our automated flow using state-of-the-art tools from Mentor Graphics and Xilinx.

### Script-based development environment

Scripts optimize and accelerate the development process by automating each step of design and verification.

The simple command syntax lets you implement your algorithms using the FPGA cores database. We also provide functional simulation models for all of the interfaces.

### IP cores database

A complete IP core database compliant with the AMBA AXI4 standard is provided. The FPGA Development Kit also allows smooth integration of third party IP cores such as the function-rich Xilinx LogiCore IP libraries.

### Functional partitioning and floor planning

The Keysight IP cores which interface to the underlying hardware are functionally partitioned in an area optimized floor-plan. These cores are provided as pre-synthesized netlists with area-locked constraints (physical placement). Together, these techniques improve overall runtime and enhance repeatability of results.

### Get Started example design

The FPGA Development Kit also includes a fully operational example that is aimed to be used as a design tutorial. The example provides all the material needed to generate the target bitfile. In addition, it also contains a tutorial on how to download the bitfile, and a Get Started program on how to operate with real hardware.

### Embedded calibration digitizer

Complete calibration capabilities are embedded into each design ensuring the unmatched analog performance of Keysight digitizers when used with end-user firmware.

### A powerful FPGA design flow

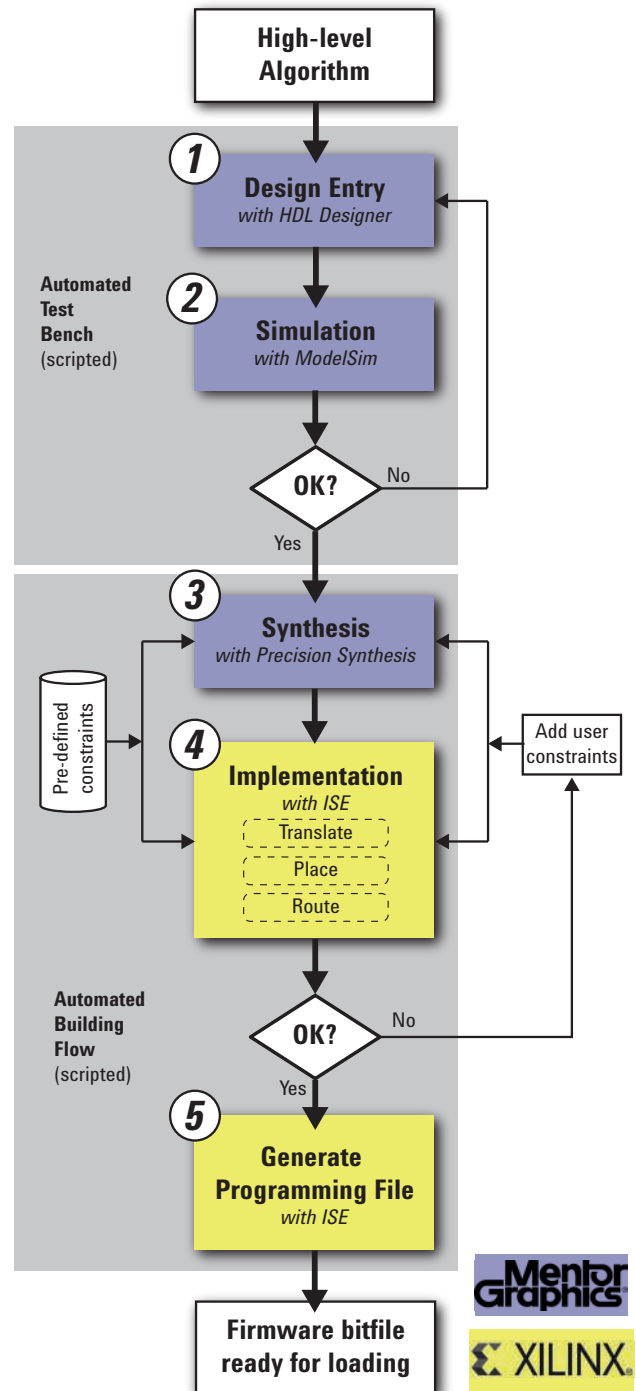


Figure 3. The grey areas represent the automated process, which is scripted. This means you can concentrate on your algorithm design - the rest is automated.

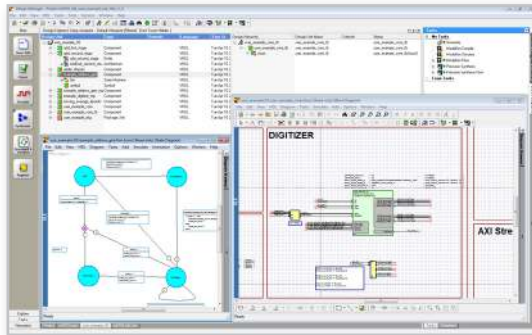
## Providing the Resources You Need to Succeed (continued)

### Embedded engines

The U5340A FPGA Development Kit runs on a Windows host computer, interacts with two embedded engines from Mentor Graphics and Xilinx, and communicates with the FPGA in the digitizer module.

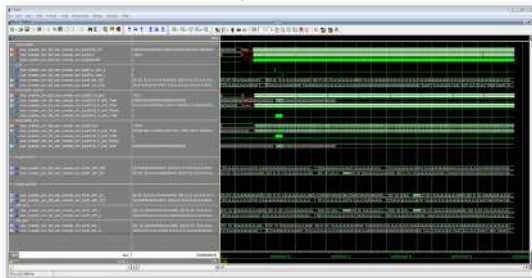
#### 1 Design Entry

The embedded version of the Mentor Graphics HDL Designer is a powerful HDL-based environment used by engineers worldwide to analyze, create and manage complex FPGA designs.



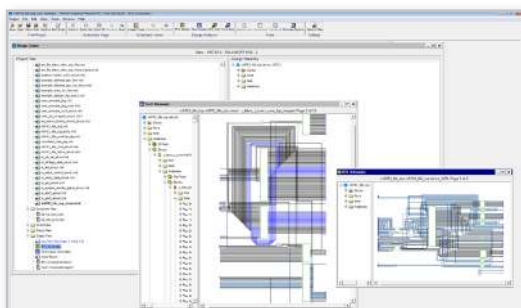
#### 2 Simulation

Mentor Graphics ModelSim's easy to use and unified debug and simulation environment provide today's FPGA designers both the advanced capabilities that they need and the environment that makes their work productive.



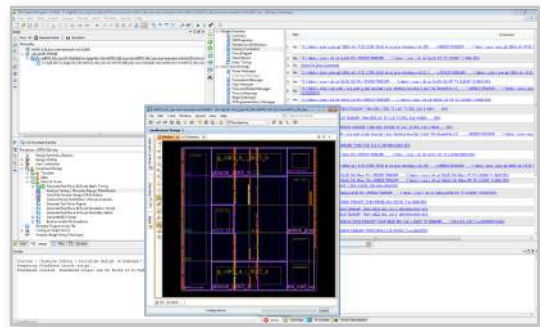
#### 3 Synthesis

Mentor Graphics Precision Synthesis offers an intuitive environment with advanced synthesis optimizations to deliver superior quality of results and analysis to eliminate defects.



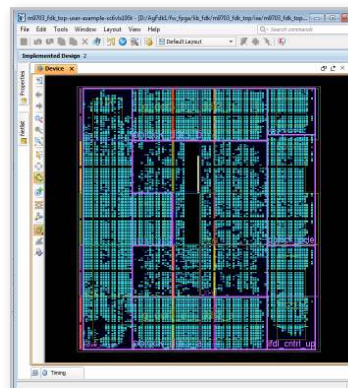
#### 4 Implementation

The embedded Xilinx ISE Design Suite provides a tight connection between the design flow and the hardware to ensure that your design will fit inside the FPGA, and also provides debug and ChipScope capabilities.



#### 5 Generate Programming file

The file generation process runs BitGen, the Xilinx ISE generation program, to produce a bitfile for the specific device as configured within the FPGA Development Kit.





## Providing the Resources You Need to Succeed (continued)

### Integrated debug facilities

The Xilinx ChipScope Pro Analyzer can be easily integrated into the firmware design, allowing you to view any internal signal or node. Signals are captured at the speed of operation and brought out through the JTAG debug interface. Captured signals are displayed and analyzed using the ChipScope Pro Analyzer tool. A simple micro USB cable is all that's needed to gain access to the debug interface.

### Specific software API

A full set of direct and indirect I/O functions provides complete and detailed control of your design. In addition to this low-level access, a high-level API allows simple and protected user access to a set of common board-control functions.

This simple API has three key advantages:

- Reduces the need for detailed hardware knowledge of the common control functions (e.g., register mapping, control state machines)
- Enables fast and easy integration of custom processing
- Avoids erroneous operation by protecting against prohibited actions

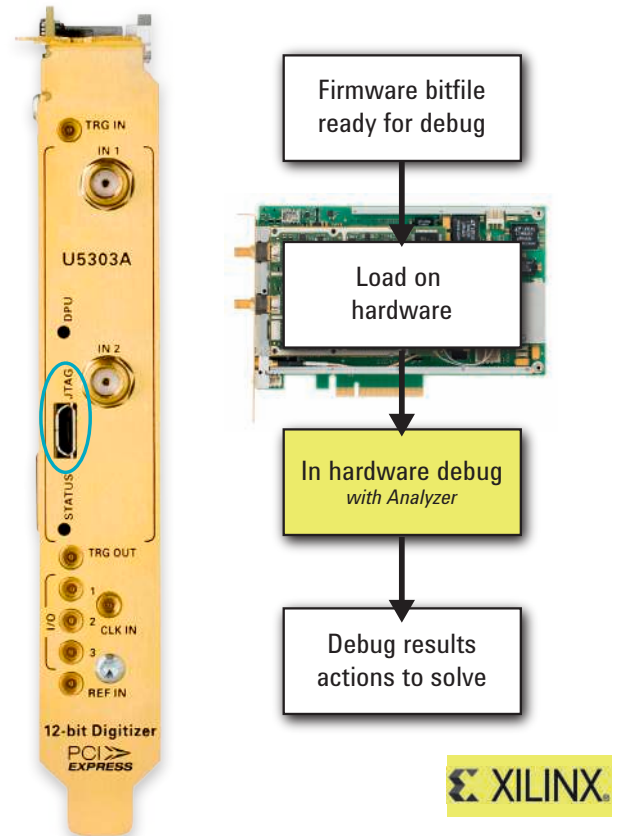


Figure 4. In the PCIe and AXIe high-speed digitizers front-panel, a micro USB connector allows in-system debugging.

## Making Implementation Simple and Efficient

Within the FPGA Development Kit, the cumulative benefits of several key elements make implementation simple and efficient, in summary:

- Complex FPGA flows are masked and simplified by internal scripts
- Keysight IP cores have a standard interface that is compliant with AMBA AXI4
- Development libraries contain AMBA AXI4 blocks and general building blocks
- Fast scripted functional level simulation environment
- Optimized flow improves reusability and repeatability of results
- Example design is ready to used as template
- C++ and MATLAB Get Started examples are included
- Creation of a bitfile which can be downloaded to the digitizers via a simple API call



The benefits of using AMBA AXI4 interface include the following:

- Consistent: use the same transfer protocol
- Fully specified: ready for adoption
- Standardized: includes standard models and checkers for designers to use
- Interface-decoupled: the interconnect is decoupled from the interface
- Extendable: open-ended to support future needs

One key result is the ability to create algorithms that are reusable across technology, product families and platforms.

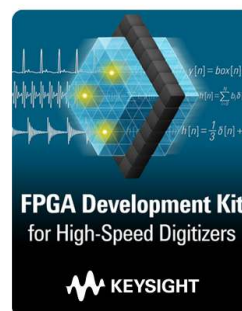
## Configuration and Ordering Information

### Ordering information

Model	Description
<b>Typical Product Configuration</b>	
U5340A	FPGA Development Kit for High-Speed Digitizers
U5340A-ANY	1-year floating license with support, advanced bundle
U5340A-ARY	1-year floating license with support, advanced bundle - renewal
U5340A-CRY	1-year bitfile maintenance - renewal
U5340A-WIN	FPGA Development Kit, Windows installer on DVD

Related products	
<b>U5303A</b>	PCIe 12-bit Digitizer with on-board processing <a href="http://www.keysight.com/find/u5303a">www.keysight.com/find/u5303a</a>
<b>U5309A</b>	PCIe 8-bit Digitizer with on-board processing <a href="http://www.keysight.com/find/u5309a">www.keysight.com/find/u5309a</a>
<b>M9703A</b>	AXIe 12-bit Digitizer with on-board processing <a href="http://www.keysight.com/find/m9703a">www.keysight.com/find/m9703a</a>

Please contact Keysight to discuss your need and find the best solution using the U5340A FPGA Development Kit:  
[digitizers@keysight.com](mailto:digitizers@keysight.com)



## Technical Specifications and Characteristics

System Requirements	
Topic	Windows 7 Requirements
Operating Systems	Windows 7 (32-bit and 64-bit), All versions
Available Memory	4 GB
Available Disk Space <sup>1</sup>	30 GB available hard disk space

1. Because of the installation procedure, less disk space may be required for operation than is required for installation. The amount of space listed above is required for installation.



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Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Other AP Countries	(65) 6375 8100

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