

## **UDK3 Performance Monitor**

The Cesium UDK3 Performance Monitor is a tool to measure data transfer speed between a host PC and UDK3 compatible devices. The Performance Monitor can check the correct access to memory devices by performing write-readback-compare loops, too.

## Introduction

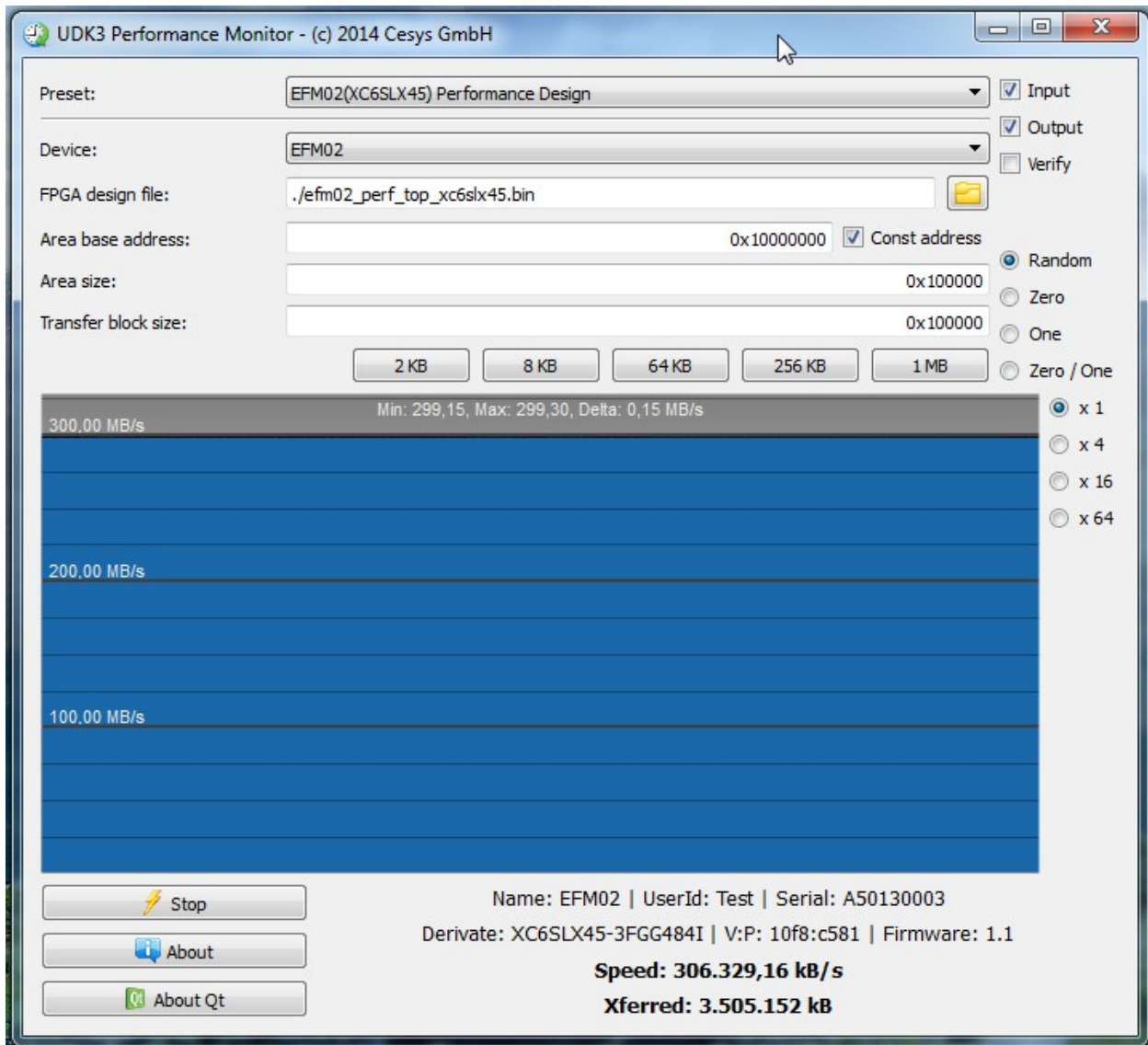
UDK3 Performance Monitor is a tool that helps to maximize the data transfer rate with UDK3 compatible devices. It can be used to locate bottlenecks and errors in the devices FPGA designs.

The tool configures the FPGA of the device using a user-defined bitstream and transfers data to and from a specified address range. It displays the maximum data throughput during continuous data transfer.

There is an option to verify data when using bi-directional communication intended for address ranges mapped to memory resources such as BRAM, DDR2, or DDR3 SDRAM.

# Options

The image below shows the UDK3 Performance Monitor.



The **Preset** combo box allows the selection of common test scenarios using FPGA designs made by Cesium. Choose one of these presets to select default values for the settings directly below.

The **Device** selection specifies the device type that should be used for the test. UDK3

Performance Monitor uses the device that comes first during enumeration of this type.

**FPGA design file** must contain the path to the bitstream file. The button right of the input control opens a file browser to ease the selection.

**Area base address** and **Area size** specify the area to which data is written and / or read from. Every single transfer is done using the block size specified in **Transfer block size**. Data is transferred starting to / from the **Area base address** and continued at **Area base address + Transfer block size** and so on until **Area size** is reached. This is the reason why **Area size** must be a multiple of **Transfer block size**. Values in these fields are interpreted as decimal, except they are prefixed using **0x**, in which case the values are expected to be hexadecimal.

If **Const address** is checked, data is always transferred to / from **Area base address** only and the const address flag is used. Use the buttons directly below **Transfer block size** to set these values to common sizes.

**Input** and **Output** check boxes define the direction of the transfer. Direction is interpreted from host side. Either one or both options must be selected. If both are selected, the **Verify** check box is available, too.

**Random**, **Zero**, **One** and **Zero / One** define the content used for transfer. **Random** is randomly generated data, **Zero** are just buffers filled with 0. **One** and **Zero / One** must be interpreted as bits in this context. **One** means buffers filled with 0xFFFFFFFF. **Zero / One** uses alternating bit patterns per 32 bit data line (0xFFFFFFFF / 0x00000000) to produce a maximum toggle rate on the data lines.

The factors right of the performance graph (**x 1**, **x 4**, **x 16**, **x 64**) are pure visualization related options and specify the time factor of the graph.

The **Start / Stop** button switches between idle and running state. Starting a new test uses the currently selected options. Changing the options while a test is running, will not affect the test.

## Typical transfer speeds

The table shows typical transfer speeds when using an EFM-02 with the performance design at different hosts.

Host configuration	Input	Output	Both
Intel™ Core i7-3770K 3.50GHz, Intel™ USB 3.0 eXtensible Host controller (8086:1e31), Windows 7 x64	308 MB/s	293 MB/s	300 MB/s
Intel™ Core i7-3770K 3.50GHz, uPD720200 USB 3.0 controller (expansion card) (1033:0194), Windows 7 x64	267 MB/s	114 MB/s	160 MB/s
Intel™ Core i3-2100 1.60GHz, uPD720200 USB 3.0 controller (expansion card) (1033:0194), Ubuntu 12.04 LTS x86_64 / Kernel 3.5.0-45	231 MB/s	127 MB/s	164 MB/s
AMD™ A4 4300M 2.50GHz (Laptop), AMD USB 3.0 Host Controller (1022:7814), Windows 7 x64	207 MB/s	156 MB/s	181 MB/s
Intel™ Core i7-2600K 3.40GHz, uPD720200 USB 3.0 controller (1033:0194), Windows 7 x64	244 MB/s	122 MB/s	163 MB/s
Intel™ Core i7-4800MQ 2.70GHz (Laptop), Intel™ USB 3.0 eXtensible Host controller (8086:8c31), Windows 7 x64	244 MB/s	188 MB/s	210 MB/s

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CESYS Gesellschaft für angewandte Mikroelektronik mbH  
Gustav-Hertz-Str. 4  
D - 91074 Herzogenaurach  
Germany

## Revision history

<b>Version</b>	<b>Date</b>	<b>Comment</b>	<b>Author</b>	<b>Approved</b>
V1.0	February, 17 2014	Initial release.		
V1.1	April, 28 2017	Updated to UDK3 API version 1.5 with support for EFM-03.	mra	mh

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