

# FAQ

## BADGE - FAQ

### BitSim Accelerated Display Graphics Engine-platform



#### What is BADGE?

BADGE is a graphics controller. Basically, this means that it acts as an interface between a CPU and a graphics display unit in an embedded system, performing the same tasks as the graphics card on your computer. In short, BADGE does the following:

- BADGE controls a graphics memory which stores the image to be displayed
- BADGE provides a way for the CPU to write graphics information to this memory
- BADGE repeatedly reads graphics information from the memory and feeds it to the display unit
- BADGE provides hardware graphics acceleration features

Hardware graphics acceleration means that BADGE quickly can draw graphical objects such as lines, rectangles, text, etc. into the graphics memory, and it does this faster than the CPU can. Since BADGE performs most of the graphics drawing, the CPU is offloaded from many graphics tasks. This means that the CPU can spend more time on other tasks, which increases performance for the rest of the system. With hardware graphics acceleration, the performance for both graphics operations and other tasks will be increased! BADGE comes in the form of an IP (Intellectual Property) block, which can be instantiated in an FPGA or an ASIC. This means that BADGE is modular and flexible for easy adaptation to different environments and different functionality requirements.

## Our 2D graphics- and video platform BADGE:

- Supports multiple memory types
- Supports multiple CPU types, also with a programmable interface
- Can mix video and graphics on the display (overlay)
- Is proven both in FPGAs and ASICs
- Over 2.5 million BADGE has been shipped, both as ASICs and FPGAs
- Can be configured to handle single or multiple video streams
- Can overlay text, symbols and menus in the video window
- Is scalable and adaptable

## BADGE IP parts:

- BADGE Lite, Display Driver
- MDAGPU, Memory Direct Access
- SPDGPU, Simple Pixel Drawing
- CHRGPU, Character GPU
- RCCGPU,, BitBlit, Rectangle Copy
- VPU, Video processing unit. For mixing video & graphics
- IPU / SPIGPU Compact Storage, SPI Flash, Boot FPGA & unpack data
- HWU, accelerated Waveform drawing

## Since BADGE is flexible and configurable, does different versions exists?

Today we have the following base versions:

### BADGE Lite

- Acts as a display-controlling device
- Pixel-by-pixel access and HW Cursor

### BADGE 2D

- 2D graphics acceleration (BADGE Lite is also included)

### BADGE Video

- Analog and Digital Video (BADGE Lite is also included)

### BADGE Full

- Analog, Digital Video and 2D acceleration (BADGE Lite is also included)

## How much memory do I need to use BADGE?

A typical embedded system with XGA resolution (1024 x 768 pixels) and 16-bit color depth requires 2MByte of external memory. For other resolutions, color depths, and functionalities (such as double buffering, font tables etc.) the memory requirement may differ.

## What type of memory is best for my product?

In most applications, SDRAM is the most performance/cost effective choice.

Other memory types are also supported for applications with other needs.

## Which Host Interfaces are provided?

The number of supported host CPU interfaces is growing.

Currently, the FPGA-internal buses OPB and Avalon are supported, but also PCB-based buses such as Intel XScale (VLIO) and 386EX.

## Do I need to have a fast 32-bits processor to add graphics functionality to my product?

No, by taking advantage of the hardware graphics acceleration features of BADGE, even a low-end CPU can be used in a system which provides fast graphics performance.

## Which types of displays can BADGE handle?

Currently, TFT graphics displays with parallel LVTTTL (digital RGB) interface or serial LVDS interfaces. This includes OpenLDI, and DVI capable screens. Support for other display interfaces can be developed depending on market needs, or as an adaptation for you.

## Is there a standard for display interfaces?

There are several different display interfaces around in many variants, where some are standardized and some are proprietary. BADGE support most TFT display interfaces including parallel LVTTTL RGB and serial LVDS.

## What if I need to add a new type of display next year?

BADGE is flexible and can be easily reconfigured into another FPGA bit-file (this file determines the content of the FPGA which is programmed on boot). Minor changes as display resolution, vertical timing etc. can be set from software. If your PCB has been prepared for future display interface types, BADGE can in most cases be adopted for the new interface type within days.

## How many I/O pins does BADGE need?

The number of I/Os on the FPGA depends on how BADGE is configured regarding:

- Host interface bus (mainly address and data bus widths)
- Memory (mainly address and data bus widths)
- Display interface (parallel LVTTTL RGB or serial LVDS)

A typical configuration with 16-bit host interface to external CPU, 32-bit SDRAM, and serial LVDS display interface requires 109 FPGA I/O pins. If the CPU is embedded in the FPGA, no FPGA I/O pins are required for the host interface.

## Which FPGA types does BADGE support?

Most modern FPGAs with embedded memory and, depending on BADGE configuration, hard multipliers. BADGE has been tested in:

- Altera: Cyclon, Cyclon II, and Stratix II
- Xilinx: Spartan-III, Virtex, Virtex II, Virtex-IIPro and Virtex-4

## How is BADGE delivered?

Normally, the netlist is delivered directly by e-mail to the customer.

After that, a CD is delivered which includes:

- Netlist
- Source code (if purchased)
- User Guide
- Design- and Simulation environment and setup (test bench, scripts etc.)

## How can I know that BADGE will be supported in the future?

By purchasing BADGE with the source code option, you get full control now and in the future.

## My present standard (ASSP) graphics controller is End-Of-Life, could BADGE handle that?

Yes! BitSim has helped customer with exact this problem. We have had specific experience with Epson circuits.

## How large (in FPGA-gates) is BADGE?

Depending on which BADGE configuration you choose, it will fit in different FPGA types and sizes. But in general, the BADGE IP will fit into some of the smaller versions of Spartan-3 and Cyclone families.

## Is it possible to have other functions in the FPGA?

Yes, depending on the size of the FPGA, much more functionality can be included besides BADGE. Example of such functionality is CPUs, Ethernet MACs, Flash controllers, PCI etc.

## What does BADGE cost?

Please contact us for quotation - [contact@bitsim.com](mailto:contact@bitsim.com).

## We're not so familiar with FPGAs...

Many engineers at BitSim has been developing for FPGAs since the end of the 80s. BADGE was released 2003, and we've already done several projects for customers around the world. If you need assistance, we could help you both with FPGA and PCB designs.

Please contact us - [contact@bitsim.com](mailto:contact@bitsim.com)

## We don't want someone to "clone" the content in the FPGA!

This problem can be handled in many different ways depending on your exact need. BitSim has the right solution for copy-protecting FPGA designs.

Please contact us - [contact@bitsim.com](mailto:contact@bitsim.com)

## Do I need some kind of SW driver?

It depends on which operating system, if any, you use in your embedded system. BitSim has device drivers available for both Linux and WinCE, but if you don't use an operation system, BitSim provides API functions for C programmers.

## Do the drivers cost extra?

No, drivers for Linux, WinCE and the barebone API is included in the license.

## How is support handled?

Included in the BADGE license is up to 40 hours of support (depending on license type).

For additional support, please contact us - [contact@bitsim.com](mailto:contact@bitsim.com)

## Is there a Reference Design Kit (RDK) available?

Today we're finalizing one RDK. It contains a standard Altera Nios II-kit, a TFT-display (6.4" QVGA Sharp) and a time limited version of the BADGE IP.

We're also working on a RDK for Xilinx.