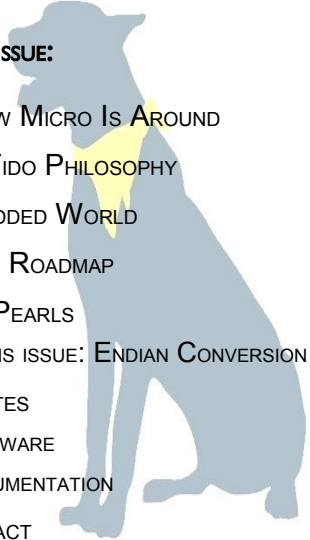


# THE fido™ NEWSLETTER



**IN THIS ISSUE:**

1. A NEW MICRO IS AROUND
2. THE FIDO PHILOSOPHY
3. EMBEDDED WORLD
4. FIDO ROADMAP
5. FIDO PEARLS  
IN THIS ISSUE: ENDIAN CONVERSION
6. UPDATES  
SOFTWARE  
DOCUMENTATION
7. CONTACT



## 1. A NEW MICRO IS AROUND

On September 19<sup>th</sup>, Innovasic Semiconductor launched the fido microcontroller family, the first member of which is the fido1100.

Why a new 32 bit micro controller? Aren't there enough micros around? Why Innovasic Semiconductor, a company known for its replacement products in the first place?

Well, the answer to all those questions is easy:

*Customers asked for it !*

While talking with customers about their obsolescence problems in the past they frequently asked: "Can't we use one of your micros for future products"? That question was born out of Innovasic "Continuous Supply Policy", not to terminate the life of any product as long as there are customers out there who need them. Our first simple answer was "Yes", but then we learned that our customers' needed a feature set that our current product offering did not support. A product with a life cycle that matches the life expectancy of embedded applications. With support of current protocols, interfaces and proprietary needs both now and into the future.

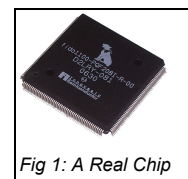


Fig 1: A Real Chip

All this requires a degree of flexibility and adaptability that conventional micros do not offer. In addition, a compact instruction set to support industrial requirements. Two years in development have resulted in the solution known as fido. Innovasic Semiconductor has launched fido to live longer than other Microcontrollers.

*To live as long as you need it.*

## 2. THE FIDO PHILOSOPHY

### Deterministic Real-time Performance

The 5 contexts of the fido 1100 offers a unique real-time performance. Each of the contexts can be seen as a thread of a tiny real-time operating system implemented in hardware. It eases the task of writing OS-free applications as well as it allows running different operating systems with different real-time requirements on one and the same chip. You can run a real RTOS in one context and an uCLinux in another, combining the best of both worlds! You can have a deterministic, hard real-time task running exactly every 100us without jitter, by just giving it a single, high priority context! Hard and/or expensive to do so on other machines!

The MPU (Memory Protection Unit) can hide memory used by contexts from each others as you need it, making it a perfect solution for safety critical systems, too.

### Flexible I/O

The UIC, the *Universal I/O Controller*, is one of the keys to support long product lifecycles. The UIC can be seen as freely programmable, highly optimized, small footprint 8-Bit micro controller, designed to implement communication peripherals like UARTS, SPI, I<sup>2</sup>C, Ethernet MAC or similar in software. This makes the I/O of the fido1100 flexible

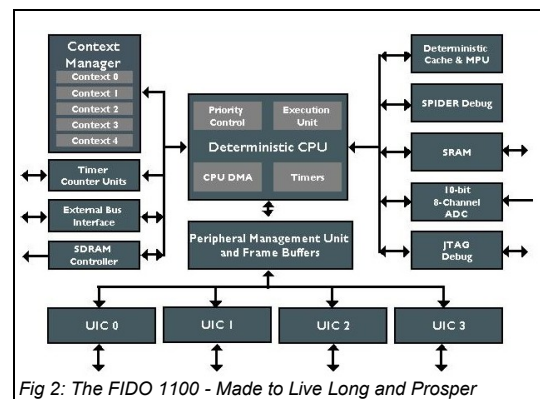


Fig 2: The FIDO 1100 - Made to Live Long and Prosper

and adaptable and eases the developer’s task to support his products over a long lifetime.

Beside this, the UIC allows the designer to reduce the part number count in his designs, because the fido1100 can serve multiple I/O needs.

No surprise, the UIC is hardware multi-threaded itself.

**Excellent Debugging**

SpiderDebug is a real hardware debugger kernel that has, among others, one outstanding feature: It's there to help if you are really in trouble. Many of today’s jtag debug kernels work partly with software emulation. That means that you may run into trouble the moment you really need the debugger – maybe because you falsely manipulated vital system registers - because the debugger itself is gone. Not Spider. It’s a true hardware debugger and was used to develop and test the chip itself at Innovasic.

This debugger is also aware of the hardware contexts. That allows Spider to debug one context while another is running at full speed. And it supports tracing with complex trigger conditions for hard to find, on site debugging.

**Long Lifetime Support**

Fido is an architecture for long life cycle products by design. And Innovasic Semiconductor is a company committed to long lifecycle markets. There is no better combination if you need to support your product for 10, 15 or more years.

**3. EMBEDDED WORLD**

We are very proud to present fido1100 in Hall12 Booth 654 at Embedded World. In addition to the booth we have specialists to answer both technical and sales questions.



In **Session 23: Microprocessor Architectures and Cores** of the conference program our CEO, Mr. Keith Prettyjohns, will give a fido™ presentation.

- Time: Thursday, 15<sup>th</sup>, 11:30
- Title: “*HARD REALTIME MICROCONTROLLER FOR EMBEDDED APPLICATIONS*”.

We hope to meet you at our booth. To ensure enough discussion time, it is recommended that you schedule an appointment with us, please contact Gary H. Tougas [gtougas@innovasic.com](mailto:gtougas@innovasic.com).

**4. FIDO ROADMAP**

FIDO is a product family rather than a single device. We are working with our customers on next generation’s fido chip definitions, as well as improved versions of the 1100. We are going to address needs like embedded Flash, application specific solutions focused on the automotive, medical, industrial, etc markets. If you want to influence those new devices to ensure suitability for your application, market or design, contact European Application Manager Volker Goller ([vgoller@innovasic.de](mailto:vgoller@innovasic.de)).

**5. FIDO PEARLS**

Fido is not about contexts and UICs and debugging only. There are a number of features included that do not make it to prominence. However, they are valuable in every day work and can be a major key to some applications. In *Fido Pearls* we want to present those hidden features to a wider audience.

*IN THIS ISSUE: ENDIAN CONVERSION*

There are two kinds of microprocessors in the world, some look at their multi byte variables (like integers) in the BIG Endian fashion and others use the LITTLE Endian. Big Endian is prominent with the VAX, the 68k, the H8 and the 8051 families. Little Endian is prominent with the Z80, all flavors of the x86 and most ARM designs. Fido supports zero overhead Endian conversion, simplifying software migration.

Basically, there is no major benefit using one endian mode or the other.

BIG ENDIAN 68K		LITTLE ENDIAN x86	
0x4560	0x87	0x4560	0x21
0x4561	0x65	0x4561	0x43
0x4562	0x43	0x4562	0x65
0x4563	0x21	0x4563	0x87

It's just a question of tradition. And in most cases it's not a big deal if the least significant byte of a multi byte variable is the first in memory or the last.

In addition to software migration, there can be compatibility issues system to system. It can be very difficult to interconnect two microprocessors via a network or dual ported memory if they use different endian modes. Lets assume, a DPRAM couples an x86 and a 68k, at address 0x4560, there is an integer of value 0x87654321. The 68k will store most significant byte first while the x86 will store the least significant byte there (see Table 1).

So, if those two want to exchange data, they have to either prevent use of multibyte variables like integer values or one or both has to swap the bytes of those variables before using them. Both methods are painful. The first would require exchanging data as ASCII strings, which gives both sides an extra load.

Most compilers do not support accessing "opposite" endian variables automatically, so the programmer has to address this, adding risk and unnecessary code complexity. Fido is designed to solve this problem with zero overhead Endian swapping.

There is a data lane switch in from the register set(s). Whenever a long or short value is fetched from memory, it is fetched big endian if the highest bit of the address is zero and little endian if that bit is high. Therefore, any pointer with the highest bit set or any static address pointing to the upper 2GByte of the address space refer to a little endian address space.

With DPRAM, it is simple:

- Create a C-pointer to the DPRAM
- Set the highest bit of that pointer

Now, any access to long or short values is swapped automatically.

## 6. UPDATES

### SOFTWARE

**EDK:** Innovasic Semiconductor plans to released an update of the fido development tools by end of January<sup>f</sup>. Owners of a fido I100 EDK will receive a free update as soon as available.

**TCP/IP Stack:** Innovasic Semiconductors released a stand alone TCP/IP stack. The release features a highly optimized embedded TCP/IP stack, no OS dependencies and supports zero data copy. In addition, it supports DNS client, socket interface, BOOTP, DHCP, TELNET, FTP, TFTP, POP3, SMTP, IMAP4, HTTP 1.0/1.1, TCP, UDP, IP, ICMP, IGMP, ARP, multicast, Ethernet, SNTP client protocols.

### DOCUMENTATION

Latest documentation:

Document	Version	Available from
Datasheet	9.3 – Jan 2007	<a href="http://www.engineersbestfriend.com">www.engineersbestfriend.com</a>
Users Manual	5.0 – Oct 2006	<a href="http://www.engineersbestfriend.com">www.engineersbestfriend.com</a>
Instruction Set Manual	2.0 – Sept 2006	On request
Application Note I20	1.0 – Dec 2006	<a href="http://www.engineersbestfriend.com">www.engineersbestfriend.com</a>
Whitepaper: Remove the RISC from your Embedded Design	1.0	<a href="http://www.engineersbestfriend.com">www.engineersbestfriend.com</a>
Whitepaper: Reliability Starts at the Core	1.0	<a href="http://www.engineersbestfriend.com">www.engineersbestfriend.com</a>
Errata	2.1 – Nov 2006	

## 7. CONTACT

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