Memory Redefined
Diablo's groundbreaking system-level memory solutions

Riccardo Badalone
Co-founder & CEO of Diablo Technologies

+ ARM's New Connected Community

November 26, 2013 | Issue 118
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**4-Digit Duplex LCD Car Lock**

The PCF1175C is a single chip, 4.19 MHz CMOS car clock circuit providing hours, minutes and seconds functions. It is designed to drive a 4-digit duplex liquid crystal display (LCD). Two external single-pole, single-throw switches will accomplish all time setting functions. Time calibration and voltage regulator are electrically programmable via an on-chip EEPROM. The circuit is battery-operated via an internal voltage regulator and an external resistor. Read More

**Dual Low-Ohmic SPDT Analog Switch**

The NX5L2750C is a dual low-ohmic single-pole double-throw analog switch suitable for use as an analog or digital 2:1 multiplexer/demultiplexer. Each switch has a digital select input (nS), two independent inputs/outputs (nY0 and nY1) and a common input/output (nZ). The NX5L2750C is capable of switching audio signals with negative swing without the need of a coupling capacitor. Schmitt trigger action at the digital input/output (nZ). The NX5L2750C is capable of switching audio signals with negative swing without the need of a coupling capacitor. Schmitt trigger action at the digital input/output (nZ). The NX5L2750C is capable of switching audio signals with negative swing without the need of a coupling capacitor. Schmitt trigger action at the digital input/output (nZ). Read More

**16-bit MCUs for Automotive Control**

The new MCUs consist of total of 91 products including 40 products in the RL78/F13 Group and 31 products in the RL78/F14 Group. The RL78/F13 MCUs are designed for use in an extensive range of automotive applications; from body control systems such as power window and side mirror control, to automotive motor control systems such as electric water pumps and cooling fans. The RL78/F14 MCUs support the body control system applications, such as BCM (body control module) and HVAC that require especially large memory capacities. Read More

**Flat Gain High Linearity Gain Block**

Avago Technologies’ MGA-30689 is a flat gain, high-linearity, low-noise, 22dBm Gain Block with good OP1 achieved through the use of Avago Technologies’ proprietary 0.25um GaAs Enhancement-mode pHEMT process. Housed inside a standard SO8P package (4.5 × 4.1 × 1.5 mm), MGA-30689 required simple dc biasing components to achieve wide bandwidth performance. The temperature compensated internal bias circuit provides stable current over temperature and process threshold voltage variation. Read More

**Low-Power Low-Noise 24-bit ADC**

The ADS1220 is a precision, 24-bit, analog-to-digital converter (ADC), offered in a leadless QFN-16 or a TSSOP-16 package. The device features two differential or four single-ended inputs through a very flexible input multiplexer (mux), a low-noise, programmable gain amplifier (PGA), two programmable excitation current sources, an internal reference, an oscillator, a low-side bridge switch, and a precision temperature sensor. The many integrated features and the simple control of the ADS1220 through an SPI-compatible interface ease precision measurements of the most common sensor signals. Read More

**Integrated Audio Click-and-Pop Suppressor**

The MAX9890 provides click-and-pop suppression for devices such as CODECs with integrated headphone amplifiers that lack a clickless/popless startup/power-up or shutdown/power-down. The device controls the ramping of the DC bias voltage on the output-coupling capacitors and the application of the audio signal to ensure that no audible transients are present at the headphones. The MAX9890A features a 200ms startup time for use with up to 100µF coupling capacitors. Read More

**High Reliability Temperature Sensor**

Intersil Corporation introduced the ISL71590SEH, a radiation-hardened, low power, current output temperature sensor able to deliver a high level of accuracy over radiation exposure, time and temperature. The new ISL71590SEH temperature sensor is ideal for remote temperature sensing in satellites and other space applications. Developers of the most advanced next generation satellite systems require temperature sensors that provide accuracy over the mission life of a satellite, eliminating the need for expensive radiation lot acceptance testing or spot shielding. Read More

**Low Cost Dual Drive Core**

2SC0108T is a new, low-cost SCALE-2 dual-driver core that combines compact design and high reliability with broad applicability. The 2SC0108T drives all usual IGBT modules up to 600 A / 1200 V or 450 A / 1700 V. Embedded paralleling allows simple inverter design even at higher power ratings. Multi-level topologies are also supported. The 2SC0108T combines a complete two-channel driver core with all components required for driving such as an isolated DC/DC converter, short-circuit protection as well as supply voltage monitoring. Read More
RF to IF Dual Downconverting Mixer

The IDT1100 is a dual channel device that operates with a single 5 V supply. It is optimized for operation in a Multi-carrier Base Station Receiver for RF bands from 698 to 915 MHz with High Side Injection. IF frequencies from 150 to 450 MHz are supported. Normally, the device offers +41 dBm Output IP3 with 350 mA of ICC. In typical base station receivers the mixer limits the linearity performance for the entire receive system. The F1100 with Zero-Distortion technology dramatically improves the maximum IM3 interference that the BTS can withstand at a desired Signal to Noise Ratio. Read More

World’s Smallest Electronic Compass

AK09911 is a 3-axis electronic compass IC with high sensitive Hall sensor technology designed for the use of portable devices. The device is considered as the world’s smallest sized electronic compass with package size reduced to approximately 56% of AK8963C. AKM’s smallest electronic compass until now. The small package of AK09911 incorporates magnetic sensors for detecting terrestrial magnetism in the X-axis, Y-axis, and Z-axis, a sensor driving circuit, signal amplifier chain, and an arithmetic circuit for processing the signal from each sensor. Read More

Arm Cortex-M4 Based Flash MCUs

Atmel’s SAM4N ARM Cortex-M4 Based MCUs are a member of a family of Flash microcontrollers based on the high performance 32-bit ARM Cortex-M4 RISC processor. It operates at a maximum speed of 100MHz and features up to 1024Kbytes of Flash and up to 80Kbytes of SRAM. The peripheral set includes 3x USART, 4x UARTs, 3x TWI, 1x SPI, as well as 1 PWM timer, 2x three-channel general-purpose 16-bit timers, an RTC, a 10-bit ADC (up to 12-bit with digital averaging) and a 10-bit DAC with an internal voltage reference. Read More

Cost-Effective High Efficiency SiC MOSFET

The ROHM SCT2080KE and SCH2080KE SiC MOSFETs offer significantly lower switching loss; as much as 90% lower than comparable silicon devices thanks to the absence of tail current and the fast recovery performance of the power diode. This allows power system designers to increase switching frequency to reduce size, cost and weight of passives. Furthermore, designers can use these benefits to achieve higher efficiency systems from the implementation of simplified, less expensive cooling systems such as moving from liquid or forced air thermal management to smaller and lighter passive air-cooled heat sinks. Read More

Four Channel Power/Energy IC

The CS5467 is a watt-hour meter on a chip. It measures the line voltage and current and calculates active, reactive, apparent power, energy, power factor, and RMS voltage and current. An internal RMS voltage reference can also be enabled for voltage measurement. A built-in tamper detection feature is included to initiate an event for unaltered status. Optionally, voltage and current channel can be used for temperature measurement. The CS5467 is designed to interface to a variety of voltage and current sensors. Additional features include system-level calibration, voltage sag and current fault detection, peak detection. Read More

Turnkey Capacitive Touch Controller

Microchip Technology Inc. introduced a new family of capacitive touch controllers—the CAP1XXX Family. These turnkey capacitive touch controllers expand the CAP11XX RightTouch® product portfolio, providing a wide variety of slider, button and proximity functionality. Additionally, the CAP12XX controllers make it easy for designers to add aesthetically pleasing, low-cost touch interfaces. This new six-member family is comprised of the CAP1203, CAP1293, CAP1206, CAP1296, CAP1208 and CAP1298, available in 8- to 16-pin packages. Read More

Fully Integrated Hall-Effect Sensor

The Allegro ACS756 family of current sensor ICs provides economical and precise solutions for AC or DC current sensing in industrial, automotive, commercial, and communications systems. The device package allows for easy implementation by the customer. Typical applications include meter control, load detection and management, power supplies, and overcurrent fault protection. The device consists of a precision, low-offset linear Hall sensor circuit with a copper conduction path located near the die. Applied current flowing through this copper conduction path generates a magnetic field. Read More

Automotive Smart Sensor Interface

The MLX90320 covers the most typical resistive type of Wheatstone bridge applications for use in an automotive environment. It is a monolithic silicon analog sensor interface that converts small changes in resistors, configured in a full Wheatstone bridge on a sensing element, to large output voltage variations. The signal conditioning includes gain adjustment, offset control and second order temperature compensation in order to accommodate variations of the different resistive sensing elements. Compensation values are stored in EEPROM and can be reprogrammed with an interface circuit and provided software. Read More
Ultra Mini DC-DC Converter

Murata announced the MEU1 series of ultra miniature single isolated output 1 Watt DC-DC converters from Murata Power Solutions. Measuring just 8.30 × 6.10 × 7.55 mm, this new series achieves a 26% footprint reduction when compared to previously released products. Available as through-hole mounting with staggered style pin outs, MEU1 achieves a 25% increase in power density and can deliver its output power over the whole temperature range of –40 degrees C to +85 degrees C. The reduction in converter volume and footprint allows engineers to reduce the overall dimensions of their application which is critical for space-constrained designs...

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Low Power ARM11 Processor Family

The ARM11™ processor family provides the engine that powers many smartphones in production today and is also widely used in consumer, home, and embedded applications. It delivers extreme low power and a range of performance from 350 MHz in small area designs up to 1 GHz in speed-optimized designs in 45 and 65 nm. ARM11 processor software is compatible with all previous generations of ARM processors, and introduces 32 bit SIMD for media processing, physically tagged caches to improve OS context switch performance, TrustZone for hardware-enforced security, and tightly coupled memories for real-time applications...

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45W Medical Open Frame

Due to their potentially life-saving nature the design and integration of medical-grade power supplies into medical equipment poses unique challenges. Responding to the burgeoning medical apparatus market, Astrodyne designers understand the particular medical compliance standards. Astrodyne offers a wide variety of medically-approved power solutions to fit any application spanning the power range of 5 watts to 450 watts. Whether you choose economical open frame power supplies, or high density encapsulated versions, all models are fully approved and carry safety certifications for UL/EN60601-1 safety standards. Models options include single, dual or triple outputs from 5VDC to 48VDC...

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Find Your Place in ARM's Ecosystem of Innovation

Since its inception in 1990, ARM’s technologies have provided the fundamental building blocks that have transformed the way we manage our cities, health services, environment, education, and our everyday lives. Unified by a set of values about the openness of ideas, technology, treating each other well, and profit sharing and risk mitigation to ensure the health of all members, ARM’s ecosystem encompasses an expansive network of over 1,000 partners and countless developers and engineers from around the globe. The recent launch of the ARM's interactive online platform expands upon the ARM Connected Community and provides members of the ARM ecosystem a place to collaborate, discuss ideas and challenges, and stay abreast on the latest news from ARM and its Connected Community partners; it also ensures the growth of a thriving ARM ecosystem well into the next generation.

The Next-Generation ARM Connected Community

The next generation of the ARM Connected Community website has been redesigned from scratch and is based on the Jive Community platform. The site includes all the features common to social media such as the ability to follow individuals, share videos and photo albums, create blogs, participate in discussion forums, and create polls to gather and share the community’s opinion on a topic.

The redesigned user interface is clean, simple, and intuitive, and ARM partners are singing their praises, “Hats off to our friends at ARM who had the vision to evolve the ARM community into this excellent new format. As old forms of publishing and communications fade, the conversation becomes the focal point for technology information. The ARM Connected Community is an inspired user-friendly way to leverage the conversation to disseminate timely and relevant technical information to a hungry worldwide engineering audience,” raved Brian Fuller, Editor-in-Chief of Cadence Design Systems.

Find Your Place

“Places” within the ARM Connected Community are made up of logically grouped sub-communities where experts in the field engage with community members to answer questions and help drive discussion, and advocates and developers create content to share. The ARM Processor community for example provides established developers, designers, SoC experts, or those just getting started with ARM a place to share best practices and design knowledge, or a place to ask and answer questions. The Smart and
Connected community is dedicated to those developing and interested in mobile, computing, wearables, and consumer electronics based on ARM technology. Additional communities focus on connecting users within the following areas:

**Android.** Within the Android community, users will find the latest ARM technology including Android porting guides, reference platform information and Linux kernel information including ARM’s partnership with Linaro. Users will also find useful information on Mali, ARM’s graphics IP and their Android porting service partners.

**Embedded.** The Embedded community offers users a place to discuss trends, products, and platforms that serve a range of embedded markets across automotive, industrial, medical, home, agriculture, and numerous other industries.

**ARM Mali Graphics.** The Mali Developer Community is a place where developers are free to ask each other questions, collaborate on projects and discuss the latest Mali tools, drivers and development platforms. Users will find a variety of support material, information on developer education activities, articles of interest, and blogs.

**SoC Implementation.** Whether you are an established designer, a SoC expert, or just getting started with selecting a process and physical IP, the SoC community will help users stay informed and will offer a place to discuss design and implementation, technological challenges, manufacturing processes, and physical IP.

**ARM and Keil Tools.** The ARM and Keil Tools community focuses on the necessary tools for every stage of the software development workflow, including the ARM mixed development platform, DS-5 embedded development tools, and the Keil MDK-ARM software development environment.

**China.** The Chinese community is completely written in simplified Chinese and contains blogs, discussions, videos, and whitepapers to assist the Chinese developer community to create designs based on the ARM architecture.

**News.** ARM’s News community will keep users in touch with all the ARM buzz. Here users can follow and discuss the latest ARM news.

**Find a Partner.** The Find a Partner directory compiles profiles and product family information from ARM’s global network of more than 1,000 partner companies which come together to provide end-to-end customer solutions based on the ARM architecture.

Within all of the ARM Connected Communities, users not only have the ability to browse content, but can also post questions and polls, participate in discussions, and much, much more. EEWeb explored several of the communities and discovered lively dialogue among members on a variety of topics ranging from smart diapers to ARM’s Generic Interrupt Controllers.

**Partners have a Place**

In addition to the aforementioned communities, ARM partners can also have their own place. These communities partner places enable users to follow ARM partners, participate in meaningful dialogue, ask questions about design challenges, and provide a valuable resource for developers of ARM-based systems. As Ross Bannatyne of NXP Semiconductors commented, “The ARM Connected Community is another valuable resource for designers of ARM-based systems. There are many places within the Connected Community where engineers will have meaningful discussions and interactions directly with NXP engineers on Embedded, Tools and Smart/Connected Technology.” Moreover, the ARM partner communities, as Steve Pancoast of Atmel asserts, enables companies to share their expertise and contribute to the greater ecosystem, “As the industry heads to the digital age where collaboration and real-time information becomes a must for the design and development of ARM-based processors, it becomes crucial for engineers to have a variety of information at their fingertips. Atmel is excited to contribute to this new online ARM Connected Community to share our expertise in leading-edge technology and design tools.”

**Get Involved**

Joining the ARM Connected Community is easy. Simply browse to Community.ARM.com and register. Once registered, be sure to update your profile with your company information, a short bio, interests, and tags that relate to your expertise. With these steps complete your own way to becoming a member of a rich ecosystem of ARM developers, experts, and partners.
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Diablo Technologies was founded in 2003 by Montreal-based visionaries Riccardo Badalone, Michael Parziale, and Franco Forlini. Coming from a long line of entrepreneurial ancestry, the founders were instilled with a strong work ethic and an innovative drive to succeed from a very young age. After holding various technical positions in Ottawa, Badalone, Parziale, and Forlini decided it was time to work for themselves and apply their skills in a way that would somehow change the market—so they started Diablo.

The burst of the 2003 telecom bubble proved to be a difficult time in the industry, with tech companies needing to lay off thousands of qualified engineers. However, the downturn in the economy didn’t deter the Diablo founders. Instead, it drove them even further to create their first product: The Advanced Memory Buffer. This product was the first real mainstream SerDes-based enterprise memory bridge on the market. After the launch, Diablo continued to pioneer disruptive memory solutions that made them a mainstay in the memory industry. We spoke with Riccardo Badalone, CEO of Diablo Technologies, about the evolution of their products, the Memory Channel Storage platform, and how their latest advancement is presenting a massive change in the industry.
Diablo Technologies is on the verge of introducing their Memory Channel Storage™ device—a potential replacement of DRAM and SSDs that will redefine the word "disruptive."

Let’s talk about Memory Channel Storage™. What gave you the idea to go after this kind of architecture?

In early 2010, we started to think about what was next for the company and there were steps that we kind of missed. We built the AMB1 as a standard product which meant that our chip could be swapped out for another chip at any point. This was interesting to us at the beginning because the market was so big we felt we had a high differentiation. We brought that product to market and had it qualified by Intel. We were part of the approved vendor list for Intel but then the downturn in 2008 hit exactly at that time. At that point, it was all about cost as a small company. In a commoditized industry, of course, you’re not able to keep up with the companies that had their own fabs and could frankly dump the price on competing products.

We needed to shift away from a plug and play standard commodity type environment but stay where we were strong and leverage our reputation. Intel moved towards a direct attach, which is what we see today: processor, channel, DRAM talking directly to each other. Diablo developed a very specific expertise in understanding the details of that memory subsystem at the picosecond level. Then, what we did was successfully build a chipset that operated without the processor even knowing it was there, which was a pretty challenging analog design feat.

Diablo successfully transitioned away from the standard enterprise DRAM market and we’ve built a core expertise. We knew if we could apply this core expertise to flash memory, we would have something unique and game-changing. Initially, we had many different versions of MCS that we put on the table. Eventually we figured that the most interesting way to develop this platform would be to come up with an architecture that was modular in nature that had very little to no disruption in the hardware ecosystem of a standard server, but could somehow make a homogeneous memory subsystem turn into a heterogeneous memory subsystem.

There are two reasons this idea was interesting. Number one, everything that people do in terms of reads and writes is all about getting the data out of the media and into system memory so that the application can use it. Ultimately what everyone is trying to do, when you talk about IO in the system is to take the physical media, whether it’s a hard disk or flash, and put it somewhere the application can actually use the data which has to be system memory. We envisioned an interesting dynamic where if we could get the data out of the flash and into the DRAM, very fast, with very low latency, then we could truly accelerate the applications.

We came from a world where a memory subsystem was only as good as the parallelism that it offered. Here’s what I mean by that: if someone wants to deploy 128 gigabytes of RAM, they don’t set about building a 128 gigabyte DRAM module. This is because it’s much more cost effective, and much more scalable in terms of performance, bandwidth, and latency to create a sub system of many small modules distributed through the server where they can be accessed in parallel—read from one while you’re writing to the other. We came from a world where getting performance out of flash meant lighting up as much of the flash in parallel as possible. This concept of a distributed flash subsystem—a heterogeneous flash subsystem—was the direction we wanted to go. What we did was solve all the problems on an engineering level internally in Diablo including the software stack. We didn’t want any operating system changes, we didn’t want any application changes; we were determined to find a way to make this all work without changing motherboards, changing the operating system, or changing applications, at least at the onset.

Did you have to change the BIOS code?

Yes, although believe it or not, we actually found a way to work with zero BIOS changes in fact we prototyped that in hardware. However, it turns out when someone gets really serious about technology integration they hook it into their management system. When a serious Tier 1 OEM puts a new technology into the system, they wrap all their system management software around it then it becomes very important to differentiate flash from DRAM. Even though it could be done with absolutely no BIOS changes at all, we decided to implement a few BIOS changes with our lead OEM partners that would allow us to streamline everything and make the products more effective.

What you’re talking about is huge. This is a massive change. Could you just sum up the performance gains and benefits of this over what is currently on the market outside of this technology?

I’ll try to be succinct. First, for persisting data we will accelerate that by 10x at least. The second thing is the form factor. The modularity will allow you to scale in very high performance as well as in very dense environments including micro servers, blades, dense 1Us, and twins. All those form factors where real estate is at a premium, you move away from customized mezzanine type cards and move towards high performance, fully scalable hybrid subsystem. Today you think blades are compromised in terms of adding persistent memory—now there is no more compromise for them.

The third point is workload performance. If you look at one hundred percent reads you’ll find that there are a hundred different ways to get the performance you want. Very few applications operate in that mode; unfortunately, Most applications are mixed workloads and many are very write intensive. What we have created provides extremely high performance at very low latencies. With other solutions, IOPS and latency are at odds.
"We take very seriously the commitment to deliver on our first generation. I think a lot of companies start thinking what’s next before completing what’s on their plate."

Databases, caches, and persistent layers in clusters are going to benefit tremendously from MCs in two ways: the increased throughput and the significantly reduced latency.

To summarize, we will at least double throughput and the significantly reduced latency.

With respect to both your company and the products that you have planned, where do you see Diablo Technologies in the future?

First of all, we take very seriously the commitment to deliver on our first generation. I think a lot of companies start thinking what’s next before completing what’s on their plate. As a growing company, I think it’s very easy to become distracted by all of the attention we’re getting. I want to make it clear that we’re focused like a laser beam on delivering a very strong financial syndrome, a strong partnering ecosystem, and a very strong end user demand builds the character and culture of a company. You can never quit. The drive to push through adversity is ingrained in the company and we’re very proud of that... it’s a very hard working company and we operate at the limit of personal capability across the board. Our management team works hard and our employees work hard.

The third cultural value is our strong personal connections to each other. As founders, we’ve really grown very close. We have grown very close as a company as well and we pride ourselves on working together as a team. We all work very, very hard and it gives us a sense of responsibility to help each other and work together as a team.

I’ll tell you when you have the first two; when people feel their working in an environment to try to break rules, that no problem is too big to solve, along with tremendous pull from the market, people naturally start working harder. It allows us to do things in a time frame that larger companies are just not able to deliver on. Those are the three core values that the company has evolved into, instead of me trying to impose them. It’s just kind of happened that way.

What has the industry reaction been to your new architecture?

The interesting thing about this technology is that it’s getting a huge positive reaction for many different verticals and workloads—the trading guys, datacenters, the database applications, and very critically, the virtualization community. The reason for that is that finally there is an element in the server architecture that can provide a cost effective persistence layer to allow distributed systems to perform extremely well. Think about virtual sans that some of the hypervisor companies are developing. Think about clusters with distributed storage systems instead of centralized.

This element that we’re building now augments DRAM. If you think about it in a system architecture where you have processors, DRAM, some latent network pipe, and the storage you’re trying to access, we’ve taken the concept of DRAM as a high performance cache for the operating system and we’ve made it extremely fast. We’ve made it very fast while using very low-cost, enterprise ready MLC NAND.

In my opinion, all the users are excited and I’m excited because yes, we have a very wide range of high performance applications already taking advantage of the benefits of our architecture. If you ask me where the real disruption is going to happen, what we have created is a new legitimate persistence tier in the cluster, in the data center, that will actually allow distributed systems and distributed storage at a lower cost and higher performance than the traditional centralized storage.
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An increasing market demand for sophisticated products that interface the digital world of 1s and 0s with the “real-world” has catapulted the need for analog solutions. Consumer devices, from cell phones and music players to blood pressure and glucose meters, are all part analog, and companies like Microchip Technology are more than suited for ensuring their agile development and deployment.
The announcement of Microchip’s latest family of analog microcontrollers—the GC family—expands upon their portfolio of analog intensive applications. It joins the sophisticated PIC line, tailored for advanced applications such as motor control, digital power, and automotive lighting, and the PIC24F line, suited for cost-sensitive applications such as low-cost motor control and LED lighting. By embedding Intelligent Analog, Microchip’s GC family of microcontrollers offers designers reduced development costs, consistent analog performances from one design to the next, and faster market delivery. As Jason Tollefson, Senior Marketing Manager at Microchip, told EEWeb, “The GC [family] is the latest and most sophisticated that we’ve done.”

Flexible Features for Designers

The GC family offers several features to ensure designers needed flexibility and end-product quality. These include a programmable block referred to as the Programmable Gain Amplifier (PGA), an interconnected switch, and a Peripheral Pin Select. The PGA which serves as the input to the 16-bit Sigma Delta, provides developers four levels of programmable gain, up to 16x the original size. This, in turn can be combined with the op-amps to create differential input and gain stage. The interconnected switch enables developers to tie into multiple components and programmatically configure signal paths to different devices. Because each component is under software control, developers can make refinements “on the fly.” This enhancement is achieved by the inclusion of muxes into each of the different blocks. “The idea,” explained Jason, “Is that...
outputs at certain blocks feed into the inputs of other blocks and vice versa. So, it’s quite flexible in that the muxes have a huge amount of inputs.”

“The Peripheral Pin Select serves as a re-mapping feature, allowing developers, using software control, to remap peripherals away from pins to other pins. As Jason articulated, “There’s a certain combination of analog and digital peripherals that a customer needs and [the developer] can manipulate where these digital peripherals come out to make use of them and also allow them to make the most use of their design.”

**Features for Rich Applications**

The GC Family is the second device in the PIC24 family to include a Direct Memory Access controller (DMA). The DMA serves to facilitate the transfer of data between the CPU and the peripherals without CPU assistance and in doing so, saves power. It also allows the device, “To do two things at once,” said Jason, “We can have our core doing a function and updating the LCD with new information, while in the background, our DMA can be streaming information from [the] 50 channels of A to D into a RAM space.”

Another noteworthy attribute of the GC Family is the ability to tailor the presentation of rich information to the end user. If the designer chooses to implement a screen for example, they can show icons that can be animated, they can also show information in text form, or even simple graphic form. With the rich information display, explained Jason, “You can present specific procedures to a user rather than a blinking icon and a number. You can tell them how to apply the sample, when to apply the sample, and if they want to upload the data or results of the information to a smart phone or to a PC, it can walk them through that process as well. With an aging community of diabetic folks, that might be more important to be able to walk them through the process so that there’s not as much jeopardy of them doing the process incorrectly and the data not being valid.”

These features, coupled with USB and LCD touch sensing interfacing, along with Microchip’s XLP technology to ensure extended battery life, make the GC family an ideal choice for medical and industrial applications. As Jason indicated, “[Microchip] looked a lot at the medical space—that’s one of our key targets with the family—so things like blood pressure meters, glucose meters, and so on. We also looked at industrial applications, so things like lab instrumentation, environmental quality testers, data loggers, production tracks where they need high-speed sensors, and even things like mining where the miners wear portable gas sensors to make sure they’re not being exposed to dangerous chemicals.”

In order to service the spectrum of designers that will be developing these applications, Microchip included high-speed 12-bit and 16-bit A/D converters. Whereas, in the past developers were limited to using only one A/D converter, providing both expands the capabilities of the end application. The high-speed 12-bit A/D converter, for example could be used to quickly analyze an area of interest, after which time, the 16-bit A/D converter could be used to collect very fine detail on a subset of data.

**Development Kit**

To help designers get started, Microchip has developed the PIC24F Starter Kit for Intelligent Analog. The analog header that accompanies the kit can plug directly into the board; Sensors can also be connected to the board itself, which can in turn interface with the analog header. As Jason explained, “We designed the board to be very clean; [the] analog signals are routed away from digital so you’ll get the best representation of the analog you need to conceive of coming out of the header.”

To make things interesting for designers who get the developer kit and showcase the capabilities of the LCD display, Microchip has included onboard sensors with associated demos and menus. These include a microphone demo, a headphone demo, and a light sensor demo. There is also a demo revolving around the A/D converters themselves. To assist with the programming, Microchip has even thrown in a built-in programmable debugger.

Developing a prototype for an end application. With the release of the GC Family, concluded Jason, “We are trying to anticipate all the things that our designers [of] portable applications would want to do and put that on our board in terms of hardware and software so that they can leverage that to the maximum extent.”
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BENAND™ SLC Flash Memory Solution

Toshiba’s new storage device simplifies migration to advanced process technologies

Built-in ECC NAND, which Toshiba refers to as BENAND, is a discrete SLC NAND solution that performs its own error correction internally (in the device itself). Shrinking memory process geometries are driving the need for improved error correction, which has traditionally been a burden on the host processor. Many NAND suppliers are discontinuing the older 4x nm and 3x nm SLC type devices. Toshiba responded to this industry need by embedding the error correction code, which will extend the product life of low-density SLC NAND flash devices.
Key Features

Densities

Toshiba offers its 24nm SLC discrete devices in 1Gb, 2Gb, 4Gb, and 8Gb densities. The user has a choice of using the raw NAND part, which requires 8-bits of ECC, or, if the host controller can’t accommodate the full 8-bits of ECC, they have the option of using the BENAND version - which requires no additional ECC.

Error Correction Code

Until now, ECC has been embedded in the host processor and it corrected 1-bit per 512 bytes. However, NAND flash memory—fabricated with a 32 nanometer process or lower — requires at least a 4-bit error correction per 512 bytes. According to Brian Kumagai, Toshiba’s Sr. Business Development Manager of Embedded NAND Memory Products, “Today, many industrial applications have older host processors with 1-bit or very limited ECC capability.” As a result, “those particular devices have to use some of the older NAND technologies that are 4x nm or older, so they can’t really reap the benefits of the newer devices.” Toshiba’s BENAND offers its own error correction, enabling it to replace the older NAND devices that are still being used today.

BENAND vs. SLC

“Engineers often ask me to describe the true difference between BENAND and discrete SLC NAND,” said Kumagai. “In terms of BENAND, the form-fit, function, and NAND commands are all fully compatible and it’s almost a drop-in replacement – this is one of its biggest benefits over SLC. Because the BENAND performs its own built-in ECC, the host has to accommodate for the longer busy times between read and write. One of the true attributes of 24nm BENAND is that, even though it’s performing error correction internally, it offers the user the full range of spare area that can be used for metadata.”

Conclusion

Toshiba invented NAND Flash over 25 years ago. The company understands the needs of the industrial market, and is committed to future innovations of low-density SLC solutions. The latest result? A versatile device that can extend the product life of everything from LCD TVs and set-top boxes to robots and printers.

To watch a video overview of the BENAND Flash Solution, click the video link below:
Bert's Part Barter

BERT, DO YOU HAVE ANY SPARE PARTS IN BACK?
FOLLOW ME...

RESISTORS ARE FIFTY CENTS, PCB’S ARE TWO DOLLARS, BUT I CAN CUT A Deal.
HOW ABOUT YOU GET TO GO HOME EARLY?

YEAH SURE, TAKE WHAT YOU WANT!

Best Tutor Ever

...BUT CHIP, THIS CALCULUS PROBLEM DOESN'T MAKE SENSE!
SURE IT DOES! WATCH...

BEST TUTOR EVER!

Water Cooler Chat

SERIOUSLY, HOW CAN YOU NOT AGREE?
IT'S THE BASIS OF THE OLD KOPERNIK-SALLILE-KEPHER-NEWTONIAN CLASSICAL THEORY!

I PREFER THE PLANCK-EINSTEINIAN THEORY MYSELF!

YEAH! WHAT HE SAID!