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Introduction



PMBus was again “present and accounted for” at last month’s APEC show in Anaheim. Industry attendance at the event was the largest ever and our booth was abuzz with activity. The booth was dedicated to highlighting the efforts underway within our Working Group committees (refer to the following section on *Working Group Updates* for more details).

Featured at the booth was a slide show demonstrating the utility of the Universal

Configuration file that is being defined by one of the WG committees. For those of you who could not attend, you can view the demo in the Resources section of the PMBus website by clicking on [Presentations](#).

We were successful in generating interest from several new participants for our WG committees. More than 50 people entered our raffle of an Apple iPad Mini. Congratulations to Andrew Mikulsk of Kemet on winning the raffle! The much sought after PMBus-branded giveaway this year was a stylus equipped mop-top writing pen which “flew off the shelves”.

We look forward to seeing everyone at our booth next year at APEC2020 in New Orleans.

Working Groups Update.

The purpose of the workgroups is to extend PMBus to new application areas that are currently not sufficiently covered by the existing standard. This includes the creation of Application Profile documents for different product segments allowing for a higher degree of commonality and re-use of the application software based on general PMBus standards.

The PMBus[®] Application profile Work Group leaders are seeking participants from member companies to develop specifications for the following four industry needs:

1. AVSBus extensions Leaders: David Bates (ST) & Juan Arango (TI)

This effort extends the behavior of the existing point-to-point AVSBus architecture to allow multiple slave devices on the bus,

with the concomitant command and monitoring changes.

2. Front end power supply application profile

Leader: Richard Caubang (Artesyn)
This is an effort to define the PMBus application profile for front end power supplies for industrial, medical, communication, and computing markets, since no application profile currently exists. The spec will encompass AC-input, 48V-input, HVDC-input power supplies.

3. Universal configuration file format

Leader: Chris Eckhoff (Maxim)
This is an effort to define the characteristics of a Universal (or Neutral) file format for configuring PMBus devices from many vendors on a newly manufactured board.

4. PMBus uniform implementation over other physical layers (PHYs)

Leader: Chris Jones (Artesyn)
SMBus has been the default PHY for PMBus, but some have implemented other PHYs to transmit PMBus commands over longer distances (ENET, CAN, RS485, etc.). This effort would create a way to support PMBus over other PHY implementations.

What will be required from the volunteers? Around 1-2 hours per week for commentaries and meetings.

What's the benefit of getting involved? Lead your company into driving industry standards and be part of a group of experts in the field.

If you are interested, please contact the WG leader or send a note to

admin@smiforum.org and let us know the track to which you would like to contribute. We'll be happy to get you connected to the committee leaders.

Membership Updates

Congratulations to our newest Tools member, Soliton Technologies (see below). PMBus membership now stands at 47 members, comprised of 44 "Full Members" and 3 "Tools Members". Several companies who visited our APEC booth have expressed interesting in becoming members. So watch here for future announcements.

Soliton Technologies has been an Alliance Member of National Instruments since 1998 and has over 100 LabVIEW trained engineers on staff. Soliton specializes in consulting and development to enable multinational companies to standardize their test & measurement automation hardware and software platforms and build tools that substantially increase their engineering productivity.

Soliton is an STS/Semiconductor Speciality Partner of National Instruments with deep expertise in chip characterization / post-silicon validation and production test on the STS. Soliton has the largest semiconductor focused team among all the NI Alliance Partners and over the last decade helped multiple semiconductor companies substantially improve their engineering productivity in test & measurement automation through powerful tools and standardization. Soliton holds the unique distinction of receiving the 'Overall Winner' award a record three times at the annual NIWeek Best Applications Contest.

Interested in joining PMBus? Get a detailed description of the System Management Interface Forum and membership benefits by clicking [PMBus Organization Overview](#). Or, just send an email to admin@smiforum.org to get immediate answers to specific questions.

New Product Announcements

Analog Devices, Inc. (ADI) has expanded its suite of μ Module[®] regulators with the LTM4700 step-down dc-dc regulator, which combines the highest power in its class with the energy efficient performance needed to reduce data center infrastructure cooling requirements. Configured as dual 50A or single 100A configuration, the new μ Module's innovative package technology enables an increasing server density and boosts data center throughput and computational power with minimal impact on system size and cooling costs.

The LTM4700 μ Module's highly integrated, component-on-package design includes onboard memory, data conversion circuitry and digital interface, reducing it to nearly half the size of competing devices. Applications include cloud computing, high-speed computing and optical networking systems, communication infrastructure, and PCIe boards, as well as medical, industrial, and test and measurement equipment.

Artesyn Embedded Technologies announced the LGA50D dc-dc module, which boasts one of the highest current density ratings in the industry. With a footprint of just 25.4mm x 12.5mm (1 inch x

0.5 inch), this non-isolated unit offers two independent and configurable 25A, 50W outputs, which can also be combined to a single configurable 50A, 100W output. Up to 4 units can be connected in parallel so that up to 200 amps can be supplied as a single power rail.

The input voltage and output voltage specifications remain the same in any configuration. So, the input is defined as 7.5V to 14V, and the output voltage can always be adjusted within the range of 0.6V to 5.2V. Therefore, Artesyn's LGA50D digital dc-dc converter can support a broad range of semiconductor devices and applications including both analog control and digital control functions. This support lets design engineers control units with resistors or control and monitor the converter modules using the industry-standard PMBus digital interface.

Cadence. Incorporating the latest protocol updates, the Cadence[®] Verification IP (VIP) for PMBus provides a complete bus functional model (BFM), integrated automatic protocol checks, coverage model, and compliance tests. The VIP for PMBus is designed for easy integration in testbenches at IP, systems-on-chip (SoC), and system levels, and helps to reduce time to test, accelerate verification closure, and ensure end-product quality. The VIP for PMBus runs on all major simulators and supports SystemVerilog verification language along with associated methodologies, including the Universal Verification Methodology (UVM) and Open Verification Methodology (OVM).

Delta Electronics, Inc. has introduced the newest innovative additions to their board-mounted dc-dc power converters, the Q54SJ, a series of 48V/54V nominal input, 10.8V output, isolated dc-dc converters. The Q54SJ converters provide up to 1300W of output power. The size of the converters follows the DOSA industry quarter brick standard (2.30"x1.45"x0.48"). The Q54SJ series currently includes two models. The Q54SJ108A2NCDH delivers 1,300W at 10.7Vdc output. The Q54SJ10892NCDH delivers 1,000W at 10.8Vdc output.

The Q54SJ series operates from an input voltage range of 40V to 60V and is available for different output current levels to suit customer's requirement (92A and 121A). There is a built-in digital PWM controller in the converter, which is used to support output voltage feedback, PWM signal generation, fault protection, output voltage trim, on/off control and PMBus™ communications, and more.

Excelsys Technologies, an Advanced Energy company, announced the launch of the CoolX1000, the world's first fanless 1000W modular power supply. Packaged in a compact 6.5 x 10 x 1U U-channel design, the CoolX1000 provides up to 1000W without any requirement for fan or base plate cooling, eliminating acoustic noise detrimental to scientific and medical applications, as well as applications sensitive to vibration or where fan cooling is not available. The CoolX1000 also offers increased flexibility by allowing system designers to monitor and control power supply performance - essential for staving off process disruption - via analog or digital communications (PMBus™).

The series will offer two base models: the CX10S, which is certified to IEC60950 2nd edition for industrial applications, as well as the upcoming IEC62368-1 standard; and the CX10M, which carries IEC60601-1 3rd edition and IEC60601-1-2 4th edition (EMC) for medical applications. Both models can be populated with up to six CoolMods, providing up to 12 isolated dc outputs ranging from 2.5V to 58.0V. Outputs can be configured to the required set point voltages and connected in parallel of the series for higher output current and/or higher output voltages.

Flex Power Modules introduced its first generation of Direct Conversion products to address the growing need for higher energy efficiency levels in data center and cloud computing infrastructure. The new BMR481 DC-DC converter has an input range of 40-60V targeting 48-54V nominal supplies, and a programmable 0.5-1.35V output. The 12 x 27.7mm footprint 'main' module provides a maximum output current of 70A and also incorporates a digital interface for monitoring, configuration and control purposes. This Main unit can then be supported by up to 5 additional 'satellite' modules, resulting in a total current rating that reaches 420A.

The Direct Conversion modules offer optimal efficiency across a wide range of loads. Their architecture can be configured with 1 phase up to a maximum of 6. When the current demand increases or decreases during operation, the controller in the Main unit automatically enables or disables Satellites to maintain optimal efficiency across a wide

current range. Six BMR481 units operating in parallel provide above 90% efficiency at 1V from loads of approximately 25A to 375A.

Monolithic Power Systems. To address the challenges of active power management, engineers must now consider solutions built around the PMBus specification, which offers a platform for monitoring and controlling power management devices. To address space-constraint issues, solutions with a minimal number of components must be implemented. The MPQ8645P, the latest point-of-load (PoL) regulator with PMBus integration from Monolithic Power Systems (MPS), provides a way for engineers to meet both sets of system design challenges.

Unlike conventional discrete analog solutions, MPS implements a monolithic solution. The MPQ8645P is a 16V, step-down regulator with PMBus interface that can deliver 30A of current in a single-phase operation, taking advantage of synchronous rectification for optimum efficiency, all on a single silicon die. It is available in a thermally enhanced TQFN (4×5mm) package. The MPQ8645P is about 20 - 50% smaller than discrete analog solutions using a separate controller IC and power stage (not including external components).

Renesas Electronics Corporation announced a new family of encapsulated digital dc-dc PMBus™ power modules. The five RAA210xxx simple digital power modules offer advanced digital telemetry and performance; and are as easy to use as Renesas' analog power modules.

They are complete step-down regulated power supplies that deliver 25A, 33A, dual 25A, 50A, and 70A of output current, while operating from industry-standard 12V or 5V input power rails. The RAA210xxx family provides point-of-load (POL) conversion for advanced FPGAs, DSPs, ASICs and memory used in servers, storage, optical networking, and telecom equipment.

TDK Corporation has announced the introduction of the conduction cooled TDK-Lambda PFH500F-28 ac-dc third-generation power supplies. They deliver 504W at 28V, feature a compact 4" x 2.4" footprint and have optional Read/Write programming and communication through a PMBus™ interface. Applications include COTS (Commercial-Off-The-Shelf), power amplifiers, LED displays and test equipment. The PFH500F-28 series utilizes GaN semiconductors, bridgeless power factor correction, synchronous rectification and digital control, enabling efficiencies of up to 92%. Opto-couplers have been replaced by digital isolators for long term reliability and stability.

Accepting an 85- to 265-Vac input, the modules deliver 28V at 18A and can be adjusted from 22.4 to 33.6V using the trim pin or PMBus interface. Baseplate cooling allows operation at temperatures ranging from -40 to +100°C. The metal enclosure measures 4 x 2.4 x 0.53" (101.6 x 61.0 x 13.3mm) and is encapsulated for MIL-STD-810G shock and vibration. Features and options include a 12V standby voltage with 200mA (or 2.4W) capability, remote on/off, pre-biasing start-up, droop mode current share, a DC Good signal, various protections

(OVP, UVP, OCP, OTP) and a PMBus interface. The interface can be used to program (read-write) the output voltage and fault management functions and monitor the unit's operating status.

If your company has new products that you would like to be included in our next newsletter, just send an email with the subject line "new product(s)" and the details to admin@smiforum.org. Then watch this space for updates.

Website Updates

Based on the onslaught of new product announcements, 13 new items have been added to the Products pages. Members' PMBus-related listings have increased to 401. These include PMBus-compliant semiconductor and power supplies as well as other supporting material such as application notes, evaluation kits, articles, reference designs, and videos.

The dedicated *Products* pages are one of the benefits of PMBus membership. They enable our members to identify and promote all of their PMBus-compliant products. We encourage you to contact us when you are ready to include or update your company's product listings.

You can click [here](#) to see an example of the *Renesas Products* page. Be sure to utilize the "Featured Product", option which includes graphics on your company's page. Please send any request for changes to admin@simforum.org.

New Website.

Development of our new PMBus website continues. Based on feedback received, we are redesigning the sort/filter functionality to make it easier to find products as well as reviewing the product category classifications. In addition to a new 'look & feel', the site will include simplified usability for content updates and an integrated contact database for subscription and email.

For those of you on our mailing list, you will receive an email notification as soon as the new website is launched.

Promotional Activities

We invite you to join the [PMBus Group](#) on LinkedIn. In the future we will be utilizing the platform for new product announcements, meeting notifications and other newsworthy items.

Upcoming Events

Mark your calendars to visit the PMBus booth at the upcoming **APEC 2020 Conference & Expo** at the Ernest N. Morial Convention Center in New Orleans, LA
March 15-19 / March 17-21.

FAQ

This newsletter's *Frequently Asked Question* section includes a recently received question along with the detailed answer.

Question: *How should undefined specifications be interpreted? For example, in Table 2 the Clock/Data Fall Time (tf) and Clock/Data Rise Time (tr) do not have a minimum time defined. Should this be interpreted as On's or truly as "don't care"?*



Quarterly Newsletter

Winter 2019

Can a compliant device have a fall/rise time spec of 295ns to 300ns and still meet the SMBus 3.1 spec?

Answer:

Effectively the specification is 0 ns. However, physics set the real limit.

For rise time, the 300 ns specification essentially sets a maximum value for the pullup resistor for a given maximum bus capacitance. Once the pullup resistor value is chosen, then the minimum rise time will be set by the minimum value of the pullup resistor and the minimum bus capacitance (generally I/o pin capacitance of one device).

For the fall time, the minimum fall time is set by the on-resistance of the transistor driving the clock or data line and the total bus capacitance.

So one cannot really specify an SMBus device to have a fall or rise time specification of 295 ns min, 300 ns max as the device itself has little to do with the rise and fall time (governed by pullup resistors and total bus capacitance).

Have a question about the PMBus or SMBus specifications? SMIF technical volunteers provide free answers. Send your question to

techquestions@smiforum.org and a PMBus or SMBus consultant will respond.

Other Items

The PMBus name and logo are registered trademarks of SMIF. PMBus adopters who are SMIF members in good standing are allowed free, unlimited commercial use of the PMBus name and logo. Proper usage of the name and logo is important in order to retain our rights. Please encourage your company's marketing communications department to collaborate with SMIF whenever there are publications or questions.

Please remember to use the ® symbol when referencing PMBus and the ™ symbol with AVSBus in data sheets, press releases or other written material. It should be included in any title or blurb and with the first usage in the main text for articles. The logo graphics for web postings and hi-res print can be downloaded from the [resources](#) section of the PMBus website.

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