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Introduction

For those of you who plan to attend APEC 2020 in New Orleans, but have yet to register, your procrastination could now pay off. SMIF is once again conducting a raffle giveaway of a free Full Conference badge for the upcoming APEC 2020. The full



registration pass, with a value of up to \$1175, will be awarded to one lucky entrant. The Full Registration allows you to attend all Technical Sessions, Seminars, the Social Event (and of course, the Exhibition Floor) and gives a discount for advanced purchase of the Conference Proceedings.

To sign up for a chance to win, just go to the home page of the PMBus website and register by answering a few easy questions regarding your PMBus[®] activities. Time is short, though, as the drawing will be held on Friday, March 6---just a few weeks away! Only one entry per person will be allowed, and the winner will be contacted directly by SMIF.

Working Group Updates

The PMBus working groups are planning a face-to-face meeting in New Orleans during the APEC 2020 Exposition. The meeting is scheduled for Tuesday, March 17th from 1pm to 5pm at the Omni Riverfront Hotel located on 701 Convention Center Boulevard.

To confirm your attendance, contact the leader of the working groups, Peter Miller of Texas Instrument at peter_miller@ti.com. For those not attending APEC, you can also participate remotely via teleconference. Please join in to contribute to future PMBus specifications, revisions and application profiles.

Membership Updates

Please join us in welcoming a new member to the PMBus consortium, VeriSilicon. of PMBus adopter members. Our total member count is a bit “up in the air” now due to mergers & acquisitions that took place at the end of last year. We will sort through the details and provide an update in the next edition of the newsletter.

VeriSilicon Microelectronics (Shanghai) Co., Ltd. (VeriSilicon) is committed to providing customers with platform-based,

all-round, one-stop custom silicon services and semiconductor IP licensing services leveraging its in-house semiconductor IP. Under the unique "Silicon Platform as a Service" (SiPaaS) business model, depending on the comprehensive IP portfolio, VeriSilicon can create silicon products from definition to test and package in a short period of time, and provides high performance and cost-efficient semiconductor alternative products for IDM, Fabless, system vendors (OEM/ODM) and large Internet companies, etc. VeriSilicon's business covers consumer electronics, automotive electronics, computer and peripheral, industry, data processing, Internet of Things and other applications.

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 new LTC[®]7841 is a high performance PolyPhase[®] single output synchronous boost dc-dc converter controller that drives two N-channel power MOSFET stages out-of-phase. Multiphase operation reduces input and output capacitor requirements and allows the use of smaller inductors than the single-phase equivalent. PolyPhase allows the LTC7841 to be configured for 2-, 3-, 4-, 6-, and 12-phase operation.

The LTC7841 is designed for use in automotive, industrial and medical systems. Synchronous rectification increases efficiency, reduces power loss and eases thermal requirements, enabling high power boost applications. The output voltage can be adjusted up to 60V with 0.2% resolution via a PMBus-compliant serial interface. The serial interface can also be used to read back fault status, input/output current, input/output voltage and temperature. System configuration and monitoring is supported by the LTpowerPlay[®] development system.

Artesyn Embedded Power announced the BDQ1300, a new 1300W, 110A isolated quarter-brick dc-dc converter with 12V output and optional digital control. It has an input voltage range from 40 to 60V, operating temperature range of -40 to +85°C with options for base plate cooling and efficiency rated over 97%. The modules use a standard high-current quarter-brick pin-out with a pair of power pins each provided for the positive output and ground connections to enable the current to be conducted to the host PCB. Conduction losses from the module are minimized using large diameter pins.

The four-pin PMBus header provides standard PMBus control and monitoring functions such as voltage and current monitoring, start-up and shutdown control, protection feature warning and shutdown limits, temperature monitoring functions and revision-control information. The BDQ1300 is also available without the four-pin PMBus connection, which gives a solution of maximum conversion performance with minimum control complexity.

Delta Electronics, Inc., has launched the Q54SH series of high efficiency quarter brick dc-dc converter modules for datacenter, high end server, and networking applications – Q54SH series family. It provides high power from 600W up to 1300W with input voltage range of 40- to 60-V, output voltage of 11.8V and up to 97.8% efficiency.

With PMBus communications interface, Q54SH series can remotely control or monitor power module's status. Q54SH series also can achieve a fast load transient response. Other features include No Minimum Load Requirement, Over Current Protection, Input UVP/OVP, Over Temperature Protection, Remote ON/OFF, Pre-Bias Startup, Active Droop Performance, Parallel Operation with Direct Output Connection and 707Vdc Isolation Voltage.

Flex Power Modules has announced the BMR4615001/001, a new variant of its popular BMR461 series of digital point-of-load (PoL) regulators. The new module provides up to 15A/50W with an input voltage range of 4.5V to 14V at an adjustable output voltage of 0.6-3.3V. Offered in the compact 12.2 x 12.2 x 8.0mm (0.48 x 0.48 x 0.315in) package of the BMR461 series, it features high efficiency of typically 96% at 12Vin, 3.3Vout and 80% load.

The new regulator is part of a family of scalable digital PoL solutions from Flex Power Modules. Each device includes a digital PMBus interface to provide advanced monitoring, configuration and control capabilities, and is fully supported by the Flex Power Designer design tool.

Mean Well has developed the HEP-1000, a 1000W intelligent ac-dc power supply for harsh environments. The HEP-1000 is enclosed in a unique fanless and fully-sealed metal casing and is fully encapsulated with silicone gel, which provides effective environmental protections for harsh environments. Output voltages of 24V, 48V and 100V are available. Another key feature of the HEP-1000 is the integration of power supply and charger in a single model. On the charger side, the HEP-1000 has built-in three-stage programmable charging curves for constant current, constant voltage and floating charge capabilities.

The standard HEP-1000 models are equipped with the PMBus communication protocol, and optional models with the CANBus communication protocol are also available. At the same time, the HEP-1000 has analog controlled programmable voltage and programmable current functions (PV/PC). Through external dc voltage signals, the output voltage and current level can be adjusted between 50% to 125% and 20% to 100% respectively.

Mean Well has released the 2500W UHP-2500 ac-dc power supply. The unique fanless power supply is designed to solve headaches regarding fan failures caused by absorbing dusts, and it can reduce the frequency and cost of device maintenance. Fanless design can also solve fan noise level issues, thus making the UHP-2500 suitable for environment that requires absolute quietness.

The product is equipped with programmable voltage and current (PV/PC) functions, which allows the trimming of output voltage

between 50% and 120% and current between 20% and 100% by an external dc control signal, with PMBus or CANBus communication protocols available. UHP-2500 design meets the EN60335-1 household safety standard.

Mean Well's PHP-3500 is a 3.5kW single output enclosed type ac-dc water-cooled power supply which adopts fully digital power supply design. Features include 96% efficiency, programmable output, support communication, multiply output power in parallel connection, 60mm profile and 18W/inch³ power density. This series can operate at both 90 to 264Vac and 120 to 370Vdc input voltage and offers models with 24 or 48Vdc outputs mostly demanded by the industry. Unique water-cooling technology offers improved reliability with the most effective heat dissipation while eliminating acoustic fan noise and power fail problems triggered by a fan failure event.

The PHP-3500 provides vast design flexibility by equipping various built-in functions such as auto de-rating function, remote ON-OFF control, auxiliary power, active current sharing and built-in ORing FETs for output parallel configuration up to 14kW. This series features built-in PMBus communication protocols, with CANBus as an option. By integrating Mean Well's human-machine interface (HMI) with digital power units, simultaneous system-wide power management is feasible through digital controllers on-board HMI and PSUs.

Monolithic Power has launched the MPM3695A-10, an ultra-thin, scalable and fully integrated power module with PMBus

interface. MPM3695A-10 offers a complete power solution that achieves up to 10A of continuous output current with excellent load and line regulation over a voltage range from 3V to 14V. Its 1.6mm height enables placement on the back-side of a PCB for space optimization. The module operates at high efficiency and can be paralleled to deliver up to 60A of continuous current.

The MPM3695A-10 uses MPS's proprietary, multi-phase constant-on-time (MCOT) control, which delivers ultra-fast transient response and simple loop compensation. The PMBus 1.3 compliant interface provides module configurations and monitors critical parameters. Telemetry read-back includes Vin, Vout, Iout, temperature, and faults. It operates in either PWM mode or switching frequency mode.

Monolithic Power Systems announced the MP2853, a dual-loop, digital, multi-phase controller that provides power for the core of the AMD SVI 2.0 platform. The MP2853 can work with MPS Intelli-Phase products to complete the multi-phase voltage regulator (VR) solution with minimal external components. It can be configured with up to 4-phase operation for Rail 1 and up to 2-phase operation for Rail 2.

The MP2853 provides an on-chip EEPROM to store and restore device configurations. Device configurations and fault parameters can be programmed easily or monitored via the PMBus/I2C interface. The MP2853 can monitor and report output current through the CS output from Intelli-Phase products. With only one power-loop control method for both

steady state and load transient, the power loop compensation is very easy to configure.

Murata Power Solutions announced the expansion of its D1U54 Series with the 2000W rated D1U54-x-2000-12, the latest in its line of slim, redundant, ac-dc power supplies and dc-dc converters. In an industry standard 1U x 2.15" x 12.65" (1U x 54.5mm x 321.5mm), this Series provides 2000W continuous output power with cold redundant power management features, an impressive 46W/inch³ power density and Platinum efficiency (94% efficient at 50% load).

Active ORing devices on the output of the D1U54-x-2000-12 Series ensures no reverse load current and renders the supply suited for operation in redundant power systems. These models are hot swappable and can be connected in parallel with active current sharing. PMBus communication allows complete monitoring of the D1U54-x-2000-12 Series, including input and output voltage, current, power, and critical component temperatures. Multiple protections such as over-voltage, over-current, and over-temperature are standard.

TDK Corporation has added the 2kW QM8B series of ac-dc power supplies with the capability of providing up to 18 outputs. This further extends the QM modular power supply series to now cover 550W to 2kW. Like all the models in the QM series, the QM8B features low acoustic noise and full MoPPs isolation. Features include both medical and industrial safety certifications, up to 91% operating efficiency, operation in ambient temperatures of -20°C to +70°C and an online product

configurator for optimizing output module selection.

Accepting a wide range 90- to 264-Vac, 47-440Hz input, the QM8B can deliver 1.5kW output power or a full 2kW with a high line input of 180- to 264-Vac. Available output voltages range from 2.8V to 105.6V and up to eight single or dual modules can be fitted. Optional standby/signal modules can be specified with a choice of one or two standby voltages (5V, 12V and 13.5V at up to 2A), a PMBus communication interface and unit inhibit or unit enable, and an AC Good signal.

TDK Corporation has introduced the TDK-Lambda brand TPS4000-24 ac-dc industrial power supply, extending the existing 3000W rated TPS series. Delivering up to 4080W output power (24V at 170A) in a 2U high package, the TPS series operates from a wide range Delta or Wye 350- to 528-Vac three-phase input. The output voltage can also be adjusted from 19.2 to 28.5V and the current limit point by 70-105% using front panel potentiometers or an analog 0-5Vdc voltage. The 92% efficient unit can operate at full load in ambient temperatures of up to 50°C, and deliver up to 55% load at 70°C. Up to eight units can be connected in parallel for higher power and internal ORing FETs allow redundant operation.

The TPS4000-24 is fully featured with isolated AC Fail, DC Good and dropped phase signals, remote on/off, remote sense and a 12V 0.3A standby supply. A PMBus communications interface allows remote monitoring of the output voltage, output current, internal temperature, status signals

and fan speed. In addition, the output voltage, over current limit and the remote on/off can be programmed by the PMBus.

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

Our PMBus members continue to expand their offerings of compliant products. As of this moment there are 455 items shown across the *Products* pages of the PMBus website. 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 [Flex Power 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

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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 #754 at the upcoming **APEC 2020 Conference & Expo** at the Ernest N. Morial Convention Center in New Orleans, LA March 15-19. This year Artesyn will be demonstrating their PMBus communications over an ethernet link to remotely control a power supply back at their laboratory in Arizona.

FAQ

In this newsletter’s *Frequently Asked Question* section we’ve included a Q&A exchange that was recently submitted to our technical experts.

Question: *What is difference between a Write Byte with PEC and a Block Write with no PEC? They are both 4 bytes with the same start, stop and ack conditions.*

If a device receives these 4 bytes how is it supposed to know which way to interpret them, since PEC is optional?

Answer: The protocol (e.g. Write Byte) associated with each Command Code must be unique. This is how the slave device knows which protocol to expect. The Master may or may not send a PEC byte with any given

transaction (some exceptions, some ARP processes required a PEC byte).

Suppose the protocol associated with command code 0x00 is Write Byte. Then a transaction with a PEC byte would proceed as follows:

Master: START Condition

Master: Address byte with bits [7:1] = slave address and bit [0] = 0 indicating a write (most always a write as the Command Code is coming next)

Slave: ACK

Master: 0x00 // One byte command code. Now the slave knows that the Write Byte protocol is to be expected.

Slave: ACK

Master: One data byte

Slave: ACK //Slave now has the one data byte it is expecting

Master: PEC Byte //Since the slave knows that it already has the data byte and the Write Byte protocol is being used, then this must be a PEC byte.

Slave: ACK or NACK depending on whether or not the PEC byte as transmitted by the master matched the PEC byte computed by the slave

Master: STOP condition //Ends the transaction. The slave now processes the data byte according to the Command Code

Further, a transaction without a PEC byte would proceed as follows:

.....

Master: START Condition

Master: Address byte with bits [7:1] = slave address and bit [0] = 0 indicating a write (most always a write as the Command Code is coming next)

Slave: ACK

Master: 0x00 // One byte command code. Now the slave knows that the Write Byte protocol is to be expected.

Slave: ACK

Master: One data byte

Slave: ACK //Slave now has the one data byte it is expecting

Master: STOP condition //Ends the transaction. The slave now processes the data byte according to the Command Code

Follow on Question: *Thank you for the detailed explanation and it mostly clears up my confusion except for one thing. How do Command Codes get associated with different protocols (in your example, how would someone know that 0x00 means Write Byte)? I do not see this information in the SMBus Spec (3.1).*

...and Answer: The SMBus standard is only concerned with moving bytes (commands and data) from one device to another. The SMBus standard, like the I²C standard, does not assign any meaning to those bytes. That meaning is assigned by IC manufacturers, SMBus users, or in a higher level standard. For the SMBus two of the most common higher level standards are the



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Smart Battery standards and the PMBus® power management protocol standard.

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.

Contacts:

Membership inquiries:
admin@smiforum.org

Tech help:
techquestions@smiforum.org

General:
questions@smiforum.org

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