Quarterly Newsletter

Spring 2021

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Introduction

Despite the challenging fall and winter due to the COVID-19 pandemic, the PMBus® consortium continues to grow and thrive. Membership is growing. The Working Group and sub-groups are defining specifications. Members continue to release new PMBus compliant products. Listings on our Product Pages continue to increase as more members update and/or display their portfolios. And, our new website will launch soon.

Details on all of the above are included in this issue of our quarterly newsletter. So, read on and get caught up to date with the latest going-ons!

Working Group Updates

The PMBus Specification Work Group continues to meet weekly and work diligently through clarifications and updates to SMBus revision 3.2 and PMBus 1.4. Both are expected to be released later this year. In addition to minor editorial changes and clarifications, PMBus 1.4 will add new commands that better enable system designers to interface with increasingly complex power solutions.

In addition to the new specification revisions, the Work Group is continuing development of a PMBus-endorsed standard configuration file format. The goal is to help original equipment designers and manufacturers to more easily integrate PMBus components from multiple vendors into a single system. As always, the PMBus Specification WG is looking for participants to help review and support the PMBus standard as we move forward.

The *Standard Configuration File Format sub-group* is actively looking for participants with software coding experience. The focus is to assist in developing a Configuration File Format parser to convert the standard configuration files into SMBus instructions to detect, configure, and verify digital power devices using PMBus.

If you would like to contribute or have questions, please contact admin@smiforum.org.

Membership Updates

Membership activity since our last newsletter has been, to say the least, very busy. Please join us in welcoming four new members to the PMBus consortium. Applied Kilovolts, D-Clue Technologies and Richtek and Vishay are now Full Members. Read below for details on all four companies.

D-CLUE Technologies Co., Ltd., headquartered in Yokohama, Japan, is a pioneer in Power Amplifiers. D-Clue is a leading design company focused on analog/RF and platform technology.

D-Clue solves customer problems with mixed signal technologies.
Sensing—Processing—Connecting.
With core Technology sensing modules, D-Clue help customers move to the Internet of Things (IoT). "D" of D-Clue means Design, Development, Dynamic and Dream.
The "C" of D-Clue means "We provide a Clue to Design, Development and work Dynamically to catch Dreams with customer".

Applied Kilovolts, a part of Adaptas Solutions, is a recognized leader in the design, manufacture, and supply of High Voltage (HV) power supplies for quadrupole and time-of-flight mass spectrometry — featuring deep experience in the areas of Ripple, Stability, and Low-Frequency noise.

RichTek Technology Corporation is one of the world's leading analog IC companies. The company consistently delivers inventive power management solutions that improve the performance of consumer electronics, computers, and communications equipment. RichTek adds value to end equipment by synthesizing technological innovation, uncompromised quality, and devotion to customer service. Founded in 1998, the Company is headquartered in Taiwan with additional offices in Asia, the U.S., and Europe. For more information about Richtek and its analog IC solutions, please visit the Company's Web site at www.richtek.com.

Vishay manufactures one of the world's largest portfolios of discrete semiconductors and passive electronic components that are essential to innovative designs in the automotive, industrial, computing, consumer, telecommunications, military, aerospace, and medical markets. Serving customers worldwide, Vishay is The DNA of tech™. Vishay Intertechnology, Inc. is a Fortune 1,000 Company listed on the NYSE (VSH). More on Vishay at www.vishay.com.

With the latest additions, the PMBus consortium now has 44 members. There are 42 adopters and 2 tools members.

"Interested in joining PMBus? Please refer to the *Adopt PMBus* page of our website for the full details and benefits of membership. 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

ABB's new DJT090 DecaDLynx II non-isolated power modules provide full rated power of 90A at typical operating conditions and can be linked in parallel with up to eight units to achieve a maximum output current of 720A. The DC-DC converter fits into a 327 mm^2 footprint and achieves a 178 A/in^2 power density.

The power supplies can accommodate input voltages ranging from 7.0 to 14.4 volts (V) DC, with precisely regulated, programmable output voltages of 0.50V to 2V. Using built-in PMBus controls, the converters can be digitally configured to support the tight voltage rails for high-performance processors and in application-specific integrated circuits (ASICs), high-current field-programmable gate array (FPGA) processors, ARM

processors, test and measurement devices, and data storage equipment.

ABB has expanded its line of CC-series conduction-cooled rectifiers with the addition of the CC2725AC34TZL, CC2725AC48TZL and CC3500AC52TZL power supplies. The new rectifiers feature wide output voltage ranges:

- CC2725AC34TZL - 28-36VDC output with 94% efficiency
- CC2725AC48TZL - 30-58VDC output with 95% efficiency
- CC3500AC52TZL - 42-53VDC output and 80 PLUS Titanium-level 96% efficiency.

The rectifiers have fully digital operation, PMBus-compliant I^2C serial bus and RS485 communications for diagnostics, reporting, remote monitoring and, for the CC3500AC52, remote firmware updates. Additional features include OVP/OTP/OCP; redundant, parallel operation with active load sharing and redundant 5V auxiliary power; and PFC that meets both EN/IEC 61000-3-2 and EN 60555-2 requirements.

Advanced Energy's Artesyn's new µMP series GEN II power supply features a very wide 85 to 264 Vac input voltage range and employs active power factor correction to minimize input harmonic current distortion and to ensure compliance with the international EN61000-3-2 standard. The power supplies also feature active AC inrush control to automatically limit inrush current at turn-on to 40 A maximum

The µMP series GEN II can deliver up to 1800 Watts maximum with up to 12 outputs from the µMP16 case. The power supply has a low profile 1U size and has a power density of more than 22.9 Watts per cubic inch. When fed with a 180 to 264 Vac input, the µMP series GEN II can achieve a very high - 91.5% typical efficiency at full case load.

Flex Power Modules announced the launch of the BMR492 – a series of digital eighth-brick intermediate bus converters capable of delivering between 600 to 800W of continuous power along with a peak power of up to 1100 W for short periods <1s. This so-called 'burst mode' operation is commonly required for CPUs for datacom and data center applications. The baseplated converters have a standard DOSA pinout including the 7-pin digital header for the PMBus interface.

The new BMR4920302/861 converter, the first of three variants of the BMR492 family to be introduced, delivers a 12V output. Rated to a maximum 600W output over an input voltage range of between 40-60V, the DC/DC step-down solution is ideal for nominal 48 or 54 V input voltage systems commonly found in data center server applications. The through-hole mounted device is fully regulated and includes an input to output isolation voltage of 1500Vdc.

Maxim Integrated Products new PMBus 1.3 compliant MAX20796 offers a fully integrated, highly efficient, two-phase switching regulator for applications operating from 4.5V to 16V and requiring up to 60A maximum load or 90A with an optional third-phase external power stage. The output voltage range can be configured from 0.5V to 5.5V with some restrictions on

duty cycle. The switching regulator uses a fixed-frequency control scheme providing an extremely compact, fast, and accurate power delivery solution for server and telecom applications. Integrated linear regulators allow single-supply operation.

Key system parameters are configured by external resistors, including the selection of soft-start timing, output voltage, switching frequency, 32 PMBus addresses, overcurrent trip point, and loop control parameters. The device operates with either coupled or discrete inductors. The device is also available as MAX20796A, which is preconfigured for a 1V, 800kHz application with LEAD_LAG enabled.

Maxim Integrated Products new MAX20710 is a fully integrated, highly efficient switching regulator with PMBus for applications operating from 4.5V to 16V and requiring up to 10A (max) load. This single-chip regulator provides extremely compact, high efficiency power-delivery solutions with high-precision output voltages and excellent transient response for networking, datacom, and telecom equipment.

The IC offers a broad range of programmable features through either the PMBus or a capacitor and resistor connected to a dedicated programming pin. The IC includes protection and telemetry features. Positive and negative cycle-by-cycle overcurrent protection and overtemperature protection ensure a rugged design. Input undervoltage lockout shuts down the device to prevent operation when the input voltage is out of specification. A status pin provides an output signal to show that the output voltage is within range and the system is regulating.

MEAN WELL released the 1000W HEP-1000-W series to provide a complete harsh environment AC/DC power supply product. The input and output adopt waterproof wires, meeting the IP67 standard. The specifications allow this power product to be used in outdoor equipment or high humidity/high dust environments. The HEP-1000 series adopts MEAN WELL's unique fully potted design filled with top-grade silicone gel, effectively helping the components to dissipate heat and avoiding failure caused by high dust and high humidity environments.

The HEP-1000-W series is also designed with power supply and charging functions. With programmable voltage and constant current function (PV/PC), by applying a 0~5 DC voltage, the output voltage can be adjusted in a wide range from 50% to 125% and constant current 20% to 100%. Featuring built-in standard communication PMBus and CANBus protocols, HEP-1000-W series can be integrated into the high-end system seamlessly, making it a controllable peripheral device to bring several benefits, such as power conservation, easy monitoring, and fast communication.

Murata Manufacturing Co., Ltd. has added 2 new POL DC-DC converters with the PMBus interface to the small size, high power density, and high reliability "MonoBK™ (monoblock)" series. The new products are the 24A MYMGM1R824ELA5RA and 16A MYMGM1R816ELA5RA housed in a 10.5 mm × 9.0 mm × 5.0 mm (length × width ×

height) SMD package with a -40°C to 105°C operating temperature.

The MYMGM series is equipped with an industry standard PMBus interface that makes it possible to configure, control, and monitor power supply. It also has 20% higher power density compared with the existing "MonoBK™". In addition, with the downsizing of modules made possible by Murata's original packaging technology, the mounting area of FPGAs, ASICs, and other LSI power supply rails was reduced.

TDK-Lambda announced the TPS4000-48 power supply, further extending the existing 3kW to 4kW rated TPS series. Delivering up to 4080W output power (48V at 83.3A) in a 2U high package, the TPS4000 series operates from a wide range Delta or Wye 350 – 528Vac three phase input. The high voltage, three-phase input avoids the requirement for costly step-down transformers and assists phase load current balancing. 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. Cooling is provided by an internal temperature-controlled fan to reduce acoustical noise in a case measuring 107 x 84.4 x 335mm.

The TPS4000 series 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. The output voltage can also be adjusted from 38.4to 58V and the current limit point by 70-105% using front panel potentiometers or an analog 0-5Vdc voltage. Up to eight units can be connected in parallel for higher power and internal ORing FETs allow redundant operation.

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

Product Page Listings

A concerted effort is ongoing to help our members display all of their PMBus-compliant products. The results this period is that more than 100 items were added to the products listing. As of this newsletter there are 634 items displayed on the *Products* pages of the PMBus website. Included are semiconductors 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 Electronics *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
After some unanticipated delays, the new PMBus website is expected to launch in early April. In addition to a new 'look & feel', it will simplify usability for content updates and includes an integrated contact database for our email and newsletter subscription list. For the 2600+ of you on our mailing list, you will receive an email notice 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

As of present, this year's **APEC 2021 Conference & Expo** for June 9-12 at the Phoenix Convention Center in Arizona. Keep your fingers crossed that we will be able to attend the event in person. If not the case, the APEC committee is exploring options for hosting a virtual event online. PMBus plans to participate regardless of the 'venue'.

FAQ

The *Frequently Asked Question* section addresses recent technical inquiries to PMBus experts. This publication has a three-part question related to configuration settings of PMBus devices.

I have a few questions about the ON_OFF_CONFIG setting => Bits<7:1> set to 0001_111(b) => indicates start the regulation when both control pin and soft enable bit (operation bit #7) are high.

Question 1: *If Bit #0 of ON_OFF_CONFIG is high, indicating immediate shutdown, and if OPERATION bit#6 is high indicating soft shutdown, what should the unit do, Immediate shutdown or soft shutdown (uses TOFF_DELAY & TOFF_FALL) or vice versa?*

Answer 1: Note that bit [0] of the ON_OFF_CONFIG command (described in Table 10) refers to what happens when the CONTROL pin changed from the level indicating "Run" to the level indicating "Stop".

Bit [6] of the OPERATION command indicates what happens when the PMBus device is commanded to turn off using the OPERATION command.

These are independent. For example, it is possible to configure the PMBus device to turn off immediately when the CONTROL pin says turns off (ON_OFF_CONFIG.0 = 1) and for the PMBus device to use power down sequencing when turned off with the OPERATION command (OPERATION.6 = 1).

Question 2: *If Bit #0 of ON_OFF_CONFIG is low indicating soft shutdown and if OPERATION bit#6 is low indicating immediate shutdown, what should the unit*

do, Immediate shutdown or soft shutdown (uses TOFF_DELAY & TOFF_FALL)?

Answer 2: The previous answer also applies to your Question 2. How the PMBUs device behaves at turn off depends on the settings of ON_OFF_CONFIG and OPERATION and how the device is commanded to turn off (via the CONTROL pin or via the OPERATION command).

Question 3: The shutdown behavior => The device shuts down when soft enable goes low **or** control pin goes low; any of these controls going low initiates the shutdown. Is this correct?

Answer 3: If ON_OFF_CONFIG[3:2] = 11 then both the CONTROL pin AND the OPERATION command must be commanding the PMBus device to run. If this AND condition is not met then the device turns off (and how it turns off depends, as described above, on how it is being commanded to turn off, via the CONTROL pin or the OPERATION command).

Note the active level of the CONTROL pin is set by bit [2] of the ON_OFF_CONFIG command. In your example value of bit [2] = 1 then the CONTROL pin requires a high level to start/run.

Have a question about the PMBus or SMBus specifications? SMIF technical consultants 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