MARS Smart Battery Module

+12 VDC
+5 VDC
+5 V Standby
optional:
-5 VDC
-12 VDC
+3.3 VDC
VSB#1
VSB#2
SM-Bus

5 V-28 VDC
alternative
ATX
20 or 24 ATX + 4
Carrier board

SM-Bus
Feature
comm. (SM-Bus)

Computer-on-Module

MARS Smart Battery Module

Test setup: MARS platform with ETXexpress® computer-on-module and ETXexpress® miniBaseboard

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K-station
Powerful software toolkit and developer library for Computer-on-Modules.

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» Evaluate efficiently: Smart Battery Starter Kit
» Broadly scalable: Input voltage range 5 VDC to 28 VDC
» Configure optimally: Use ready-made modular building blocks
» Use in parallel: Support for two smart batteries
» Save time and money: Proven layout and schematic documents

» Benefits in a nutshell «

» MARS «

Modular Building Blocks
Layout Schematics
Development Kit

Smart ready-to-use power solution
» Mobile Application platform for Rechargeable Systems
» Minimize efforts, save time and money
» Use ready-made building blocks and proven layout & schematics

» Learn more «
» Ready, Steady, MARS «

Time-to-market vs. development effort

MARS is a universal development platform for all Kontron modules based on the ETX® or COM Express® standards. It allows you to save a great deal of time and effort when developing Smart Battery concepts. Simply adapt the modular building blocks you need and utilize the proven layout and schematics instead of having to develop them from scratch.

MARS Development Kit

Develop your own mobile power supply solution and evaluate the best functionality for your application with the reference platform. It includes an AXX power controller, an SM-Bus connecting cable and a Y-power cable, so your test setup is ready to run in just a few minutes.

Proven layout & schematics

Speed up your design-in with complete modular building blocks including layout and schematics, without losing time!

Support for two smart batteries

The input voltage range can be flexibly scaled from 5 V to 28 V. MARS supports a wide variety of differing battery types even if these form part of a single application. You can use MARS as an intelligent battery system and run two rechargeable batteries simultaneously. In addition, these act as backup for an uninterruptible power supply, thus guaranteeing system security.

» Flexible power concept «

Mobility is increasing

More and more manufacturers are depending on intelligent battery management solutions. Typical applications include mobile medical patient monitoring, mobile measurement devices, rugged computer units for outdoor use, surveying equipment and vehicle diagnosis.

» Configuration for any application «

Battery concepts

- Lithium-polymer (lipo): For mobile telephones and notebook computers
  - Shorter life expectancy: 300-500 charge cycles
  - Needs no maintenance
  - Greater energy density than NiCd

- Lithium-ion (li-ion): For radio and medical equipment and tools
  - Longer life expectancy: 1500 charge cycles
  - Needs maintenance
  - Contains no poisonous metallic substances

- Nickel-Cadmium (NiCd): For mobile telephones
  - Needs no maintenance
  - No maintenance
  - Greater energy density than NiCd

Comparison of battery types

Niche-Metal hybrids (NiMH):
- Greater energy density than NiCd
- Shorter life expectancy: 500-1000 charge cycles
- Contains no poisonous metallic substances
- For mobile telephones, laptop computers
- Nickel-Cadmium (NiCd):
- Moderate energy density
- Longer life expectancy: 1500 charge cycles
- Suitable for large temperature ranges
- For radio and medical equipment and tools
- Lithium-ion (Li-ion):
- Offers high energy density at low weight
- Shorter life expectancy: 500-1000 charge cycles
- Needs maintenance
- For mobile telephones and notebook computers

Suspend-Load-Polymer (LSP):
- Increased safety. More resistant to overcharging
- Shorter life expectancy: 500-1000 charge cycles
- Needs maintenance
- For mobile telephones

Energy-saving modes (ACpi standard)

50 – System fully functional: All systems up and running.
51 – Basic sleep mode: A few functions are deactivated, the CPU stops executing instructions.
52 – Extended sleep mode: further components are deactivated, particularly the CPU cache.
53 – Standby mode: Most hardware on the motherboard is deactivated, operating state is stored in volatile memory (Suspend To RAM – STR, Suspend To Memory – STM).
54 – Hibernation mode: Operating state is stored in non-volatile memory (Suspend To Disk – STD).
55 – Soft-off mode: The system is shut down but the power supply continues to deliver power and the system can be woken by input from a supported power-on source (power-on switch) connected to the mainboard or, depending on the model and the BIOS setup, via the network interface.

www.kontron.com/mars
MARS is a universal development platform for all Kontron modules based on the ETX® or COM Express™ standards. It allows you to save a great deal of time and effort when developing Smart Battery concepts. Simply adapt the modular building blocks you need and utilize the proven layout and schematics instead of having to develop a complete system yourself. Draw on all of the resources that MARS offers and you'll gain the development time that you need to get your target application faster to market.

Mobility is increasing

More and more manufacturers are depending on intelligent battery management solutions. Typical applications include mobile medical patient monitoring, mobile measurement devices, rugged computer units for outdoor use, surveying equipment and vehicle diagnosis.

Battery concepts. Simply adapt the modular building blocks and layout and schematics, without losing time!

Support for two smart batteries

The input voltage range can be flexibly scaled from 5 V to 28 V. MARS supports a wide variety of differing battery types even if these form part of a single application. You can use MARS as an intelligent battery system and run two rechargeable batteries simultaneously. In addition, these act as backup for an uninterruptible power supply, thus guaranteeing system security.

Comparison of battery types

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**Flexible power concept**

Comparison of battery types

- Nickel-Metal hybrid (NiMH):
  - Greater energy density than NiCd
  - Slower life expectancy: 100-150 charge cycles
  - Contains no poisonous metal substances
- Nickel-Cadmium (NiCd):
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- Nickel-Metal hydride (NiMh):
  - Greater energy density than NiCd

Energy-saving modes (ACpi standard)

- **S0 – System fully functional**: All systems up and running.
- **S1 – Basic sleep mode**: A few functions are deactivated, the CPU stops executing instructions.
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**Power supply blocks**

- Buck Boost Converter IN
- Dual Buck Boost Converter OUT
- Buck Boost Converter OUT

**MARS Applications**

- MARS REfeRence Applications
- MARS Applications ON Certified Design Partner Baseboards

**MARS Applications ON Certified Design Partner Baseboards**

- **Application**: Mobile telecommunication system
  - Vertical market: Medical
  - Application: Mobile test system for control and diagnosis
  - Vertical market: Medical

**MARS Development Kit**

Develop your own mobile power supply solution and evaluate the best functionality for your application with the reference platform. It includes an ATX power cable, an SM-Bus connecting cable and a Y-power cable, so your test setup is ready to run in just a few minutes.

**Proven layout & schematics**

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**Support for two smart batteries**

The input voltage range can be flexibly scaled from 5 V to 28 V. MARS supports a wide variety of differing battery types even if these form part of a single application. You can use MARS as an intelligent battery system and run two rechargeable batteries simultaneously. In addition, these act as backup for an uninterruptible power supply, thus guaranteeing system security.

- **MARS Starter Kit** - Technical Information
  - **System shuts down in controlled form into a defined operating state**
  - **For mobile telephones and notebook computers**
  - **Needs no maintenance**
  - **Shorter life expectancy: 300-500 charge cycles**
  - **Offers high energy density at low weight**
  - **Uninterruptible power supply by means of Li-Ion rechargeable battery**
  - **For mobile telephones, laptop computers**
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  - **Shorter life expectancy: 300-500 charge cycles**

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**Power supply blocks**

- **Buck Boost Converter IN**: Automatic voltage adaptation
- **Dual Buck Boost Converter OUT**: 12 V ATX output for batteries with lower voltages
- **Buck Boost Converter OUT**: Li-Ion output for batteries with lower voltages

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Li-Ion and LiPo up to 4S3P: e.g. 2S2P (7.2 V), 3S3P (10.8 V), 4S3P (14.4 V)

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- optional:
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  - +3.3 VDC

**VSB#1**

- SM-Bus

**VSB#2**

- Computer-on-Module

**SM-Bus**

- 20 or 24 ATEX + 6

**Feature connector (SM-Bus)**

**MARS Smart Battery Module**

**Carrier board**

**Hardware-related services and customizations**

More information on training courses is available at [www.kontron.com/specialtrainings](http://www.kontron.com/specialtrainings).

**FACE TO FACE WITH CUSTOMERS NEEDS**

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**Smart ready-to-use power solution**

- Mobile Application platform for Rechargeable Systems
- Minimize efforts, save time and money
- Use ready-made building blocks and proven layout & schematics

**If it’s embedded, it’s Kontron.**

**MARS**

**Modular Building Blocks**

- Layout
- Schematics
- Development Kit
**MARS Smart Battery Module**

- +12 VDC
- +5 VDC
- +5 V Standby
- optional: -5 VDC, -12 VDC, +3.3 VDC

**Feature connector (CPR-Bus)**

- SM-Bus

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**MARS Smart Battery Starter Kit**

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- Use in parallel: Support for two smart batteries
- Save time and money: Proven layout and schematic documents

**Kontron Academy**

Kontron’s workshops provide a solid basis for the use, development and design of Kontron boards. Hands-on use of the development environment and understanding the building process and programming interfaces are the primary objectives of the Kontron training courses. Different workshops are available to address all the developer’s hardware and software needs.

More information on training courses is available at www.kontron.com/specialtrainings

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