CB71

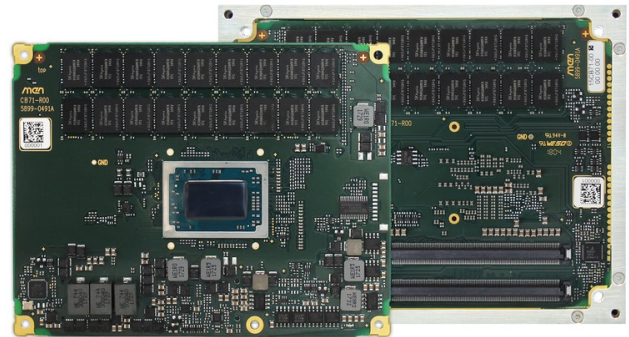## Rugged COM Express Module with AMD Ryzen Embedded
COM Express Basic, Type 6

» **AMD Ryzen Embedded V1000/R1000 APU**

» **Up to 32 GB DDR4 RAM with ECC**

» **Up to 4 Digital Display Interfaces (DP, eDP, HDMI, DVI)**

» **Hardware memory encryption**

» **Safety-relevant supervision functions**

» **Virtualization-ready**

» **Excellent price-performance ratio**

» **-40 °C to +85 °C Tcase, depending on processor**

» **Conduction cooling**

» **Compliant with COM Express Basic, type 6**

» **PICMG COM.0 and Ultra-Rugged COM versions**

Truly Rugged COM Express Module

The CB71 is a rugged COM Express module with Type 6 Pin-Out for demanding applications in the railway, public transportation and industrial markets. Its high-performance features match the requirements of applications like data acquisition, infotainment, transcoding or live 3D. The rugged CB71 is designed for operation from -40 °C to +85 °C. To withstand serious shock and vibration, only soldered-down components are used. The design is optimized for conformal coating.

Versions for Extremely Harsh Environments

For applications that need reliable operation even under the harshest environmental conditions, a specially hardened version is available - the CB71C. CB71C modules are embedded in a closed aluminum frame that ensures optimum EMC protection and efficient conduction cooling. Direct air cooling is possible by placing a heat sink on the cover. The innovative mechanical design around the COM.0 electronics makes it an ultra-rugged module.

Powerful Processing and Graphics on a Single Chip

The CB71 is based on AMD's Ryzen Embedded V1000/ R1000 APU family. It is equipped with a Radeon Vega next-generation 3D graphics engine and supports up to 4 displays with a resolution of up to 4k without the need for additional graphics hardware. With two (R1000) or four (V1000) high-performance processor cores and AMD-V extension, the CB71 is also suitable for virtualization.

Excellent Price/Performance Ratio, Flexible Design

The CB71 can be equipped with an R1000 dual-core APU or a V1000 quad-core APU offering long-term availability and scalable performance and supporting ECC. Passive cooling is possible with low-power versions.
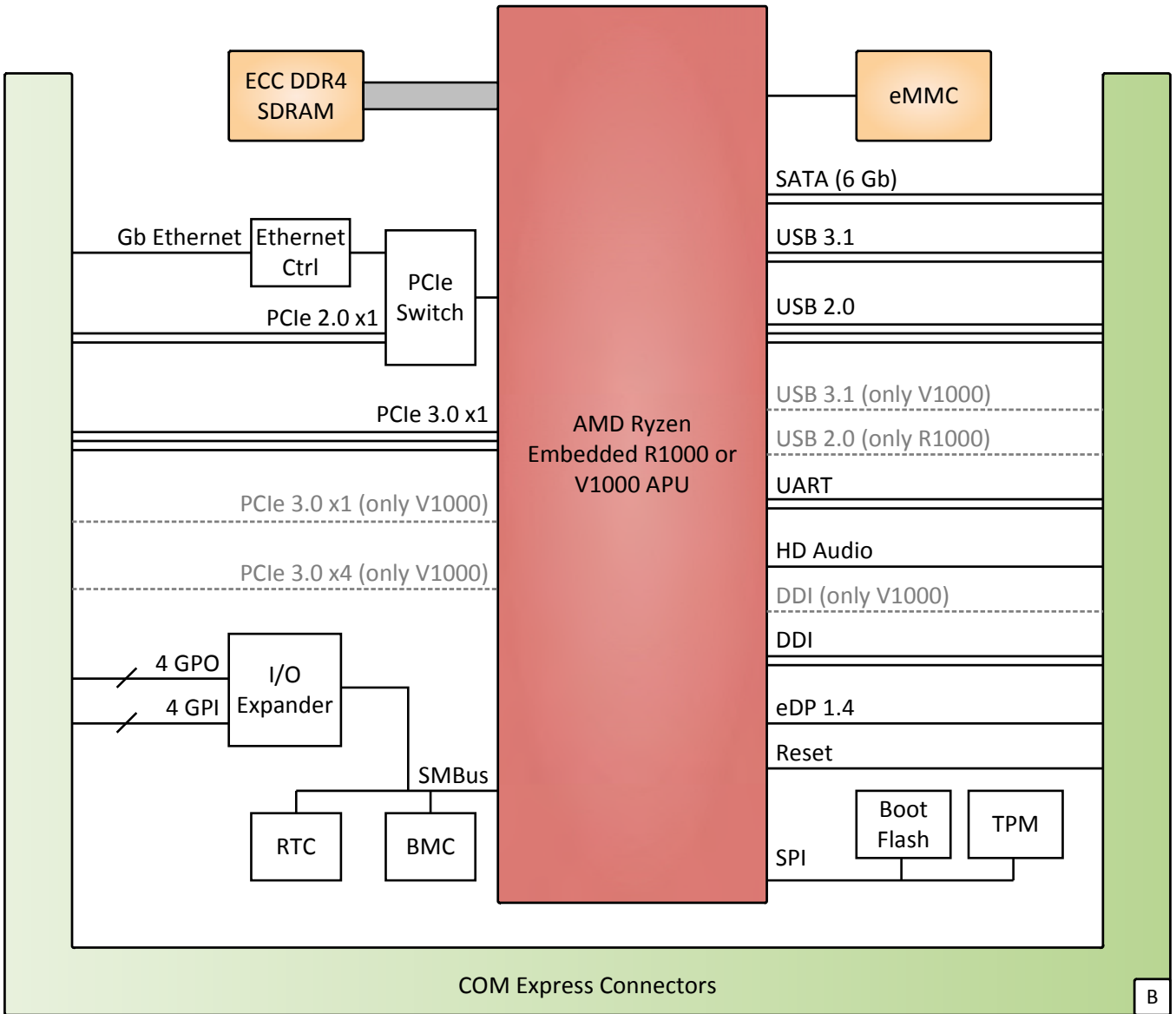
Safety and Security

The board features an advanced board management controller with monitoring functions for safety-relevant applications. In addition, the CB71 has a Trusted Platform Module and supports hardware memory encryption, providing protection against both physical and inter-VM storage attacks. This is essential for security-critical applications such as payment and ticketing terminals, fleet management or monitoring.

Memory and I/O

The CB71 can be equipped with up to 32 GB of directly soldered DDR4 main memory and up to 64 GB eMMC. Available high-speed interfaces include PCI Express 3.0 links, DDI (DP, eDP, HDMI), SATA 3.0, Gigabit Ethernet and USB 3.0.

Data Sheet

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B Onboard ⬚ Options

```
                            ECC DDR4                                    eMMC
                             SDRAM

                                                                   SATA (6 Gb)

             Gb Ethernet   Ethernet                                USB 3.1
                             Ctrl
                                         PCIe                       USB 2.0
                                        Switch
               PCIe 2.0 x1

                                                                   USB 3.1 (only V1000)
                                                                   USB 2.0 (only R1000)
                PCIe 3.0 x1             AMD Ryzen                   UART
                                      Embedded R1000 or
                                         V1000 APU
                                                                   HD Audio
            PCIe 3.0 x1 (only V1000)                               DDI (only V1000)
                                                                   DDI

            PCIe 3.0 x4 (only V1000)

                                                                   eDP 1.4
              4 GPO     I/O                                         Reset
                      Expander
              4 GPI                                                          Boot
                                                                   SPI      Flash   TPM
                                SMBus


                   RTC         BMC


                            COM Express Connectors                                  B
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CPU	■ The following CPU types are supported:
	  □ AMD V1404I, 4 cores, 8 threads, 2.0 GHz, 15 W, 2 MB cache, Vega GPU with 8 CUs
	  □ AMD V1807B, 4 cores, 8 threads, 3.35 GHz, 35-54 W, 2 MB cache, Vega GPU with 11 CUs
	  □ AMD R1606G, 2 cores, 4 threads, 2.6 GHz, 12-25 W, 1 MB cache, Vega GPU with 3 CUs

Memory	■ System RAM
	  □ Soldered DDR4, ECC
	  □ 32 GB max.

Security	■ Trusted Platform Module 2.0
Mass Storage	■ eMMC (soldered); 16 GB
Graphics	■ Processor graphics ■ Maximum resolution: 4096 × 2160 pixels @ 60 Hz, 36 bpp

Interfaces	■ This product includes interface options
	  □ Available interfaces depend on the processor type
	■ SATA
	  □ 2 × SATA Revision 3.x, board to board
	■ Video
	  □ 3 × DDI board to board
	  □ 1 × eDP 1.4, eDP board to board
	■ Audio
	  □ 1 × board to board
	  □ HD Audio
	■ USB
	  □ 3 × USB 3.1, board to board
	  □ 3 × USB 2.0, board to board
	■ Ethernet
	  □ 1 × 10/100/1000BASE-T, board to board
	■ PCI Express
	  □ 1 × PCIe 3.0, x4, board to board
	  □ 4 × PCIe 3.0, x1, board to board
	  □ 2 × PCIe 2.0, x1, board to board
	■ Serial
	  □ 2 × UART, board to board
	  □ Physical interfaces, e.g., RS232 or RS422/RS485, depending on implementation on carrier board
	■ GPIO
	  □ 4 × GPI non-isolated, board to board
	  □ 4 × GPO non-isolated, board to board
	■ SMB
	  □ 1 × board to board
	■ Reset
	  □ 1 × board to board

Supervision and Control	■ Board management controller ■ Temperature measurement ■ Watchdog timer ■ Real-time clock
Product Standard	■ Basic, Type 6, PICMG COM.0 COM Express Module Base Specification ■ Basic, Type 6, Ultra-Rugged COM

Technical Data

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Electrical Specifications	■ Supply voltage: +12 V (9.5 V to 15.5 V) ■ Power consumption: 6 W to 65 W max., depending on processor type and load

Mechanical Specifications	■ Dimensions
	  □ COM Express Basic: (W) 125 mm, (D) 95 mm
	  □ Ultra-Rugged COM Basic with cover and frame: (W) 135 mm, (D) 105 mm, (H) 18 mm
	■ Cooling: Conduction cooling

Environmental Specifications	■ Temperature range (operation)
	  □ -40 °C to +85 °C Tcase (conduction cooling cover/frame), compliant with EN 50155:2007, class TX (model 15CB71C00)
	■ Temperature range (storage): -40 °C to +85 °C, compliant with EN 50155:2007
	■ Humidity: EN 50155:2007 (+25/+55 °C, 90-100 %)
	■ Altitude: -300 m to +3000 m
	■ Shock: EN 61373:2010
	  □ Location: Vehicle body (Cat. 1; Class B)
	■ Vibration: EN 61373: 2010
	  □ Location: Vehicle body (Cat. 1; Class B)

Reliability	■ MTBF: 363 958 h predicted @ 40°C according to IEC/TR 62380 (RDF 2000) (model 15CB71C00)

Safety	■ Electrical Safety
	  □ EN 50155:2007
	  □ EN 50153:2014
	  □ EN 50124-1:2001 + A1:2003 + A2:2005

EMC (Railway)	■ Radiated Emission: EN 50121-3-2:2015 ■ Conducted Emission: EN 50121-3-2:2015 ■ Immunity: EN 50121-3-2:2015
EMC (Automotive)	■ ECE R10 Rev.5 (E-mark)
BIOS/Boot Loader	■ AMI Aptio UEFI Firmware

Software Support	■ Linux
	  □ Supported kernel: 4.14.71
	  □ Yocto BSP
	  □ Tested with: Yocto BSP (Sumo 2.5, Linux kernel 4.14.71)
	■ Windows
	  □ Windows 10 IoT Enterprise 64-bit
	■ See also Application Note Recommendations for a Robust Software Setup
	■ For more information and available packages see Software.

Technical Data

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