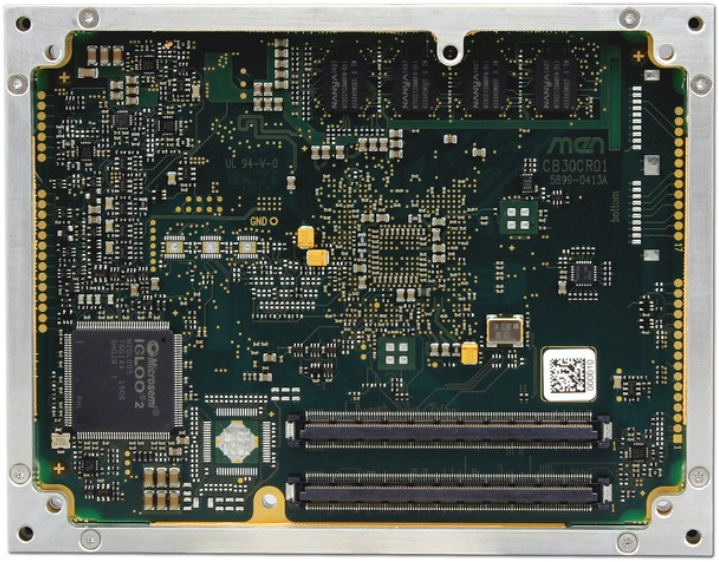
CB30C – Rugged COM Express® (VITA 59 RCE) Safe Computer

- **Freescale™ QorIQ™ P1022 CPU**
- **Up to 2 GB DDR3 SDRAM with ECC, soldered**
- **Safe supervisor**
- **Fail-safe and fail-silent board architecture**
- **Event logging**
- **SIL 2 with report from TÜV SÜD (EN 50128, EN 50129)**
- **EN 50155, class TX compliance**
- **-40°C to +85°C Tcase guaranteed with qualified components**
- **Conduction cooling**
- **Conformal coating**
- **VITA 59 in process, compliant with COM Express® Basic, type 6**
- **PICMG COM.0 COM Express® version also available**



Safe CPU System for EN 50129 SIL 2
The CB30C safe CPU board is a Rugged COM Express® module for use in safety-related applications, e.g., for rolling-stock train control systems or industrial applications. It is based on a Freescale™ QorIQ™ single-core P1013 or dual-core P1022 processor, running at up to 1 GHz and providing excellent performance per watt. It is hardware-supervised by a dedicated safe supervisor to meet EN 50129 SIL 2 level requirements. The technical assessment report from TÜV SÜD, included in the certification package, will greatly simplify certification at system level.

Functional Safety Architecture: Fail-Safe
The CB30C is a single-processor board with a reactive fail-silent design. The functional safety architecture is based on monitoring all safe CPU subsystem environmental conditions such as voltages and temperature. If safe operation of the CPU subsystem cannot be guaranteed, the safe supervisor (SUPV) removes the power of the subsystem, ensuring all external communications are stopped.
The SUPV also ensures it is only possible to exit the safe state in a controlled manner. If an overvoltage is detected the CB30C is placed in a non-recoverable disabled state and needs to be shipped to MEN for inspection before possibly returning to the field.

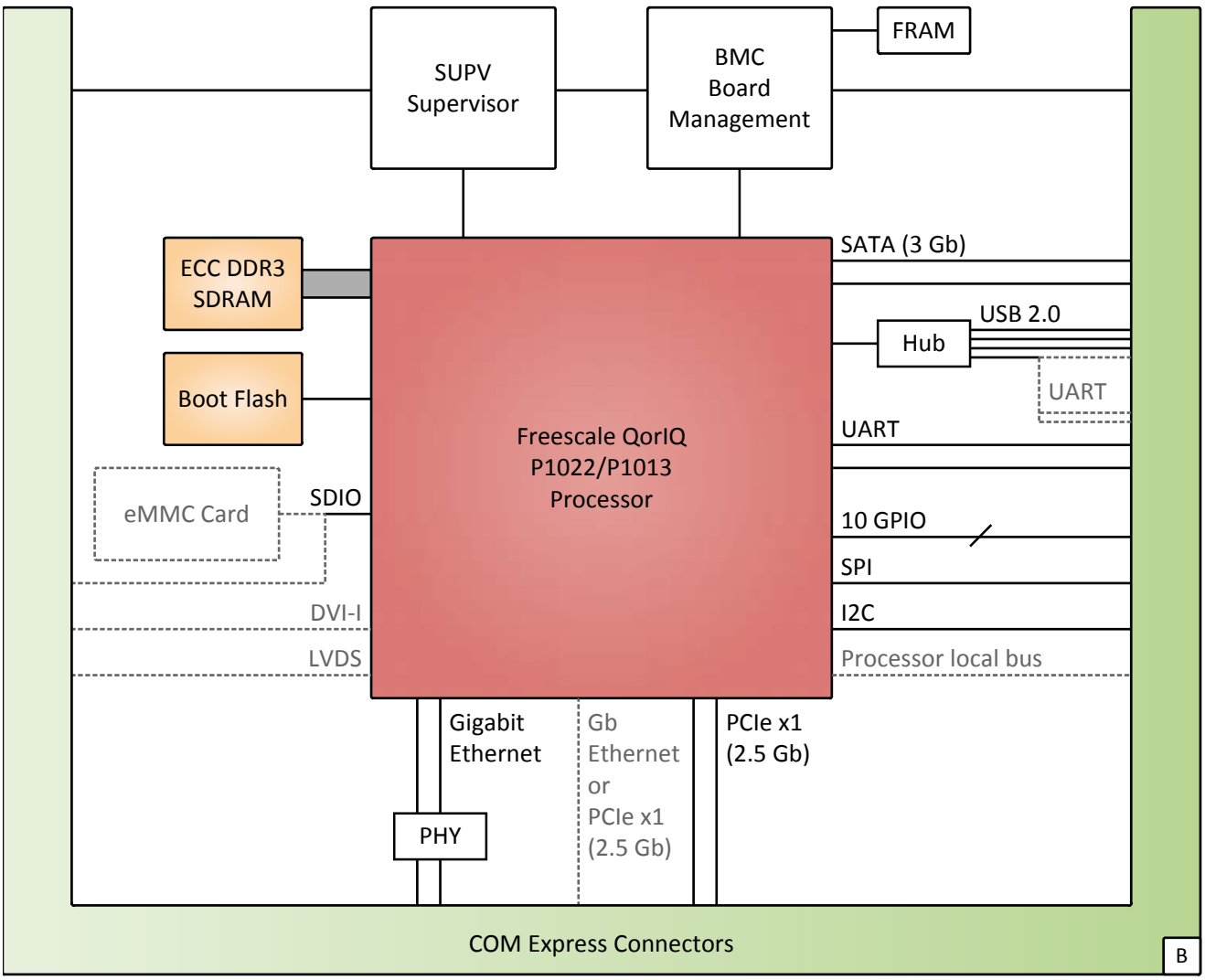
An onboard event logger helps to analyze errors while reducing software overhead.

Rugged COM Design for Harsh Environments
The computer-on-module comes in a robust aluminum cooling frame and cover that shields the COM against EMC and provides a cooling interface for integration in fanless systems. With all components soldered, its small form factor and low power consumption, the board is ideal for embedded applications in severe environments. Its full EN 50155 compliance up to Tx gives it a focus on rolling-stock applications.

Solid Connectivity and I/O
With its focus on safe design, the CB30C still offers ample I/O functionality, including two or three Gigabit Ethernet and PCI Express® interfaces, two SATA channels, up to four USB 2.0 ports, UARTs and general-purpose I/O. DVI or LVDS can be implemented for graphics functions. Up to 2 GB DDR3 SDRAM with ECC support and a soldered eMMC storage device round out the CPU.

Standardized VITA 59, COM Express® based
Being a VITA 59 standard computer-on-module, the CB30C complies with the COM Express® Basic form factor and type 6 pin-out. A COM.0 COM Express® version is also on offer.
For evaluation and development purposes a microATX carrier board, the XC15, is available.

Diagram


SUPV
Supervisor
BMC
Board
Management
FRAM
ECC DDR3
SDRAM
Boot Flash
Freescale QorIQ
P1022/P1013
Processor
SATA (3 Gb)
USB 2.0
Hub
UART
UART
eMMC Card
SDIO
10 GPIO
SPI
I2C
DVI-I
LVDS
Processor local bus
Gigabit
Ethernet
PHY
Gb
Ethernet
or
PCIe x1
(2.5 Gb)
PCIe x1
(2.5 Gb)
COM Express Connectors
B
B
Onboard
Options

Technical Data

CPU	■ The following CPU types are available: □ Freescale™ QorIQ™ P1022, dual core, 600 MHz □ Freescale™ QorIQ™ P1022, dual core, 800 MHz □ Freescale™ QorIQ™ P1022, dual core, 1.067 GHz □ Freescale™ QorIQ™ P1013, single core, 600 MHz □ Freescale™ QorIQ™ P1013, single core, 800 MHz □ Freescale™ QorIQ™ P1013, single core, 1.067 GHz
Memory	■ System Memory □ Soldered DDR3 with ECC support □ 1 GB, or 2 GB ■ Boot Flash □ 32 MB, 64 MB, or 128 MB
Mass Storage	■ The following mass storage devices can be assembled: □ eMMC device, soldered; different sizes available
Graphics	■ Optional ■ Integrated in QorIQ™ processor ■ Maximum resolution: 1280 x 1024 pixels ■ 60 Hz refresh rate ■ 24 bpp color depth
Onboard Interfaces	■ Available via COM Express® connectors ■ Video □ One DVI interface; optional □ One LVDS interface, single-channel; optional ■ SATA □ Two channels, SATA Revision 2.x (3 Gbit/s) ■ SDIO/SDHC □ One channel for MMC/SD/SDIO cards; optional ■ USB □ Four host channels, USB 2.0 (480 Mbit/s), or □ Three host channels, USB 2.0 (480 Mbit/s) ■ Ethernet □ Two channels, 1000BASE-T (1 Gbit/s), or □ Three channels, 1000BASE-T (1 Gbit/s) □ Link and activity LED signals for each channel ■ PCI Express® □ Three x1 links (250 MB/s per link), PCIe® 1.1 (2.5 Gbit/s per lane), or □ Two x1 links (250 MB/s per link), PCIe® 1.1 (2.5 Gbit/s per lane) ■ ExpressCard® □ One interface ■ UART □ Two interfaces, 230.4 kbit/s, or □ Four interfaces, 230.4 kbit/s □ Physical interfaces RS232 or RS422/RS485 depending on implementation on carrier board ■ I2C □ One I2C interface ■ SPI □ One SPI interface ■ GPIO □ 10 GPIO lines ■ Processor local bus; optional
Event Logging	■ Event history logged in non-volatile FRAM, e.g., reset, overvoltage, undervoltage, excess temperature ■ 256 entries possible ■ Events are generated by board hardware or user application

Technical Data

Supervision and Control	■ Safe supervisor □ Check for overvoltage, undervoltage, excess temperature, CPU clock □ Watchdog, configurable as a window or timeout watchdog ■ Real-time clock, with supercapacitor or battery backup on the carrier board □ Up to year 2199
Computer-On-Module Standard	■ CB30C: VITA 59 RCE: Rugged COM Express® in process □ With conduction cooling cover and frame □ Rugged COM Express® Basic, Module Pin-out Type 6 ■ CB30: PICMG COM.0 COM Express® Module Base Specification □ COM Express® Basic, Module Pin-out Type 6
Electrical Specifications	■ Supply voltage □ +12 V (10 to 14 V) ■ Power consumption □ 15 W max., specified
Mechanical Specifications	■ Dimensions □ 135 mm x 105 mm x 18 mm (models conforming to VITA 59 RCE Basic format, PCB mounted between a cover and a frame) □ 125 mm x 95 mm (models conforming to PICMG COM.0 COM Express® Basic format) ■ Weight □ 470 g (model 15CB30C00)
Environmental Specifications	■ Temperature range (operation) □ -40°C to +85°C Tcase (VITA 59 cover/frame) (qualified components), compliant with EN 50155, class Tx (model 15CB30C00) ■ Temperature range (storage): -50°C to +85°C ■ Cooling concept □ Conduction-cooled (models conforming to VITA 59 RCE Compact format, PCB mounted between a cover and a frame) □ Air-cooled (models conforming to PICMG COM.0 COM Express® Compact format) ■ Relative humidity (operation): max. 95% non-condensing (EN 50155 / EN 60068-2-30) ■ Relative humidity (storage): max. 95% non-condensing (EN 50155 / EN 60068-2-30) ■ Altitude: -300 m to +3000 m ■ Shock: 50 m/s², 30 ms (EN 50155 (12.2.11) / EN 61373) ■ Vibration (function): 1 m/s², 5 Hz to 150 Hz (EN 50155 (12.2.11) / EN 61373) ■ Vibration (lifetime): 7.9 m/s², 5 Hz to 150 Hz (EN 50155 (12.2.11) / EN 61373) ■ Conformal coating
Reliability	■ MTBF □ tbd. h @ 40°C according to IEC/TR 62380 (RDF 2000) (model 15CB30C00)
Safety	■ Functional Safety □ Certifiable up to SIL 3 according to IEC 61508 and SIL 2 according to EN 50128 / EN 50129 ("safety case" document and certificate from TÜV SÜD) □ Hazard rate (THR) for safety functions < 10E-8 / h □ Board maintains safe state after a failure ■ Electrical Safety □ EN 60950-1, class III equipment ■ Flammability □ UL 94V-0 ■ Fire Protection □ EN 45545

Technical Data

EMC	■ EMC behavior generally depends on the system and housing surrounding the COM module. ■ The Rugged COM Express® module in its cover and frame supports the system to meet the requirements of □ EN 55024, EN 50121-3-2, class A (immunity) □ EN 55022 (radio disturbance) □ IEC 61000-4-2 (ESD) □ IEC 61000-4-3 (electromagnetic field immunity) □ IEC 61000-4-4 (burst) □ IEC 61000-4-5 (surge) □ IEC 61000-4-6 (conducted disturbances)
Software Support	■ Linux ■ VxWorks® ■ INTEGRITY® ■ For more information on supported operating system versions and drivers see Software.
BIOS	■ U-Boot Universal Boot Loader

Ordering Information

Standard CB30C Models	**15CB30C00**	Rugged COM Express® "Basic", type 6, Freescale™ QorIQ™ P1022, 1.067 GHz, 1 GB RAM, 32 MB Boot Flash, 4 GB eMMC, conformal coating, -40..+85°C Tcase with qualified components; with VITA 59 conduction cooling frame
	15CB30-00	COM Express® "Basic", type 6, Freescale™ QorIQ™ P1022 dual-core 1.067 GHz, 1 GB RAM, 4 GB eMMC, conformal coating, -40..+85°C with qualified components; without VITA 59 conduction cooling frame
Related Hardware	**08XC15-00**	XC15, evaluation and development board for COM Express® and Rugged COM Express® (VITA-59) modules
Miscellaneous Accessories	**05CB00-00**	Cooling-kit for COM Express® Basic and COM Express® Compact: heat sink with fan; to be used with module specific heat spreader
Documentation	You can find the official COM Express® Carrier Design Guide directly on www.picmg.org.	

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