PCEye MC-R

MODULAR COMPUTING PLATFORM FOR RAILWAY APPLICATIONS

WESTERMO

MADE IN GERMANY

KEY FEATURES

- Highly modular design with up to 7 extension modules
- Scalable performance due to SMARC standard
- Up to 4 SIM cards for the 5G/LTE interface
- Optional Wi-Fi module / 3x3 MIMO with up to 1300 Mbps
- Gigabit Ethernet, RS232/422/485, DisplayPort, USB 3.0, Audio
- Optional internal SSD storage up to 960 GB (120 GB standard)
- Ultra-wide-range power supply 24 to 110 VDC
- Integrated GNSS
- Maintenance-free design
- Various mounting options – DIN rail, wall-mount, 19" sub rack or sub rack L-brackets
- -40 °C to +70 °C operating temperature
- EN 50155 compliant

TYPICAL APPLICATIONS

- Predictive maintenance
- Voice communication
- Passenger information
- Ticketing systems
- IoT gateway
- Diagnostic systems

MODULAR COMPUTING PLATFORM

The PCEye MC-R is a robust modular computing platform for railway applications. It offers various CPU options for scalability in performance with low power dissipation. Due to the highly modular concept various extension modules can be assembled to match customer specific needs and functions. The extension modules are pre-assembled units to offer flexible configurations for short delivery times. The fanless and maintenance-free design features various mounting options like DIN rail, wall or 19" rack mounts to integrate the system into an existing environment.

MULTIPLE INTERFACES

The PCEye MC-R features multiple interfaces which meet the strictest environmental requirements, e.g. an extended temperature range. In addition, they must be resilient to shocks and vibrations. Furthermore, the radio extension modules can operate in different standards like LTE or 802.11ac. Each LTE module can be provided with up to four SIM cards for an optimal net coverage and maximum provider flexibility. The Wi-Fi interface allows for connecting clients at high data rates. The radio interfaces are prepared for the next standard like 5G and Wi-Fi 6 thus boost network efficiency and maximize data throughput. Country-specific 5G/LTE/Wi-Fi standards are adopted optionally for worldwide use in every type of train.
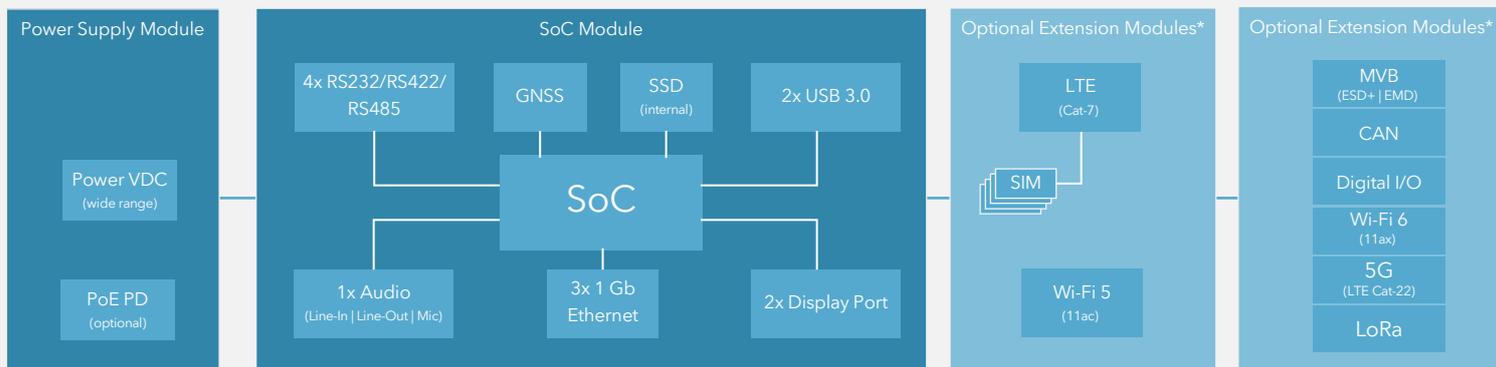
DATA STORAGE

To enhance the PCEye MC-R storage capabilities with internal storage, mounting space for a M.2 solid state disk is supplied. It is attached to the CPU's dedicated SATA port and can be used for local, on-vehicle video and audio data streaming or to store sensor data for condition based monitoring and predictive maintenance.

USER-INTERFACE AND SECURITY FEATURES

The PCEye MC-R provides an open-source operating system based on Linux as a platform for customer specific applications to manage the various interfaces or configure the Wi-Fi and LTE modules. Furthermore, the built-in Trusted Platform Module and the UFW Firewall supports security and platform integrity features and protects against unauthorized firmware and software modifications.

BLOCK DIAGRAM

Power Supply Module	SoC Module	Optional Extension Modules*	Optional Extension Modules*

Power Supply Module: Power VDC (wide range), PoE PD (optional)

SoC Module: 4x RS232/RS422/RS485, GNSS, SSD (internal), 2x USB 3.0, SoC, 1x Audio (Line-In | Line-Out | Mic), 3x 1 Gb Ethernet, 2x Display Port

Optional Extension Modules*: LTE (Cat-7), SIM, Wi-Fi 5 (11ac)

Optional Extension Modules*: MVB (ESD+ | EMD), CAN, Digital I/O, Wi-Fi 6 (11ax), 5G (LTE Cat-22), LoRa

* in larger housing

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TECHNICAL DATA

PHYSICAL INTERFACES

System Architecture	Intel Atom x5-E3930 Dual-Core CPU, up to 1.8 GHz, 2 GB RAM, 8 GB eMMC
	Intel Atom x5-E3940 Quad-Core CPU, up to 1.8 GHz, 8 GB RAM, 32 GB eMMC
Software	Debian Linux OS
Antenna	QLS connectors
LAN	3x 10/100/1000BaseT(X), M12 X-coded
USB/Serial Port	2x USB 3.0 Type-A, 4x RS232/422/485 D-Sub 9-pin
Audio / Video	Line-In, Line-Out, Mic / up to 2x DisplayPort 1.2
Mass storage	1x SSD M.2 2280 up to 960 GB (internal)
Power Input	M12 4-pin male A-coded
Reset Switch	available on the front panel

ELECTRICAL SPECIFICATIONS

Power Supply	24 to 110 VDC, wide-range power supply (compliant to EN 50155)
Interruptions of Voltage Supply	EN 50155, Class S2
Power Consumption	14 W typ., 18 W max., depending on extension modules, up to 30 W and more

ENVIRONMENTAL CONDITIONS

Ambient Temperature	depending on temperature class of Wi-Fi module Class OT4, -40.. +70 °C (85 °C) operating or Class OT3, -25.. +70 °C (85 °C) operating -40.. +85 °C storage
Humidity	max. 95 % non-condensing operating and storage
Altitude	Class AX, up to +2000 m
PCB Protection	conformal coating

RELIABILITY

MTBF	approx. ~172.000 h (acc. to IEC 62380)
Mission Profile	40 °C ambient temperature, 75 % working time ratio with 365 days annual cycle

MECHANICAL SPECIFICATIONS

Dimensions	178/249/427 x 112 x 63 mm (w h d) based on extension variants
Weight	1500 - 3500 g depending on extension modules
Housing	IP40, aluminum, conductive cooling

MODULES

LTE INTERFACE CAT-7 ADVANCED

Transfer Rates	up to 300 Mbps download / 150 Mbps upload
4G (LTE) Bands	B1,B3,B7,B8,B20,B28,B32,B38,B40,B41,B42,B43
3G Bands	B1, B5, B8
Antenna	with Diversity and MIMO

WI-FI INTERFACE IEEE 802.11 a/b/g/n/ac

Transfer Rates	up to 1300 Mbps
Frequency Range	2.412 GHz to 2.472 GHz, or 4.920 GHz to 5.825 GHz, selectable band
RF	3 RF antennas, 3x3 MIMO technology
Encryption	AES, TKIP, WPA, WPA2, WPA3
Operational Feature	up to 128 clients per radio
Security	UFW Firewall

GNSS INTERFACE

Frequency Band	GPS (L1), GLONASS (L1, FDMA), Galileo (E1) ready, Beidou, QZSS constellations
Protocol Standards	NMEA, RTCM 104
Accuracy	up to 1.5 m
Time To First Fix	cold start < 35 s, warm start 1 s

STANDARDS AND SPECIFICATIONS

Directive (EU) 2016/797	EN 50155 (IEC 60571)
	EN 45545-2 (HL 1 to HL 3)
	EN 61373 (Category 1, Class B)
RED – 2014/53/EU	EMC
	radio spectrum
	health & safety

OPTIONS

Mounting Adapter	DIN-rail, wall-mount, 19" sub rack or sub rack L-brackets
Extension Modules	MVB (ESD+, EMD), CAN, LTE Cat 7, Wi-Fi 5 11ac
	Future options: PoE PD, 5G, Wi-Fi 6 11ax, Digital I/O, LoRa
Evaluation Kit	soon available

STANDARD CONFIGURATIONS

VARIANTS	DESCRIPTION
PCMCX-1000V0*	3x ETH (M12X), 2x USB 3.0 Type A, 4x RS232/422/485, 120 GB SSD, 2x DP 1.2, 1x Audio, GNSS
PCMCX-1001V0*	3x ETH (M12X), 2x USB 3.0 Type A, 4x RS232/422/485, 120 GB SSD, 2x DP 1.2, 1x Audio, GNSS, Wi-Fi, LTE

Further information and order numbers on www.eltec.com

*coming soon

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