RC1 – Rugged IP67 Box Computer

- **3.5" 4:3 TFT LCD touch panel**
- **Intel® Atom™ 1.1 GHz or 1.6 GHz**
- **Up to 1 GB RAM, 2GB microSD™ card**
- **Optional SATA SSD, up to 8 GB Flash Disk**
- **2 Fast Ethernet, 1 USB (master or client)**
- **Additional I/O, e.g., CAN bus, IBIS, UARTs**
- **PCI Express® Mini card slot for wireless with 2 optional antenna connectors**
- **Wide-range PSU with backup (power class S2)**
- **-40 to +85°C operating temperature**
- **EN 50155 (railways), IP67 compliant**
- **e1 certified by the German Federal Motor Transport Authority**
- **Windows® XP Embedded (120-day eval version)**

The RC1 is more than just a "box PC": it is a rugged, fanless and maintenance-free control unit for harsh, mobile, mission-critical applications with or without visualization requirements in railway/transportation, avionics, industrial automation and medical engineering. Two standard models are available: One without a display and one with a 3.5" 4:3 262,144 color display (primarily for service purposes) with a resolution of 640x480 and touch functionality to control the unit.

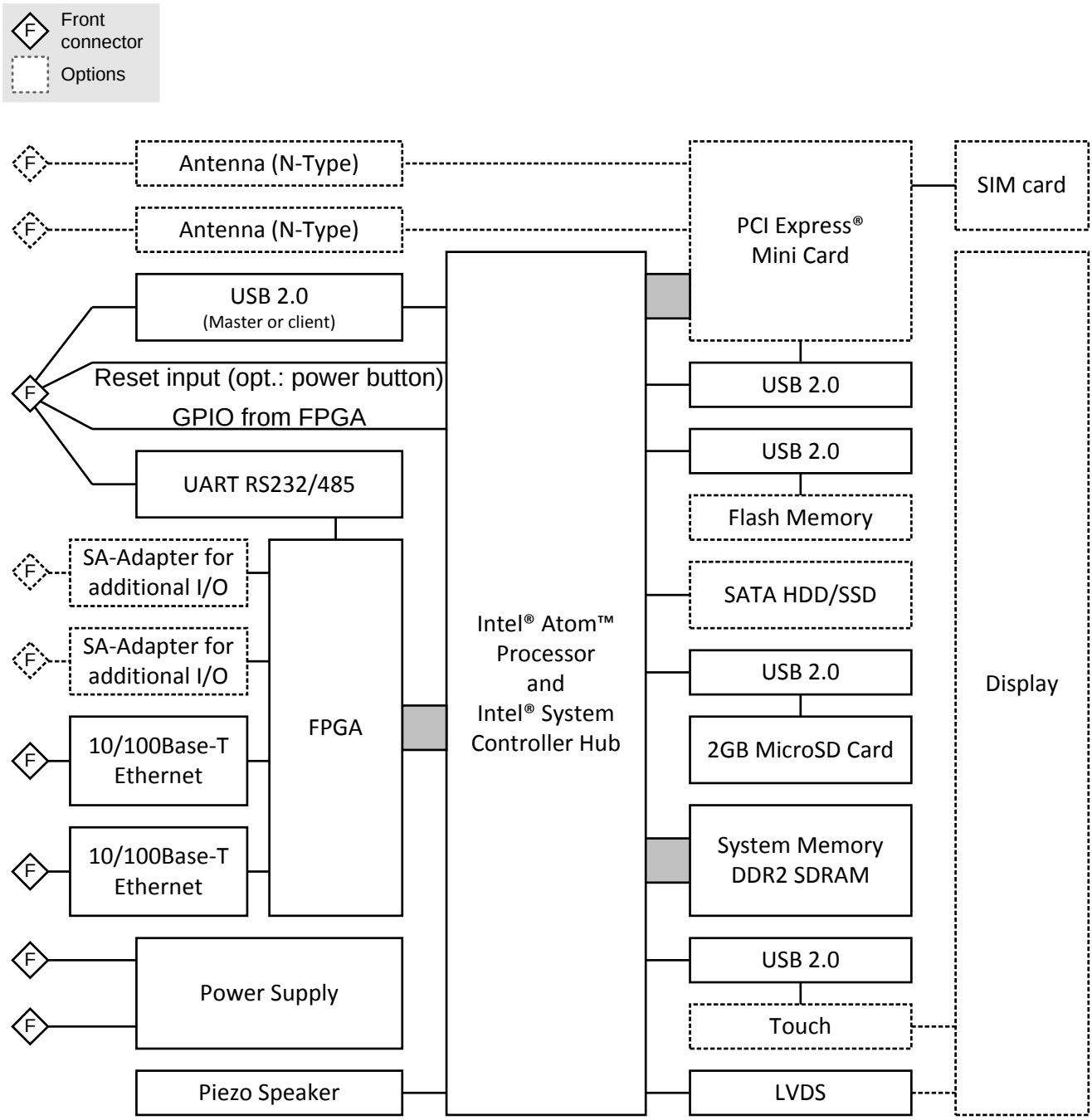
Both standard models are powered by an Intel® Atom™ Z510 running at 1.1 GHz and are equipped with 512 MB RAM and a 2GB microSD™ card (a SATA solid-state drive and Flash memory are optional). All I/O signals are concentrated at the front side. They include 2 Fast Ethernet (on M12 connectors) and a service interface with one USB port (master or client), one RS232, a reset input and one GPIO, all combined on an 8-pin M12 connector. The RC1 offers two slots for additional I/O purposes for which a number of special SA-Adapter™ kits with M12 connectors are available. The FPGA-based concept of the RC1 enables easy implementation of various interfaces (e.g., CAN bus, RS485, IBIS, GPS or binary I/O).

A second power input makes it possible to connect a backup power source (e.g., a battery) that is automatically used in case of power failure on the main power input. As a fully EN50155 compliant power class S2 unit, the RC1 remains functional despite power interruption for up to 10 ms.

The unit's PCI Express® Mini card and SIM card slots can be used to add wireless functionality like Bluetooth, WLAN, WIMAX, GSM/GPRS, UMTS etc. For this case, two optional N-Type connectors can be made available at the unit's front panel.

The RC1 is one of the first members of the MIPIOS® family of extremely rugged IP67 compliant products designed for Ethernet connectivity. The unit is prepared for wall or DIN-rail mounting. Its robust stainless enclosure is protected against violent impacts and the whole unit is compliant with IP67. With a typical power consumption of only 12 W for the total system the design is always realized without fans, using conduction cooling to spread the dissipated heat to the outside of the housing. All electronic components are soldered to withstand shock and vibration and prepared for conformal coating. The standard versions of the RC1 comply with ISO 7637-2:2004 and the EN 50155, class Tx railway standard, i.e., the units are able to operate in a -40 to +70°C (+85°C for 10 minutes) environment. The optional display panel is designed for an operating temperatue of -30 to +70°C with automatic switch-off of the display at excess temperatures.

Diagram


Front connector
Options
Antenna (N-Type)
Antenna (N-Type)
USB 2.0
(Master or client)
Reset input (opt.: power button)
GPIO from FPGA
UART RS232/485
SA-Adapter for additional I/O
SA-Adapter for additional I/O
10/100Base-T Ethernet
10/100Base-T Ethernet
FPGA
Power Supply
Piezo Speaker
Intel® Atom™ Processor and Intel® System Controller Hub
PCI Express® Mini Card
SIM card
USB 2.0
USB 2.0
Flash Memory
SATA HDD/SSD
USB 2.0
2GB MicroSD Card
System Memory DDR2 SDRAM
USB 2.0
Touch
LVDS
Display

Technical Data

CPU	■ Intel® Atom™ processor Z510 or Z530 □ Z510: 1.1 GHz processor core frequency, 400 MHz system bus frequency or □ Z530: 1.6 GHz processor core frequency, 533 MHz system bus frequency
Display (06RC01-01 model)	■ Screen size: 3.5" ■ Aspect ratio: 4:3 ■ Resolution: 640 x 480 ■ Luminance (cd/m²): 250 cd/m² ■ Contrast: 400 typ. ■ Colors: 262,144 ■ Visible screen area: 72 mm x 52.5 mm ■ Touch functionality to control the RC1 (HMI) ■ Monitored and controlled by a temperature sensor (automatic switch-off of the display below -30°C and above +70°C) ■ Display and touch functionality fully IP67 compliant
Memory	■ Up to 1GB DDR2 SDRAM system memory □ Soldered □ 400MHz or 533MHz memory bus frequency locked to the FSB frequency ■ 2GB microSD™ card
I/O	■ All I/O available at front of housing ■ Service interface □ 1 USB 2.0 master or client (configurable via BIOS setting) □ UHCI implementation □ Data rates up to 480Mbit/s □ 1 RS232 or RS485 (half-duplex), redirection for BIOS settings and terminal function □ 1 reset input (hardware reset for the Intel® Atom™ CPU) □ All accessible via the same 8-pin M12 connector (female) ■ Ethernet □ Two 10/100Base-T Ethernet channels □ Accessible via 4-pin M12 connectors (female) ■ Various I/O (optional) □ Up to two additional I/O interfaces (RS232, RS422, RS485, IBIS, CAN bus, GPS or binary I/O) via various M12 connectors, realized through special SA-Adapter™ kits ■ Audio □ 1 piezo speaker ■ Power □ Power input via 4-pin M12 connector (male) □ Backup power input via second 4-pin M12 connector (male)
Board Management Control	■ Supervision of internal supply voltages ■ Supervision of display temperature ■ Control of power sequencing and reset behavior of the Intel® Atom™ CPU ■ Emergency shutdown in case of failure ■ Watchdog functionality for CPU with clock generator ■ Accessible via SMBus

Technical Data

Electrical Specifications

- Isolation voltage:
  - 1,500 VDC (Ethernet interface, power supply)
  - 500 VDC (all other I/O)
- Buffered RTC
  - Gold cap for more than 12 h
- Power consumption:
  - 12 W typ. (without PCI Express® Mini card)
- Supply voltage:
  - 24 VDC (9 to 36 V) according to EN 50155 (main and backup)
  - Power class S2 (functional despite power interruption up to 10ms)
  - Automatic failover to secondary input in case of power failure on the primary input
  - Reverse polarity protection
  - Overcurrent protection by fuse

Mechanical Specifications

- Dimensions: 220 mm x 130 mm x 70 mm (without connectors)
- Prepared for wall or DIN-rail mounting (EN 50022, BS 5584)
- Weight: 1.8 kg
- Aluminum enclosure
- IP67 compliant
- Conformal coating on request

Environmental Specifications

- Temperature range (operation):
  - -40°C to +70°C, with up to +85°C for 10 minutes according to class Tx (EN 50155)
  - -10°C to +70°C for the display panel (with automatic switch-off of the display at excess temperatures)
  - Conductive cooling
  - Fanless operation
- Temperature range (storage): -40..+85°C
- Relative humidity (operation): max. 95% non-condensing
- Relative humidity (storage): max. 95% non-condensing
- Altitude: -300 m to + 3,000 m
- Shock: according to EN 50155 (10.2.11)
- Vibration: according to EN 50155 (10.2.11)

MTBF

- 06RC01-00: MTBF 103,413 h @ 40°C according to IEC/TR 62380 (RDF 2000)
- 06RC01-01: MTBF 20,981 h @ 40°C according to IEC/TR 62380 (RDF 2000)

EMC

- Conforming to EN 50155, EN 50121-3-2/EN 61000-4-5, ISO 7637-2:2004
- e1 certified by the German Federal Motor Transport Authority

Software Support

- Windows® XP Embedded
  - 06RC01-01: Windows® XP Embedded image included (120-day trial version for evaluation purposes only)
- Linux
  - Deliverable with eval Linux pre-installed
- VxWorks® (on request)
- QNX® (on request)
- For more information on supported operating system versions and drivers see Downloads.

Configuration & Options

Standard Configurations

Article No.	Display	PSU	Processor	Memory	Interfaces	Wireless
06RC01-00	no	24 VDC in (S2)	Z510, 1.1 GHz	512MB RAM, 2GB MicroSD card	2 Ethernet, 1 USB, prepared for 2 SA-Adapter kits	prepared for 2 antenna connectors
06RC01-01	yes, w. touch	24 VDC in (S2)	Z510, 1.1 GHz	512MB RAM, 2GB MicroSD card	2 Ethernet, 1 USB, prepared for 2 SA-Adapter kits	prepared for 2 antenna connectors

Options

Display	■ Screen size: 3.5" ■ Aspect ratio: 4:3 ■ Resolution: 640 x 480 ■ Luminance (cd/m²): 250 cd/m² ■ Contrast: 400 typ. ■ Colors: 262,144 ■ Visible screen area: 72 mm x 52.5 mm ■ Touch functionality to control the RC1 (HMI) ■ Monitored and controlled by a temperature sensor (automatic switch-off of the display below -30°C and above +70°C) ■ Display and touch functionality fully IP67 compliant!
Wireless Functionality	■ Bluetooth, WLAN, WIMAX, GSM/GPRS, UMTS etc. via respective PCI Express® Mini card □ PCI Express® Mini card slot features a SIM card slot □ PCI Express® and USB interface □ Uses optional N-type antenna connectors
Processor	■ Intel® Atom™ processor Z510 or Z530 □ Z510: 1.1 GHz processor core frequency, 400 MHz system bus frequency or □ Z530: 1.6 GHz processor core frequency, 533 MHz system bus frequency
Memory	■ Up to 1GB DDR2 SDRAM system memory ■ microSD™ card (various sizes available) ■ SATA solid-state drive (various sizes available) ■ USB Flash solid-state drive (various sizes available)
I/O Interfaces	■ Various combinations of interfaces with SA-Adapter™ kits via two M12 ports □ RS232 (isolated) □ RS422 (isolated) □ RS485 (isolated) □ IBIS (isolated) □ CAN bus (isolated) □ GPS (isolated) □ Binary I/O (isolated) ■ Two N-type connectors for antenna diversity □ Adapter with SIM card slot for optional PCI Express® Mini card □ For WLAN, WIMAX, GSM/GPRS, UMTS etc. ■ Power button instead of reset input
Electrical Specifications	■ Other nominal input voltages: 48, 72, 96 or 110 VDC
Software	■ VxWorks® (on request) ■ QNX® (on request) ■ Deliverable with customer application installed

Ordering Information

Standard RC1 Models	**06RC01-00**	Intel® Atom™ Z510, 1.1GHz, 512MB RAM, 2GB MicroSD card, prepared for SSD, 2 Fast Ethernet, 1 USB, prepared for 2 SA-Adapter™ kits, prepared for wireless access, 24V DC input (S2), -40..+70(+85)°C screened, EN50155 compliant, IP67
	06RC01-01	3.5" display with touch, Intel® Atom™ Z510, 1.1GHz, 512MB RAM, 2GB MicroSD Card, prepared for SSD, 2 Fast Ethernet, 1 USB, prepared for 2 SA-Adapter™ kits, prepared for wireless access, 24V DC input (S2), -40..+70(+85)°C screened, EN50155 compliant, IP67, 120-day Windows® XP Embedded eval version installed
Related Hardware	**15PX01-00**	GLONASS & GPS PCI Express® MiniCard (full size), 3-axis Gyro sensor, -40..+85°C with qualified components
Miscellaneous Accessories	**05RC01-00**	Service cable for RC1 with M12 to D-Sub (RS232), USB (Type A), reset connector, -40..+85°C
	05RC01-08	Cable set for MIPIOS® RCx, consisting of: 1 Ethernet cable (M12 to RJ45), 1 service cable, 1 power cable (M12 to open end), 2 SA-Adapter™ cables (M12 to open end), -40..+85° C
	05RS01-00	DIN-Rail mounting plate for MIPIOS® family, -40..+85°C
	05RS01-01	Wall-mounting plate for MIPIOS® family, -40..+85°C
Software: Linux	This product is designed to work under Linux. See below for potentially available separate software packages from MEN.	
	13Z015-06	MDIS5™ low-level driver sources (MEN) for 16Z029_CAN (MSCAN/Layer2)
	13Z016-06	MDIS5™ driver (MEN) for 16Z029_CAN (CANopen master)
	13Z017-06	MDIS5™ low-level driver sources (MEN) for 16Z034_GPIO, 16Z037_GPIO and 16Z127_GPIO
Software: Windows®	This product is designed to work under Windows®. See below for potentially available separate software packages from MEN.	
	10F014-78	Windows® XP Embedded BSP (MEN) for F11S, F14, F15, F17, F18, F19P, F21P, G20, XM1, XM1L, XM2, MM1, MM2, SC21, SC24, DC1, DC2, RC1, BC50I, BC50M and BL50W
	10Y000-78	Windows® Embedded Standard 7 BSP for F11S, F19P, F21P, F22P, G20, G22, XM1L, XM2, MM1, MM2, SC21, SC24, SC27, BC50M, BC50I, BL50W, BL50S, F206, F210, F215, F216, G215, P506, P507 and P511
	13MM01-77	Windows® Installset (MEN) for MM1 and RC1 (Includes all free drivers developed by MEN for the supported hardware.)
	13Z015-70	MDIS4™/2004 / MDIS5™ Windows® driver (MEN) for 16Z029_CAN (MSCAN/Layer2)
	13Z016-70	MDIS5™ Windows® driver (MEN) for 16Z029_CAN (CANopen master)
	13Z017-70	MDIS4™/2004 / MDIS5™ Windows® driver (MEN) for 16Z034_GPIO devices
	13Z087-70	Windows® native driver (MEN) for 16Z087_ETH (Ethernet controller)
Software: Firmware/BIOS	MEN's CANopen firmware consists of the Vector Informatik protocol stack. The corresponding driver software comes from MEN. It is based on MDIS™ (MEN Driver Interface System), which makes the hardware ready for use under Windows®, Linux, VxWorks®, QNX®, OS-9® and other software environments. You can find more information on the Vector CANopen tools at www.vector-informatik.de.	
Software: Miscellaneous	Intel® software development products such as analyzers, compilers, threading tools etc. can be downloaded under www.intel.com/cd/software/products/asmo-na/eng/index.htm. IA-32 Intel® Architecture Software Developer's Manuals are available under www.intel.com/products/processor/manuals/index.htm.	

For operating systems not mentioned here contact MEN sales.

Ordering Information

Documentation	Compare Chart Standard and Custom Box PCs » Download	
	20RC01-00	RC1 User Manual

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