



IPC/RML-R 81

This fanless RML-R COMPACT81 generation is based on the Intel® Atom™ E3900 (Apollo Lake) processor technology and offers a wide range of interface options. The robust and uncompromising industrial design allows the implementation in the most demanding rolling stock applications and guarantees long term availability.

- **Railway approved (EN50155 & EN45545)**
- **24/7 continuous operation**
- **M12 connectors for Power and LAN**
- **Shock and vibration resistant**
- **Full -40...+85°C on component level**



Product Highlights

Power Ignition controller
 Inertial Measurement Unit (IMU)
 GNSS with dead reckoning
 Fanless, No moving parts
 Maintenance free
 Long term availability

Product Features

Intel® Atom™ E3900 Series
 up to 2.0GHz, 4 Cores
 RAM soldered on board 8GB
 Socket for CFast storage card
 Gbit Ethernet, USB 3.1, RS232, CAN
 Digital I/Os
 Optional 5G, 4G, Wi-Fi & Bluetooth options
 Rugged M12 connectors
 Stainless steel housing
 Protection class IP40

Markets / Applications

Railway (rolling stock)
 Transportation

Processor / Performance

| | |
|--|----------|
| Intel® Atom™ x7-E3950 2.00GHz (Burst) 1.6GHz Clock - Quad Core 8GB RAM | • |
| Intel® Atom™ x5-E3940 1.80GHz (Burst) 1.6GHz Clock - Quad Core 4GB RAM | optional |

Memory

| | |
|--------------------------------------|-----|
| L2 cache | 2MB |
| RAM DDR3L 1866MT/s soldered on board | 8GB |

Features

| | |
|--|---|
| Inertial measurement unit (IMU) STMicroelectronics ISM330DHCXTR | • |
| Real time clock (RTC) with goldcap backup (holds charge for 48h) | • |
| Hardware watchdog & Temperature supervisor | • |
| Intelligent power management (Ignition controller) | • |
| TPM 2.0 according to ISO/IEC11889 Infineon SLB9665 | • |

Communication Interfaces

| | | |
|--|-----------------------------|---------------------|
| DisplayPort 1.4 (up to 7680 x 4320 @ 60Hz) | | 1 |
| USB version 3.1 | (Type A) | 2 |
| Ethernet 10/100/1000 Mbit (Intel I210-IT) | (M12 female x-coded) | 2 |
| CAN 2.0A/2.0B & CAN FD (PEAK FPGA chip, SJA1000 compatible), isolated, The CAN signals give no network feedback and are attached via non-volatile I/O port on the I2C bus | (DSUB9) | 2 |
| Serial RS232, isolated | (DSUB9) | 2 |
| Serial RS422/485 | (DSUB9) | 1 |
| Digital I/O, 24VDC (latency <1ms) | (Weidmüller terminal block) | 4 inputs, 4 outputs |
| Analog input, 16bit resolution, voltage input: -10 ... +10V / 0 ... 30V Accuracy: +/- 0.1% | | optional |
| Analog input, 16bit resolution, current: 0-20mA | | optional |
| CFast socket with retention frame ² | | 1 |
| M.2 Key B socket ² | (M.2 3042) | 1 |
| M.2 Key E socket ² | (M.2 2230) | 1 |
| Mini PCIe socket ² | | 1 |
| MicroSD Card socket ² | | 1 |
| Buzzer ² | | 1 |
| I2C bus ² | | 1 |

Wireless Connectivity

| | | |
|--|----------|-----------|
| Cellular 4G module (3G/2G fallback) Sierra Wireless EM7455 - M2M only! with dual nano SIM support | | 2x SMA |
| Wireless LAN IEEE 802.11ac/a/b/g/n/ dual-band 2x2 MIMO SparkLAN WxxB-263ACNI(BT) | | 2x RP-SMA |
| GNSS positioning module with dead reckoning u-blox NEO-M9 Module ³ | | 1x SMA |
| Cellular 5G module (4G/3G fallback) Sierra Wireless EM9191 - M2M only! | (2x SMA) | optional |
| High accuracy GNSS positioning module w/ RTK support u-blox ZED F9P module | (1x SMA) | optional |

Technical Data

| | | |
|---|-----------------------|-------------------|
| Exterior dimensions [mm] | | w262 x h64 x d137 |
| Net weight [gram] | | ~ 1900 |
| Input voltage (isolated and reverse polarity protected) | (M12 4P male a-coded) | 16.8 ... 45VDC |
| Wide input voltage 14.4 .. 137.5VDC (isolated and reverse polarity protected) | (M12 4P male a-coded) | optional |
| Uninterruptible power supply (UPS), interruption time of supply voltage | | ~ 10-15s |
| Current consumption typ. in mA @ 24V without Add-Ins, idle | | ~ 500 |
| Power consumption typ. in Watt @ 24V without Add-Ins, idle | | ~ 12 |

Environmental Conditions

| | | |
|--|--|-----------------|
| Operating temperature (complies with EN50155 class OT4) ⁴ | | -40°C ... +70°C |
| Storage temperature | | -40°C ... +85°C |
| Ingress Protection standard EN60529 | | IP40 |
| Conformal coating ⁵ | | PCX |
| Shock | | EN61373 |
| Vibration | | EN61373 |
| EMI-Conformity | | EN50121-3-2 |
| Safety (designed to meet) | | EN62368-1 |
| Fire protection | | EN45545-2 HL3 |
| Radio and Telecommunication (designed to meet) | | RED |
| MTBF @ 25°C according to Telcordia SR-332, Environment GB, excluding optional extensions | | ~ 480 000h |

¹ Please contact factory for minimum order quantities² Internal connector³ NEO M9 Series, NEO-M9L (with dead reckoning) is planned, however subject to availability the NEO-M9N (without dead reckoning) may be used prior.⁴ Depending on installation situation and interface connection. Please see user documentation.⁵ On all possible components (excl. connectors and wireless devices)

Product specifications subject to change without notice. | All data is for information purposes only and not guaranteed for legal purposes. Information in this data sheet has been carefully checked and is believed to be accurate. However, no responsibility is assumed for inaccuracies. Please refer to the user documentation for additional product specification.