



AC100

Embedded Blue[®]

DIN Rail AI Edge Computing Platform

NVIDIA[®] Jetson Xavier[™] NX

Wi-Fi & WWAN • PCIe[®] Optical Cabling



Overview

The **AC100** is a boxed-computer intended for AI and real-time edge computing. Equipped with the Nvidia® Jetson Xavier™ NX SoM, the Din Rail box was designed for rugged industrial applications such as IIoT or image processing, and has a wide range 9-57VDC power input.

The AC100 provides typical I/O connectors, e.g. DisplayPort, Ethernet, and USB. A PCIe® M.2 SSD is available as internal mass storage.

The AC100 comes with the L4T (Linux for Tegra) development suite by Nvidia®, customized by EKF.

For wireless networking, the AC100 is equipped with M.2 connectors for a 4G/5G WWAN and dual Wi-Fi 6 modules (must be ordered separately).

As an option, the AC100 can be configured as master or slave in distributed multi-processing applications. For this purpose the box is optionally provided with four MPO/MTP optical cabling ports, each suitable for a PCI Express® Gen3 x4 based fiber optical cable up to 100m. Moreover, these PCIe® interfaces can also be used for attachment of demanding peripheral devices such as high resolution cameras.



Technical Features

General

- ▶ NVIDIA® Jetson Xavier™ NX based box, for DIN rail mount or wall mount
- ▶ M.2 NVMe SSD socket
- ▶ Versatile standard front I/O connector suite (DisplayPort, USB, GbE)
- ▶ Option dual Wi-Fi 6 modules
- ▶ Option WWAN 4G/5G module
- ▶ SMA/SMA-RP antenna connectors
- ▶ Option 4 x PCI Express® x4 MPO/MTP optical cabling ports
- ▶ Dimensions: 65mm (W) x 140mm (H) x 150mm (D) w/o DIN rail bracket
- ▶ Metal case, TS35 DIN rail bracket or wall mount plate
- ▶ M12 power connector
- ▶ Option terminal block power connector
- ▶ Option desktop power adapter connector
- ▶ 9-57VDC power input operation

Front I/O

- ▶ Dual RJ45 Gigabit Ethernet jacks
- ▶ 3 x USB Type-A receptacles
- ▶ Dual DisplayPort connectors
- ▶ Micro SD Card slot
- ▶ Antenna connectors SMA/SMA-RP (WLAN/WWAN)
- ▶ Dual slot Micro SIM Card
- ▶ Up to 4 x MPO/MTP connectors, for 12-fiber PCIe® optical cabling
- ▶ M12-A DC power connector
- ▶ Option ATX auxiliary power connector
- ▶ Option terminal block 3.5mm pitch 4-position screw lock (bottom of box) power input
- ▶ Option rear power connector (desktop supply 4-pos. circular connector)

System-on-Module

- ▶ NVIDIA® Jetson Xavier™ NX
- ▶ AI performance up to 21 TOPS
- ▶ Volta GPU, 384 CUDA® cores, 48 Tensor cores, max. 1100MHz
- ▶ Carmel CPU, ARMv8.2, 3x dual-core CPU clusters (six NVIDIA Carmel processor cores), max. 1900 MHz
- ▶ Memory 8GB/16GB LPDDR4 DRAM, 1600MHz
- ▶ Storage 16GB eMMC 5.1 200 MHz (HS400)
- ▶ Display controller 2 x DP 1.4 up to 3840x2160 at 60 Hz, video H.265 decode/encode
- ▶ PCI Express® 1x4, 1x1 (root hub or endpoint device configurable)
- ▶ Variety of I/O e.g. USB, Gigabit Ethernet, SD Card slot
- ▶ 10W/15W/20W operating modes

Technical Features

Additional Features

- ▶ On-board M.2 SSD socket PCIe® x4, up to 2280 size
- ▶ PCIe® packet switch 6x4
- ▶ Option PCIe® optical cabling via 4 x MPO/MTP connectors (Samtec FireFly™)
- ▶ Option master/slave configuration via PCIe® optical cabling (star topology)
- ▶ Option wireless connection (dual M.2 Wi-Fi 6, M.2 WWAN 4G/5G)
- ▶ Option custom specific mezzanine board design on request

Power Requirements

- ▶ DC Input, wide range 9V-57V
- ▶ Power consumption tbd W max.
- ▶ Fast acting chip fuse (PCB soldered type - no replacement on-site)
- ▶ Protected against reverse polarity
- ▶ ESD protection (TVS)
- ▶ Common mode input filter
- ▶ M12-A 5-pin front panel power connector
- ▶ Option ATX auxiliary power connector
- ▶ Option terminal block 3.5mm pitch 4-position screw lock (bottom of box) power input
- ▶ Option rear power connector (desktop supply 4-pos. circular connector)

Applications

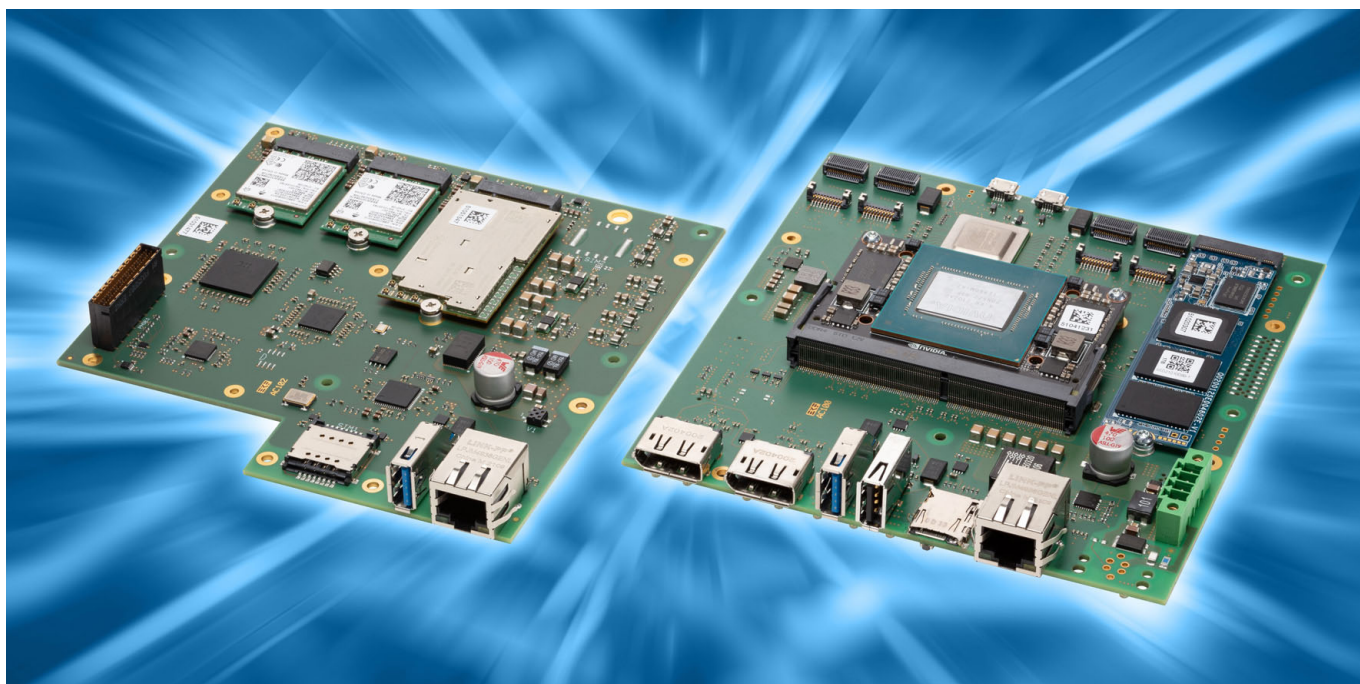
- ▶ Artificial Intelligence CUDA® based edge computing
- ▶ Distributed edge computing, real-time AI
- ▶ PCIe® based optical cabling to slave boxes
- ▶ Data acquisition
- ▶ Industrial networks - IIoT
- ▶ Cable and wireless networking
- ▶ Kiosk systems, information panels
- ▶ Dual 4k display solution, independent operation
- ▶ Single display or headless applications
- ▶ Rugged environments, DIN rail or wall mount options
- ▶ Vehicles, transportation, harvesting, construction machines
- ▶ Robotics
- ▶ Autonomous machines
- ▶ Machine learning
- ▶ Surveillance, mapping
- ▶ ADAS test equipment

Technical Features

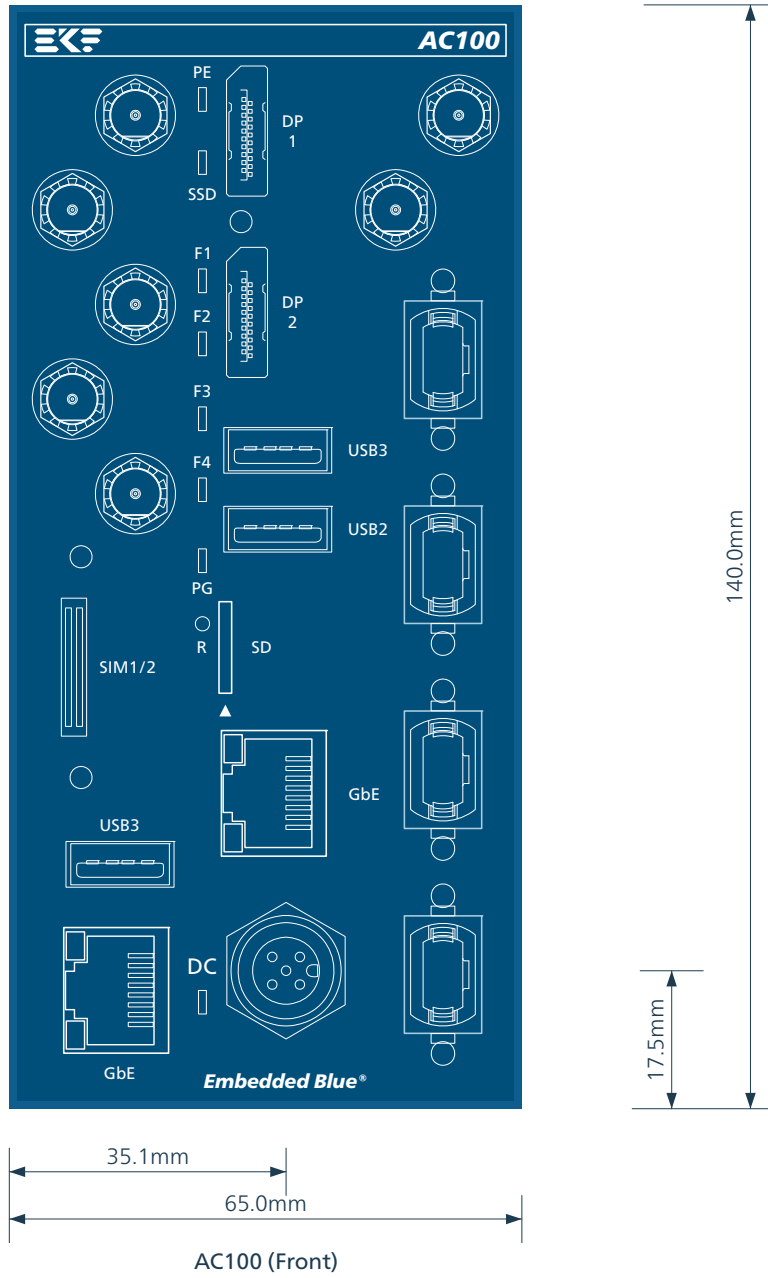
Environmental, Regulatory

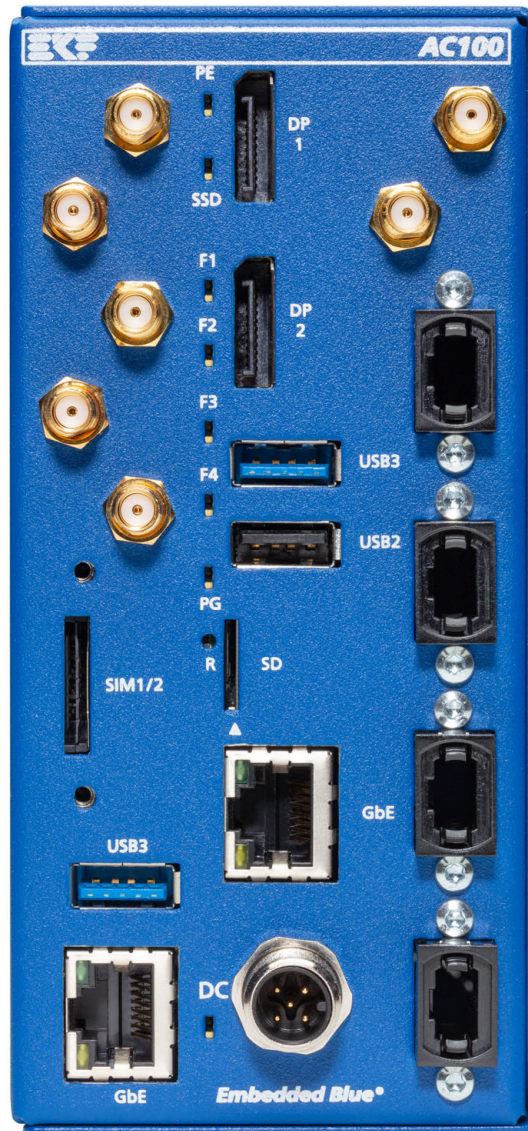
- ▶ Designed & manufactured in Germany
- ▶ ISO 9001 certified quality management
- ▶ Long term availability
- ▶ Rugged solution
- ▶ RoHS compliant
- ▶ Operating temperature -40°C to +85°C (industrial temperature range)
- ▶ Storage temperature -40°C to +85°C, max. gradient 5°C/min
- ▶ Humidity 5% ... 95% RH non condensing
- ▶ Altitude -300m ... +3000m
- ▶ Shock 15g 0.33ms, 6g 6ms
- ▶ Vibration 1g 5-2000Hz
- ▶ Protection class IP20
- ▶ EC Regulatory EN55035, EN55032, EN62368-1 (CE)
- ▶ MTBF tbd years

all items may be subject to technical changes w/o further notice



Front View





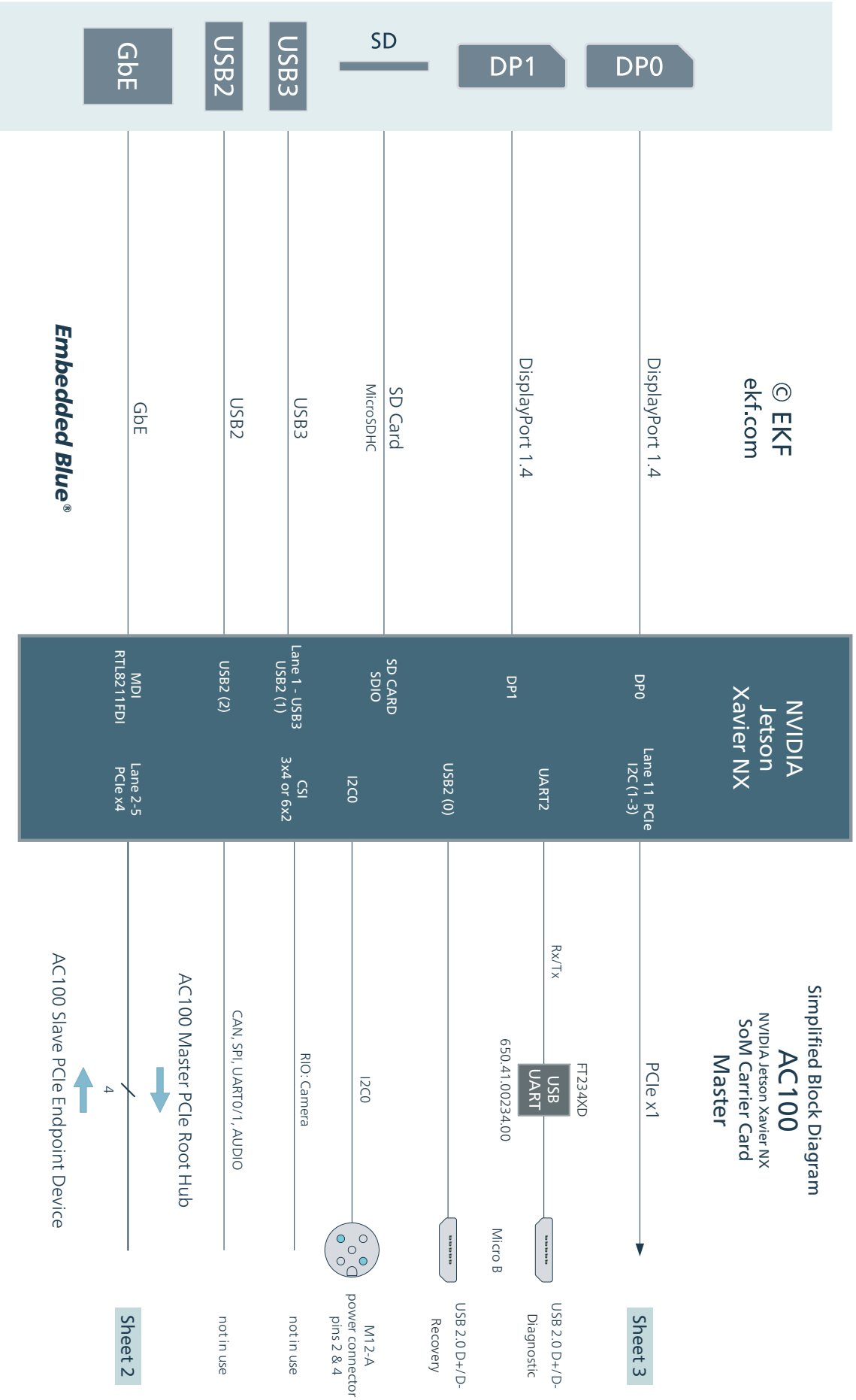
Mounting Plate Option

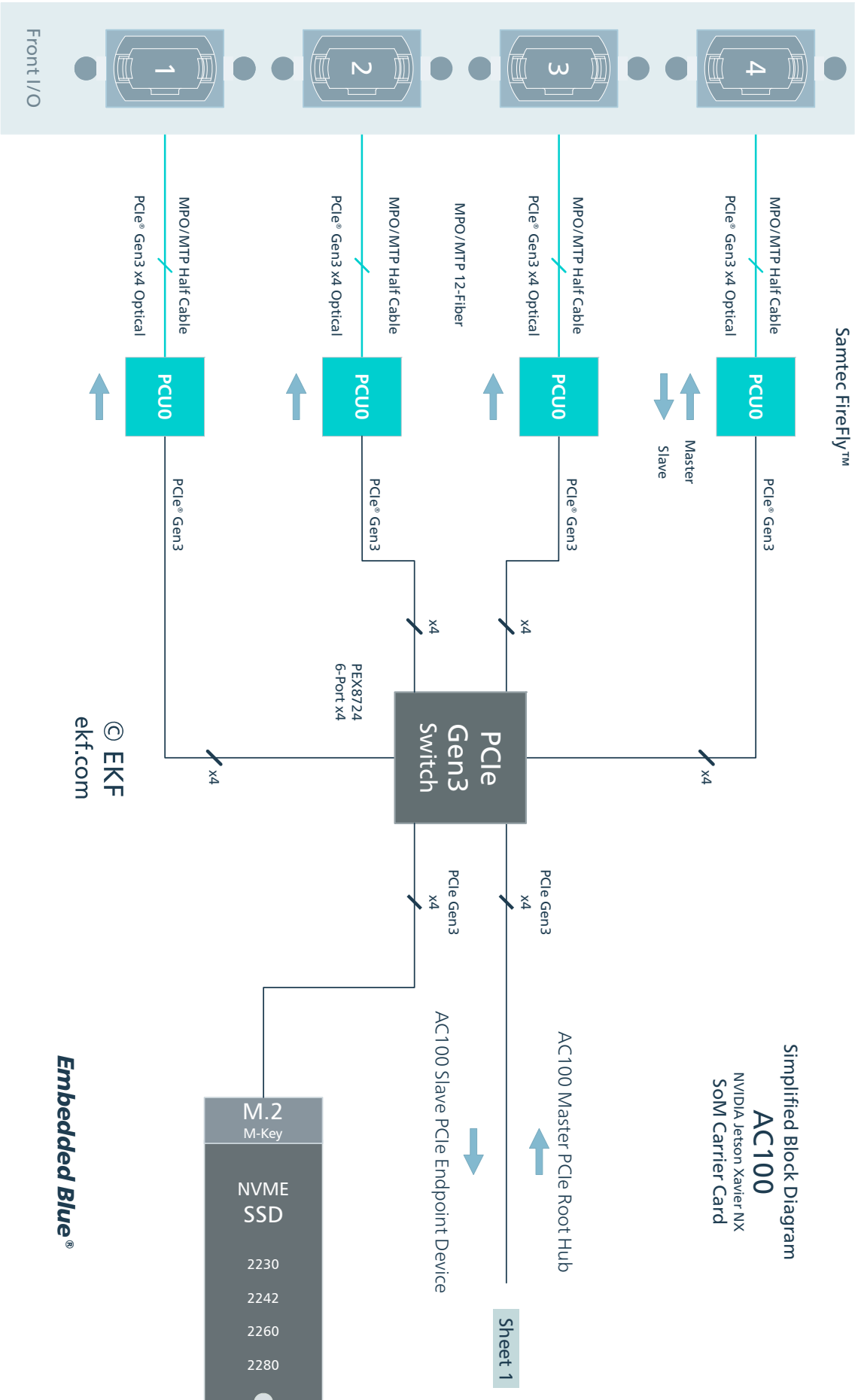


Rear View (DIN Rail)



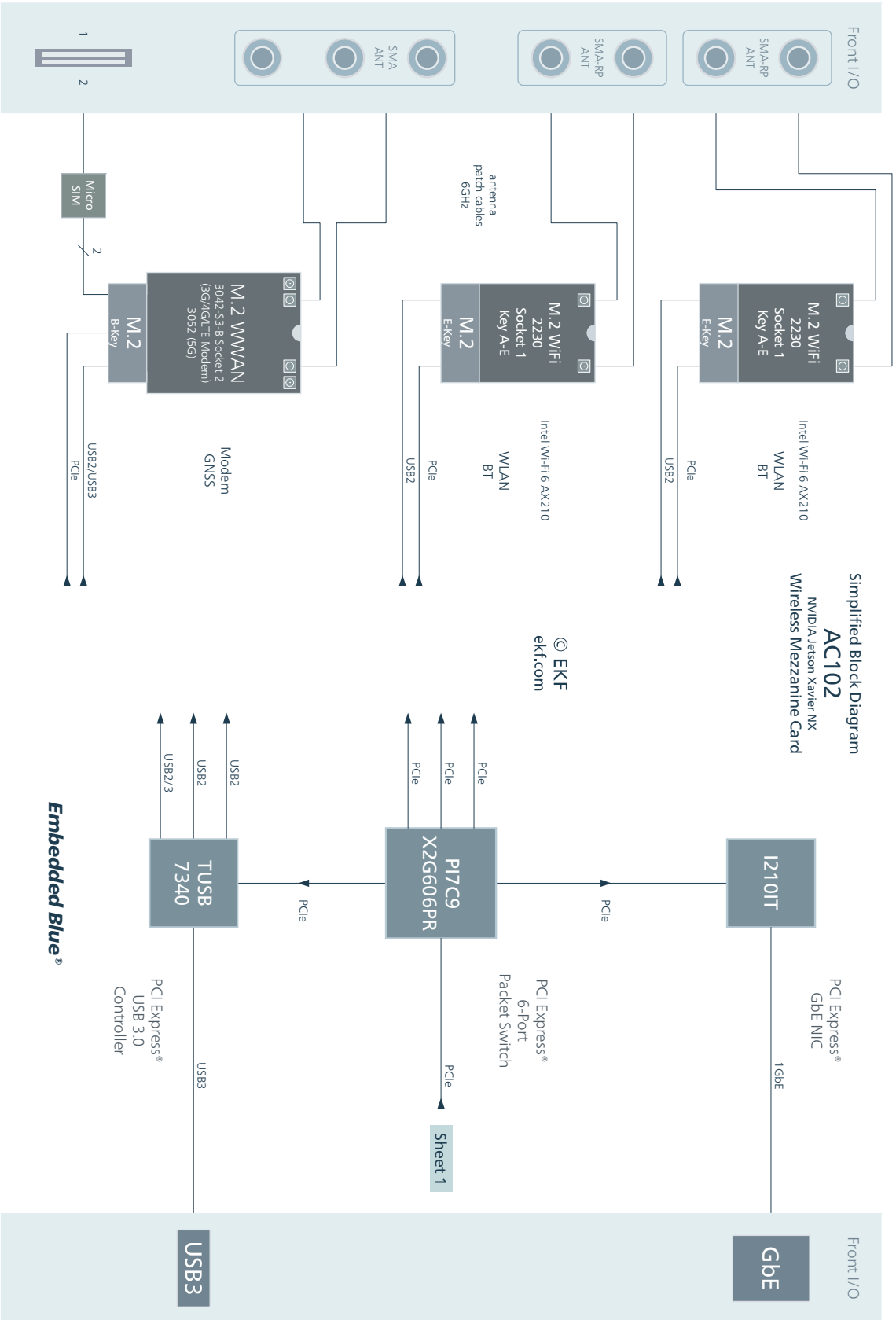
Block Diagram



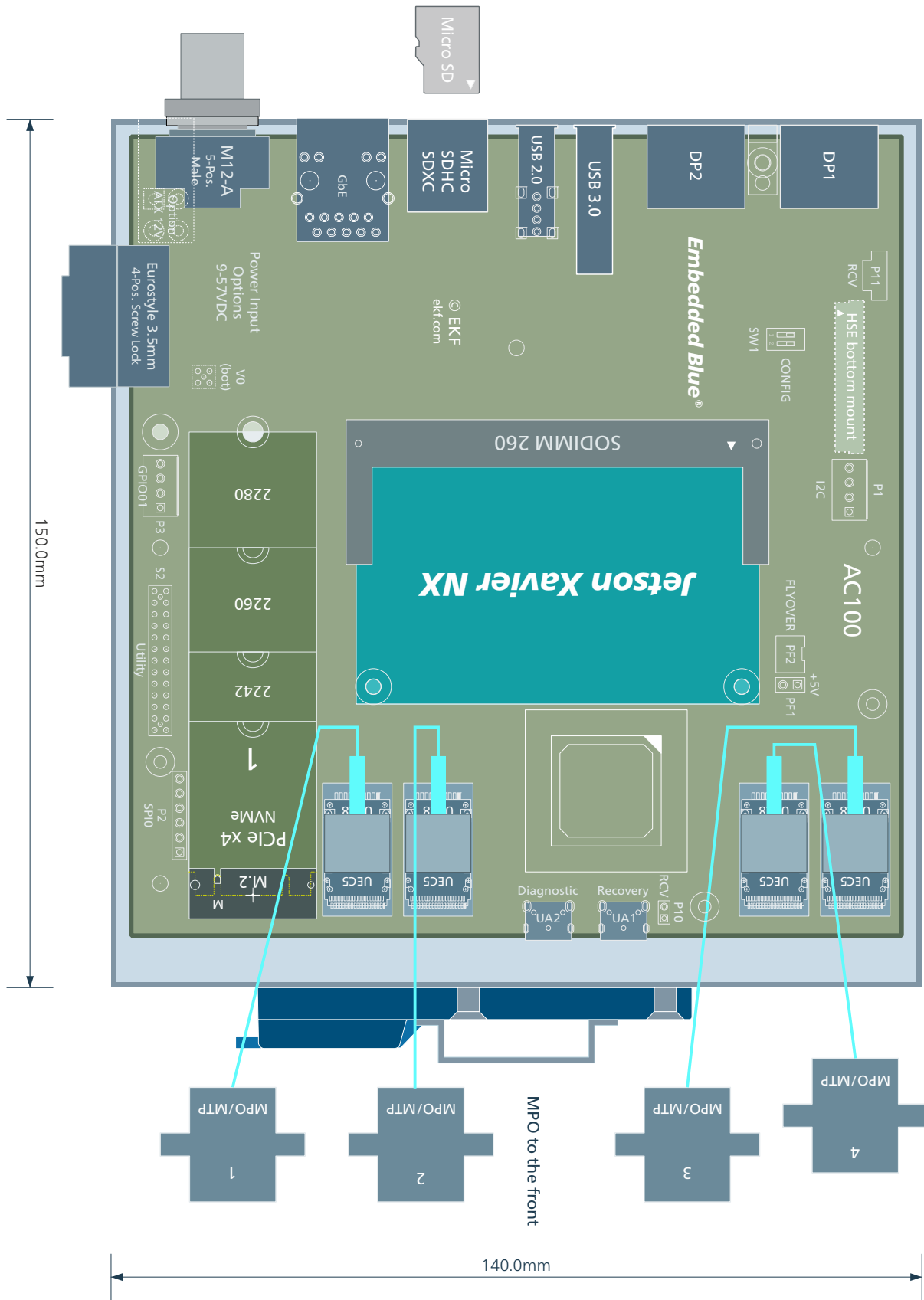


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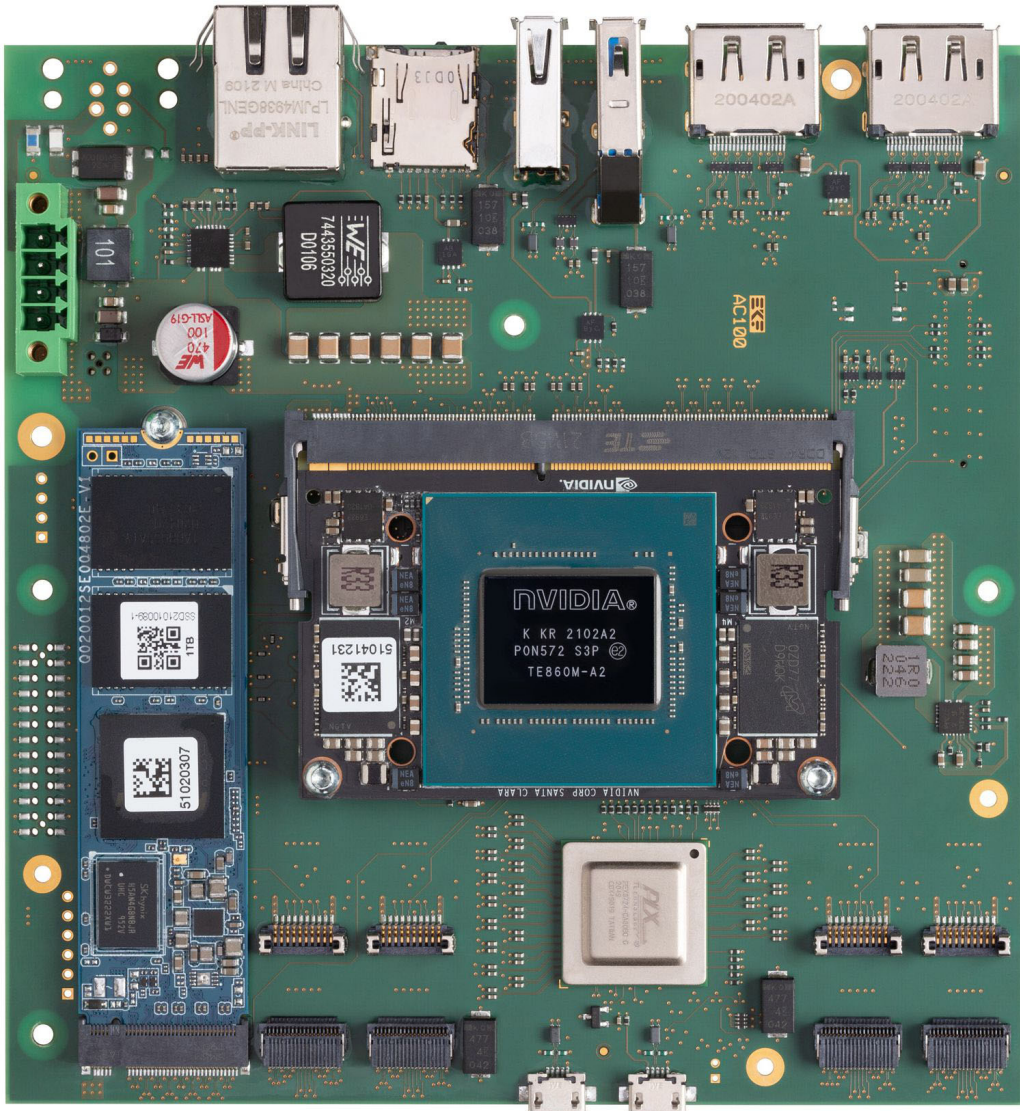
Embedded Blue®

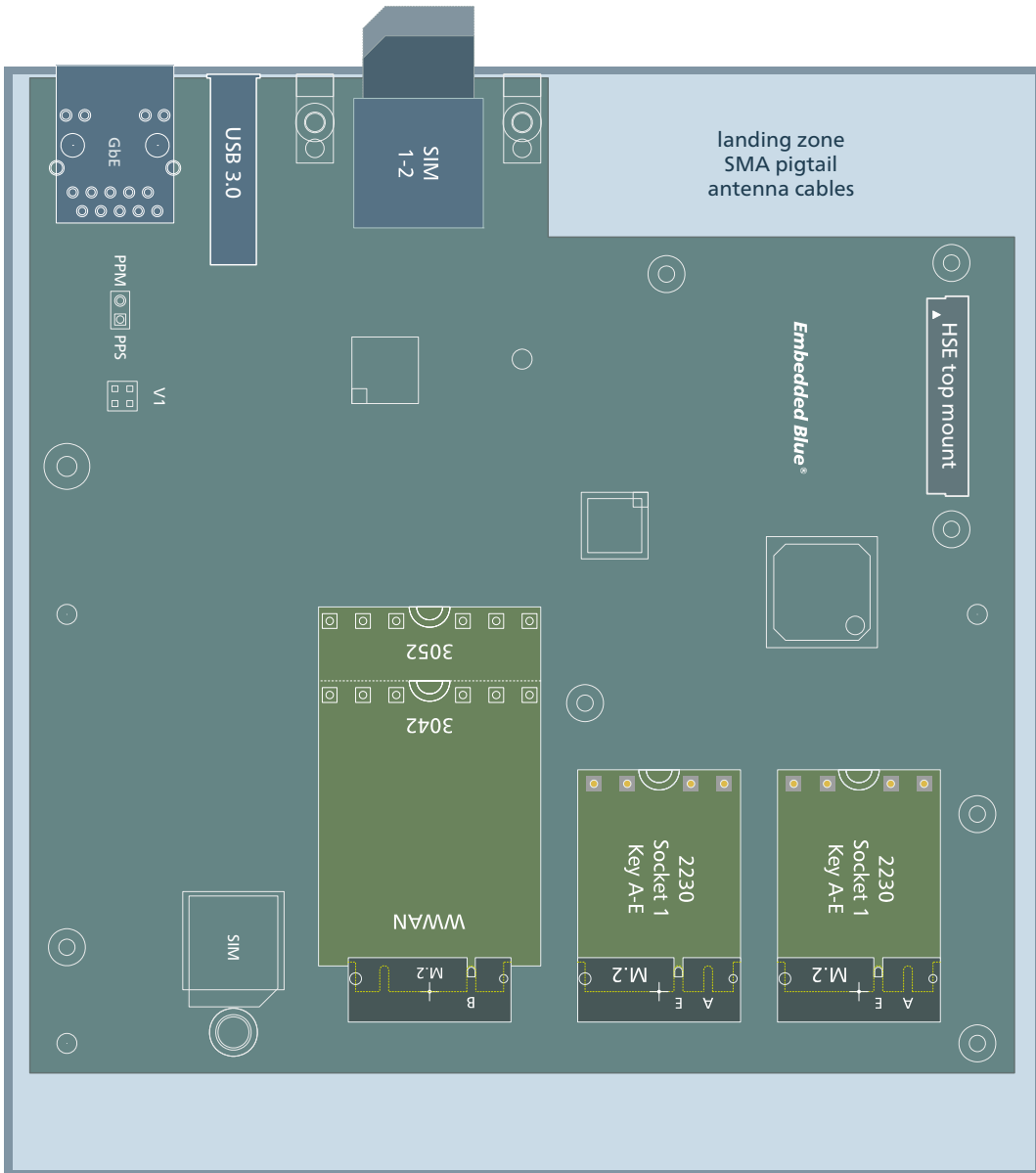


Component Orientation

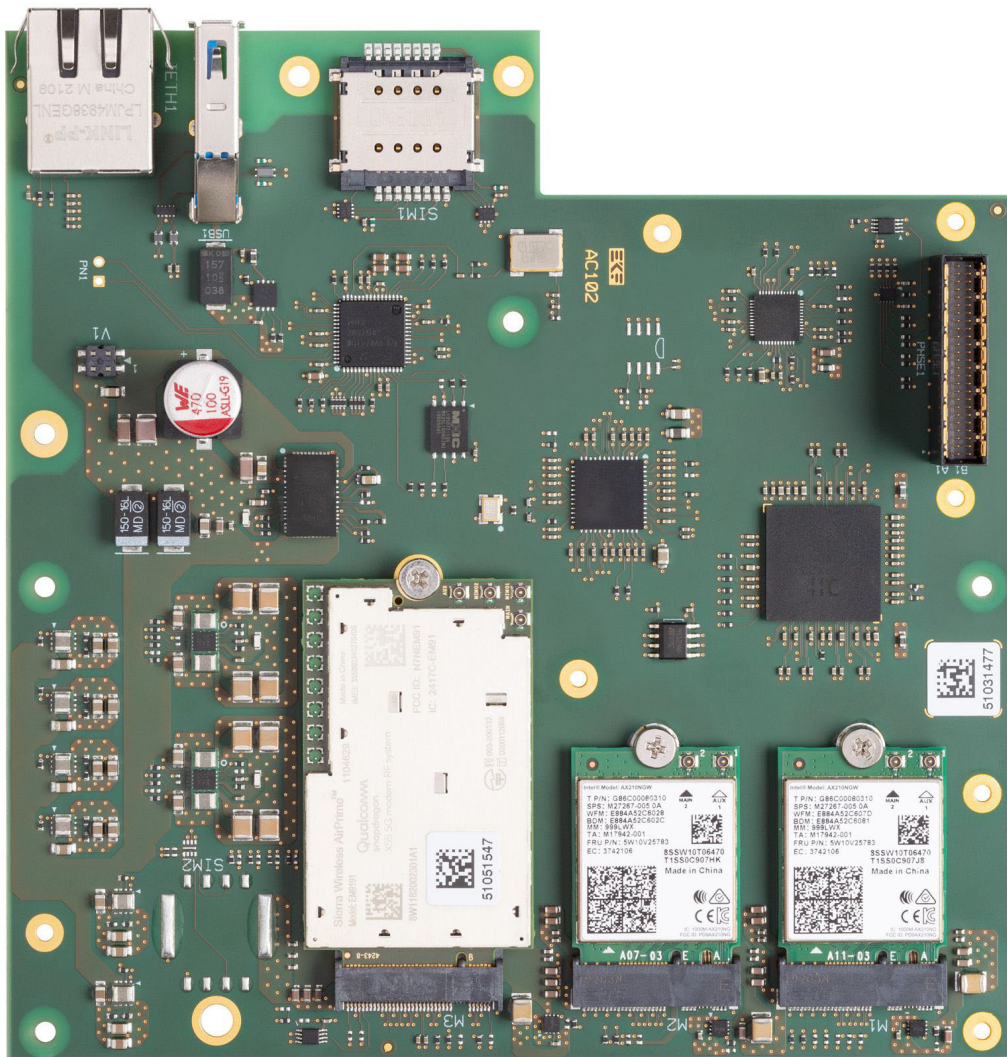


AC100 Rev.2

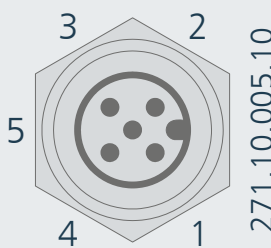




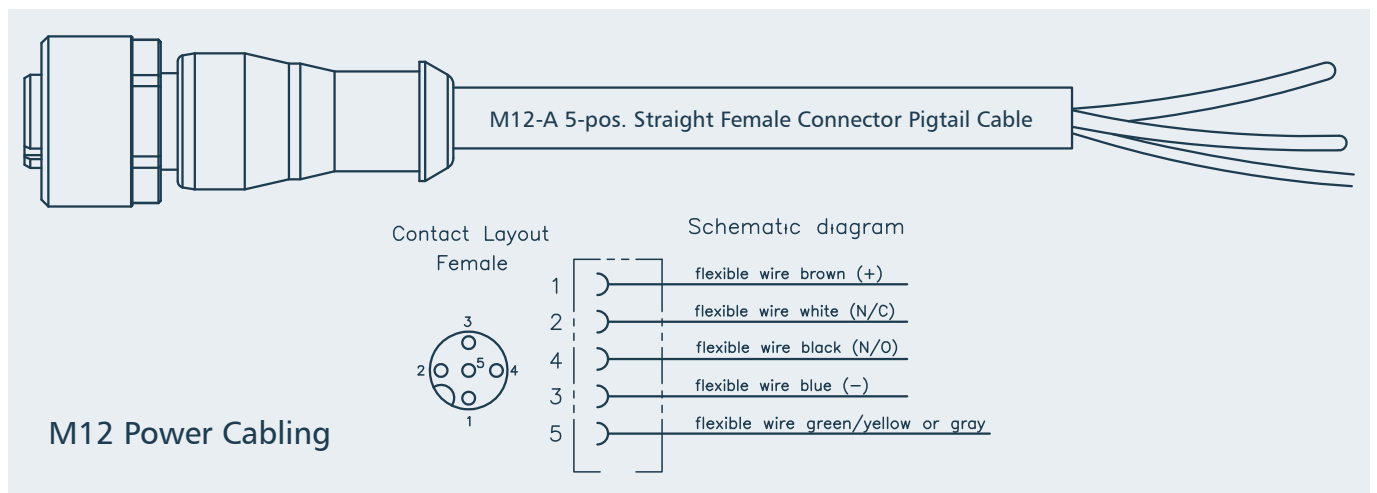
AC102 • Mezzanine Module • © EKF • ekf.com



Option M12-A Power Connector

| M12-A 5-Position Male 4A/Pin | | | |
|---|------------|---|-------------|
|  | +V=9-57VDC | 1 | +V |
| | | 2 | Reserved |
| | | 3 | -V (GND) |
| | | 4 | Reserved |
| | | 5 | FE (Shield) |

| Mating Pigtail Cable Assemblies 1.5m w. Female Straight Plug | |
|--|-------------------|
| EKF | 271.10.505.22.015 |
| Phoenix Contact | 1669822 |
| Tyco | 2273035-1 |

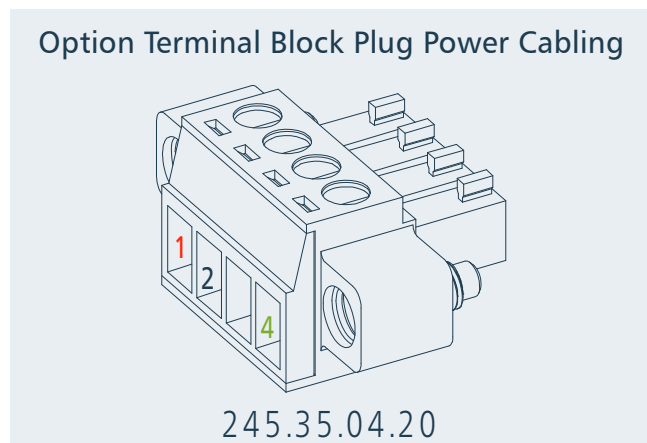


M12 Pigtail Cable

Option Terminal Block Power Connector

| 3.50mm 4-Position Terminal Block | | | |
|------------------------------------|-------------------|---|-------------|
| <p>245.35.04.00</p> <p>1 2 3 4</p> | <p>+V=9-57VDC</p> | 1 | +V |
| | | 2 | -V (GND) |
| | | 3 | RSV |
| | | 4 | FE (Shield) |

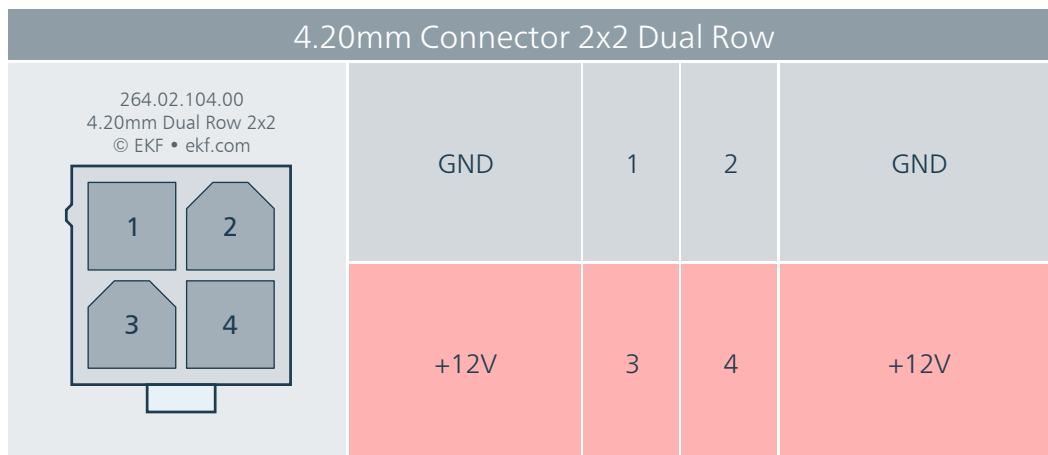
| Mating Plugs w. Screw Lock | |
|----------------------------|--------------------|
| EKF | 245.35.04.20 |
| FCI Amphenol | 20020000-C041B01LF |
| Molex | 39504-0004 |
| Phoenix Contact | 1847071 |
| Tyco | 284510-4 |



| Mating DIN Rail Power Supply | |
|------------------------------|---------------------------|
| EKF | 352.1.075.24.1 |
| Meanwell | NDR-75-24, 75W 24VDC/3.2A |

Option ATX Auxiliary Power +12V

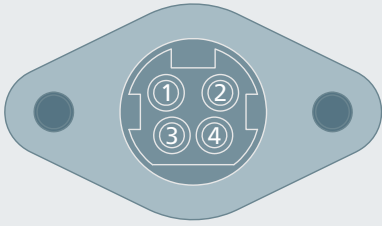
As an alternate, the PCB can be equipped with a 2x2 pin 4.2mm pitch dual row wire to board header (ATX 12V 4-pin), for attachment of a suitable cable assembly to the front. Many PC power supplies are provided with a mating cable harness.



Mating cable connectors are available e.g. from Molex, under the Mini-Fit® Jr.™ brand. A suitable housing would be e.g. the Molex part #0039013042, to be used with crimp terminals e.g. Molex part #0039000060 (18-24 AWG). Other manufacturers for 4.20mm style connectors are e.g. Würth and TE.

The M12-A power connector and the ATX power connector are exclusive manufacturing alternates.

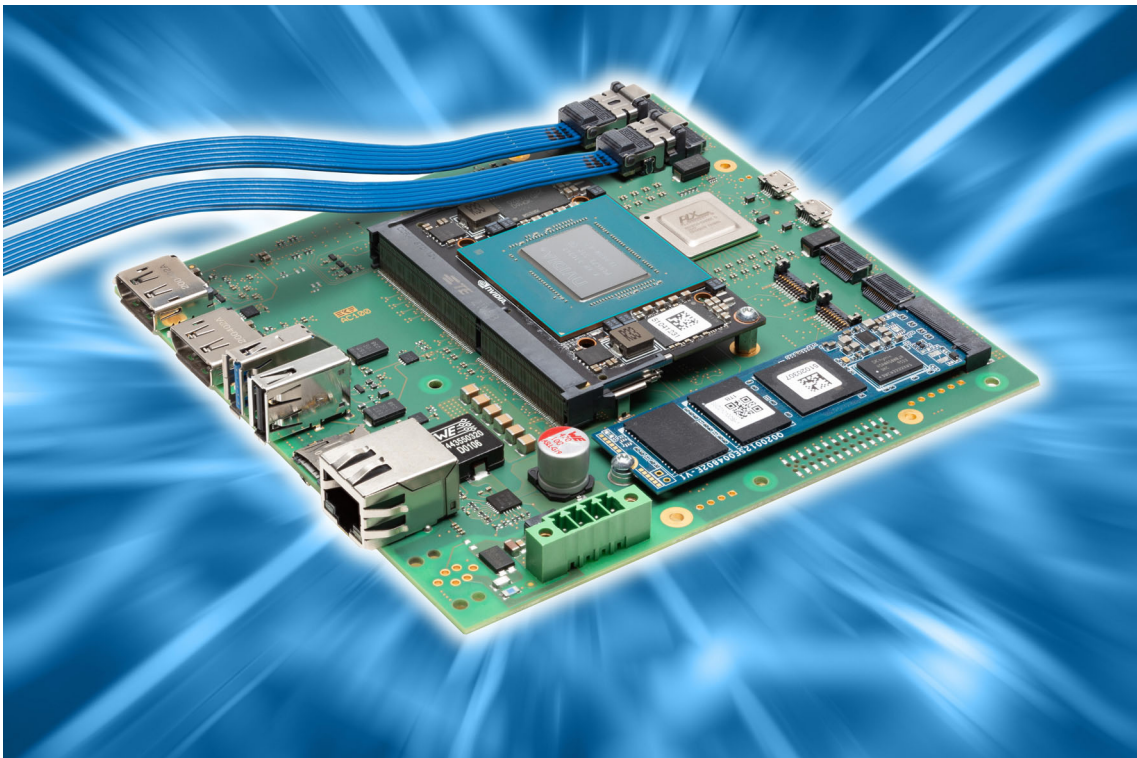
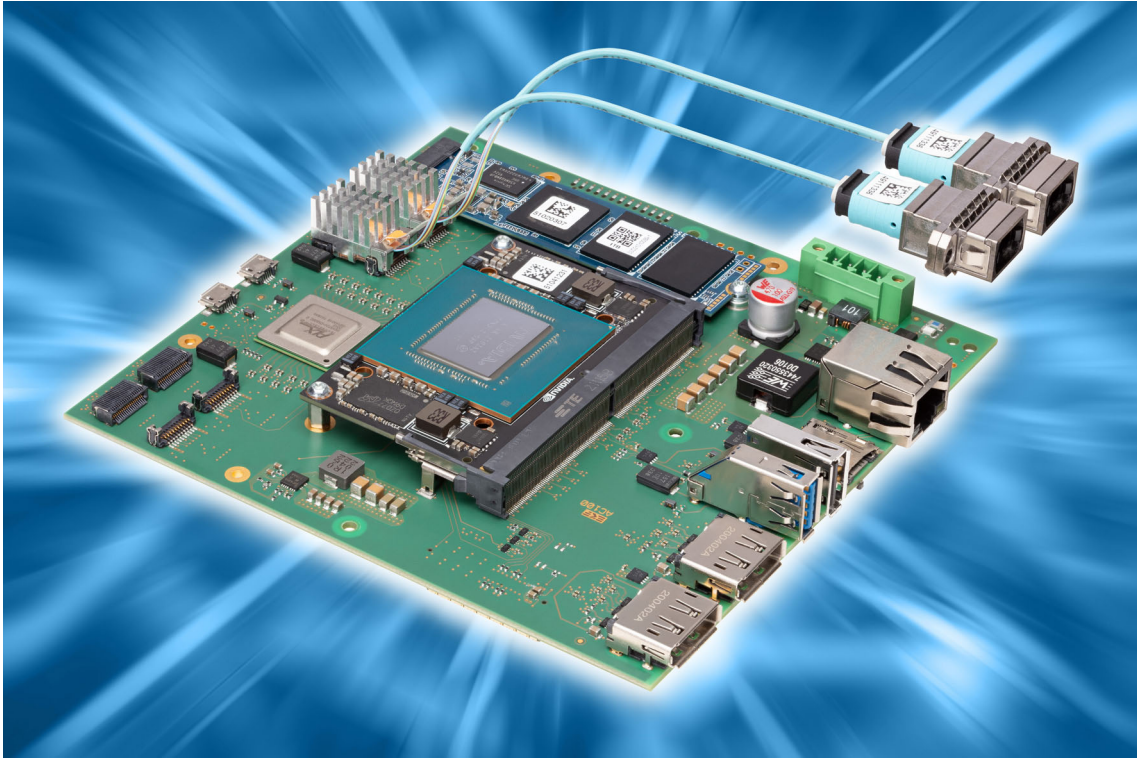
Option Rear Power Connector

| Circular 4-Position Power Receptacle (7.5A/Pin) | | | |
|--|-------------------|--------|------------|
|  <p>271.04.004.10</p> | <p>+V=9-57VDC</p> | 1 | +V |
| | | 2 | +V |
| | | 3 | -V (GND) |
| | | 4 | -V (GND) |
| | | Shield | Reserved * |

* power supply cable harness may connect GND to Shield

| Mating Desktop Power Adapter w. Cable Assy | |
|--|-----------------------------|
| EKF | 353.1.120.24.1 |
| FSP Technology | FSP120-AAAN3, 120W 24VDC/5A |





Mezzanine Interface AC100/AC102

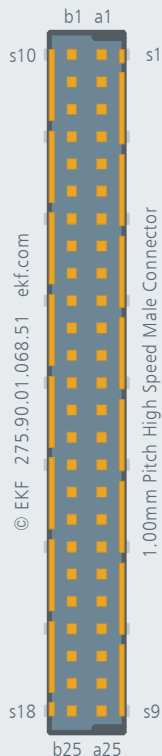
| HSE (AC100) • High Speed Expansion (Bottom Mount) | | | | |
|--|----------------------|-----|-----|------------------------------|
| Carrier card connector 8mm female ERNI Microspeed 275.90.08.068.01 | | | | |
| <p>© EKF • 275.90.08.068.01 • ekf.com 1.00mm Pitch High Speed Female Connector (H=8mm)</p> | PCIE1_CLKREQ# | a1 | b1 | GND |
| | PCIE1_TX0P | a2 | b2 | GPO FireFly 1 B12 * |
| | PCIE1_TX0N | a3 | b3 | GPO FireFly 2 B12 * |
| | GND | a4 | b4 | GND |
| | PCIE1_RX0N | a5 | b5 | GPO FireFly 3 B12 * |
| | PCIE1_RX0P | a6 | b6 | GPO FireFly 4 B12 * |
| | GND | a7 | b7 | GND |
| | SPI1_MISO (1.8V) * | a8 | b8 | GPI FireFly 1 A12 * |
| | SPI1_MOSI (1.8V) * | a9 | b9 | GPI (FireFly 2 A12 * |
| | GND | a10 | b10 | GND |
| | SPI1_CS0 (1.8V) * | a11 | b11 | GPI FireFly 3 A12 * |
| | SPI1_CS1 (1.8V) * | a12 | b12 | GPI FireFly 4 A12 * |
| | GND | a13 | b13 | GND |
| | I2S1_DOUT (1.8V) | a14 | b14 | I2C0_SCL (3.3V) |
| | I2S1_DIN (1.8V) | a15 | b15 | I2C0_SDA (3.3V) |
| | GND | a16 | b16 | GND |
| | I2S1_FS (1.8V) | a17 | b17 | I2C1_SCL (3.3V) |
| | I2S1_SCLK (1.8V) | a18 | b18 | I2C1_SDA (3.3V) |
| | GND | a19 | b19 | GND |
| | WWAN_MOD_RST# | a20 | b20 | PCIE_CLK_P |
| | PCIE1_RST# | a21 | b21 | PCIE_CLK_N |
| | +3.3V | a22 | b22 | +5V |
| | +3.3V | a23 | b23 | +5V |
| | CAN_RX (3.3V CMOS) * | a24 | b24 | SPI1_SCK (1.8V) * |
| | CAN_TX (3.3V CMOS) * | a25 | b25 | ISOGND FireFly 1-4 A11/B11 * |

* was RSV before PCB rev. 2

- these signals are intended for use on planned new mezzanines
- as of current these signals are only optional via OR (no stuff by default)

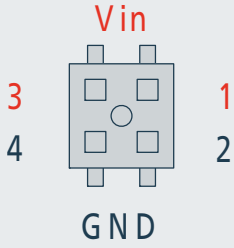
HSE (AC102) • High Speed Expansion (Top Mount)

Mezzanine card connector 10mm male ERNI Microspeed 275.90.10.068.51



| | | | |
|-----------------|-----|-----|---------------|
| GND | b1 | a1 | GND |
| RSV | b2 | a2 | PCIE_1TP |
| RSV | b3 | a3 | PCIE_1TN |
| GND | b4 | a4 | GND |
| RSV | b5 | a5 | PCIE_1RN |
| RSV | b6 | a6 | PCIE_1RP |
| GND | b7 | a7 | GND |
| RSV | b8 | a8 | RSV |
| RSV | b9 | a9 | RSV |
| GND | b10 | a10 | GND |
| RSV | b11 | a11 | RSV |
| RSV | b12 | a12 | RSV |
| GND | b13 | a13 | GND |
| I2C0_SCL (3.3V) | b14 | a14 | RSV |
| I2C0_SDA (3.3V) | b15 | a15 | RSV |
| GND | b16 | a16 | GND |
| I2C1_SCL (3.3V) | b17 | a17 | RSV |
| I2C1_SDA (3.3V) | b18 | a18 | RSV |
| GND | b19 | a19 | GND |
| PCIE_CLK_P | b20 | a20 | WWAN_MOD_RST# |
| PCIE_CLK_N | b21 | a21 | PLTRST# |
| RSV | b22 | a22 | RSV |
| RSV | b23 | a23 | RSV |
| RSV | b24 | a24 | RSV |
| RSV | b25 | a25 | RSV |

V0 (AC100) V1 (AC102) • DC High Voltage (Bottom/Top Mount)
 2x2 2.00mm Socket Pass Through w. Stacker >2A/Pin

| | | | | |
|---|---------------------|---|---|-----|
|  | V_{IN} 9-57VDC | 1 | 2 | GND |
| | V_{IN} 9-57VDC | 3 | 4 | GND |

On-Board Connectors & Switches

| S2 • Utility Connector • AC100 | | | |
|--|----|----|-------------|
| 2x13 2.0mm Socket | | | |
| Signals from Jetson, 3.3V Signal Level Shifted | | | |
| SLEEP_WAKE# | 1 | 2 | GND |
| +5V | 3 | 4 | UART0_TXD |
| MOD_SLEEP# | 5 | 6 | UART0_RXD |
| SHUTDOWN_REQ# | 7 | 8 | UART0_RTS# |
| GPIO01 | 9 | 10 | UART0_CTS# |
| USB2_EN | 11 | 12 | +3.3V |
| GND | 13 | 14 | SD_PWRON |
| USB3_EN | 15 | 16 | +3.3V |
| WWAN_RST# | 17 | 18 | GND |
| GPIO09 | 19 | 20 | GND |
| USB3_OC# | 21 | 22 | +5V |
| GPIO12 | 23 | 24 | FAN_TACH_5V |
| GPIO13 | 25 | 26 | FAN_PWM_5V |

| P1 • I ² C • AC100 | |
|---------------------------------------|----------|
| Male Locking Pin Header 2.54mm WR-WTB | |
| 5V Level Shifted | |
| 1 | +5V |
| 2 | I2C0_SDA |
| 3 | I2C0_SCL |
| 4 | GND |

| P2 • SPI • AC100 Pin Header 2.54mm (not stuffed) Signals from Jetson | |
|--|-----------|
| 1 | SPI0_SCK |
| 2 | SPI0_MISO |
| 3 | SPI0_MOSI |
| 4 | SPI0_CS0# |
| 5 | SPI0_CS1# |
| 6 | +3.3V |

| P3 • GPIO01 • AC100 Male Locking Pin Header 2.54mm WR-WTB 3.3V Level Shifted | |
|--|--------|
| 1 | RSV |
| 2 | RSV |
| 3 | GPIO01 |
| 4 | GND |

| P10 • Force Recovery • AC100 Pin Header 2.0mm (not stuffed) Wired to Jetson | |
|---|------------------------|
| 1 | FORCE_RECOVERY# (1.8V) |
| 2 | GND |

| P11 • Force Recovery • AC100 Rev. 2 Pin Header 1.25mm PicoBlade (not stuffed) Wired to Jetson Suitable 3-Wire Cable Assy 276.91.003.15 Suitable Microswitch Assy 710.3.020.0 (cut wire 3) | |
|---|------------------------|
| 1 | GND |
| 2 | FORCE_RECOVERY# (1.8V) |
| 3 | SYS_RESET# (1.8V) |

| PF1 • FireFly™ • AC100 Pin Header 2.54mm (not stuffed) Camera Power Jumper to FireFly Sockets Pins B8/B9 | |
|--|----------|
| 1 | +5V |
| 2 | +CAM_PWR |

| PF2 • FireFly™ • AC100 Pin Header 2x5 1.27mm (not stuffed) FireFly Sockets Pins A12/B12/A11/B11 | | | |
|---|---|----|-------------------|
| ISOGND FireFly 1-4 A11 B11 | 1 | 2 | GND |
| GPO FireFly 1 B12 | 3 | 4 | GPI FireFly 1 A12 |
| GPO FireFly 2 B12 | 5 | 6 | GPI FireFly 2 A12 |
| GPO FireFly 3 B12 | 7 | 8 | GPI FireFly 3 A12 |
| GPO FireFly 4 B12 | 9 | 10 | GPI FireFly 4 A12 |

| PN1 • PPS/PPM • AC102 Pin Header 2.54mm (not stuffed) Wired to I210-IT NIC | |
|--|----------|
| 1 | PPS SDP2 |
| 2 | PPM SDP3 |

| DSW1 • PCIe Configuration • AC100 DIP-Switch Wired to Jetson & PEX8724 PCIe® Switch | |
|---|--|
| Slider 1 = ON | Force Root Port |
| Slider 1 = OFF | Root/Endpoint Control via Jetson GPIO07 |
| Slider 2 = ON | Switch EEPROM 1 enabled |
| Slider 2 = OFF | Switch EEPROM 2 enabled |

| TSW1/2 • Tactile Switches • AC100 Tactile Switches Bottom Mount, Wired to Jetson | |
|--|-----------------|
| TSW1 (Front of PCB) | SYS_RESET# |
| TSW2 (PCB Rear Edge) | FORCE_RECOVERY# |

SIM Card Holders

The AC100 is equipped with three SIM card holders, a dual slot Mini SIM 2FF socket for 25mmx15mm cards, and optionally a Micro SIM 3FF card socket for a 15mmx12mm SIM card.

The sockets were constructed for 0.76mm thick Mini and Micro SIM cards. However, often SIM cards come as pre-cut assembly with a Nano SIM in its center, which is defined for a thickness of only 0.67mm. In rare cases, this may lead to contact problems.

As a professional solution, the Nano SIM 4FF can be put into an adapter for use with sockets designed for 2FF or 3FF SIMs. A simple workaround to improve contact pressure would be to attach a suitable self-adhesive Kapton label on the SIM card assembly back side, in order to bridge the gap of 0.09mm.



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Nano SIM 4FF to 3FF/2FF Adapters



https://www.ekf.com/a/DIN_Rail_on_off_500x280.mp4

Ordering Information

For popular AC100 SKUs please contact sales@ekf.de



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