



**AC600 • AC610**

***Embedded Blue***<sup>®</sup>

DIN Rail Boxed PC

Intel<sup>®</sup> Atom<sup>™</sup> E3900 Series Processor • Apollo Lake SoC

Preliminary



## Technical Features

### General

- ▶ Low Power X86 based boxed PC, for DIN rail mount or wall mount
- ▶ Intel® Apollo Lake-I (APL-I) SoC E39xx processor series (scalable AC600/AC610 versions)
- ▶ Versatile standard front I/O connector suite (dual DisplayPort, dual USB 3.0, dual M12-X GbE)
- ▶ Choice of two versions - without (AC600) or with (AC610) wireless networking
- ▶ SMA/SMA-RP antenna connectors (AC610)
- ▶ Dimensions: 30mm (W) x 140mm (H) x 150mm (D) w/o DIN rail bracket (AC600)
- ▶ Dimensions: 40mm (W) x 140mm (H) x 150mm (D) w/o DIN rail bracket (AC610)
- ▶ Metal case, TS35 DIN rail bracket or wall mount plate
- ▶ Option M12 power connector
- ▶ Option terminal block power connector
- ▶ Option desktop power adapter connector
- ▶ Nominal 12V/24VDC power input operation

### Front I/O

- ▶ Dual M12-X Gigabit Ethernet circular connectors (railway and industrial standard)
- ▶ 1000BASE-T, 100BASE-TX, 10BASE-T compliant data transfer rate front ports
- ▶ Dual USB 3.0 Type-A receptacles
- ▶ Dual DisplayPort connectors
- ▶ M12-A DC 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)

### Additional I/O AC610

- ▶ AC610 is the wireless version of AC600 with AC010 mezzanine module (40mm front width)
- ▶ SMA/SMA-RP front antenna connectors for WWAN, Wi-Fi 6, Bluetooth 5
- ▶ Dual Micro-SIM card slot for WWAN modem up to 5G

### Processor

- ▶ Intel® Apollo Lake-I (APL-I) SoC E39xx Series
- ▶ x7-E3950 • 4 Cores • 1.6/2.0GHz • 12W TDP/cTDP • 500/650MHz graphics • 2MB LLC
- ▶ x5-E3940 • 4 Cores • 1.6/1.8GHz • 9.5W TDP/cTDP • 400/600MHz graphics • 2MB LLC
- ▶ x5-E3930 • 2 Cores • 1.3/1.8GHz • 6.5W TDP/cTDP • 400/550MHz graphics • 2MB LLC
- ▶ Graphics Burst, CPU Burst, Intel® Speedstep®
- ▶ Intel® Virtualization Technology (Intel® VT-x / VT-d)
- ▶ Intel® Trusted Execution Engine (Intel® TXE) 3.0

## Technical Features

### *Firmware*

- ▶ Phoenix® UEFI (Unified Extensible Firmware Interface) with CSM\*
- ▶ Fully customizable by EKF
- ▶ Secure Boot and Measured Boot supported - meeting all demands as specified by Microsoft®
- ▶ Windows®, Linux and other (RT)OS' supported

\* CSM (Compatibility Support Module) emulates a legacy BIOS environment, which allows to boot a legacy operating system such as DOS, 32-bit Windows and some RTOS'

### *Main Memory*

- ▶ Integrated memory controller up to 8GB DDR3L 1600 +ECC
- ▶ Soldered memory for rugged applications

### *Mass Storage*

- ▶ On-board M.2 SSD socket (autosensing PCIe® or SATA based, up to 2280 size)
- ▶ Up to 2TB capacity as of current - refer to AC600/610 SKUs
- ▶ Option front I/O Micro SD Card socket (SDHC, SDXC), available on request
- ▶ 128Mbit SPI Flash (UEFI firmware and customer application data)
- ▶ Option eMMC (embedded MMC 5.0 up to 64GByte soldered)
- ▶ Option mezzanine storage expansion via P-HSE connector (up to 2 x PCIe®, 1 x USB 3.0)
- ▶ Option custom specific mezzanine board design on request

### *Graphics*

- ▶ Integrated graphics engine, Gen 9 LP
- ▶ DirectX 12.0, OpenCL 2.0 Full Profile, OpenGL 4.3
- ▶ HW media acceleration DXVA 2, VAAPI
- ▶ HW video decode H264 L5.2, H.265 HEVC, VP9, MVC, MPEG2, JPEG/MJPEG, VC1, WMV9, VP8
- ▶ HW video encode H264, SVC, AVC, MVC, MPEG-2
- ▶ Content protection PAVP, HDCP 1.4
- ▶ 2 x DisplayPort front panel connectors
- ▶ DisplayPort™ 1.2a
- ▶ Max Resolution 4096 x 2160 @60Hz
- ▶ Audio streams encoded

## Technical Features

### Networking

- ▶ Dual networking interface controllers (NIC), 1000BASE-T, 100BASE-TX, 10BASE-T connections
- ▶ 2 x Intel® I210-IT GbE controllers w. integrated PHY, -40°C to +85°C operating temperature
- ▶ IPv4/IPv6 checksum offload, 9.5KB Jumbo Frame support, EEE Energy Efficient Ethernet
- ▶ IEEE 802.1Qav Audio-Video-Bridging (AVB) enhancements for time-sensitive streams
- ▶ IEEE 1588 and 802.1AS packets hardware-based time stamping for high-precision time synchronization
- ▶ Two front port M12-X connectors
- ▶ Option 1 x Intel® I210-IS (SerDes GbE for Ethernet switch port expansion (mezzanine module))

### Wireless Networking AC610

- ▶ Option Wi-Fi with M.2 mezzanine module (Wi-Fi-6 802.11AX, BT 5.0)
- ▶ Option WWAN with M.2 mezzanine module (3G/4G/5G & GNSS)

### APL SoC I/O Usage

- ▶ 2 x PCIe® and 1 x SATA to M.2 SSD connector (auto switching logic PCIe®/SATA)
- ▶ 2 x PCIe® to 2 x I210-IT networking controllers
- ▶ 2 x PCIe® to P-HSE high speed expansion port connector (only 1 x PCIe® if 3<sup>rd</sup> NIC I210-IS is populated)
- ▶ 1 x USB 3.0 to P-HSE high speed expansion port connector
- ▶ 2 x USB 3.0 to front panel connectors
- ▶ 2 x DisplayPort to front panel connectors
- ▶ 1 x HS400 (e•MMC) to embedded MMC 5.0 64GByte (ordering option, mass storage device)
- ▶ SDIO (Micro SD Card) front panel slot (option)
- ▶ LPC to TPM 2.0 module (option)

### Building Blocks

- ▶ 2 x Gigabit Ethernet controllers Intel® I210-IT (front panel)
- ▶ Option 1 x Intel® I210-IS (for SerDes networking expansion port connector P-EXP)
- ▶ M.2 socket for 2280 SSD
- ▶ Option e•MMC (embedded MMC 5.0 64GByte HS400)
- ▶ Option Trusted Platform Module TPM 2.0

### AC610 Additions

- ▶ M.2 socket for 2230 Wi-Fi module
- ▶ M.2 socket for 3042 WWAN module (up to 3052 & 3060 extended 5G module)

### Security

- ▶ Trusted Platform Module (option)
- ▶ TPM 2.0 for highest level of certified platform protection
- ▶ Infineon Optiga™ SLB 9665 cryptographic processor
- ▶ Conforming to TCG 2.0 specification
- ▶ AES hardware acceleration support (Intel® AES-NI)

## Technical Features

### *Local Expansion*

- ▶ Mezzanine card connectors P-HSE and P-EXP for optional local expansion
- ▶ P-HSE: 2 x PCIe®, 1 x USB 3.0, 2 x USB 2.0
- ▶ Choice of P-HSE based mezzanine I/O or storage modules
- ▶ AC010 P-HSE based wireless module for Wi-Fi, Bluetooth, WWAN connectivity (AC610)
- ▶ Custom specific P-HSE based mezzanine module design
- ▶ Custom specific box design for utilization of P-HSE custom I/O mezzanine modules
- ▶ Option P-EXP connector - Gigabit Ethernet SerDes I/F derived from I210-IS NIC
- ▶ Custom specific box design for utilization of P-EXP together with Gigabit Ethernet switch card
- ▶ Custom specific P-EXP based mezzanine switching module design

### *Power Requirements*

- ▶ DC Input, 9V-30V (12VDC, 24VDC nominal input voltage)
- ▶ Power consumption 25W 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 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*

- ▶ Ultra compact industrial PC
- ▶ X86 code compatibility for rapid time to market
- ▶ Machine control
- ▶ Kiosk systems, information panels
- ▶ Dual 4k display solution, independent operation
- ▶ Single display or headless applications
- ▶ Industrial networks - IIoT
- ▶ Cable and wireless networking
- ▶ Router, bridges
- ▶ Rugged environments, DIN rail or wall mount options
- ▶ Edge computing
- ▶ Vehicles, transportation

## 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 Regulations EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)
- ▶ MTBF tbd years

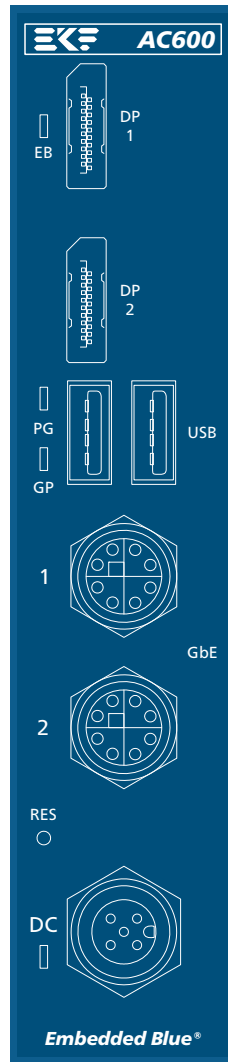
all items may be subject to technical changes w/o further notice





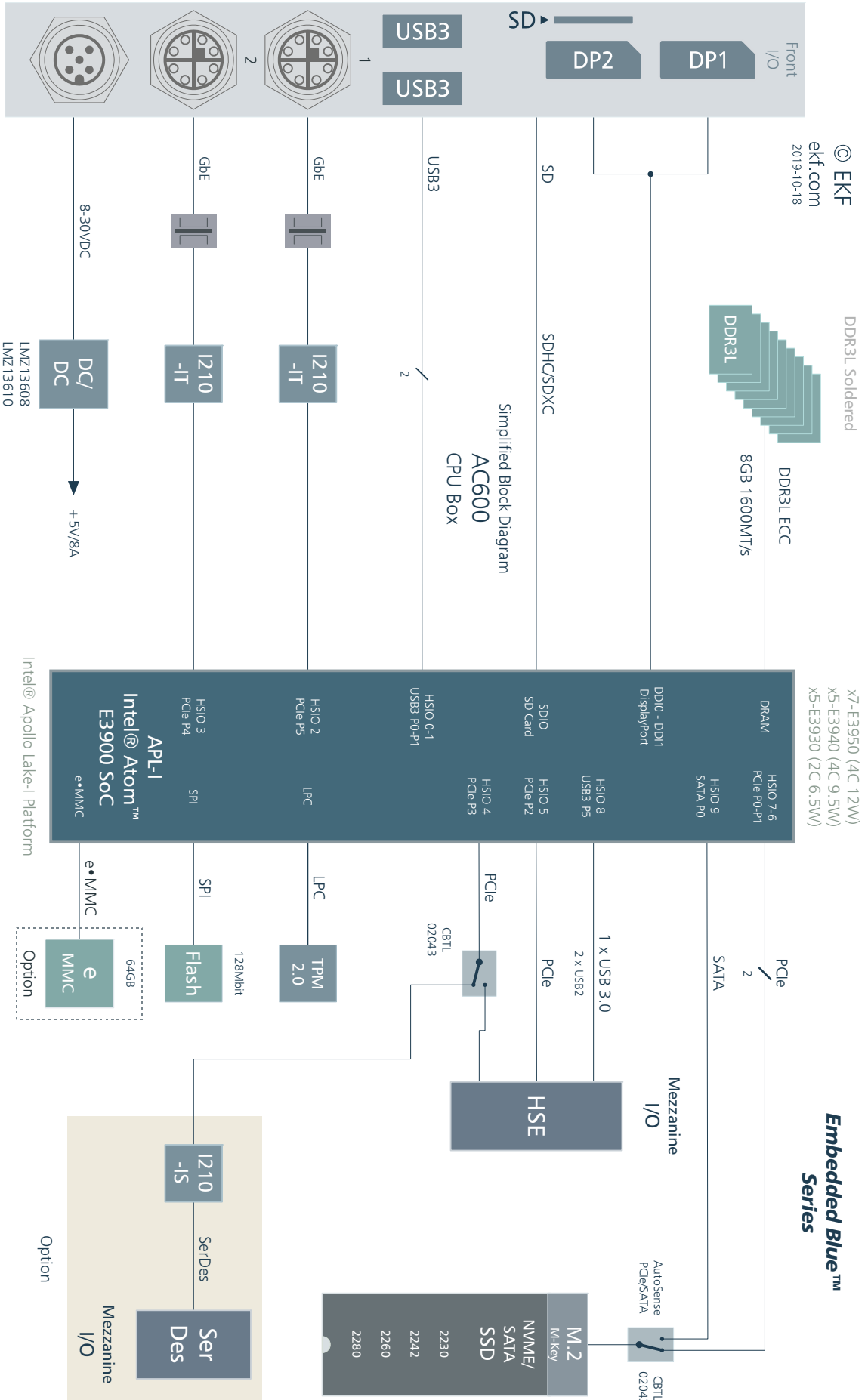


## Front View

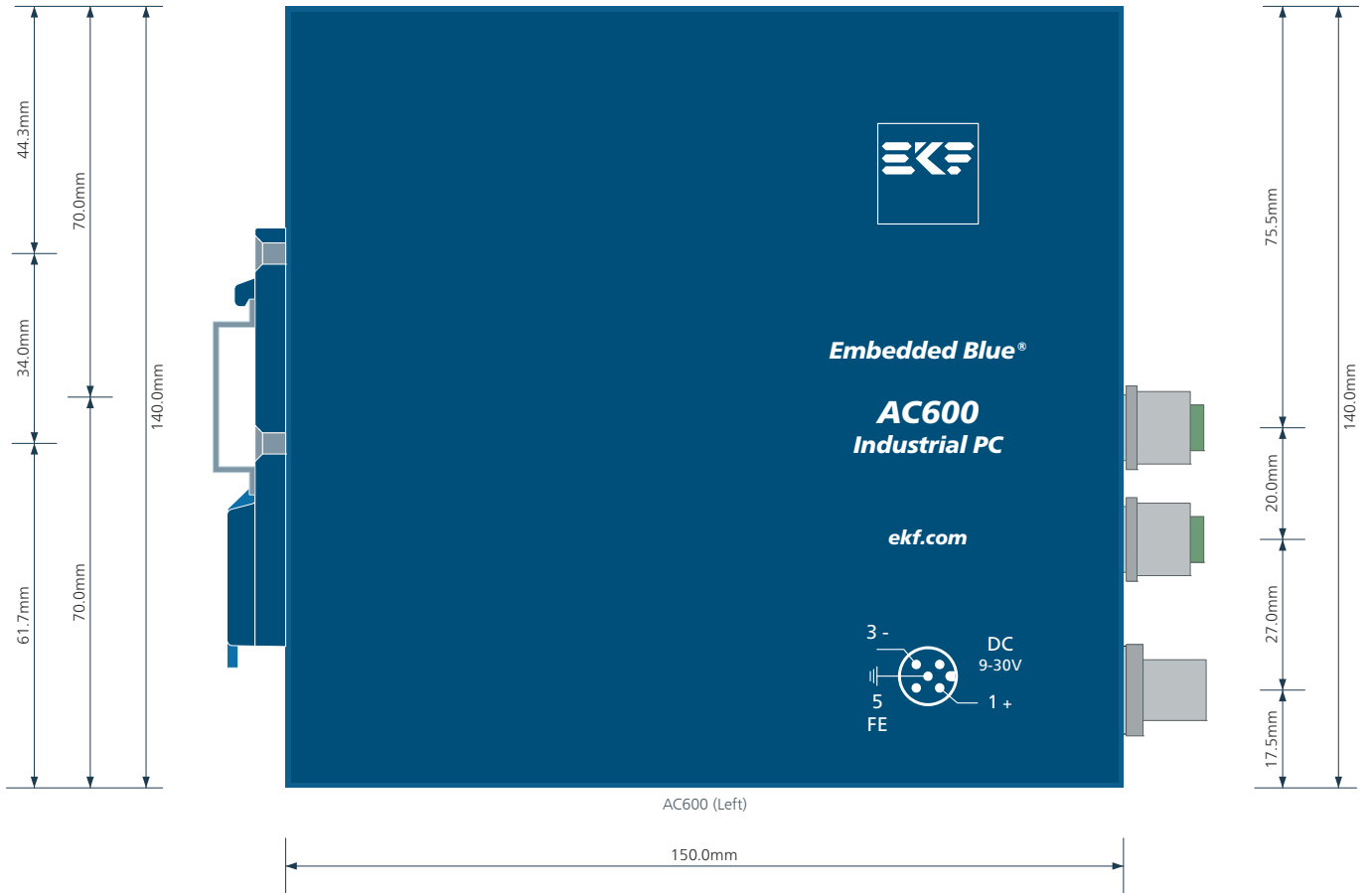




Block Diagram



## Dimensions



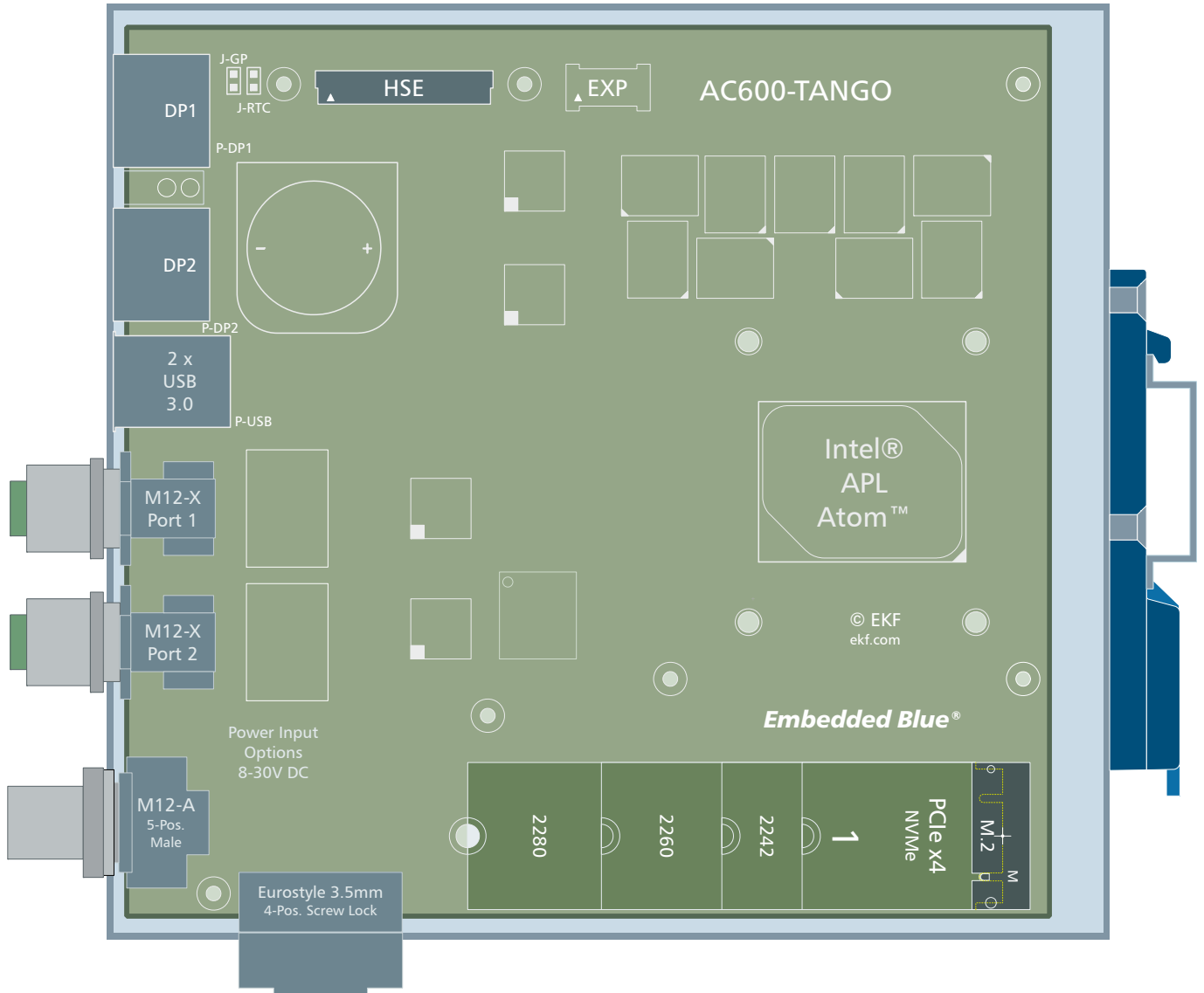


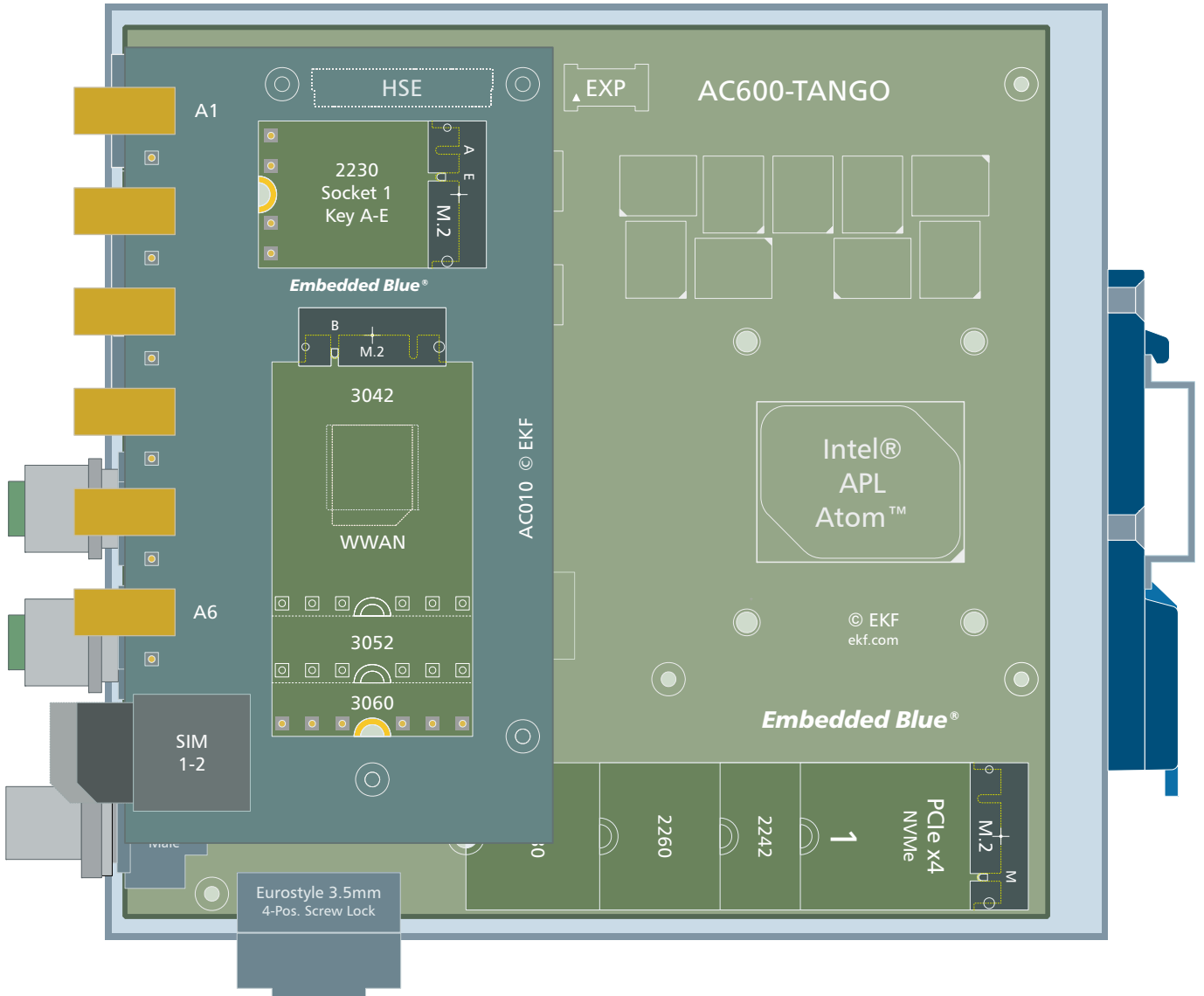
DIN Rail Mounting Option



Wall Mount Plate Option

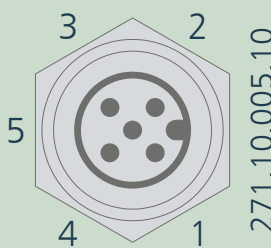
## Component Orientation



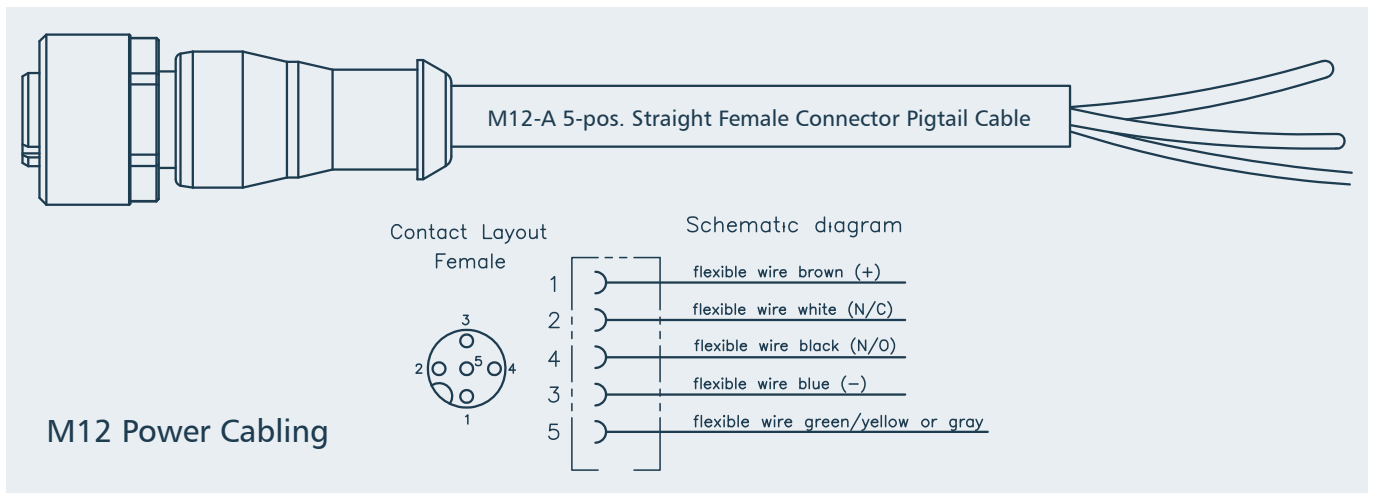


AC610 (AC600 w. AC010 Wireless Module)

Option M12-A Power Connector

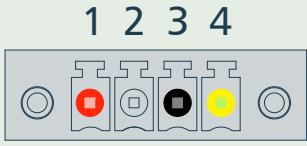
M12-A 5-Position Male 4A/Pin		
 <p>271.10.005.10</p>	<p>+V=9-30VDC</p>	1 +V
		2 Reserved
		3 -V (GND)
		4 Reserved
		5 FE (Shield)

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

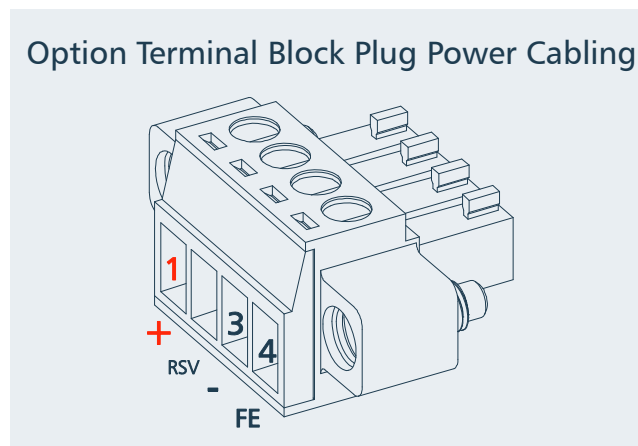


M12 Pigtail Cable  
Phoenix Contact

## Option Terminal Block Power Connector

3.50mm 4-Position Terminal Block			
 <p>245.35.04.20</p>	+V=9-30VDC	1	+V
		2	Reserved
		3	-V (GND)
		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



**Warning:**

Do not apply over-voltage e.g. 115/230V AC to the power connector, since this will cause a PCB soldered chip fuse to break, which cannot be replaced on-site.

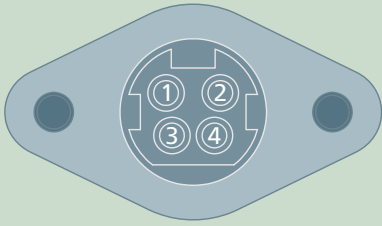




Option Terminal Plug 3.5mm Pitch

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

Option Rear Power Connector

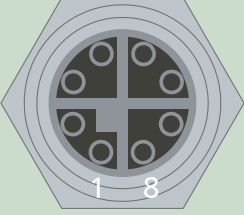
Circular 4-Position Power Receptacle			
 <p>271.04.004.10</p>	<p>V=9-30VDC</p>	1	+V
		2	+V
		3	-V (GND)
		4	-V (GND)
		Shell	FE (Shield)



Option Rear Connector for Desktop Power Adapter

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

## Gigabit Ethernet Ports M12-X

M12 X-Coded Front Panel I/O Receptacles			
Gigabit Ethernet • 271.12.008.20 • M12-X Flush-type socket Gigabit Ethernet			
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">271.12.008.00</p>  <p>© EKF • ekf.com Draft - Do Not Scale</p>	Ports 1-2	1	MDX0+
		2	MDX0-
		3	MDX1+
		4	MDX1-
		5	MDX3+
		6	MDX3-
		7	MDX2-
		8	MDX2+

The pin numbers of an M12 X-coded connector do not reflect the RJ45 Gigabit Ethernet signal assignment. For cross-over patch cables M12 to RJ45 please refer to the table below.

M12-X	Signal Colors T568B	RJ45
1	MDX0+ white/orange	1
2	MDX0- orange	2
3	MDX1+ white/green	3
4	MDX1- green	6
5	MDX3+ white/brown	7
6	MDX3- brown	8
7	MDX2- white/blue	5
8	MDX2+ blue	4

Suitable industrial Gigabit Ethernet M12-X cable assemblies can be ordered from EKF, or directly from well-known cable and connector manufacturers e.g. Metz, Phoenix, Escha and many others.



M12 to M12 Cable  
Phoenix Contact



M12 to RJ45 Cable  
Phoenix Contact





Ordering Information

For popular AC600 & AC610 SKUs please contact sales@ekf.de

# ***Embedded Blue***®

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EKF Elektronik GmbH  
Philipp-Reis-Str. 4 (Haus 1)  
Lilienthalstr. 2 (Haus 2)  
59065 HAMM  
Germany



Phone +49 (0)2381/6890-0  
Fax +49 (0)2381/6890-90  
Internet [www.ekf.com](http://www.ekf.com)  
E-Mail [sales@ekf.com](mailto:sales@ekf.com)