GC370 • *Embedded Gold*

ARM® v8 Microcomputer SBC

Overview

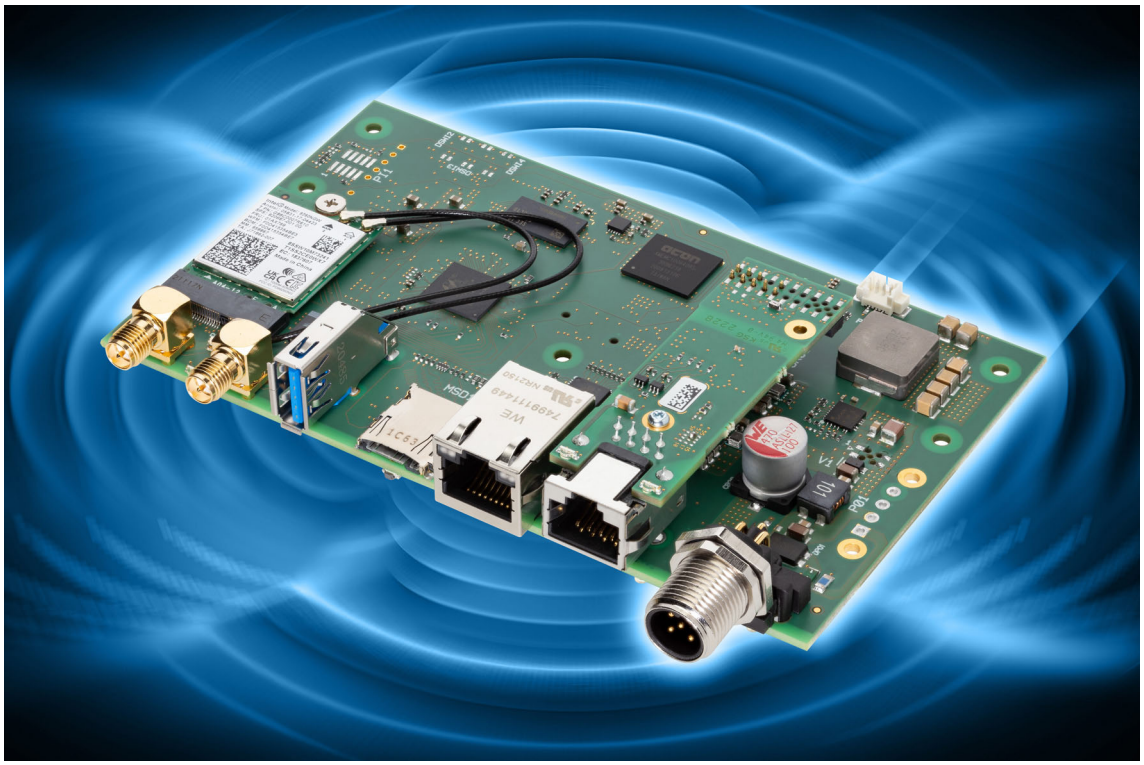
As a member of their **Embedded Gold™** ready-for-use industrial PCB assemblies, **EKF** presents the **GC370** 64-bit industrial single board microcomputer for universal control and networking applications, equipped with a low power Marvell® ARMADA® 3700 SoC (ARM® v8 Cortex™-A53).

Networking is provided through an M.2 wireless module (WiFi 6, Bluetooth), and by cable (RJ45 GbE). External devices can be attached to the USB3 Type-A receptacle. As an option, an isolated UART interface is available, either RS-232 or RS-485. The GC370 SBC has a wide-range 9-57VDC power input, via either an M12-A circular connector or terminal block (option).

Customer programming is hardware supported by means of the USB Type-B receptacle and the MicroSD card slot, or remotely across the RJ45 Ethernet jack.

Typical applications of the GC370 SBC are router, gateway, data conversion, device controller, edge and fog computing.

The GC370 has an internal mezzanine interface (SerDes 2.5GbE, MDIO) which can be used for mounting an Ethernet switch PCB. This enables switch management and/or protocol stacks e.g AVB/TSN, by the ARMADA® CPU. Eligible switch boards are e.g. the GL100, GL200, GL220.



Technical Features

General

- Single Board Microcomputer for general use and networking management
- Marvell® ARMADA® 3700 SoC family
- Intended for rugged industrial applications, ready-for-use (*Embedded Gold*)
- Industrial PCB assembly
- PCB Dimensions 133.0mm x 78.0mm
- 88F3710 single-core
- 88F3720 dual-core
- Low power consumption under different workloads
- Optimal performance-per-Watt in the embedded markets
- M12-A Power connector
- Terminal block power connector (option)
- Wide DC power input operation 9-57V

CPU

- Marvell® Armada® 88F3720 dual-core or 88F3710 single-core SoC
- ARM® v8 Cortex™-A53
- Up to 1GHz for industrial temperature range
- 32 KB-instruction / data (4-way) set associative L1 cache with parity/ECC protection
- Integrated power switches for dynamic shut down of CPU cores and unused functions
- Optimal performance-per-Watt
- High-performance security offload engine including IPSec, SSL, DTLS, and IKE
- Hardware compliance with ARM Trustzone® architecture for DRM
- Enhanced Secure-Boot flow using integrated one time programmable (OTP) memory
- FIPS-140 certified
- DDR4 512Mb x 16 (1GB) soldered DRAM
- e•MMC 5.1 Flash 16GB (up to 64GB)
- SPI Flash 64Mb
- 1 x 2.5 Gigabit Ethernet (SERDES) in use for mezzanine connector (switch host management)
- 1 x 1 Gigabit Ethernet (RGMII PHY) front panel I/O usage 1000BASE-T
- 1 x USB 3.0 front panel I/O
- 1 x PCIe Gen2 & USB 2.0 in use for M.2 socket (2230 Wi-Fi/BT)
- 1 x SDIO 3.0 for Micro SDHC card front I/O
- 2 x UART for Debug/Programming and optional RS-232 or RS-485

Technical Features

Networking

Connectivity

- RJ45 front port w. integrated magnetics, triple speed 1000BASE-T, 100BASE-TX, 10BASE-T, Energy Efficient Ethernet (EEE)
- Optional isolated RS-232 or RS-485 interface RJ45 front panel jack (mezzanine modules SUG or SUH)

Wireless (Option)

- Wi-Fi 6 IEEE 802.1ax up to 2.4Gbps dual band 2x2 160MHz (SMA antenna front connectors)
- Bluetooth® 5 (SMA antenna front connectors)

Switching

- 2.5 Gigabit Ethernet (SERDES) in use for mezzanine connector
- Switch host management for *Embedded Gold* GbE switch solutions
- Option AVB/TSN protocol stacks (AVNU certified) available

Available as Stacked Assembly

- GL110 (M12-X connector switch GL100 with GC370)
- GL210 (8 port switch GL200 together with GC370)
- GL230 (8 port PoE+ switch with GC370)

I/O Connectors

- RJ45 Gigabit Ethernet connector 1000BASE-T, 100BASE-TX, 10BASE-T compliant
- Micro SDHC Card slot
- 2 x SMA antenna connectors Wi-Fi 6 & Bluetooth® 5 associated to MHF4 coax connectors (MHF4 to MHF4 patch cables required)
- Additional SMA connectors require pigtail cables MHF4 to SMA
- USB 3.0 Type-A connector 5Gbps maximum speed
- USB 2.0 Type-B receptacle (diagnostic & programming I/F)
- M12-A 5-pin male connector DC power input
- Optional terminal block 3.5mm pitch 4-position screw lock power input
- Signal LEDs
- Reset button

Option

- Isolated RS-232 or RS-485 I/F, RJ45 jack (replaces Type-B receptacle)

Technical Features

Ecosystem

- Complete SDK available including U-Boot, Mainline Linux BSP
- AVB/TSN support (option)
- HTML Web server

- JTAG port (on-board pin header) suitable for deep hardware/software debugging
- UART wired to USB Type-B front receptacle via FT234XD for diagnosis and programming
- USB UART drivers suite (FTDI website)

Applications

- Industrial networks - IIoT
- Industrial, factory and building automation
- Rugged environments
- Edge & Fog computing
- Transportation
- Railway
- AP Routers
- Multi-protocol gateways
- Host management for networking (AVB/TSN)
- GC370 can be combined with unmanaged *Embedded Gold* switch boards via 2.5GbE I/F
- Customized connector loading
- Customized board design
- Customized programming service

Power Requirements

- DC Input, 9V-57VDC (12/24/48VDC)
- Rated power consumption 15W
- Fast acting chip fuse (PCB soldered type)
- Protected against reverse polarity
- ESD protection (TVS)
- Common mode input filter
- M12-A 5-position male connector for DC power input
- Pigtail cable assemblies available M12-A 5-pos. female plug
- Option 4-position terminal block power connector, 3.50mm pitch, screw lock removable cable plug

Technical Features

Environmental, Regulatory

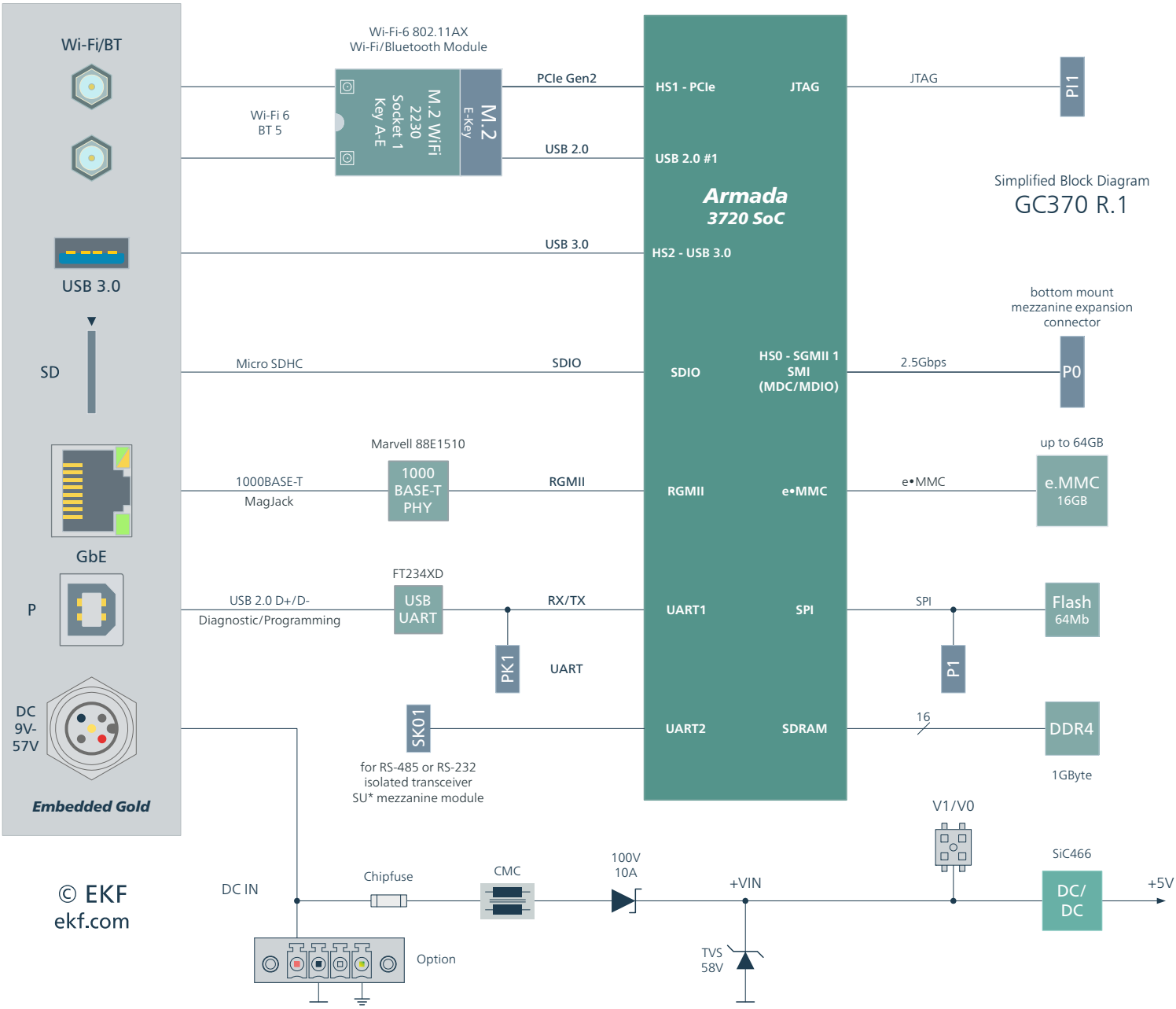
- Designed & manufactured in Germany
- ISO 9001 certified quality management
- Long term availability
- Rugged solution
- Conformal coating, sealing, underfilling on request
- RoHS compliant
- Operating temperature -40°C to +85°C (industrial temperature range)
- Storage temperature -40°C to +85°C, max. gradient 5°C/min
- Humidity 5% ... 95% RH non condensing
- Altitude -300m ... +3000m
- Shock 15g 0.33ms, 6g 6ms
- Vibration 1g 5-2000Hz
- EC Regulatory EN55035, EN55032, EN62368-1 (CE)
- MTBF 78.0 years (MIL-HDBK-217F, SN29500 @+40°C)

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

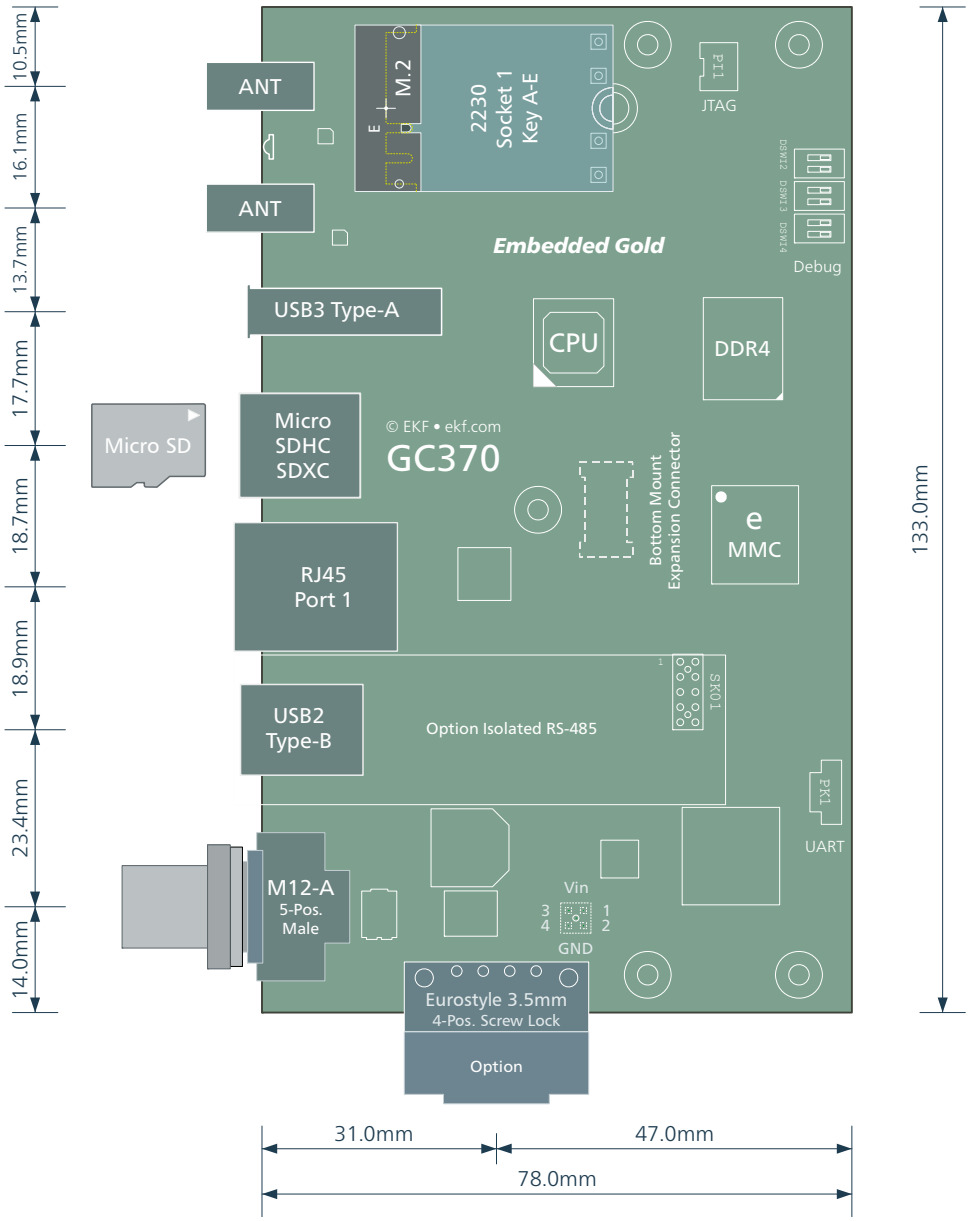
GC370-100

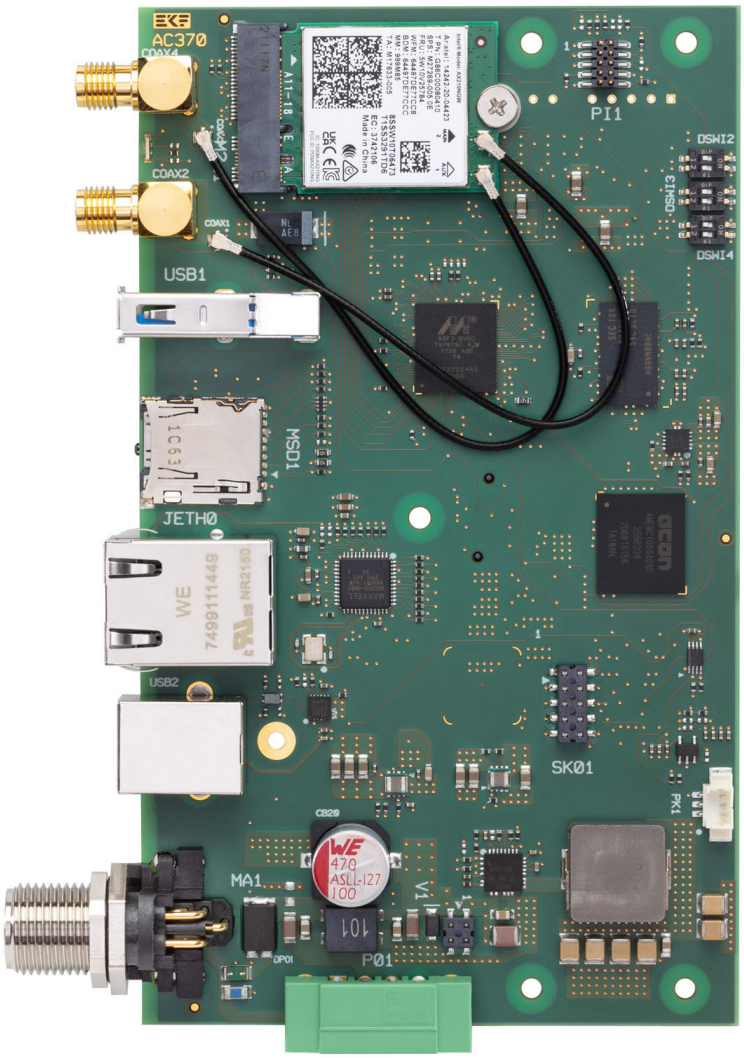
GC370-199 w. Isolated RS-485 Mezzanine Module

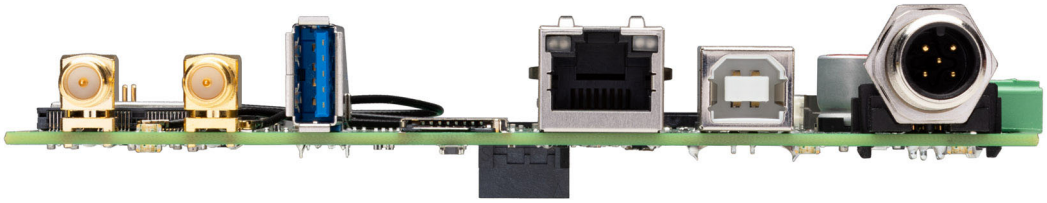
Block Diagram

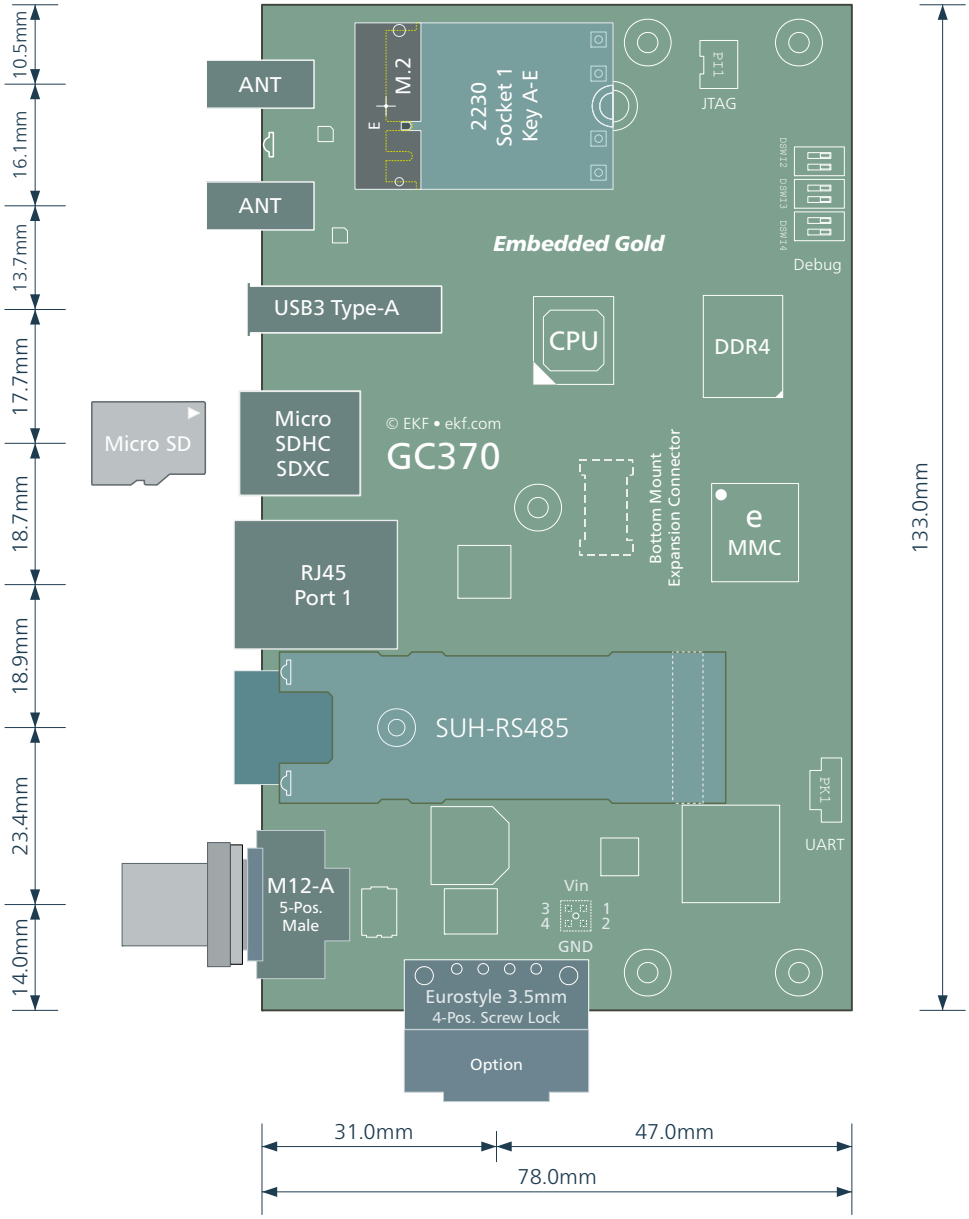


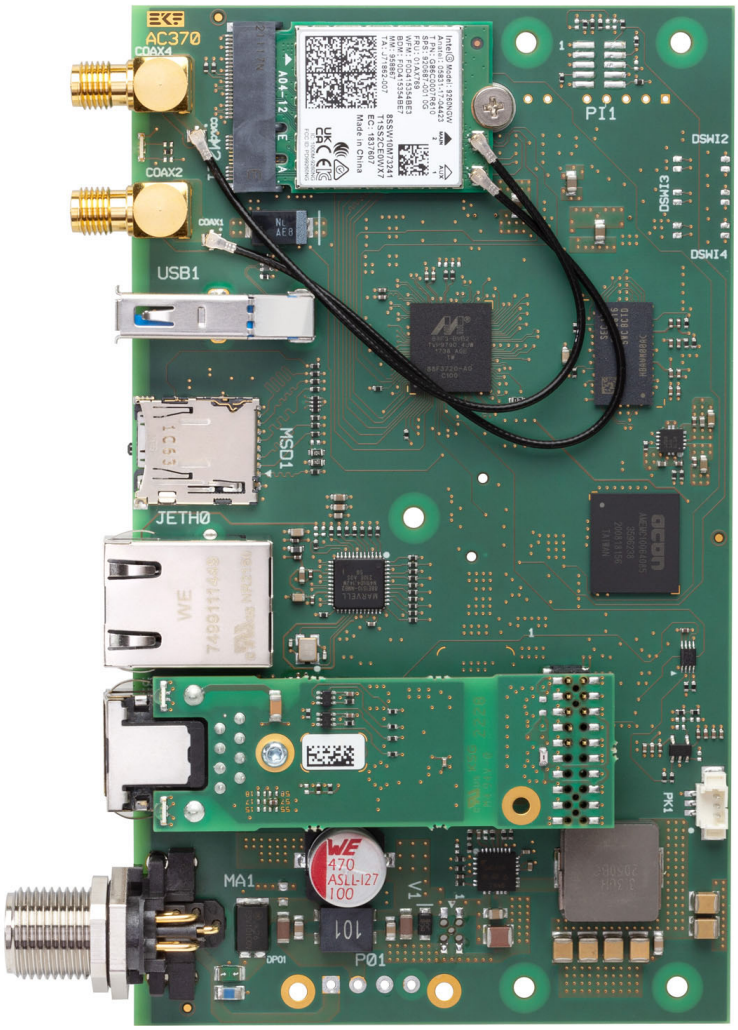
Dimensions

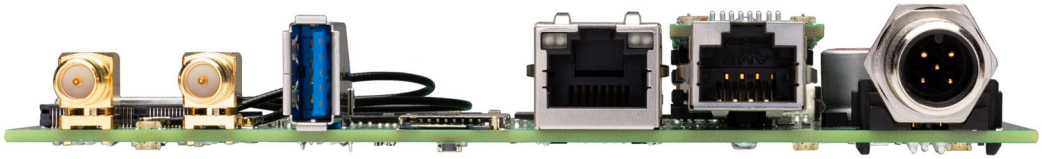

10.5mm
16.1mm
13.7mm
17.7mm
18.7mm
18.9mm
23.4mm
14.0mm
133.0mm
ANT
ANT
M.2
E
2230
Socket 1
Key A-E
JTAG
Embedded Gold
Debug
USB3 Type-A
CPU
DDR4
Micro SD
Micro
SDHC
SDXC
© EKF • ekf.com
GC370
Bottom Mount
Expansion Connector
e
MMC
RJ45
Port 1
USB2
Type-B
Option Isolated RS-485
UART
M12-A
5-Pos.
Male
Vin
GND
Eurostyle 3.5mm
4-Pos. Screw Lock
Option
31.0mm
47.0mm
78.0mm

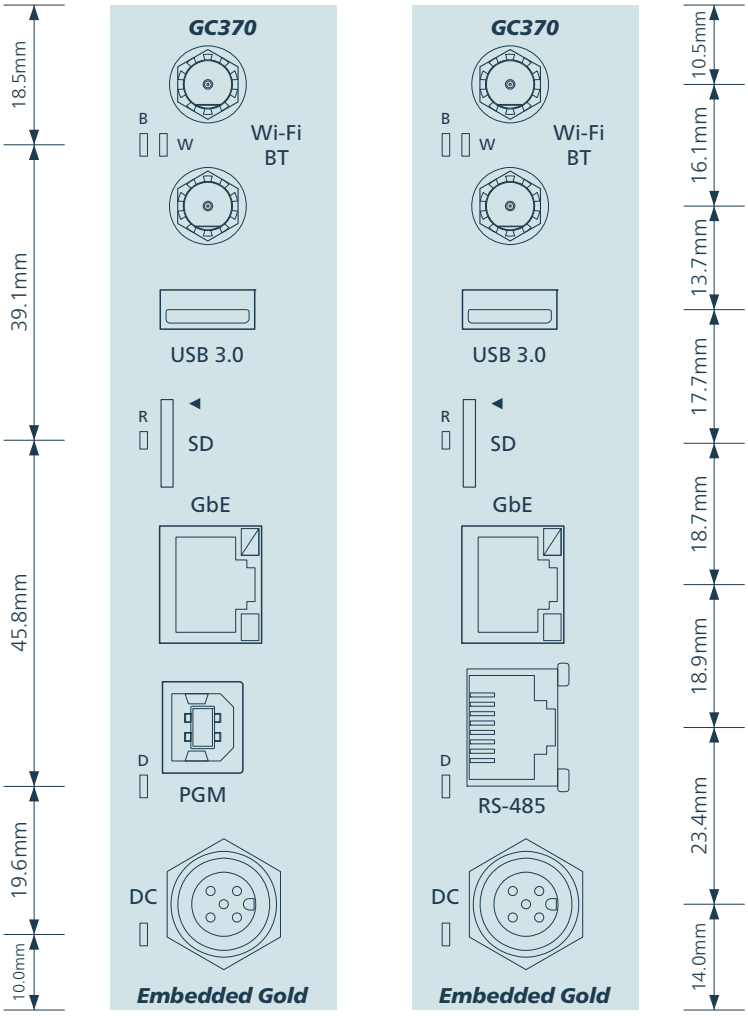

AC370
COAX2
COAX1
USB1
MSD1
JETH0
USB2
SK01
PI1
DSWI2
DSWI4
MSD-EN
MA1
P01
V1
PK1




10.5mm
16.1mm
13.7mm
17.7mm
18.7mm
18.9mm
23.4mm
14.0mm
133.0mm
ANT
ANT
M.2
E
2230
Socket 1
Key A-E
JTAG
Embedded Gold
Debug
USB3 Type-A
CPU
DDR4
Micro SD
Micro
SDHC
SDXC
© EKF • ekf.com
GC370
Bottom Mount
Expansion Connector
e
MMC
RJ45
Port 1
SUH-RS485
UART
M12-A
5-Pos.
Male
Vin
3
4
1
2
GND
Eurostyle 3.5mm
4-Pos. Screw Lock
Option
31.0mm
47.0mm
78.0mm

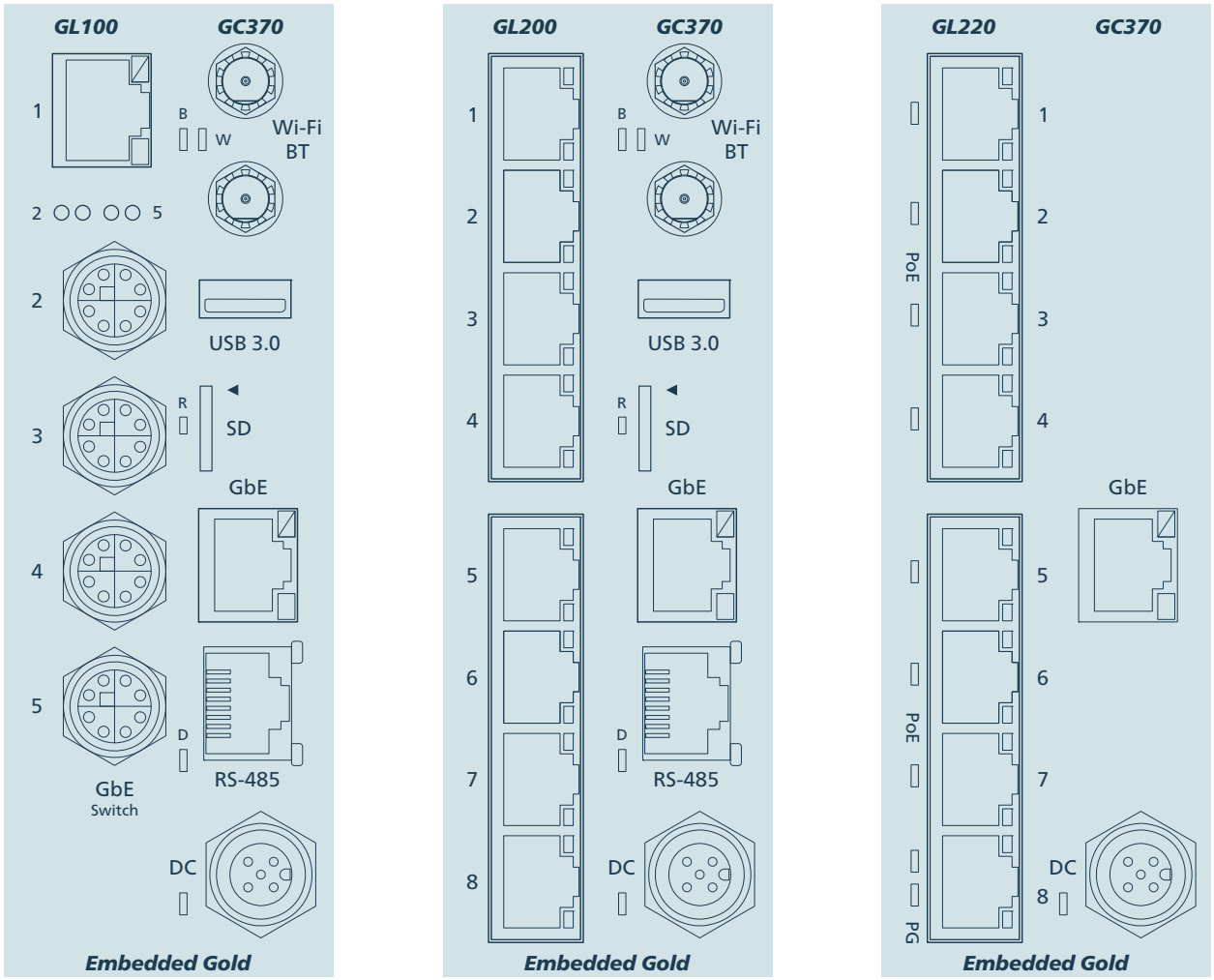

AC370
COAX4
COAX3
COAX2
COAX1
USB1
MSD1
JETH0
PI1
DSWI2
DSWI3
DSWI4
MA1
P01
V1
PK1





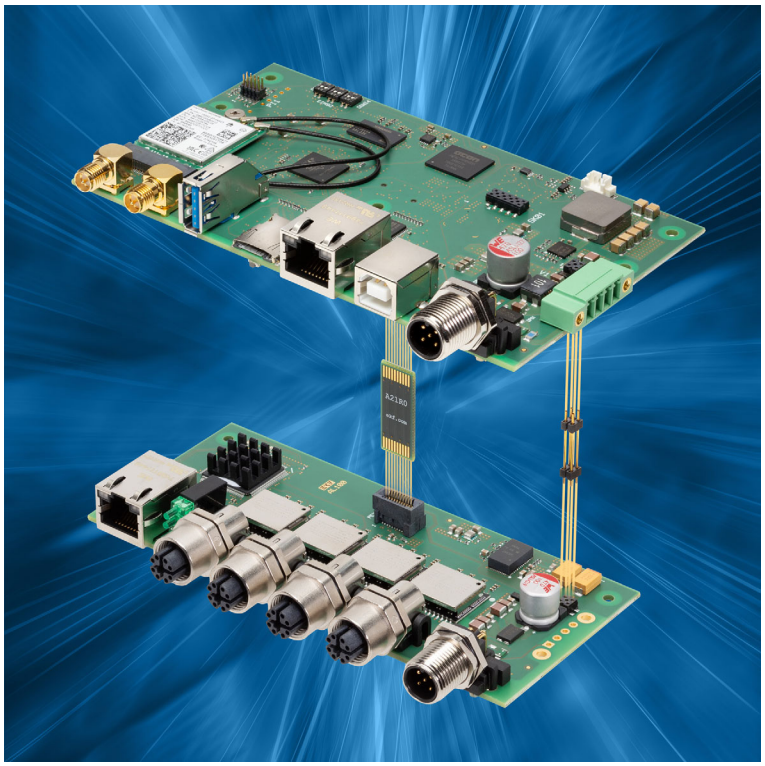
Sample F/P

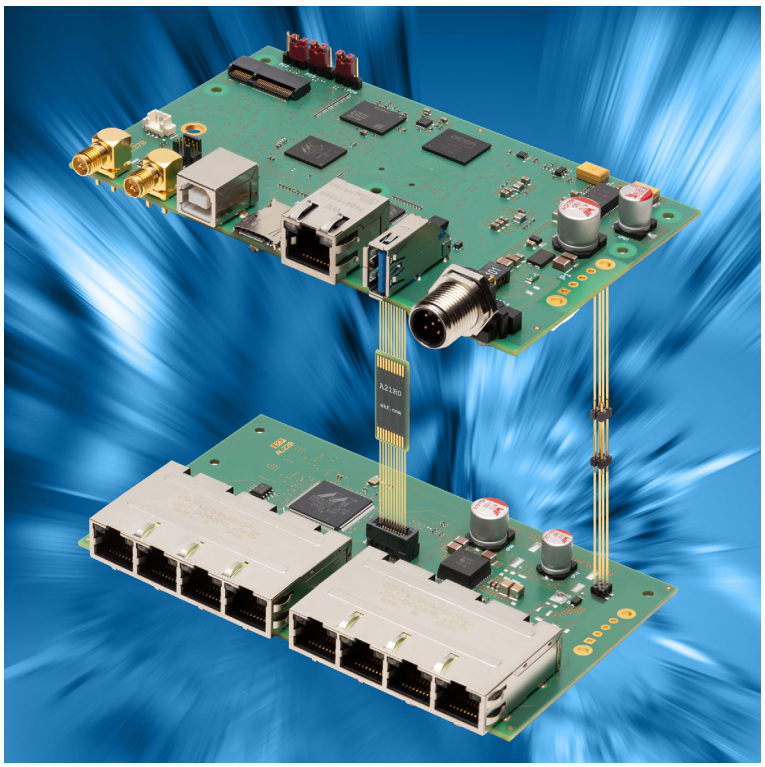
Wireless LEDs	
B green	Bluetooth active
W blue	Wi-Fi active
Push Button Switch	
R	CPU manual reset
CPU LED	
D blue	CPU active
DC LED	
blue	DC input power present, internal power good
red	internal power not yet ready or external DC power out of range
off	DC input power faulty (reverse connection, wrong pins, external power supply off?)

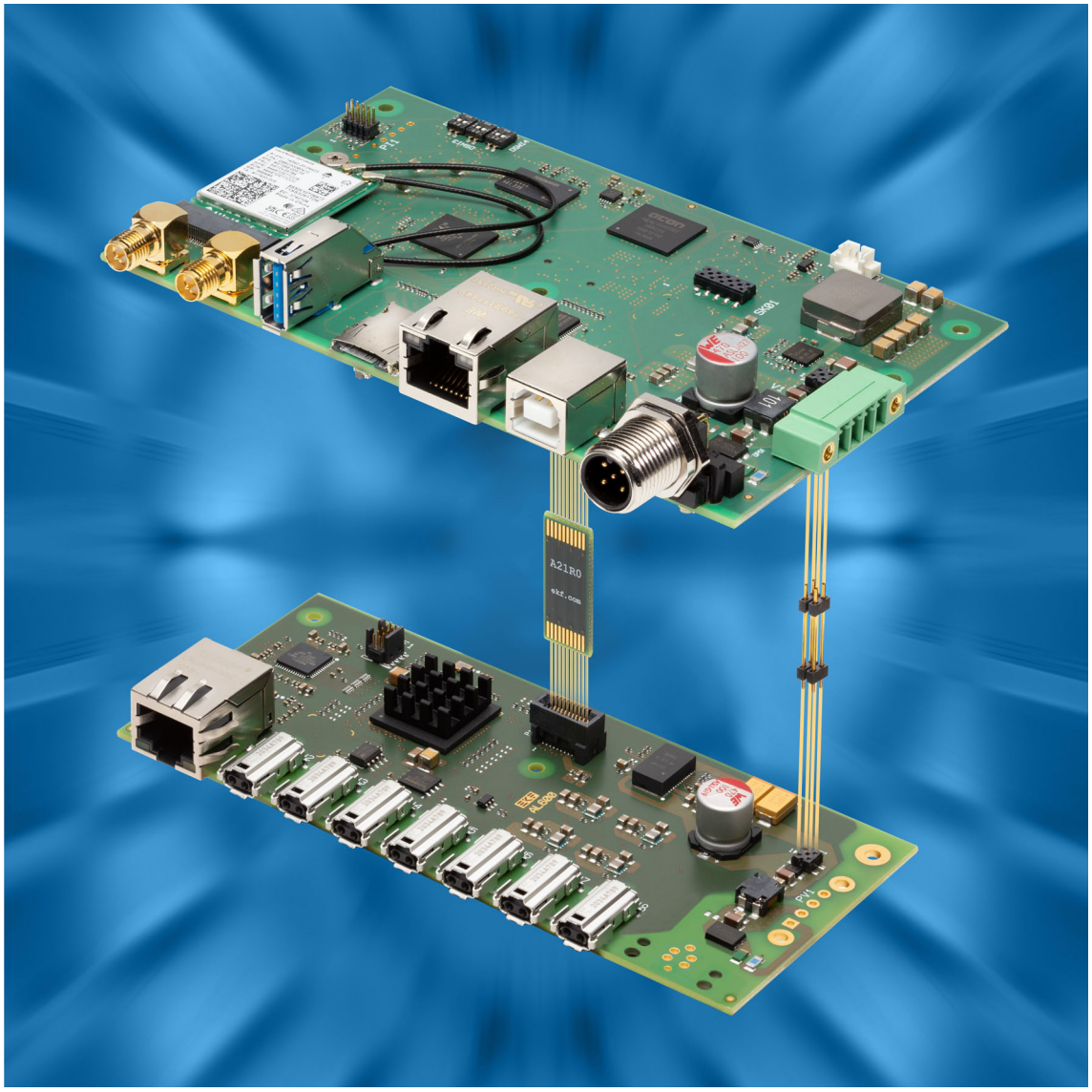


Sample F/P w. Mezzanine Switch Board

Stacked Assemblies with Ethernet Switch Boards

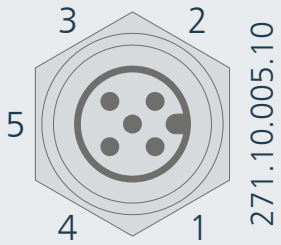




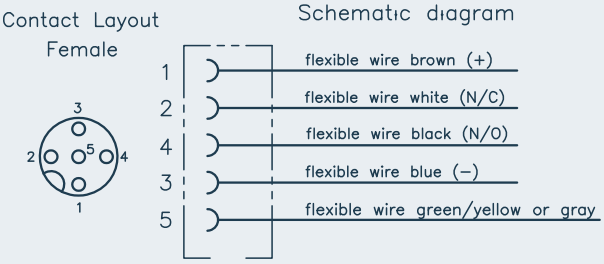


Some photos within this document may show an early board revision and are not yet up to date

M12 Power Connector Pin Assignment

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

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



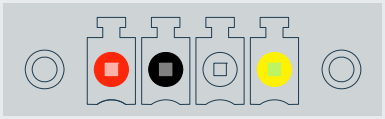
M12 Power Cabling

pre-assembled standard pigtail cables - wires #2 and #4 not in use with GL100 (reserved)

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

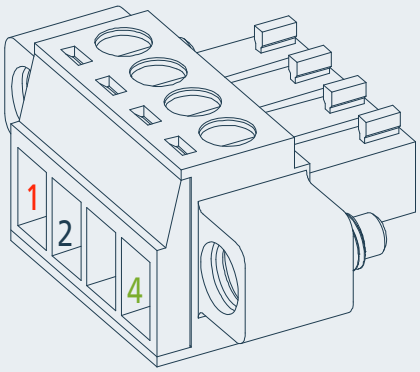
Placement of the M12 power connector by default

Option Terminal Block Power Connector Pin Assignment

3.50mm 4-Position Terminal Block 8A/Contact			
245.35.04.00  1 2 3 4	V=9-57VDC	1	+V
		2	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

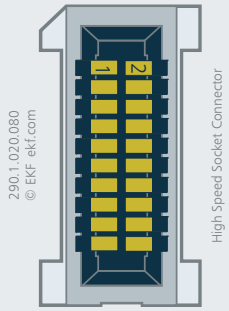
Option Terminal Block Plug Power Cabling



245.35.04.20

Placement of the terminal block is optional (consider before ordering)

Stacking Connector

P0 (Bottom) 290.1.020.080				
	GND	1	2	GND
	SERDES TXN	3	4	RSV
	SERDES TXP	5	6	RSV
	GND	7	8	GND
	SERDES RXN	9	10	RSV
	SERDES RXP	11	12	RSV
	GND	13	14	GND
	+5V	15	16	MDC
	+5V	17	18	MDIO
	GND	19	20	GND

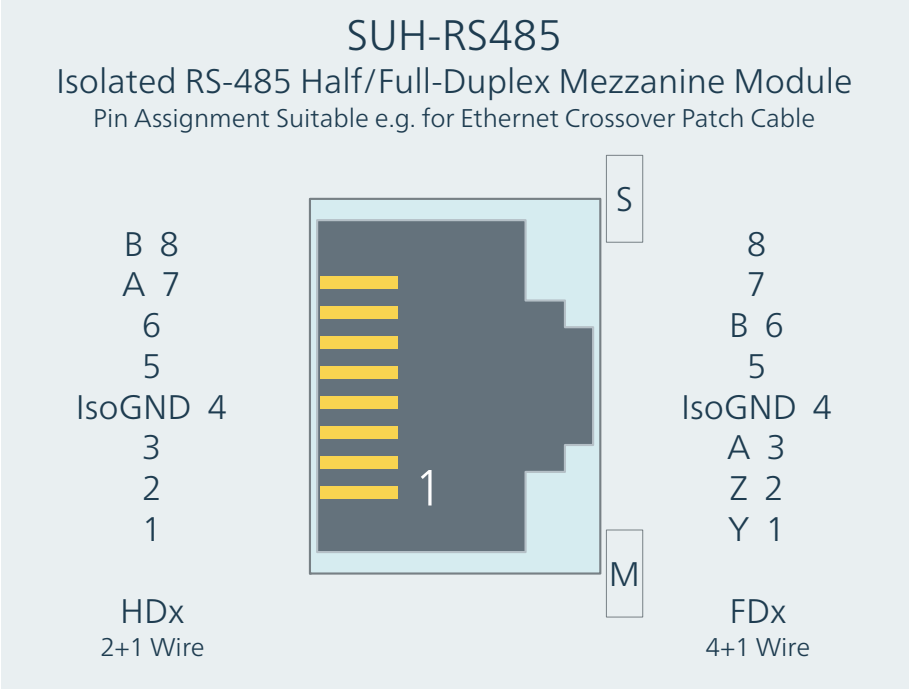
Associated Mezzanine Interposer Card	
A21	30mm PCB pitch
C21	20.32mm (4HP) PCB pitch

Option RS-485

As GC370-199 the board is equipped with an isolated RS-485 port. Due to space limitations, the USB Type-B connector of a regular GC370-100 card will be replaced by the SUH-RS485 mezzanine module, which provides isolated transceivers connected to the UART2 of the ARMADA® SoC.

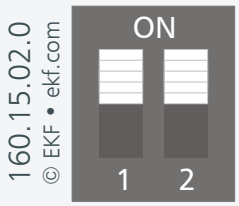
The SUH-RS485 can be ordered for either half-duplex operation (2+1 wire) or full-duplex (4+1 wire). The RJ45 front connector may be used together with a common Ethernet cable or any twisted pair wires. With respect to FDx mode (4+1 wire point-to-point) a 100BASE-T crossover cable (but not a 1000BASE-T crossover cable) can be used for direct connection SUH to SUH, e.g. the 'LogiLink CQ2029X CAT6 S/FTP Crossover Patch Cable'. In HDx mode (2+1 wire PartyLine) regular 1000BASE-T cables are suitable as well and available for up to 100m cable length.

RS-485 drivers are included in the GC370 software support package.



SUH Transceiver Modules LED			
Front Connector	Status LED S	Mode LED M	Ordering No.
RJ45 8-pos. RS-485	Week Red (ISOPWR ok) Green (Receive Data) Blue (Transmit Data)	Yellow (2W) Magenta (4W)	SUH-P5177-RS485 SUH-P5187-RS485

RS-485 transmission lines must be terminated on both cable endings via 120R. This can be done externally or by means of a DIP switch provided on the SUH module. By default the internal termination is active. The SUH module must be removed from the GC370 carrier card prior to change the switch settings.

SUH Termination DIP Switch 1		
	1=ON	Y/Z Termination 120R Active (Full-Duplex Only)
	2=ON	A/B Termination 120R Active

For PartyLine mid-span configurations (2+1W, half-duplex) there are RJ45 T-adapters available from several manufacturers, e.g. 'Renkforce RF-4538140' (picture below), with an 1:1 wiring scheme.

SUH Related Information	
SU* UART Mezzanine Modules	https://www.ekf.de/s/sue-suj/sue-suj.html
SU* Product Information	https://www.ekf.de/s/sue-suj/sue-suj_pi.pdf

Ordering Information

For popular GC370 SKUs please contact sales@ekf.de

Product Homepage

https://www.ekf.com/g/gc370/gc370.html

Related Products

GJ100	PoE+ Injector M12-X
GJ200	PoE+ Injector RJ45
GL100	5 to 15 Port unmanaged GbE switch M12-X
GL200	8 Port unmanaged GbE switch RJ45
GL220	8 Port unmanaged PoE+ GbE switch RJ45
GL600	7 Port SPE (Single Pair Ethernet) switch 100BASE-T1 (IP20)
GL700	5 Port SPE (Single Pair Ethernet) switch 100BASE-T1 (M8 Hybrid)
GL900	9 Port PoE+ GbE switch RJ45 w. CPU for AVB protocol support

Embedded Gold

Ready-for-Use Industrial PCB Assemblies

50 Years
1972 - 2022
boards. systems. solutions.

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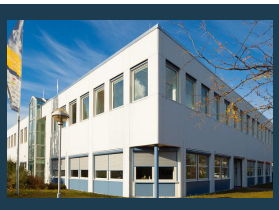
Lilienthalstr. 2 (Haus 2)
59065 HAMM
Germany



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