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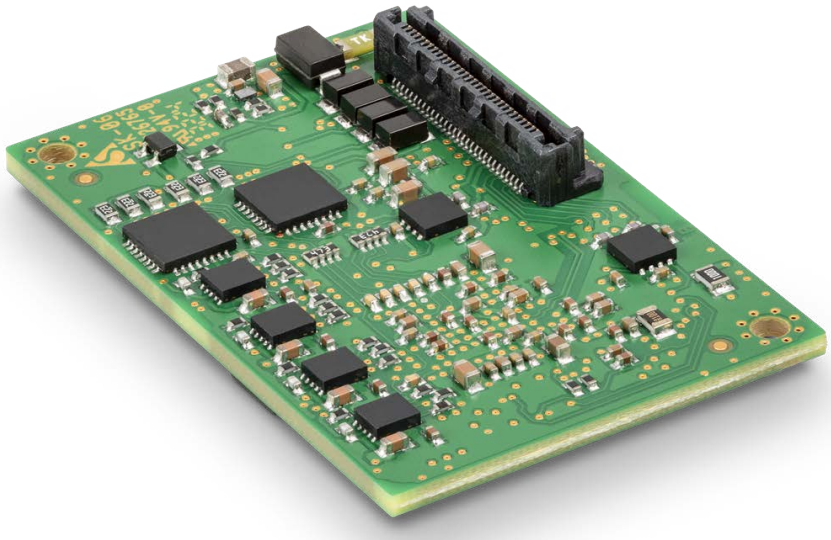
Master Controller

MicroMACS6 Module

Hardware Reference



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MicroMACS6 Module Master Controller | P/N 001822
Hardware Reference
zub | Edition 2025-03 | DocNr. rel12762

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TABLE OF CONTENTS

READ THIS FIRST

These instructions are intended for qualified technical personnel. Prior commencing with any activities*…*

- *you must carefully read and understand this manual and*
- *you must follow the instructions given therein.*

The MicroMACS6 Module Master Controller *is considered as partly completed machinery according to EU Directive 2006/42/EC, Article 2, Clause (g) and* ***is intended to be incorporated into or assembled with other machinery or other partly completed machinery or equipment****.*

Therefore, you must not put the device into service*,…*

- *unless you have made completely sure that the other machinery fully complies with the EU directive's requirements!*
- *unless the other machinery fulfills all relevant health and safety aspects!*
- *unless all respective interfaces have been established and fulfill the herein stated requirements!*

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1 ABOUT

1.1 About this document

1.1.1 Intended purpose

The purpose of the present document is to familiarize you with the MicroMACS6 Module Hardware Reference. It will highlight the tasks for safe and adequate installation and/or commissioning. Follow the described instructions …

- to avoid dangerous situations,
- to keep installation and/or commissioning time at a minimum,
- to increase reliability and service life of the described equipment

The present document is part of a documentation set and contains performance data and specifications, information on fulfilled standards, details on connections and pin assignment, and wiring examples. The below overview shows the documentation hierarchy and the interrelationship of its individual parts:

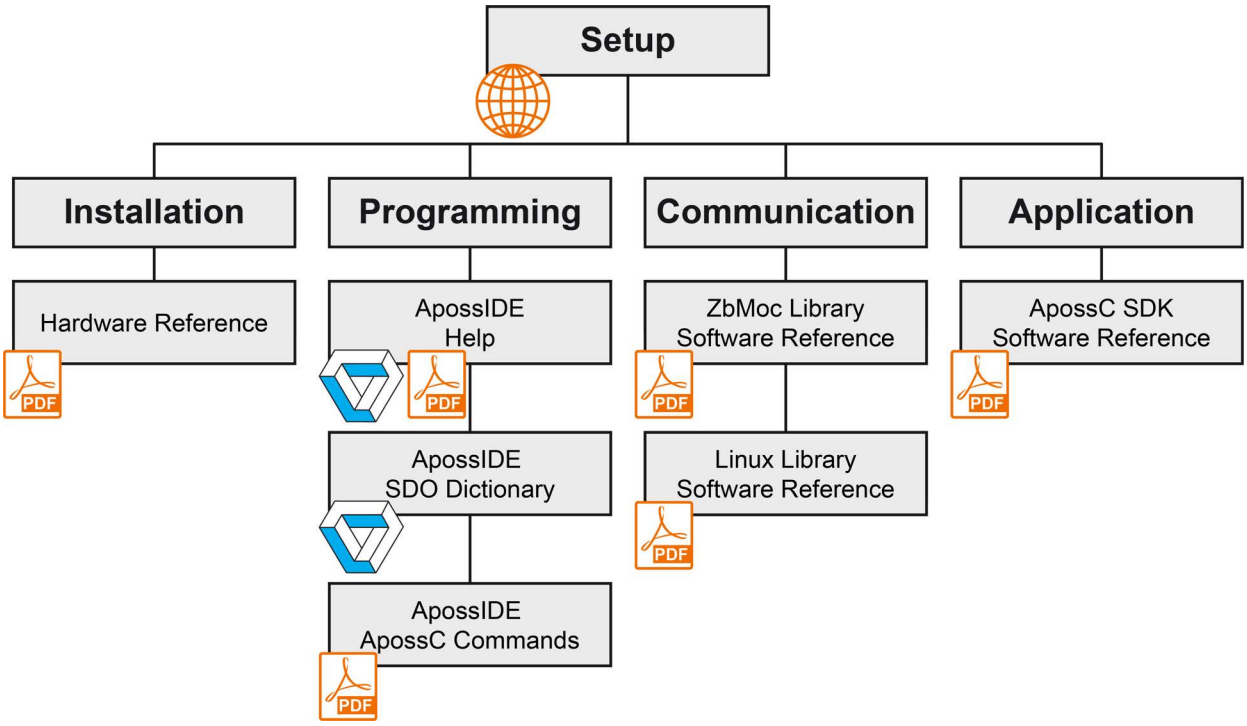

Figure 1-1 Documentation structure

1.1.2 Target audience

The present document is intended for trained and skilled personnel. It conveys information on how to understand and fulfill the respective work and duties.

1.1.3 How to use

Throughout the document, the following notations and codes will be used.

Notation	Meaning
(n)	refers to an item (such as part numbers, list items, etc.)
➔	denotes “see”, “see also”, “take note of” or “go to”

Table 1-1 Notation used

1.1.4 Symbols & signs

This document uses the following symbols and signs:

Type	Symbol	Meaning
Safety alert DANGER		Indicates an **imminent hazardous situation**. If not avoided, it **will result in death or serious injury.**
WARNING		Indicates a **potential hazardous situation**. If not avoided, it **can result in death or serious injury.**
CAUTION		Indicates a **probable hazardous situation** or calls the attention to unsafe practices. If not avoided, it **may result in injury.**
Prohibited action	 (typical)	Indicates a dangerous action. Hence, **you must not!**
Mandatory action	 (typical)	Indicates a mandatory action. Hence, **you must!**
Requirement, Note, Remark		Indicates an activity you must perform prior to continuing, or gives information on a particular point that must be observed.
Best practice		Indicates an advice or recommendation on the easiest and best way to further proceed.
Material Damage		Indicates information particular to possible damage of the equipment.

Table 1-2 Symbols and signs

1.1.5 Trademarks and brand names

For easier legibility, registered brand names are listed below and will not be further tagged with their respective trademark. It must be understood that the brands (the list below is not necessarily concluding) are protected by copyright and/or other intellectual property rights even if their legal trademarks are omitted in the later course of this document.

Brand Name	Trademark owner
Adobe® Reader®	© Adobe Systems Incorporated, USA-San Jose, CA
CANopen® CiA®	© CiA CAN in Automation e.V, DE-Nuremberg
Samtec®	© Samtec Inc. (520 Park East Blvd. New Albany, INDIANA UNITED STATES 47151)
Windows®	© Microsoft Corporation, USA-Redmond, WA
Würth Elektronik	© Würth Elektronik eiSos GmbH & Co. KG EMC & Inductive Solutions, München DE

Table 1-3 Brand names and trademark owners

1.1.6 Copyright

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1.2 About the device

The MicroMACS6 Module is a compact, fully digital, programmable master controller, designed specifically for controlling up to six axes in motion control applications. While it lacks integrated amplifiers, it serves as a pure CANopen master controller, making it ideal for applications requiring precise, multi-axis coordination. Its design philosophy ensures that it maintains a balance between performance, ease of use, and cost-effectiveness. This device is particularly suitable for projects where space is limited, and cost efficiency is a priority.

With its limited interfaces and focused functionality, the MicroMACS6 Module is an excellent choice for users seeking a smaller, more affordable alternative to larger systems like the MasterMACS. It is fully supported by the AposSC/ AposSIDE programming environment, which is available license-free, and is compatible with additional SDK extensions, templates, and examples tailored to this module.

Designed for flexibility, the MicroMACS6 Module can be integrated into custom motherboards, making it versatile for various application needs. For initial commissioning, the MicroMACS6 P/N 001794 with identical functionality can be used as a fully integrated, compact, ready-to-use solution, simplifying the setup process.

1.3 About the safety precautions

Keep in mind: Safety first! Always!

- Make sure that you have read and understood the note “READ THIS FIRST” on page A-2!
- Do not engage with any work unless you possess the stated skills (➔Chapter “1.1.2 Target audience” on page 1-6)!
- Refer to ➔Chapter “1.1.4 Symbols & signs” on page 1-6 to understand the subsequently used indicators!
- You must observe any regulation applicable in the country and/or at the site of implementation with regard to health and safety/accident prevention and/or environmental protection!

DANGER

High voltage and/or electric shock
Touching live wires causes death or serious injuries!

- *Consider any power cable as connected to live power, unless having proven the opposite!*
- *Make sure that neither end of cable is connected to live power!*
- *Make sure that power source cannot be engaged while work is in process!*
- *Obey lock-out/tag-out procedures!*
- *Make sure to securely lock any power engaging equipment against unintentional engagement and tag it with your name!*

Requirements

- *Make sure that all associated devices and components are installed according to local regulations.*
- *Be aware that, by principle, an electronic apparatus cannot be considered fail-safe. Therefore, you must make sure that any machine/apparatus has been fitted with independent monitoring and safety equipment. If the machine/apparatus should break down, if it is operated incorrectly, if the control unit breaks down or if the cables break or get disconnected, etc., the complete drive system must return – and be kept – in a safe operating mode.*
- *Be aware that you are not entitled to perform any repair on components supplied by maxon.*

Electrostatic sensitive device (ESD)

- *Wear working cloth and use equipment in compliance with ESD protective measures.*
- *Handle device with extra care.*

2 SPECIFICATIONS

2.1 Technical data

MicroMACS6 Module Master Controller (P/N 001822)		
Electrical data	Nominal power supply voltage $+V_{CC}$	10 ...24 VDC
	Absolute power supply voltage $+V_{min}$ / $+V_{max}$	8 VDC / 28 VDC
	Supply current without I/O loads	typically 35 mA @ 24 V
Memory	Program memory	16 Mbyte Flash
Inputs & outputs	Digital Input 1 (general purpose)	Selectable levels: • Logic: +2.0…+30 VDC • PLC: +9.0…+30 VDC
	Digital Input 2 (general purpose)	
	Digital Input 3 (general purpose)	
	Digital Input 4 (general purpose)	
	Digital Input 5 (general purpose)	
	Digital Input 6 (general purpose)	
	Digital Output 1 (general purpose)	25 kHz; PWM duty cycle range 2 ... 98 %
	Digital Output 2 (general purpose)	
	Digital Output 3 (general purpose)	
	Digital Output 4 (general purpose)	
	Analog Input 1	Resolution 12-bit, 0…+10 V
	Analog Input 2	
Voltage outputs	Auxilary output voltage 1	+3.3 VDC / max. 120 mA
	Auxilary output voltage 2	+5 VDC / max. 200 mA
Communication interfaces	Ethernet	Ethernet TCP/IP max. 100 MBit/s
	CAN 1	max. 1 MBit/s, master/slave
	CAN 2	max. 1 MBit/s, master
	USB 2.0	High speed
	BLE	Prepared mounting a BLE option on customer-specific motherboard
Status indicators	Device Status	Operation (green) Error (red) Application (yellow)
Mechanical data	Weight	approximate 9 g
	Dimensions (L x W x H)	45 mm x 30 mm x 9.8 mm
	Mounting	Holes for M2 screws

Continued on next page.

MicroMACS6 Module Master Controller (P/N 001822)			
Environmental conditions	Temperature	Operation	−30…+55 °C
		Storage	−40…+85 °C
	Altitude [a]	Operation	0…6'000 m MSL
	Humidity	5…90 % (condensation not permitted)	

[a] Operating altitude in meters above mean sea level, MSL

Table 2-4 Technical data

2.2 Limitations

Protection functionality	Switch-off threshold	Recovery threshold
Undervoltage	7.5 V	8.0 V
Overvoltage	32 V	29 V

Table 2-5 Limitations

2.3 Dimensional drawing

2.3.1 MicroMACS6 Module

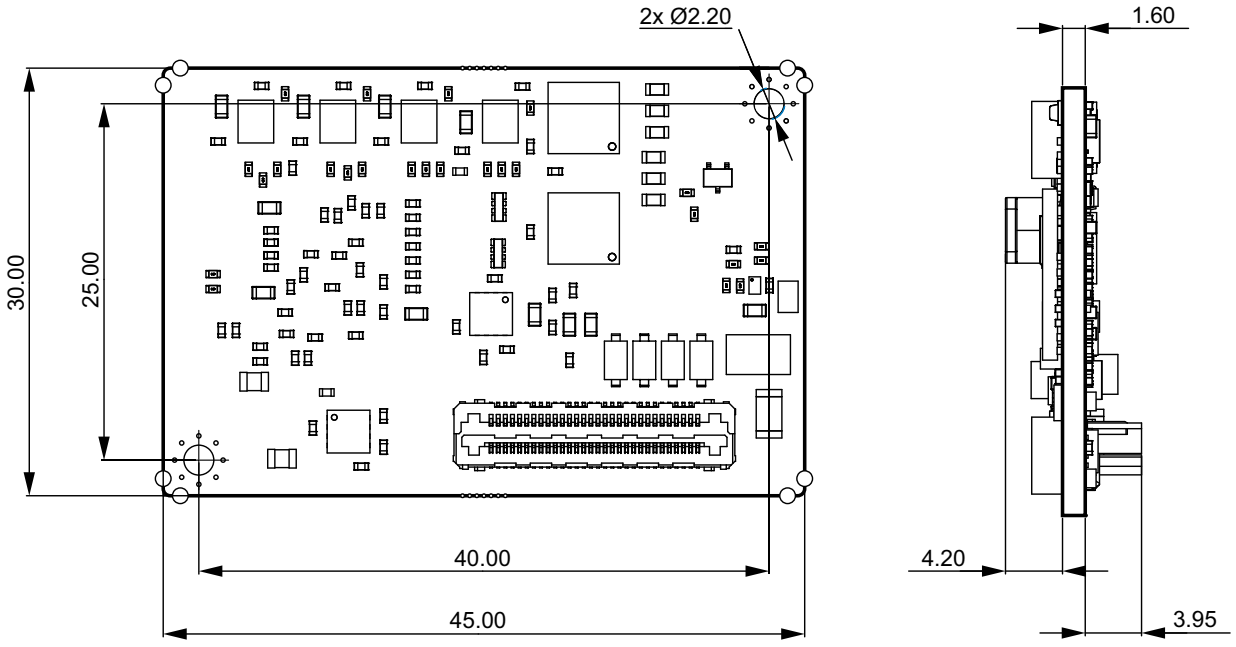

Figure 2-2 MicroMACS6 Module – Dimensional drawing [mm]

2.4 Standards

The described device is successfully tested for compliance with the below listed standards. In practical terms, only the complete system (the fully operational equipment comprising all individual components, such as motor, servo controller, power supply unit, EMC filter, cabling etc.) can undergo an EMC test to ensure interference-free operation.

Important notice
The device's compliance with the mentioned standards does not imply its compliance within the final, ready to operate setup. In order to achieve compliance of your operating system, you must perform EMC testing of the involved equipment as a whole

Electromagnetic compatibility (under development		
Generic	IEC/EN 61000-6-2	Immunity for industrial environments
	IEC/EN 61000-6-3	Emission standard for residential, commercial and light-industrial environments
Applied	IEC/EN 55022 (CISPR32)	Radio disturbance characeristics / radio interference
	IEC/EN 61000-4-3	Radiated, radio-frequency, electromagnetic field immunity test >10 V/m
	IEC/EN 61000-4-4	Electrical fast transient/burst immunity test ±2 kV
	IEC/EN 61000-4-6	Immunity to conducted disturbances, induced by radio-frequency fields 10 Vrms

Others		
Safety	UL File Number	Unassembled printed circuit board: E197709
Reliability	MIL-HDBK-217F [a]	Reliability prediction of electronic equipment Environment: Ground, benign (GB) Ambient temperature: 298 K (25 °C) Component stress: Maximal power Mean Time Between Failures (MTBF) MicroMACS6 Module: 873'916 hours

[a] The reliability calculation is based on MIL-HDBK-217F. Since component manufacturer data is more accurate, it has been used whenever possible.

Table 2-6 Standards

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3 SETUP

IMPORTANT NOTICE: PREREQUISITES FOR PERMISSION TO COMMENCE INSTALLATION

The MicroMACS6 Module Master Controller is considered as partly completed machinery according to EU Directive 2006/42/EC, Article 2, Clause (g) and **intends to be Incorporated into or assembled with other machinery or other partly completed machinery or equipment**.

WARNING

Risk of injury
Operating the device without the full compliance of the surrounding system with the EU directive 2006/42/EC may cause serious injuries!

- *Do not operate the device, unless you have made completely sure that the other machinery fully complies with the EU directive's requirements!*
- *Do not operate the device, unless the other machinery fulfills all relevant health and safety aspects!*
- *Do not operate the device, unless all respective interfaces are established and fulfill the requirements stated in this document!*

3.1 Generally applicable rules

Maximal permitted supply voltage

- *Make sure that supply power is between 10…24 VDC.*
- *Supply voltages above 28 VDC will destroy the unit.*

Hot plugging the USB interface may cause hardware damage

If the USB interface is being hot-plugged (connecting while the power supply is on), the possibly high potential differences of the two power supplies of controller and PC/Notebook can lead to damaged hardware.

- *Avoid potential differences between the power supply of controller and PC/Notebook or, if possible, balance them.*
- *Insert the USB connector first, then Switch on the power supply of the controller.*

Hot plugging/hot swapping the extension slots may cause hardware damage

- *Switch off the controller's power supply before removing or inserting an extension card.*

3.2 Pin assignment

For in-depth details on connections ➔Chapter “3.3 Connection specifications” on page 3-16.

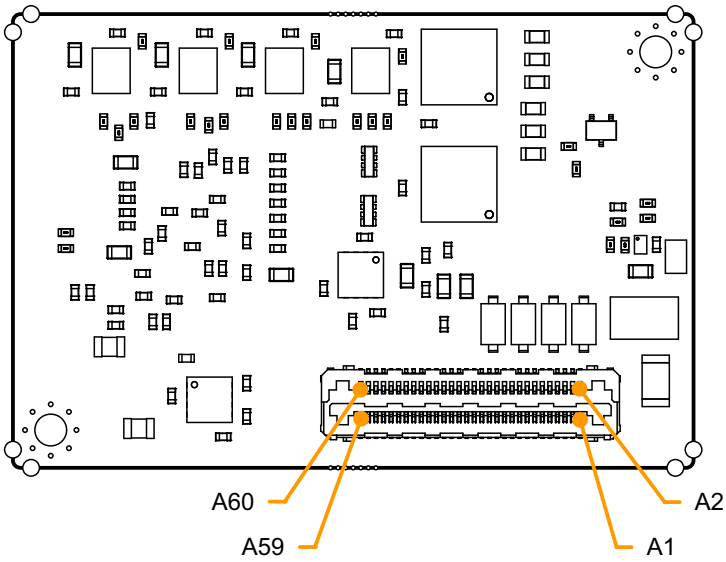

Figure 3-3 Pin assignment

Pin	Signal	Description
A1	$+V_{CC}$	Power supply voltage (+8…+28 VDC)
A2	GND	Ground
A3	$+V_{AUX1}$	Auxiliary supply voltage output (5 VDC / I_L ≤ max. 120 mA)
A4	GND	Ground
A5	$+V_{AUX2}$	Auxiliary supply voltage output (3.3 VDC / I_L ≤ max. 200 mA)
A6	GND	Ground
A7	DigIN1	Digital input 1
A8	DigOUT1	Digital output 1
A9	DigIN2	Digital input 2
A10	DigOUT2	Digital output 2
A11	DigIN3	Digital input 3
A12	DigOUT3	Digital output 3
A13	DigIN4	Digital input 4
	AnIN2	Analog input 2
A14	DigOUT4	Digital output 4
A15	DigIN5	Digital input 5
	AnIN1	Analog input 1
A16	GND	Ground
A17	DigIN6	Digital input 6
A18	SPARE_0	for future options
A19	SPS/nLogic	Digital input level (DigIN1, DigIN2, DigIN3)
A20	SPARE_1	for future options
A21	SPS/nLogic1	Digital input level (DigIN4, DigIN5, DigIN6)

Continued on next page.

Pin	Signal	Description
A22...A23	GND	Ground
A24	OPTION_I2C_SCL	for future options
A25	OPTION_IO	for future options
A26	OPTION_I2C_SDA	for future options
A27	ENET_LED0	Ethernet LED0 (yellow)
A28	ENET_LED1	Ethernet LED1 (green)
A29...A30	GND	Ground
A31	ENET_RX-	Ethernet receiver exchange -
A32	ENET_TX-	Ethernet transmit exchange -
A33	ENET_RX+	Ethernet receiver exchange +
A34	ENET_TX+	Ethernet transmit exchange +
A35...A36	GND	Ground
A37	CANID_1	CAN ID 1 (valence = 1)
A38	CANID_2	CAN ID 2 (valence = 2)
A39	CANID_3	CAN ID 3 (valence = 4)
A40	BOOT_MODE_0	Boot mode (for internal use)
A41...A42	GND	Ground
A43	CAN1_H	CAN1 high bus line
A44	CAN2_H	CAN2 high bus line
A45	CAN1_L	CAN1 low bus line
A46	CAN2_L	CAN2 low bus line
A47...A48	GND	Ground
A49	OPTION_UART_TX	for future options
A50	OPTION_SPI_SDO	for future options
A51	OPTION_UART_RX	for future options
A52	OPTION_SPI_SCK	for future options
A53...A54	GND	Ground
A55	USB_D+	USB Data+
A56	OPTION_SPI_CS	for future options
A57	USB_D-	USB Data-
A58	OPTION_SPI_SDI	for future options
A59...A60	GND	Ground

Table 3-7 Pin assignment A1…A60

3.3 Connection specifications

3.3.1 Power Supply

Basically, any power supply can be used provided that it meets the stated minimum requirements.

Module header pin	Signal	Description
A1	$+V_{CC}$	Power supply voltage (+8…+28 VDC)
A2	GND	Ground

Table 3-8 Power supply – Pin assignment

Power supply requirements	
Output voltage	$+V_{CC}$ 10…24 VDC
Absolute output voltage	min. 8 VDC; max. 28 VDC
Output current	Depending on digital outputs load • continuous max. 0.5 A

Table 3-9 Power supply – Specification and accessories

3.3.2 Digital outputs

Module header pin	Signal	Description
A8	DigOUT1	Digital output 1
A10	DigOUT2	Digital output 2
A12	DigOUT3	Digital output 3
A14	DigOUT4	Digital output 4
A16	GND	Ground

Table 3-10 Digital output – Pin assignment

Digital output	
Output voltage	$+V_{CC}$
Max. output current	100 mA
Max. output frequency	25 kHz; PWM duty cycle range 2 ... 98 %

Table 3-11 Digital output specification

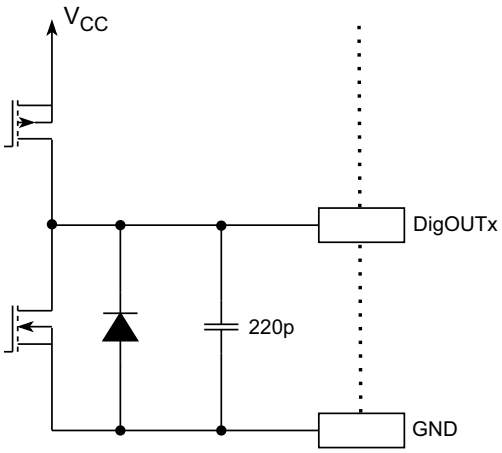

Figure 3-4 Digital output circuit

3.3.3 Digital and analog inputs

Head A Pin	Signal	Description
A3	V_{AUX1}	Auxiliary supply voltage output (5 VDC / I_L ≤ max. 120 mA)
A5	V_{AUX2}	Auxiliary supply voltage output (3.3 VDC / I_L ≤ max. 200 mA)
A7	DigIN1	Digital input 1
A9	DigIN2	Digital input 2
A11	DigIN3	Digital input 3
A13	DigIN4	Digital input 4
	AnIN2	Analog input 2
A15	DigIN5	Digital input 5
	AnIN1	Analog input 1
A17	DigIN6	Digital input 6
A19	SPS/nLogic	Digital input level (DigIN1, DigIN2, DigIN3)
A21	SPS/nLogic1	Digital input level (DigIN4, DigIN5, DigIN6)
A23	GND	Ground

Table 3-12 Digital and analog inputs – Pin assignment

Digital inputs 1 ... 6 (logic level setting)	
Input voltage	0 ... 30 VDC
Max. input voltage	±30 VDC
Logic 0	<0.8 V
Logic 1	>2.0 V
Input current at logic 1	255 µA @ 5 VDC
Switching delay	<300 µs @ 5 VDC (Sampling rate firmware 1kHz)

Table 3-13 Digital input specification - logic level settings

Digital input level setting	
Digital input level (DigIN1, DigIN2, DigIN3) Digital input level (DigIN4, DigIN5, DigIN6) GND	Pin A19 Pin A21 Pin A5
PLC level	connected to 3.3 VDC
Logic level	not connected

Table 3-14 Digital input level setting

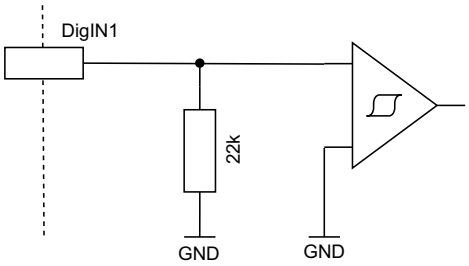

Figure 3-5 DigIN 1 circuit (analogously valid for DigIN 2, DigIN 3, DigIN 6) logic level setting

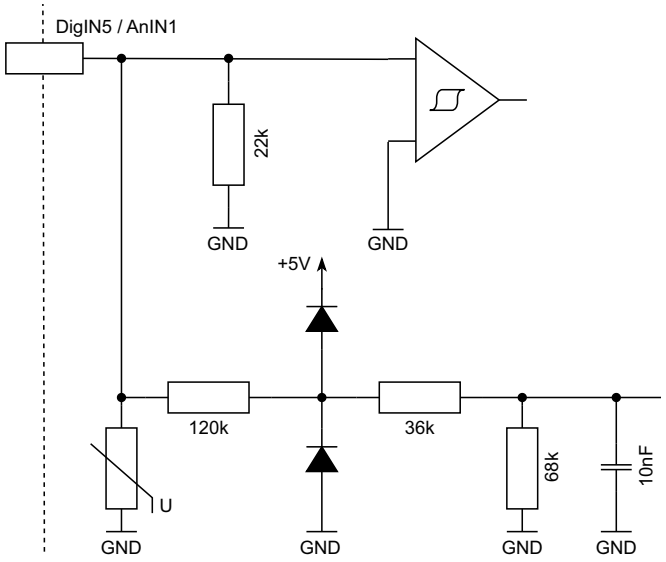

Figure 3-6 DigIN 5 / AnIN1 circuit (analogously valid for DigIN 4 / AnIN2) logic level setting

Digital inputs 1 ... 6 (PLC level setting)	
Input voltage	0 ... 30 VDC
Max. input voltage	±30 VDC
Logic 0	<5.5 V
Logic 1	>9 V
Input current at logic 1	>2 mA @ 9 VDC typically 3.5 mA @ 24 VDC
Switching delay	<300 µs @ 24 VDC (Sampling rate firmware 1kHz)

Table 3-15 Digital input specification - PLC level setting

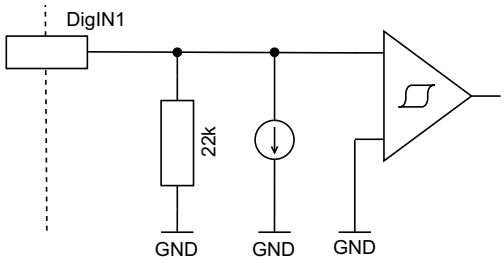

Figure 3-7 DigIN 1 circuit (analogously valid for DigIN 2, DigIN 3, DigIN 6) PLC level setting

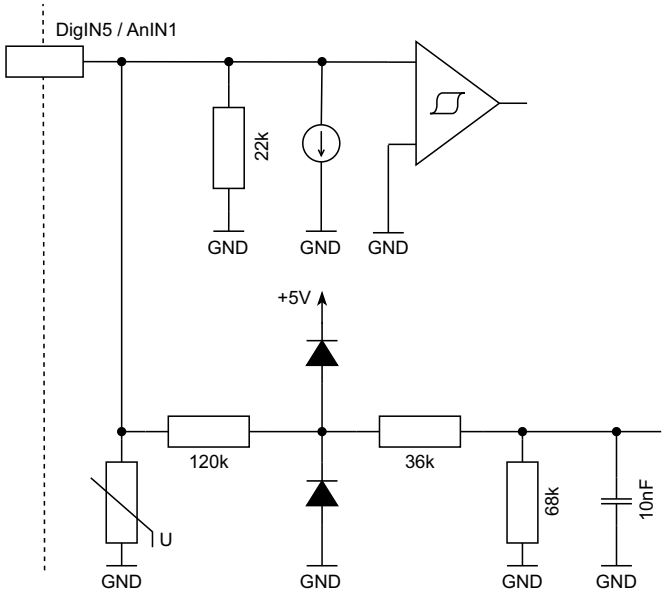

Figure 3-8 DigIN 5 / AnIN1 circuit (analogously valid for DigIN 4 / AnIN2) PLC level setting

Analog inputs AnIN1, AnIN2 (only logic level setting allowed) [2]	
Input voltage	+10 VDC
Max. input voltage	±30 VDC
Input resistance	20 kΩ
A/D converter	12 Bit
Resolution	2.654 mV
Bandwidth	336 Hz

[2] Operation of the analog inputs is only in logic level mode possible.

Table 3-16 Digital input specification - PLC level setting

3.3.4 CAN1, CAN2

CAN2 is used as CAN-Master and CAN1 is used as CAN-Slave or CAN-Master in the CANopen network.

3.3.4.1 Connection

Module header pin	Signal	Description
A43	CAN1_H	CAN1 high bus line
A44	CAN2_H	CAN2 high bus line
A45	CAN1_L	CAN1 low bus line
A46	CAN2_L	CAN2 low bus line
A47...A48	GND	Ground

Table 3-17 CAN – Pin assignment

CAN interface	
Standard	ISO 11898-2:2003
Max. bit rate	1 Mbit/s
Protocol	CiA 301
Node-ID setting CAN1	by external wiring or software

Table 3-18 CAN1 CAN2 interface specification

Note

- *Consider the CAN master's maximal bit rate.*
- *Use 120 Ω termination resistor at both ends of the CAN bus.*

3.3.4.2 Configuration

The device's identification (subsequently called "ID") is set using the input lines ID1…ID3. The ID (1…3) may be coded using binary code.

Module header pin	Signal	Description	Binary code	Valence
A37	CANID_1	CAN ID 1 (valence = 1)	2^0	1
A38	CANID_2	CAN ID 2 (valence = 2)	2^1	2
A39	CANID_3	CAN ID 3 (valence = 4)	2^2	4
A41	GND	Ground		

Table 3-19 ID – Pin assignment

CAN ID	
Max. input voltage	3.3 VDC
Logic 1	connected to GND
Logic 0	not connected

Table 3-20 CAN ID specification

Important
The internal circuit of the ID pins (A37…A39) is based on an analog voltage measurement. Ensure a proper ground connection (0.0 V) when Logic 1 state is intended and a high impedance for Logic 0 state.

The set ID can be observed by adding the valences of all inputs connected externally to GND. Use the following table as a (non-concluding) guide:

CAN ID			ID
1	2	3	
0*	0	0	-
1**	0	0	1
0	**1**	0	2
0	0	**1**	4
1	0	**1**	5

0* ID input line not connected
1** ID input line externally connected to GND

Table 3-21 ID – Examples

3.3.5 Ethernet

Module Header Pin	Signal	Description
A27	ENET_LED0	Ethernet LED0 (yellow)
A28	ENET_LED1	Ethernet LED1 (green)
A35...A36	GND	Ground
A31	ENET_RX-	Ethernet receiver exchange -
A32	ENET_TX-	Ethernet transmit exchange -
A33	ENET_RX+	Ethernet receiver exchange +
A34	ENET_TX+	Ethernet transmit exchange +

Table 3-22 Ethernet – pin assignment

Ethernet interface	
Protocol	Ethernet TCP/IP
Max. bit rate	Max. 100 MBit/s

Table 3-23 Ethernet specification

Ethernet LED output specification	
Max. input voltage	5 V
Max. LED current	8 mA

Table 3-24 Ethernet LED output specification

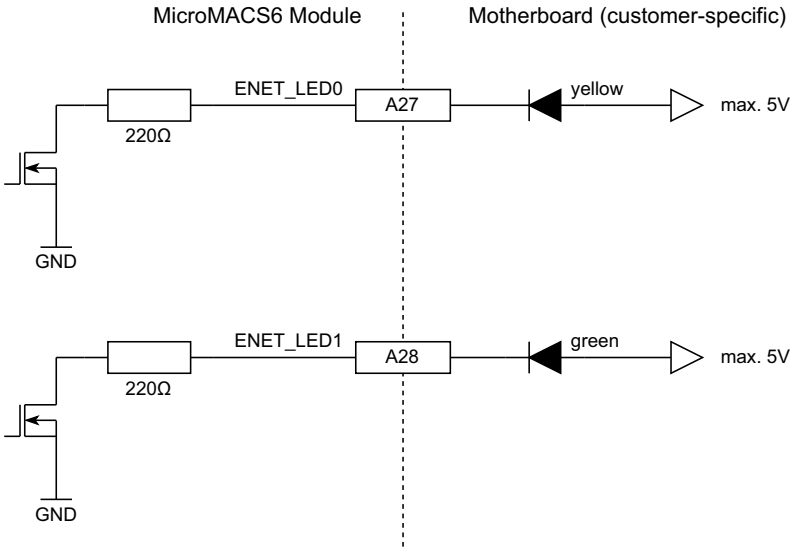

Figure 3-9 Ethernet LED output

3.3.6 USB

The USB interface is for commissioning and service tasks. Use Ethernet or CAN for process communication.

Hot plugging the USB interface may cause hardware damage

If the USB interface is being hot-plugged (connecting while the power supply is on), the possibly high potential differences of the two power supplies of controller and PC/Notebook can lead to damaged hardware.

- *Avoid potential differences between the power supply of controller and PC/Notebook or, if possible, balance them.*
- *Insert the USB connector first, then Switch on the power supply of the controller.*

Pin	Signal	Description
A59	GND	Ground
A55	USB_D+	USB Data+
A57	USB_D-	USB Data-

Table 3-25 USB - Pin assignment

3.3.7 Optional interfaces (for future release)

The following signals are intended for future use. SPI, UART, I2C, and all the power levels from the main board are available.

Pin	Signal	Description
A3	$+V_{AUX1}$	Auxiliary supply voltage output (5 VDC / $I_L \leq 120$ mA)
A4	GND	Ground
A5	$+V_{AUX2}$	Auxiliary supply voltage output (3.3 VDC / $I_L \leq 200$ mA)
A6	GND	Ground
A18	SPARE_0	for future options
A20	SPARE_1	for future options
A24	OPTION_I2C_SCL	for future options
A25	OPTION_IO	for future options
A26	OPTION_I2C_SDA	for future options
A49	OPTION_UART_TX	for future options
A50	OPTION_SPI_SDO	for future options
A51	OPTION_UART_RX	for future options
A52	OPTION_SPI_SCK	for future options
A53...A54	GND	Ground
A56	OPTION_SPI_CS	for future options
A58	OPTION_SPI_SDI	for future options
A59...A60	GND	Ground

Table 3-26 Optional connections – Pin assignment

3.4 Status indicators

The MicroMACS6 Module Master Controller features a set of LED indicators to display the Device status.

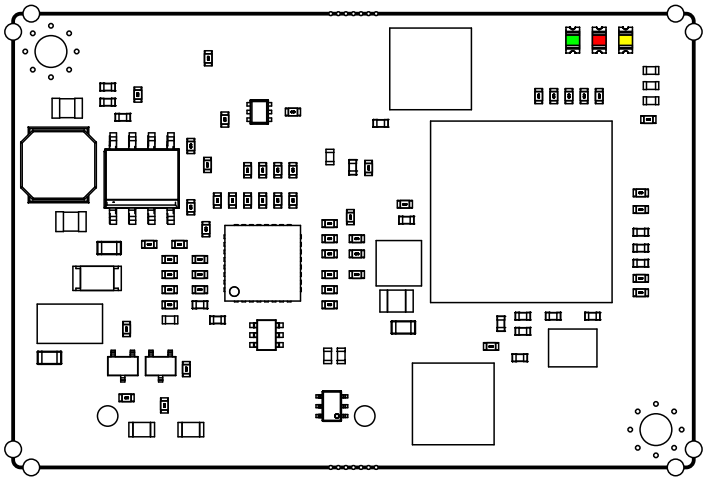

Figure 3-10 LEDs – location

- Green LED shows operating status
- Red LED indicates error
- Yellow LED indicates application status

LED	Status	Description
Green	ON	Power supply in range, firmware is running
Red	ON	An error occurred
Yellow	ON	User application is running. Power supply in range, firmware is running.

Table 3-27 Device status LED

4 MOTHERBOARD DESIGN GUIDE

The «Motherboard Design Guide» provides helpful information on integrating the Module on a printed circuit board. It contains recommendations for the motherboard layout and specifies external components that may be required, pin assignments, and connection examples.

CAUTION

Dangerous action
Errors in implementing the design can result in serious Injury!
- *Only proceed if you are skilled in electronics design!*
- *Designing a printed circuit board requires special skills and knowledge and may only be performed by experienced electronic developers!*
- *This quick guide is only intended as an aid, does not make any claim to completeness, and will not automatically result in a functional component!*

Get help
If you are not trained in the design and development of printed circuit boards, you will need additional support for this point.
maxon will be happy to provide you with a quote for designing and manufacturing a motherboard for your specific application.

4.1 Requirements for components of third-party suppliers

Best practice
For references and recommended components consult ➔Table 4-28.

4.1.1 Terminal/Socket combo strip

For implementation of a motherboard for the Module, a terminal/socket combo strip is required.

4.1.2 Spacers

For implementation of a motherboard for the Module, two 5 mm long spacers with M2 screws are required. For respective matching types, see ➔"Recommended components and manufacturers" on page 4-25, for their locations and footprint see ➔Figure 4-13 on page 4-28.

4.1.3 Recommended components and manufacturers

	Recommended components
Terminal/ socket strip	Dual row terminal/socket combo strip, 0.5 mm pitch **30 poles, 2 rows:** • Samtec LSHM-130-02.5-LDV-A-N-K-TR
Spacer	2 spacers Ø4.3 x 5 mm, M2 thread • Würth (9774050243) (9774050243R)

Table 4-28 Motherboard design guide – Recommended components

4.2 Design guidelines

The following instructions are intended to serve as an aid when designing an application-specific motherboard and ensures the correct and reliable integration of the Module.

While designing a motherboard, consider the following characteristics of the Module:

- Pin assignment (➔Page 3-18)
- Technical data (➔Page 2-11) and dimensional drawing (➔Page 2-15)

4.2.1 Ground

All ground connections (GND) should be internally connected to the Module (equal potential). It is customary to equip the motherboard with a ground plane. All ground connections should be connected to the voltage supply ground via wide conductive tracks.

Pin	Signal	Description
A2	GND	Ground
A4	GND	Ground
A6	GND	Ground
A16	GND	Ground
A22...A23	GND	Ground
A29...A30	GND	Ground
A35...A36	GND	Ground
A41...A42	GND	Ground
A47...A48	GND	Ground
A53...A54	GND	Ground
A59...A60	GND	Ground

Table 4-29 Motherboard design guide – Grounding

If an earth potential is in place or required, the ground plane should be connected to the earth potential via one or more capacitors. The use of ceramic capacitors with 100 nF and 100 V is recommended.

4.2.2 Layout

Guidelines for the layout of the motherboard:

- Connector pin [A1] for $+V_{CC}$ (nominal power supply voltage) should be connected via wide conductive tracks.
- Connector pin [A2] for GND (ground) should be connected with the operating voltage ground via wide conductive tracks.

4.3 Terminal/Socket placement & SMT footprint

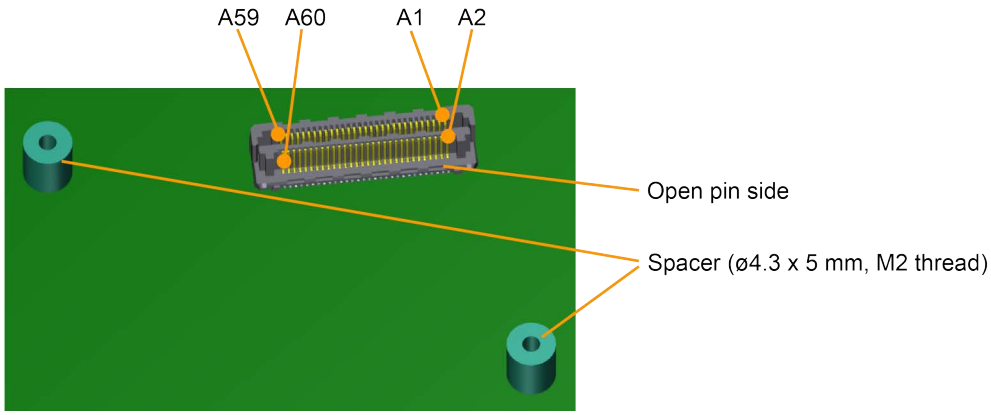

Figure 4-11 MicroMACS6 Module – Terminal/socket placement for a custom motherboard (example)

Mirroring of terminal rows
The socket is of hermaphroditic design. When mating the Module's socket onto the motherboard's socket, you must consider to mirror the pinning of the motherboard's socket (➔Figure 4-12, left, blue shaded).

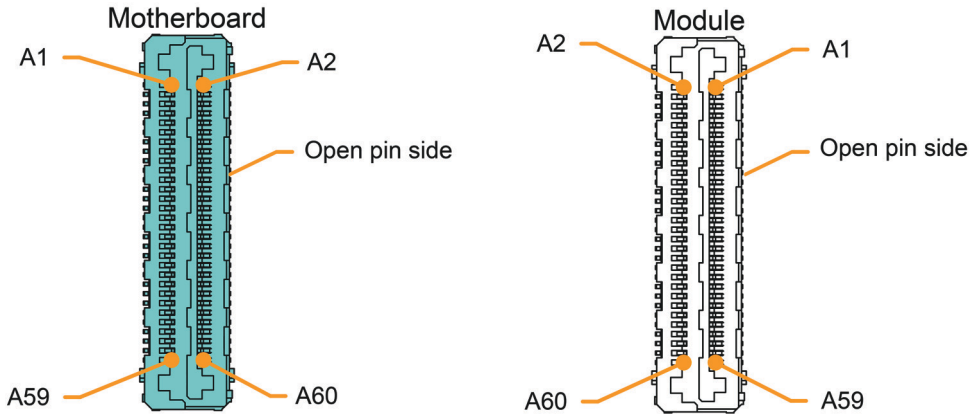

Figure 4-12 MicroMACS6 Module – Terminal/socket placement (mating)

Possible dimensional differences in STEP files

For conversion reasons, the below stated dimensions may slightly differ from the dimensions specified in the downloadable STEP file. Use only the below stated dimensions for your design.

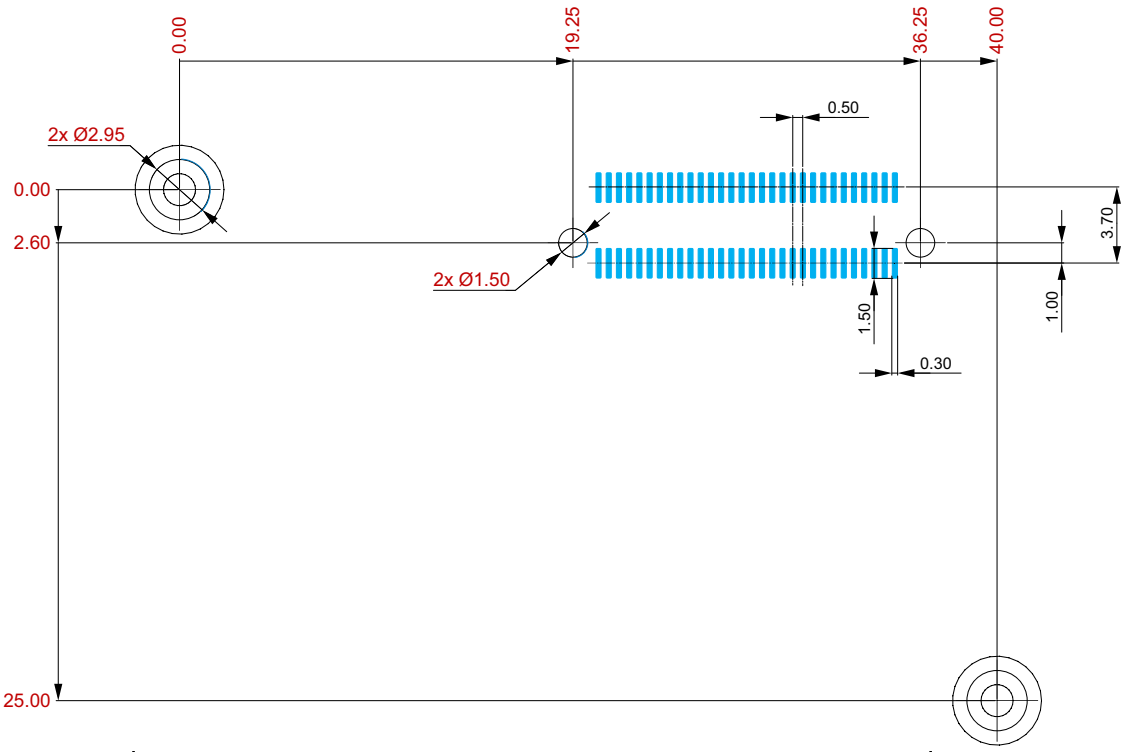

Figure 4-13 MicroMACS6 Module – Terminal/socket footprint

5 MAIN WIRING DIAGRAM

5.1 Main wiring diagram

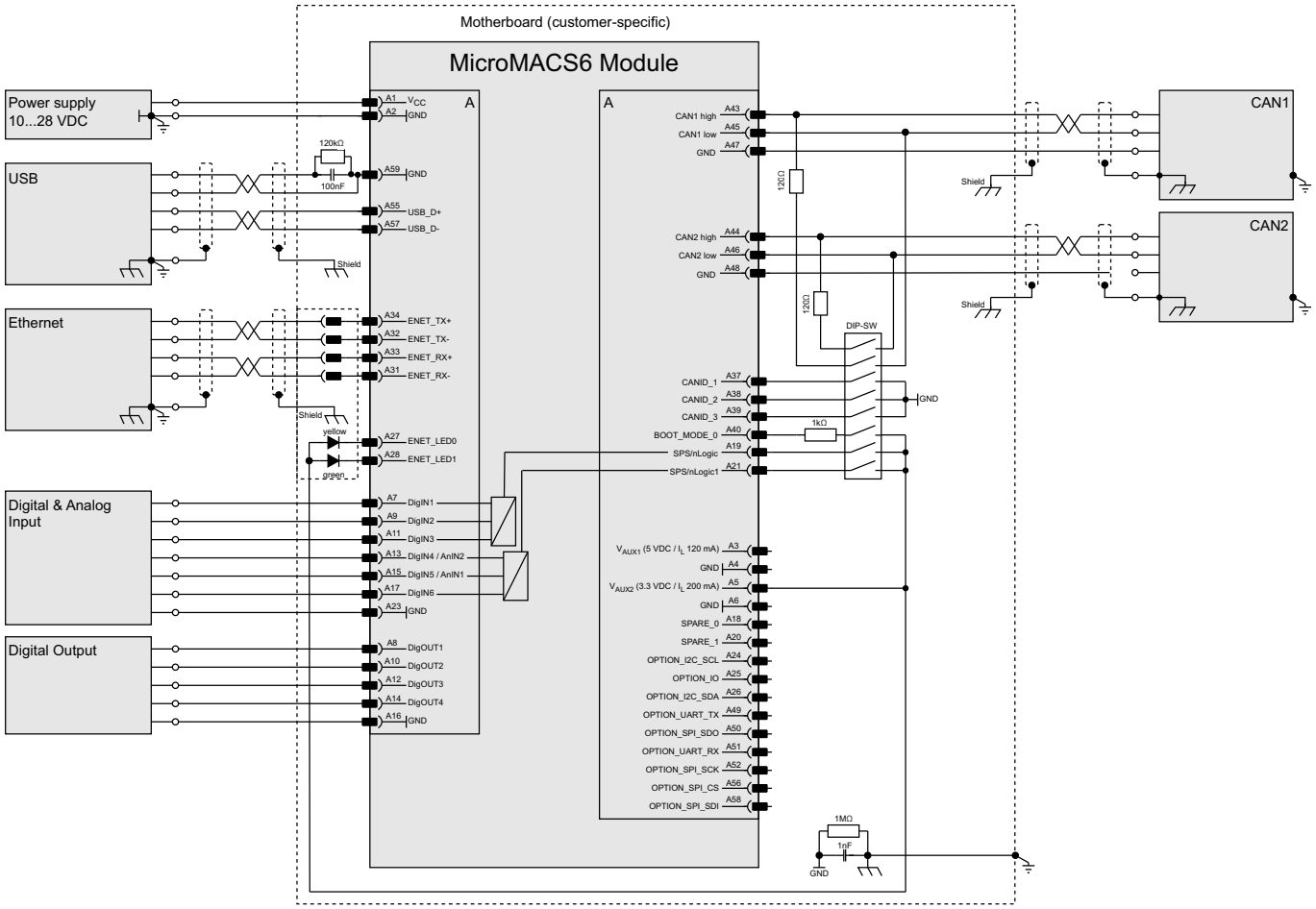

Figure 5-14 Main wiring diagram

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LIST OF FIGURES

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