

### General Description

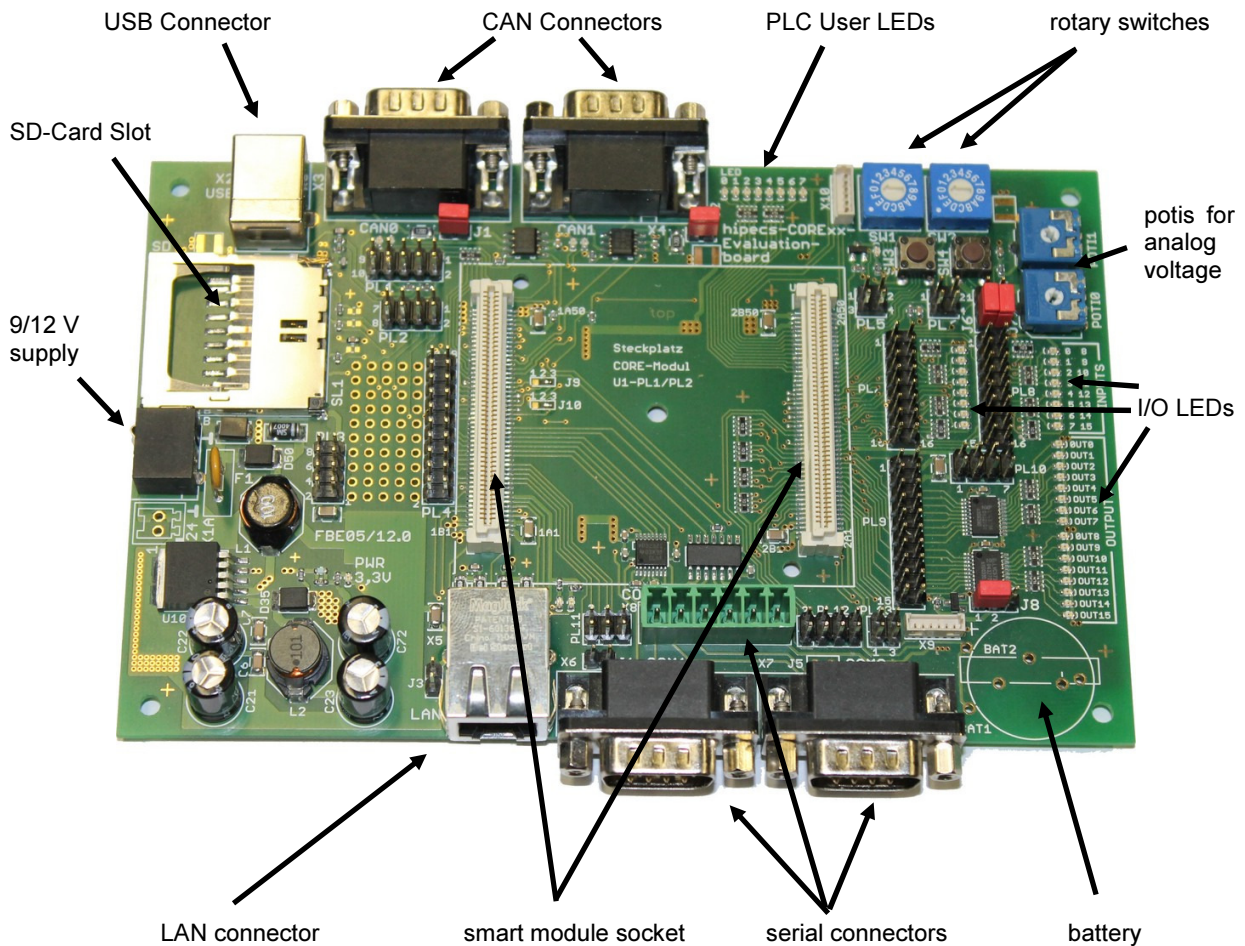
The hipecs CORE10-EVA is an evaluation board for the embedded PLC core modules of the hipecs CORE series of frenzel + berg electronic. The board supports all main features of the core modules.

All digital and analog inputs and outputs are wired to pin headers for simple evaluation. All digital IOs offer indication LEDs. The analog inputs are connected to potentiometers. A SD socket for the external SD card slot is available.

Furthermore, connectors for USB, serial interfaces, Ethernet and CAN bus (D-SUB and RJ45) are available on this board.

### Ordering Information

| Part              | Description  |
|-------------------|--|
| hipecs-CORE10-EVA | Evaluation board for hipecs CORE10 module, wall power supply included, with FCI connectors |



### Connectors

#### Power-Supply X1A/X1B

The evaluation board has an own 3,3V power regulator. It needs an external power supply unit with 9V to 12V DC at the power input connector X1B or a 24V DC supply at connector X1A. An external wall socket power supply unit with unregulated 9VDC output and 230VAC input is included.

#### X1A

| Pin No. | Pin Name | Function                          |
|---------|----------|-----------------------------------|
| 1       | U+       | 9V/12V from wall socket connector |
| 2       | U-       | Ground                            |

#### X1B

| Pin No. | Pin Name | Function             |
|---------|----------|----------------------|
| 1       | U+       | 24 volt power supply |
| 2       | GND      | Ground               |

#### USB-Connector X2

The USB connector is used for CoDeSys programming and command shell access.

#### X2

| Pin No. | Pin Name | Function      |
|---------|----------|---------------|
| 1       | nc       | not connected |
| 2       | D-       | Data -        |
| 3       | D+       | Data +        |
| 4       | Gnd      | Ground        |

#### CAN-Connector X3

Two of the four CAN bus interfaces are connected to a D-Sub male Connector. X3 is connected to CAN0.

#### X3 / CAN0

| Pin No.   | Pin Name | Function                   |
|-----------|----------|----------------------------|
| 2         | CANL0    | CAN LOW / CAN interface 0  |
| 7         | CANH0    | CAN HIGH / CAN interface 0 |
| 3,6       | GND      | Ground                     |
| 1,4,5,8,9 | nc       | not connected              |

#### CAN-Connector X4

Two of the four CAN bus interfaces are connected to a D-Sub male Connector. X4 is connected to CAN1.

#### X4 / CAN1

| Pin No.   | Pin Name | Function                   |
|-----------|----------|----------------------------|
| 2         | CANL1    | CAN LOW / CAN interface 1  |
| 7         | CANH1    | CAN HIGH / CAN interface 1 |
| 3,6       | GND      | Ground                     |
| 1,4,5,8,9 | nc       | not connected              |

#### Ethernet-Connector X5

X5 is a RJ45 Connector for the hipecs Ethernet interface.

#### X5

| Pin No. | Pin Name | Function                                 |
|---------|----------|--|
| 1       | TX+      | Transmit +                               |
| 2       | VCC3A    | VCC LAN                                  |
| 3       | TX-      | Transmit -                               |
| 4       | RX+      | Receive +                                |
| 5       | VCC3A    | VCC LAN                                  |
| 6       | RX-      | Receive -                                |
| 7       | nc       |  |
| 8       | shield   | Shield (use J3 to connect shield to GND) |

#### Serial-Connector X6 / COM1

Two of the three serial interfaces are connected to a D-Sub male Connector. X6 is connected to COM1. ATTENTION: In CoDeSys applications physical COM1 is COM0 in CoDeSys software!!

#### X6 / COM1

| Pin No.     | Pin Name | Function      |
|-------------|----------|---------------|
| 2           | COM1RX   | COM1 Receive  |
| 3           | COM1TX   | COM1 Transmit |
| 5           | GND      | Ground        |
| 1,4,6,7,8,9 | nc       | not connected |

### Serial-Connector X7 / COM2

Two of the three serial interfaces are connected to a D-Sub male Connector. X7 is connected to COM2. ATTENTION: In CoDeSys applications COM2 is COM0 in CoDeSys!!

| X7 / COM2   |          |               |
|-------------|----------|---------------|
| Pin No.     | Pin Name | Function      |
| 2           | COM2RX   | COM2 Receive  |
| 3           | COM2RX   | COM2 Transmit |
| 5           | GND      | Ground        |
| 1,4,6,7,8,9 | nc       | not connected |

### Serial-Connector X8 / COM3

The third serial interface is equipped with a RS422 Transceiver, offering differential signals. The connector is a PTR plug-in screw terminal (3,81 mm grid).

| X8 / COM3 |          |                   |
|-----------|----------|-------------------|
| Pin No.   | Pin Name | Function          |
| 1         | A        | A-Signal of RS422 |
| 2         | B        | B-Signal of RS422 |
| 3         | Z        | Z-Signal of RS422 |
| 4         | Y        | Y-Signal of RS422 |
| 5         | GND      | Ground            |
| 6         | GND      | Ground            |

### ISP-Connector X9

The ISP connector X9 is used for in-circuit programming and debugging by the manufacturer.

### PLD-Connector X10

The PLD connector X10 is used for PLD programming by the manufacturer.

### CAN Header PL1

The CAN Header PL1 provides the signals of two of the 4 CAN interfaces of the hipecs CORE 10. These signals are not connected to a transceiver!

| PL1     |          |  |
|---------|----------|--|
| Pin No. | Pin Name | Function   |
| 1,2     | CAN2T    | CAN interface 2 transmit line (on board pull-up 10k) |
| 3,4     | CAN2R    | CAN interface 2 receive line                         |
| 5,6     | GND      | Ground   |
| 7,8     | CAN3T    | CAN interface 3 transmit line (on board pull-up 10k) |
| 9,10    | CAN3R    | CAN interface 3 receive line                         |

### File System IRQ / PWR enable Header PL2

The Header PL2 provides the signals the file system interrupts and the power enable of the hipecs CORE10.

| PL2     |           |          |
|---------|-----------|----------|
| Pin No. | Pin Name  | Function |
| 1       | IRQ_FS_01 |          |
| 2       | IN_FS_11  |          |
| 3       | IRQ_FS_00 |          |
| 4       | IN_FS_00  |          |
| 5       | PWREN1#   |          |
| 6       | PWREN0#   |          |
| 7       | +3V3      |          |
| 8       | GND       |          |

### Power Header PL3

PL3 offers 4 pins connected to the on board 3,3 volt power supply and 4 pins connected to ground.

| PL3     |          |                       |
|---------|----------|-----------------------|
| Pin No. | Pin Name | Function              |
| 1,3,5,7 | GND      | Ground                |
| 2,4,6,8 | +3V3     | 3,3 volt power supply |

### Address Bus Header PL4

The pins of the hipecs external address bus are connected to the pin header PL4

| PL4     |          |                               |
|---------|----------|-------------------------------|
| Pin No. | Pin Name | Function                      |
| 1       | ALE      | address latch enable          |
| 2       | IN_OB_20 |                               |
| 3       | IN_OB_21 |                               |
| 4       | EX_AD0   | external address/data line 0  |
| ...     | ...      | ...                           |
| 11      | EX_AD7   | external address/data line 7  |
| 12      | EX_A8    | external address line 8       |
| ...     | ...      | ...                           |
| 15      | EX_AD11  | external address/data line 11 |
| 16      | EX_RD#   | read signal (active low)      |
| 17      | EX_WR#   | write signal (active low)     |
| 18      | EX_CS0#  | chip select 0 (active low)    |
| 19      | EX_CS1#  | chip select 1 (active low)    |
| 20      | RESOUT#  | reset out (active low)        |

### Header PL5

The pin Header PL5 provides the signal of Port P510, the output enable signal and the failure input.

| PL5     |          |   |
|---------|----------|---|
| Pin No. | Pin Name | Function  |
| 1       | GND      | Ground  |
| 2       | FAULT#   | failure input for digital outputs. A failure output of a power driver may be connected to this pin. |
| 3       | OE       | output enable pin. May be used for enabling external power drivers.                                 |
| 4       | P510     | not in use at this time   |

### Analog Input Header PL6

PL6 offers the possibility to measure the analog voltages of the inputs. The eva board has two on board potentiometers to simulate analog voltages. On this pins, the voltage can be measured by external devices.

| PL6     |          |                                |
|---------|----------|--------------------------------|
| Pin No. | Pin Name | Function                       |
| 1       | GND      | Ground                         |
| 2       | AIN1     | analog input voltage channel 0 |
| 3       | AIN0     | analog input voltage channel 0 |
| 4       | AN_REF   | reference voltage              |

### Digital Input Header PL7

The digital inputs of the input byte 0 are connected to the pin header PL7.

| PL7                   |           |  |
|-----------------------|-----------|--|
| Pin No.               | Pin Name  | Function   |
| 1,3,5,7,9<br>11,13,15 | POLAR_INP | input polarity. By setting jumper J6, this signal can either be set to GND or 3,3 volt. See chapter jumpers for further information. |
| 2                     | IN0       | digital input 0  |
| ...                   | ...       | ...  |
| 16                    | IN7       | digital input 7  |

### Digital Input Header PL8

The digital inputs of the input byte 1 are connected to the pin header PL8.

| PL8                   |           |  |
|-----------------------|-----------|--|
| Pin No.               | Pin Name  | Function   |
| 1,3,5,7,9<br>11,13,15 | POLAR_INP | input polarity. By setting jumper J6, this signal can either be set to GND or 3,3 volt. See chapter jumpers for further information. |
| 2                     | IN8       | digital input 8  |
| ..                    | ..        | ...  |
| 16                    | IN15      | digital input 15   |

### Power / Ground Header PL10

PL10 offers 4 pins connected to the on board 3,3 volt power supply and 4 pins connected to ground.

| PL10    |          |                       |
|---------|----------|-----------------------|
| Pin No. | Pin Name | Function              |
| 1,3,5,7 | GND      | Ground                |
| 2,4,6,8 | +3V3     | 3,3 volt power supply |

### On-Board SPI Header PL11

The onboard SPI signals are connected to PL11.

| PL11    |             |                                    |
|---------|-------------|------------------------------------|
| Pin No. | Pin Name    | Function                           |
| 1       | SPI_OB_CS2  | on-board SPI chip select           |
| 2       | SPI_OB_MISO | on-board SPI Master In / Slave Out |
| 3       | SPI_OB_MOSI | on-board SPI Master out / Slave In |
| 4       | SPI_OB_SCLK | on-board SPI serial clock          |
| 5       | IRQ_OB_02   | on-board SPI interrupt             |
| 6       | nc          | not connected                      |

### Analog Output Header PL12

The analog outputs of the hipecs CORE10 are connected to the pin header PL12. The outputs are realized as PWM signals, so external components are required to generate a DC output signal.

| PL12    |          |                              |
|---------|----------|------------------------------|
| Pin No. | Pin Name | Function                     |
| 1       | DAYSYI   | on board daisy chain input   |
| 2       | DAYSYO   | on board daisy chain output  |
| 3       | ANPW0    | analog output channel 0      |
| 4       | ANPW1    | analog output channel 1      |
| 5       | +3,3 V   | on board supply voltage 3,3V |
| 6       | +3,3 V   | on board supply voltage 3,3V |
| 7       | GND      | Ground                       |
| 8       | GND      | Ground                       |

### Output Enable Signal Header PL13

The output Enable pin for external drivers is connected to PL13.

| PL13    |          |  |
|---------|----------|--|
| Pin No. | Pin Name | Function                                       |
| 1       | GND      | Ground   |
| 2       | HBS#     | reserved                                       |
| 3       | OUTEN#   | Output Enable for external output power driver |
| 4       | MRXSTX   | reserved                                       |

### Jumper Settings

| Jumper | Setting | Function   |
|--------|---------|--|
| J1     | open    | no bus termination CAN0  |
|        | closed  | bus termination CAN0 (120 Ohm)   |
| J2     | open    | no bus termination CAN1  |
|        | closed  | bus termination CAN1 (120 Ohm)   |
| J3     | open    | network connector shield not connected to ground                                 |
|        | closed  | network connector shield connected to ground                                     |
| J4     | open    | COM1 shield not connected to ground  |
|        | closed  | COM1 shield connected to ground  |
| J5     | open    | COM2 shield not connected to ground  |
|        | closed  | COM2 shield connected to ground  |
| J6     | 1-2     | digital inputs work active low<br>indication LEDs only available when active low |
|        | 2-3     | digital inputs work active high  |
| J7     | 1-2     | digital inputs work active low<br>indication LEDs only available when active low |
|        | 2-3     | digital inputs work active high  |
| J8     | 1-2     | digital outputs work active high   |
|        | 2-3     | digital outputs work active low  |

### Jumper for soldering

(beneath the CPU module)

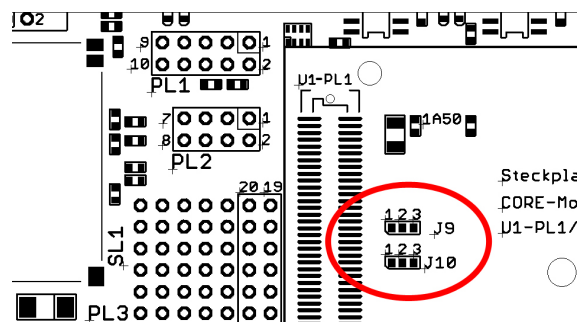
|     |     |  |
|-----|-----|--|
| J9  | 1-2 | card <b>select</b> drive D connected to SD1 slot                           |
|     | 2-3 | card <b>select</b> drive C connected to SD1 slot<br><b>factory setting</b> |
| J10 | 1-2 | card <b>detect</b> drive D connected to SD1 slot                           |
|     | 2-3 | card <b>detect</b> drive C connected to SD1 slot<br><b>factory setting</b> |

### Switch buttons

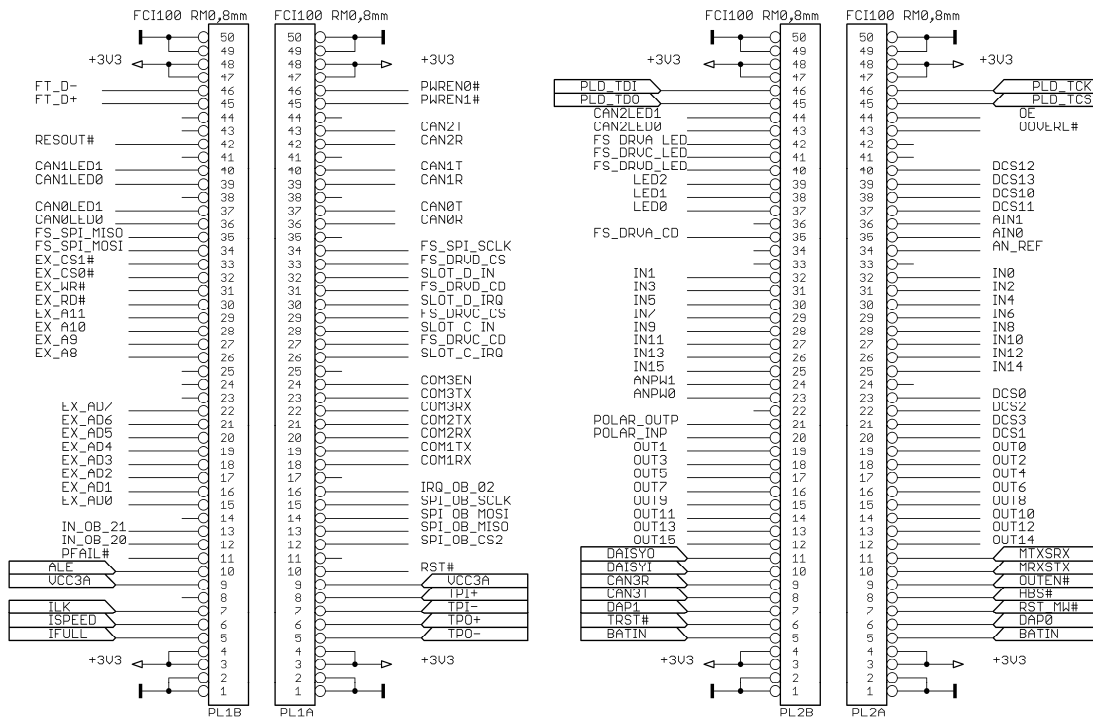
| Jumper | Function   |
|--------|--|
| SW1    | not in use   |
| SW2    | 0: boot from drive a<br>1: boot from drive c<br>e: boot loader mode, boot drive a<br>f: boot loader mode, boot drive c |
| SW3    | Simulation of a Power-Fail (PFAIL#)  |
| SW4    | Simulation of a FAULT (FAULT#)   |

### LED's

| LED | Function                         |
|-----|----------------------------------|
| 0   | User LED 0 (status LED firmware) |
| 1   | User LED 1                       |
| 2   | User LED 2                       |
| 3   | LED file system drive D          |
| 4   | LED file system drive C          |
| 5   | LED file system drive A          |
| 6   | CAN 4 run LED                    |
| 7   | CAN 4 error LED                  |



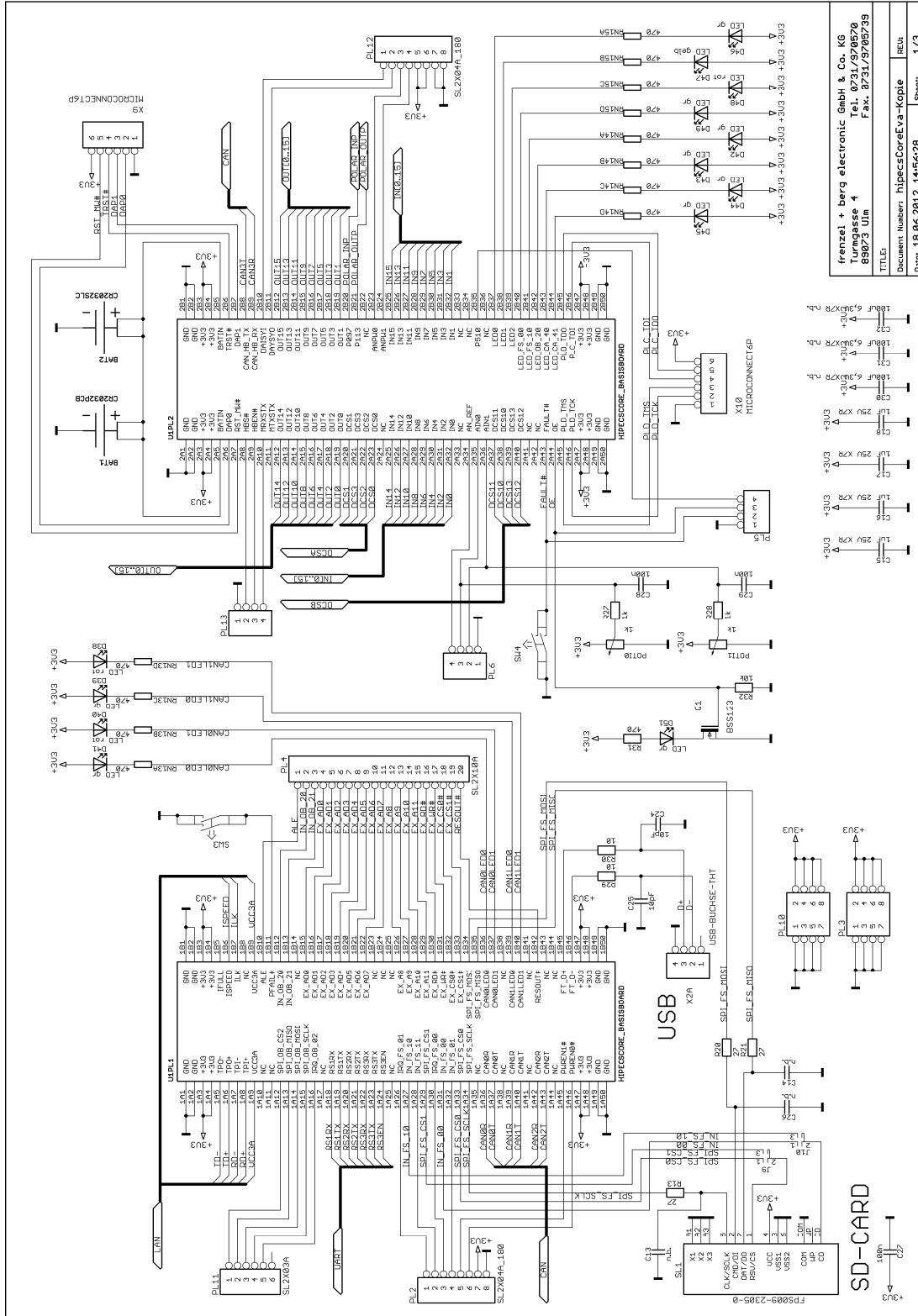
### Addendum ( Pin Assignment of hipecs CORE10)



The Pinning shows the pin configuration from the hipecs CORE10 controller module from TOP view. Use this pinning on your application board. For More Information about the pinning and pin functions see hipecs CORE10 data sheet.



### Schematic (page 1)

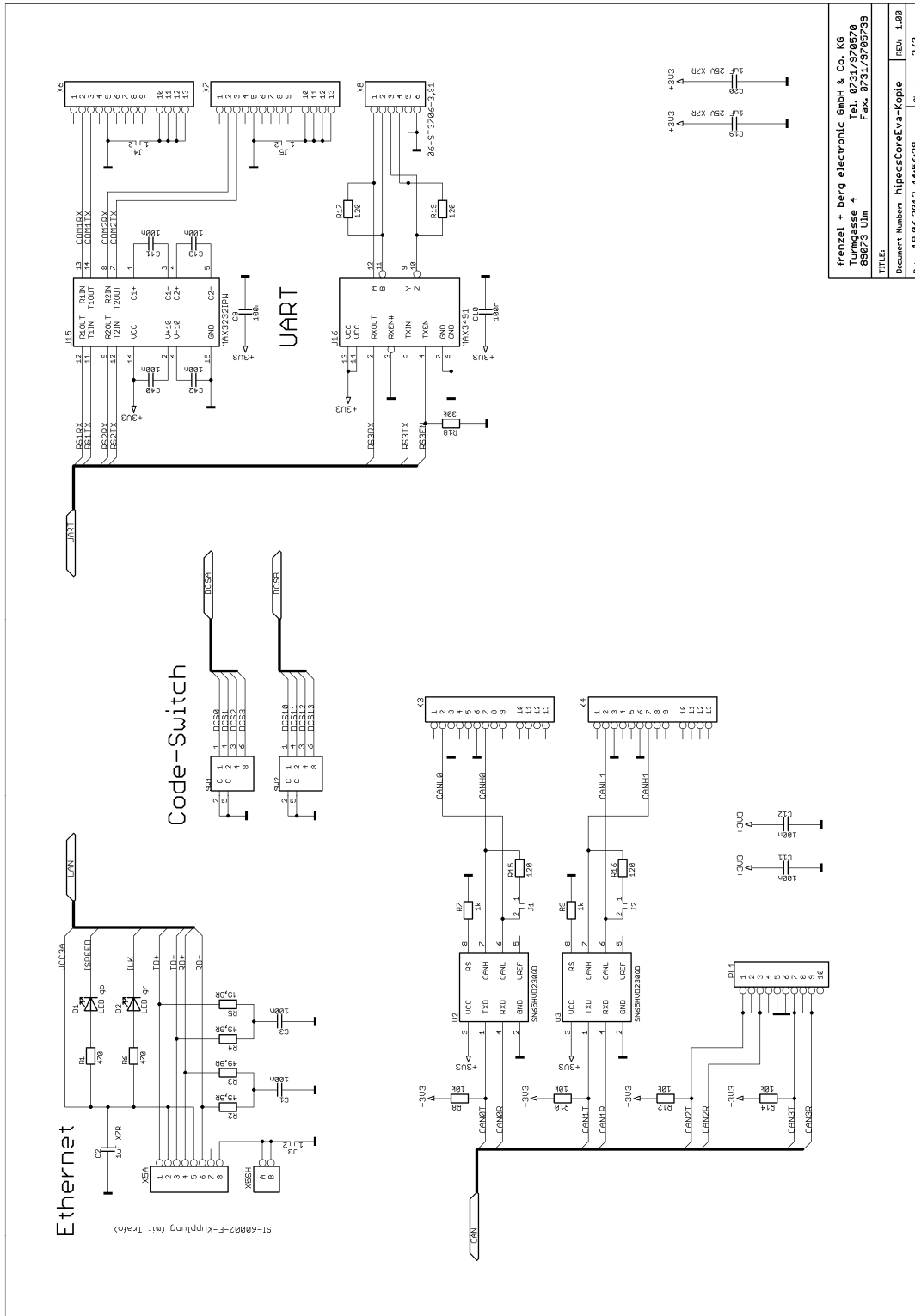


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 Document Number: hipecsCoreEva-Kopie REV: 1/3  
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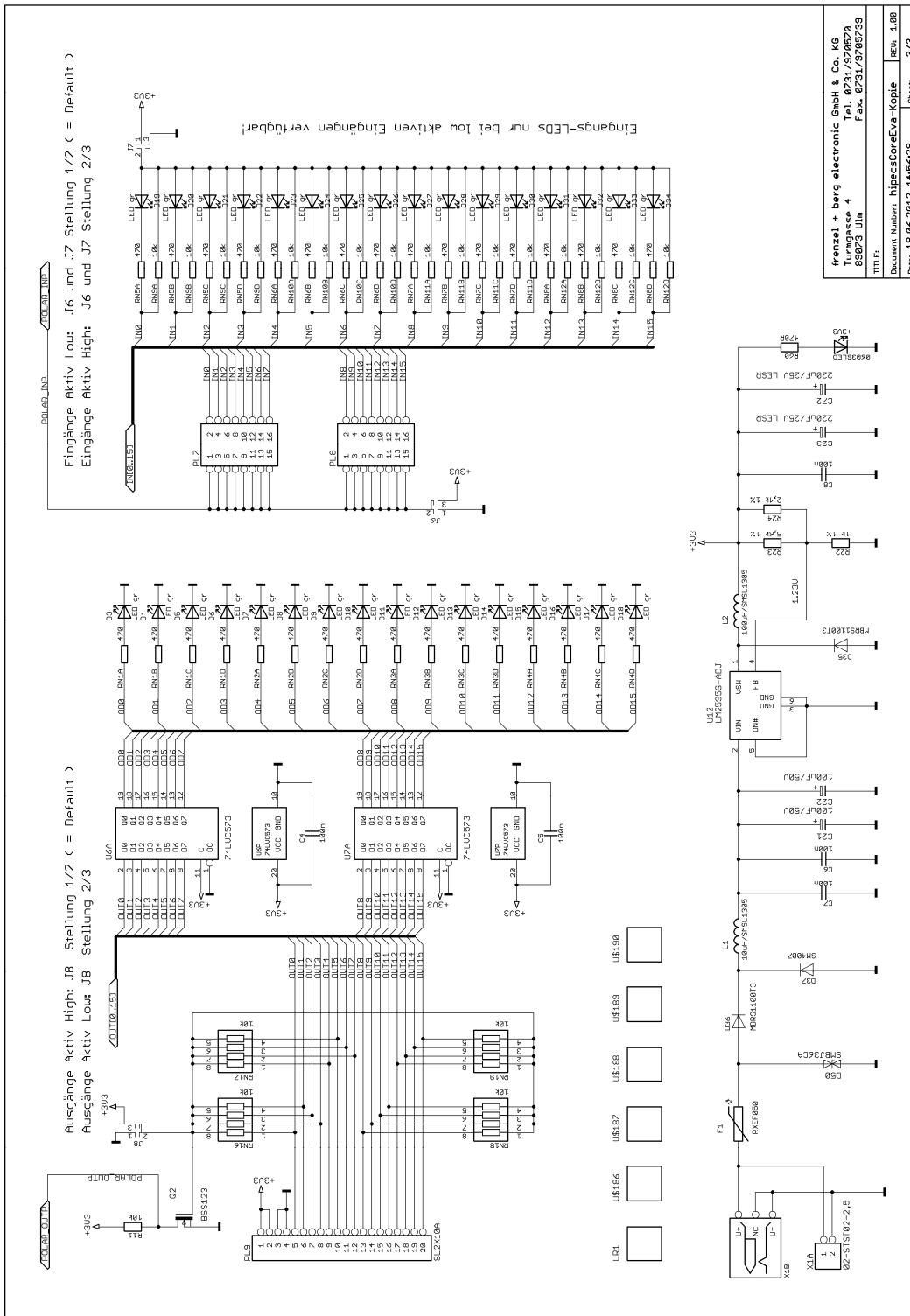


### Schematic (page 2)



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 TITLE:  
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### Schematic (page 3)



|   |                     |
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| Document Number:  | 18.06.2012 1456128  |
| Rev.:   | 1.08                |
| Sheet:  | 3/3                 |

## Changes and Version History

| Version     | Date        | Changes   |
|-------------|-------------|---|
| V1.00 Rev 0 | 2013/Feb/21 | First version   |
| V1.00 Rev 1 | 2013/Mar/07 | Added factory settings for jumper J9 & J10                  |
| V1.00 Rev 2 | 2016/Dec/12 | Added description for SW 3 and 4; J9 and 10 placement added |
|             |             |   |

## Attention please !

The information herein is given to describe certain components and shall not be considered as warranted characteristics. Terms of delivery and all rights to technical changes are reserved.

We hereby disclaim any and all warranties, including but not limited to warranties of non-infringement, regarding circuits, descriptions and charts stated herein.

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