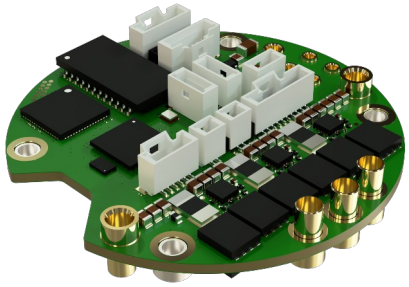
Servo amplifier

# mcDS-i5-60cXX-E



Picture similar

## 1. Technical data

| Power stage | | | | | | |
|---|---|---|---|---|---|---|
| **Name** | **Symbol** | **Description** | **min.** | **Value** | **max.** | **Unit** |
| $U_p$ Ma, Mb, Mc | $U_p$ | Power supply voltage | 10 | - | 60 | V |
| | $I_{out_MAX}$ | Max. output current | - | - | 60 | A |
| | $U_{out}$ | Output voltage | - | - | 97 | % $U_p$ |
| | $F_{PWM}$ | PWM frequency | - | 40 | - | kHz |
| | $\eta_p$ | Efficiency | - | typ. 98 | - | % |
| • $I_{out_CONT}$ applies to max. 40°C ambient temperatur. | | | | | | |

| Electronic supply | | | | | | |
|---|---|---|---|---|---|---|
| **Name** | **Symbol** | **Description** | **min.** | **Value** | **max.** | **Unit** |
| $U_e$ | $U_e$ | Electronic supply voltage | 10 | 24 | 30 | V |
| | $U_{e_WO_DOUT}$ | Electronic supply voltage for devices without DOUT's | 10 | 24 | 60 | V |
| | $I_e$ | Electronic supply current @ Ue=24V | - | typ. 70 | - | mA |
| • $I_e$ applies to unconnected DOUT's and unconnected HALL/Encoder. | | | | | | |

| Inc.-Encoder and Hall | | | | | | |
|---|---|---|---|---|---|---|
| **Name** | **Symbol** | **Description** | **min.** | **Value** | **max.** | **Unit** |
| INC-A, INC-B, INC-INX, H1, H2, H3 | $U_{INC_HALL_LOW}$ | Input voltage: low-state | 0 | - | 1.2 | V |
| | $U_{INC_HALL_HIGH}$ | Input voltage: high-state | 3.5 | - | 5.0 | V |
| | $R_{INC_HALL}$ | Input resistance | - | 1 | - | kΩ |
| | $F_{INC}$ | Input frequency inc. encoder | - | - | 500 | kHz |
| | $F_{HALL}$ | Input frequency hall sensors | - | - | 10 | kHz |
| | $VDD_{INC}$ | 5V Output supply voltage for inc. encoder | 4.9 | 5.1 | 5.3 | V |
| | $VDD_{HALL}$ | 5V Output supply voltage for hall sensors | 4.9 | 5.1 | 5.3 | V |
| | $I_{VDD_INC}$ $I_{VDD_HALL}$ | Summarized output supply current for inc. encoder and hall sensors | - | - | 190 | mA |
| • Internal 1 kΩ Pull-$U_p$-Resistors to $VDD_{INC}$ on Encoder inputs.<br>• Internal 1 kΩ Pull-$U_p$-Resistors to $VDD_{HALL}$ on Hall inputs.<br>• Reference potential is $VSS_{INC}$ and $VSS_{HALL}$. | | | | | | |

| SSI-, BISS-C Absolute encoder | | | | | | |
|---|---|---|---|---|---|---|
| **Name** | **Symbol** | **Description** | **min.** | **Value** | **max.** | **Unit** |
| ABS-DATA, ABS-/DATA, ABS-CLK, ABS-/CLK | $V_{id}$ | Permissible Differential Input Voltage | -15 | - | 15 | V |
| | $V_{th+}$ | Receiver switching threshold (positive) | 200 | - | - | mV |
| | $V_{th-}$ | Receiver switching threshold (negative) | -200 | - | - | mV |
| | $V_{od}$ | Differential output voltage RI=60 Ohm | 1.5 | 3.5 | - | V |
| | $V_{od}$ | Differential output voltage RI=100 Ohm | 2 | 4 | - | V |
| | $R_{ABS}$ | Input resistance (internal pull-up) | - | 2 | - | kΩ |
| | $F_{ABS}$ | Clock frequency absolut encoder | - | t.b.d | - | |
| | $VDD_{ABS}$ | 5V output voltage for absolute encoder supply | 4.9 | 5.1 | 5.3 | V |
| | $I_{VDD_ABS}$ | Output supply current for absolut encoder | - | - | 190 | mA |
| • Reference potential is VSS. | | | | | | |

| Digital inputs | | | | | | |
|---|---|---|---|---|---|---|
| **Name** | **Symbol** | **Description** | **min.** | **Value** | **max.** | **Unit** |
| DIN0, DIN1, DIN2, DIN3 | $U_{DIN_LOW}$ | Input voltage: low-state | 0 | - | 5 | V |
| | $U_{DIN_HIGH}$ | Input voltage: high-state | 9 | - | 30 | V |
| | $R_{DIN}$ | Input resistance | - | 24.1 | - | kΩ |
| • Reference potential is GND. | | | | | | |



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| Digital outputs | | | | | | |
|---|---|---|---|---|---|---|
| **Name** | **Symbol** | **Description** | **min.** | **Value** | **max.** | **Unit** |
| DOUT0-BR, DOUT1 | $U_{DOUT_HIGH}$ | Output voltage: high-state | 0 | - | $U_e$ | |
| | $I_{DOUT_HIGH}$ | Output current: high-state | - | - | 700 | mA |

- Reference potential is GND.
- DOUT0-BR has a free-wheeling diode to GND
- DOUT0-BR load: resistive, inductive
- DOUT1 load: resistive
- The outputs switch to $U_e$.

| Analog inputs | | | | | | |
|---|---|---|---|---|---|---|
| **Name** | **Symbol** | **Description** | **min.** | **Value** | **max.** | **Unit** |
| MT, AIN | $U_{MT}$ | Input voltage | 0 | - | 2.047 | V |
| | $U_{AIN}$ | Input voltage | 0 | - | 10.24 | V |
| | $R_{MT}$ | Input resistance | - | 1.5 | - | kΩ |
| | $R_{AIN}$ | Input resistance | - | 15 | - | kΩ |

- MT: Temp. sensor KTY84-130, PT1000.
- MT, AIN Tolerance = 3%
- Reference potential for MT is $VSS_{MT}$.
- Reference potential for AIN is VSS.

| Magnetchip-Encoder | | |
|---|---|---|
| **Name** | **Description** | **Value** |
| MCHIP-ENC | Resolution | 15 Bit |
| | Magnet | neodymium alloy (N35) Ø 6 mm x 2.5 mm |
| | Air gap between magnet and sensor | typ. 1 mm |
| | Radial positioning accuracy | 0.5 mm |

- A typical magnet is a cylinder made of a neodymium alloy (N35) with a diameter of 6 mm and a height of 2.5 mm, inserted into an aluminum shaft. The typical air gap between the magnet and the sensor is between 1 mm and 2 mm. To ensure good measurement linearity, the sensor must be positioned with a radial accuracy of typically 0.5 mm.

| CAN Interface | | |
|---|---|---|
| **Name** | **Description** | **Value** |
| CAN-Hi, CAN-Lo | Protocol | CANopen DS301 |
| | Device profile | DS402 and miControl |
| | CAN specification | 2.0.B |
| | Max. baudrate | 1 Mbit/s |
| | Galvanically isolated | no |

| Environment | | |
|---|---|---|
| **Name** | **Description** | **Value** |
| ENV | Protection class | IP00 |
| | Ambient temperature - operating | -40 .. 105 °C |
| | Ambient temperature - storage | -40 .. 70 °C |
| | Pollution degree | 1 |
| | Humidity | 5 .. 90 % (non-condensing) |

| Mechanical | | |
|---|---|---|
| **Name** | **Description** | **Value** |
| MECH | Dimensions Ø x H | 55 x 11,15 mm |
| | Weight | 22.5 g |

| EtherCAT® Interface | | |
|---|---|---|
| **Name** | **Description** | **Value** |
| ETCAT1, ETCAT2 | Protocol | CoE |
| | Type | EtherCAT Slave |
| | Max. baudrate | 100 Mbit/s |
| | Physical layer | 100 Base-Tx EtherCAT |
| | Number of ports | 2 |

Additional technical data are available in mcManual.



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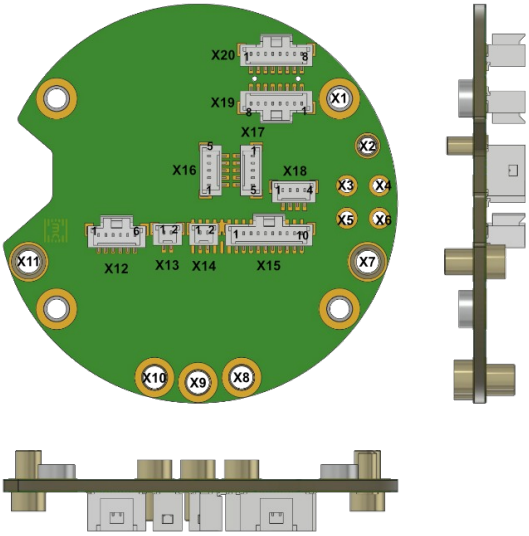
## 1. Scheme




## 2. Terminal assignment

| X1 | Supply | |
|---|---|---|
| 1 | FE | Functional earth |

| X2 | Supply | |
|---|---|---|
| 1 | $U_e$ | Electronic supply voltage |

| X3 | Temperatur | |
|---|---|---|
| 1 | $VSS_{MT}$ | Ground for external motor temperature (KTY84-130, PT1000) |

| X4 | I/O's | |
|---|---|---|
| 1 | $VSS_{BR}$ | Ground for Digital output 0 / parking brake |

| X5 | Temperatur | |
|---|---|---|
| 1 | MT | External motor temperature input (KTY84-130, PT1000) |

| X6 | I/O's | |
|---|---|---|
| 1 | DOUT0-BR | Digital output 0 / parking brake |

| X7 | Supply | |
|---|---|---|
| 1 | $U_p$ | Power supply voltage |

| X8 | Motor | |
|---|---|---|
| 1 | Ma | Motor phase A |

| X9 | Motor | |
|---|---|---|
| 1 | Mb | Motor phase B |

| X10 | Motor | |
|---|---|---|
| 1 | Mc | Motor phase C |

| X11 | Supply | |
|---|---|---|
| 1 | GND | Ground |

| X12 | Encoder | |
|---|---|---|
| 1 | ABS-DATA | DATA - absolut encoder (protocol: SSI, BiSS-C) |
| 2 | ABS-/DATA | DATA - absolut encoder inverted (protocol: SSI, BiSS-C) |
| 3 | ABS-CLK | CLK |
| 4 | ABS-/CLK | /CLK inverted |
| 5 | $VDD_{ABS}$ | 5V output voltage for absolute encoder supply |
| 6 | $VSS_{ABS}$ | Ground for absolute encoder supply |

| X13 | CAN | |
|---|---|---|
| 1 | CAN-Hi | CAN interface for external connections |
| 2 | CAN-Lo | CAN interface for external connections |

| X14 | CAN | |
|---|---|---|
| 1 | CAN-Hi | CAN interface for external connections |
| 2 | CAN-Lo | CAN interface for external connections |

| X15 | I/O's | |
|---|---|---|
| 1 | res. | Reserved |
| 2 | AIN | Analog input |
| 3 | res. | Reserved |
| 4 | DIN0 | Digital input 0 |
| 5 | DIN1 | Digital input 1 |
| 6 | DIN2 | Digital input 2 |
| 7 | DIN3 | Digital input 3 |
| 8 | res. | Reserved |
| 9 | DOUT0-BR | Digital output 0 / parking brake |
| 10 | DOUT1 | Digital output 1 |

| X16 | Encoder | |
|---|---|---|
| 1 | INC-A | Inc. encoder, A channel |
| 2 | INC-B | Inc. encoder, B channel |
| 3 | INC-INX | Inc. encoder, index channel |
| 4 | $VDD_{INC}$ | 5V output voltage for incremental sensor supply |
| 5 | $VSS_{INC}$ | Ground for incremental sensor supply |



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| X17 | Hall | |
|---|---|---|
| 1 | H1 | Hall input 1 |
| 2 | H2 | Hall input 2 |
| 3 | H3 | Hall input 3 |
| 4 | $VDD_{HALL}$ | 5V output voltage for Hall supply |
| 5 | $VSS_{HALL}$ | Ground for Hall supply |

| X18 | Brake,Temperatur | |
|---|---|---|
| 1 | DOUT0-BR | Digital output 0 / parking brake |
| 2 | $VSS_{BR}$ | Ground for Digital output 0 / parking brake |
| 3 | MT | External motor temperature input (KTY84-130, PT1000) |
| 4 | $VSS_{MT}$ | Ground for external motor temperature (KTY84-130, PT1000) |

| X19 | EtherCAT | |
|---|---|---|
| 1 | TX+ | EtherCAT Transmit + |
| 2 | TX- | EtherCAT Transmit - |
| 3 | RX+ | EtherCAT Receive + |
| 4 | VG1 | Virtual Ground Connection via 75R (Unused RJ45 Pins) |
| 5 | VG1 | Virtual Ground Connection via 75R (Unused RJ45 Pins) |
| 6 | RX- | EtherCAT Receive - |
| 7 | VG2 | Virtual Ground Connection via 75R (Unused RJ45 Pins) |
| 8 | VG2 | Virtual Ground Connection via 75R (Unused RJ45 Pins) |

| X20 | EtherCAT | |
|---|---|---|
| 1 | TX+ | EtherCAT Transmit + |
| 2 | TX- | EtherCAT Transmit - |
| 3 | RX+ | EtherCAT Receive + |
| 4 | VG1 | Virtual Ground Connection via 75R (Unused RJ45 Pins) |
| 5 | VG1 | Virtual Ground Connection via 75R (Unused RJ45 Pins) |
| 6 | RX- | EtherCAT Receive - |
| 7 | VG2 | Virtual Ground Connection via 75R (Unused RJ45 Pins) |
| 8 | VG2 | Virtual Ground Connection via 75R (Unused RJ45 Pins) |



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