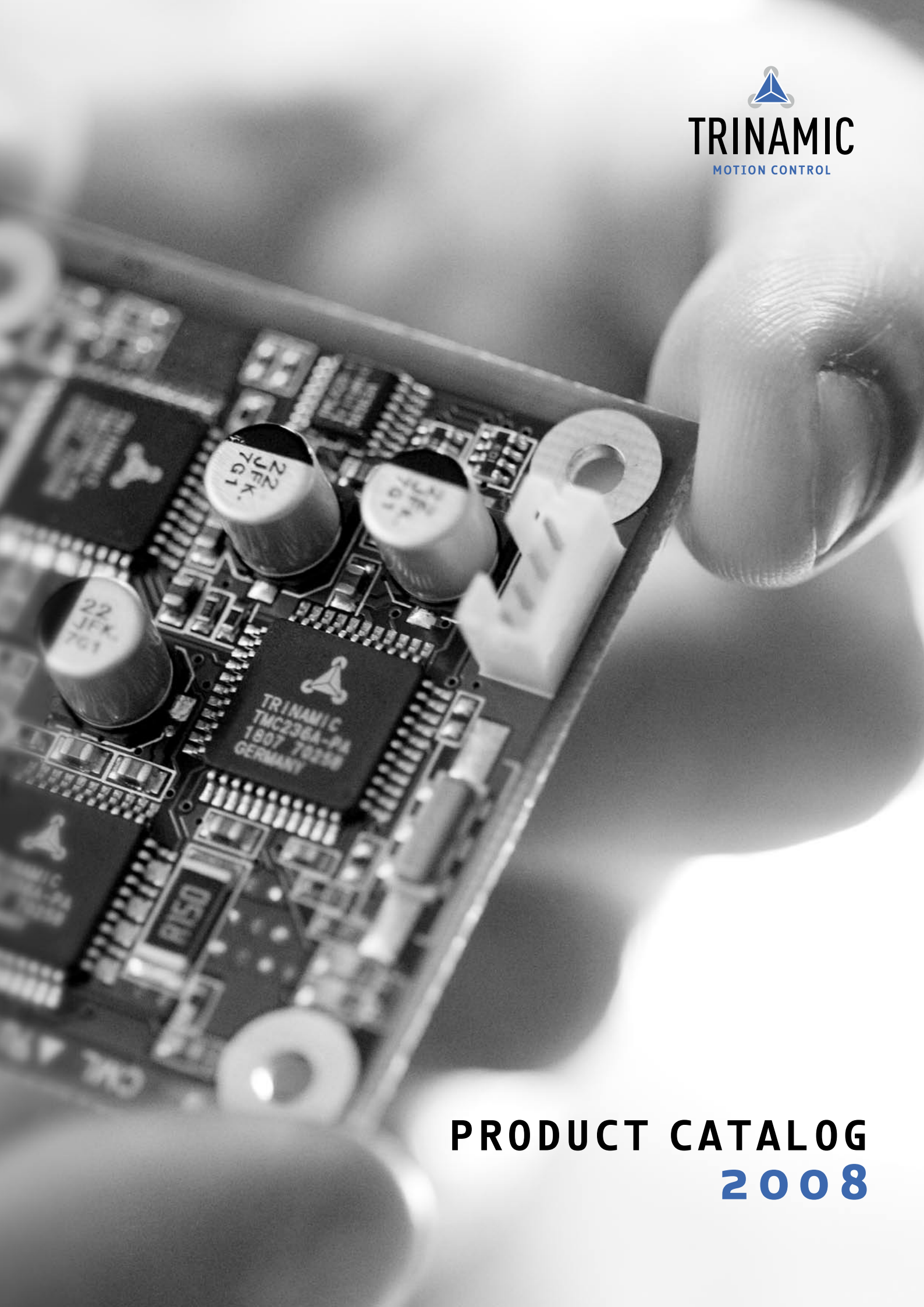

PRODUCT CATALOG
2008

TRINAMIC

PRODUCT CATALOG 2008

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TRADEMARKS

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Motion Controller

Interface Controller

High Precision Sequencer for Stepper Motors

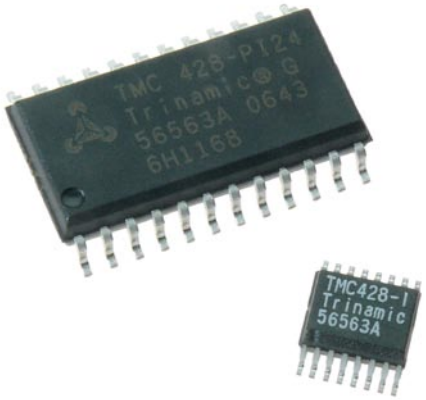
Power Driver for Stepper Motors

Gatedriver for BLDC and Stepper Motors

MOSFETs

Integrated Motion Controller and Driver for Stepper Motors

Evaluation Boards



TMC428

**Three Axis
Stepper Motor Controller
with Integrated Sequencer**

INFO The TMC428 is a revolutionary miniaturized low cost and high performance stepper motor controller for up to three motors. It integrates all real time critical tasks in reliable, dedicated hardware: An integrated motion ramp profile generator as well as an adaptable microstep sequencer with microstep RAM table. Advanced stop- and reference switch handling allows for precise and fast referencing as well as on-the-fly position checking. Automatic motor current control gives high motor dynamics while saving energy. The interrupt output can generate precise position pulses. The TMC428 directly connects to SPI™ drivers or to step-/direction drivers. A second SPI™ interface allows communication with a host microcontroller. The host microcontroller just needs to do high-level control tasks, e.g. giving the command: Drive motor 2 to position 1000. The TMC428 then automatically calculates the motion ramp based on velocity and acceleration parameters. The TMC423 adds encoder functionality to the TMC428. Evaluation Boards, application notes, spreadsheets for parameter calculation, C code examples and schematics are available in order to support short design-in times.

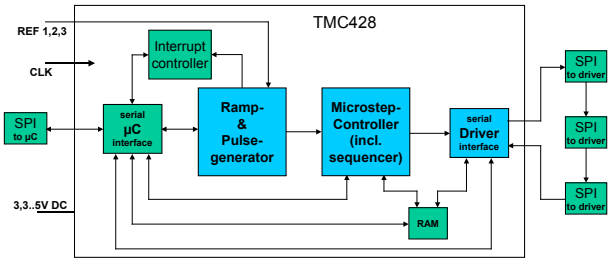
MAIN CHARACTERISTICS

- unique minaturized stepper motor controller realized as low power 0.35µ CMOS device
- up to three stepper motors
- up to 64 times microstepping
- full step frequencies up to 20 kHz
- alteration of parameters at any time
- driver status information read back for µC
- power down mode
- ideally suited motor drivers are TMC236, TMC239, TMC246 and TMC249

INTERFACE
- SPI™ µC interface
- easy-to-use protocol for µC
- serial 4-wire driver interface (SPI™)
- step-/direction output

ELECTRICAL DATA
- 3.3V or 5V operation
- CMOS / TTL compatible IOs

PACKAGE
- miniature SSOP16 package
- SO24 package available
- RoHS compliant



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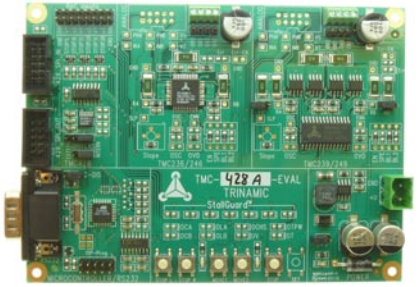


ORDER CODE	DESCRIPTION
TMC428-I	3-axis controller SSOP16-package
TMC428-PI24	3-axis controller SOP24-package
TMC428A-EVAL	Evaluation board for TMC428, TMC246 and TMC249 with stallGuard™

TMC454

Stepper Motor Controller with Integrated Sequencer and Encoder Inf.

INFO

The TMC454 is a high-end motion controller for all common 2-, 3-, and 5-phase stepper motors. It provides encoder feedback for high reliability or high position resolution drives. A large set of motion control features is included on this IC. The various function blocks are hardwired and „ready-to-use". All processes can be serialized using the instruction based interface. A complete linear & S-shaped ramp generation unit is integrated within the TMC454. All dynamic parameters can be adjusted for a given application in a very broad range. The CPU is relieved from all time critical tasks like ramp calculation or microstep generation. Thus CPU and software engineer can focus on higher level motion control jobs. In many applications, the TMC454 reduces the time time-to-market, and it saves costs for software development and hardware engineering. The TMC454 turns stepper motors into easy to use peripherals!

The TMC454 is upwards function compatible to its predecessor TMC453.

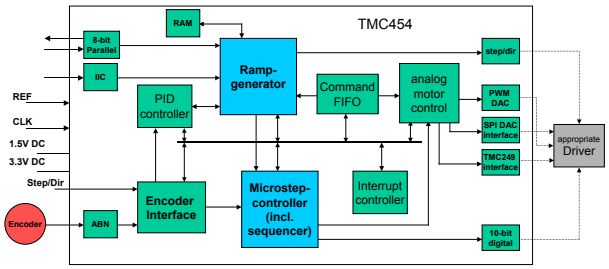
MAIN CHARACTERISTICS

- upwards function and software compatible to TMC453
- controls 2-, 3-, and 5-phase stepper motors
- full step, half step, sine-step
- relieves CPU from all time critical tasks
- incremental encoder interface
- pulse generation from mHz to MHz
- S-shaped and linear ramp generation
- PID controller for holding the position
- synchronization of multiple TMC454
- direct SPI interface for TMC246/TMC249 stepper driver IC family
- high resolution microstep drive using external SPI DACs
- interrupt controller

ELECTRICAL DATA
- 3.3V / 1.5V supply

INTERFACE
- parallel interface (3.3V), with additional control output for optional 5V level shifter
- serial IIC bus interface

PACKAGE
- FBGA144 (1 mm fine pitch, 11 mm * 11 mm)
- RoHS compliant



ORDER CODE	DESCRIPTION
TMC454-BC	1-axis motion controller with encoder feedback

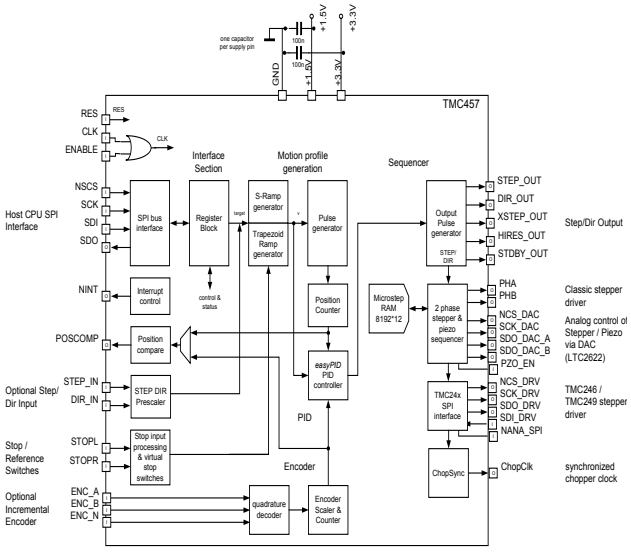
TMC457

Stepper and Piezo Motor Controller (S-shape Ramps) with Encoder Interface, easyPID™ Feedback Control and Integrated Sequencer

INFO The TMC457 is a high-end single axis micro stepping motion controller for 2-phase bipolar stepper motors, piezo motors (Piezo LEGS®). Via step / direction interface 3-phase stepper motors can also be controlled (requires additional TMC332). It adds to any microcontroller or processor with SPI interface. It is intended for applications, where a precise and fast, jerk-free motion profile is desired. The TMC457 supports linear and S-shaped velocity ramps. It's chopSync™ feature allows high speed movement avoiding resonances.

An encoder can be added for extremely quick and precise positioning using the internal hardware PID regulator easyPID™ and for increased reliability / fault detection.

For maximum flexibility all motion control parameters (target position, target velocity, acceleration, deceleration and bow) can be changed on-the-fly at any time during motion.



MAIN CHARACTERISTICS

- S-shaped and linear ramps with on-the-fly alteration of all parameters
- programmable high resolution sequencer with (12bit, 8192 entry) micro step LUT table
- integrated sequencer
- incr. encoder interface with flexible up- and down scaling to match drive resolution
- fast and stable easyPID™ PID controller
- 32 bit registers "from mHz to MHz"
- reference switch processing
- virtual stop sw. (programmable soft limits)
- position pulse output to trigger ext. events
- synchronization of multiple axis via step/direction input
- integrated chopSync™ for high velocities
- analog high resolution motor driver control via external dual -low cost- 12 bit DAC
- energy saving by automatic load angle dependent current control

ELECTRICAL DATA
- 3.3V IO/ 1.5V core

INTERFACE
- SPI interface to microcontroller
- step / direction output (with progr. timing)
- stallGuard™ interface for TMC246/TMC249 family stepper motor drivers

PACKAGE
- FBGA144 package 13 x 13 mm²
- RoHS compliant

ORDER CODE	DESCRIPTION
TMC457-BC	1-axis motion controller with encoder feedback, FBGA144 package
Related product:	
TMC457-Eval	Evaluation board for TMC457

TMC401

Step / Direction to SPI converter

INFO

The TMC401 converts step/direction signals into SPI datagrams that can be used to drive a TMC236, TMC239, TMC246 or TMC249 stepper motor driver chip directly. It provides five different microstep resolutions (from 1/32 to 1/2) as well as two full step resolution modes. The stallGuard™ bits of a TMC246 or TMC249 motor driver are output on three pins, in order to allow an easy usage of the stallGuard™ feature. Also the overtemperature pre-warning bit is output on one extra pin (and can be used to shut off the driver when there is an overtemperature pre-warning condition).

The TMC401 also provides a feature that reduces the motor current to 25% when there have not been any step pulses for at least one second. This features can be enabled or disabled. Mixed Decay can also be enabled or disabled using a dedicated pin.

The evaluation board contains the TMC401 and different driver configurations of the TMC249 wit external MOSFETs.

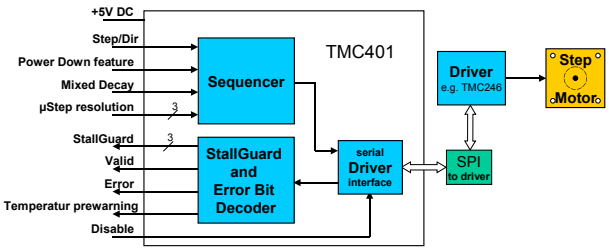
MAIN CHARACTERISTICS

- step / directon signal to SPI converter
- allow step-/direction control for TMC236, TMC246, TMC239, TMC249 drivers
- outputs for stallGuard™ value and driver OTPW flag
- resolution control from fullstep up to 1/32 microsteps
- optional power down control
- mixed decay selectable

INTERFACE
- step-/direction input up to 245kHz
- SPI output

ELECTRICAL DATA
- 5V supply
- 5V CMOS / TTL compatible IOs

PACKAGE
- TQFP32 package
- RoHS compliant



10 mm

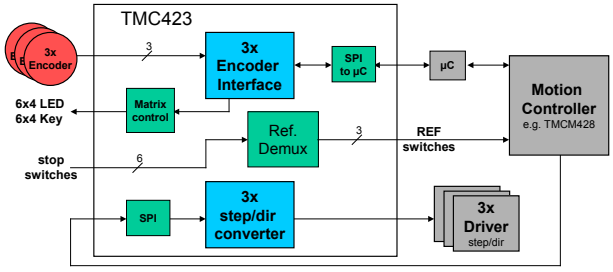
ORDER CODE	DESCRIPTION
TMC401-PI	Step / direction to SPI converter in TQFP-32 package
TMC32NPx-EVAL	Evaluation board for TMC401-PI, TMC249A-LA & TMC32NP-MLP, TMC249A-SA & TMC32NP2-SM8 and TMC249A-LA & TMC34NP-PSO

TMC423

Triple Incremental Encoder Interface and Companion IC for the TMC428

INFO The TMC423 is a triple incremental encoder input chip, which interfaces to any SPI™ compatible controller. It integrates 24 bit counters – one for each encoder – to provide a high position resolution without CPU interaction. The TMC423 is intended as a companion chip for the TMC428 but not limited to this. Both ICs together enable the realization of a motion control system of three axis with encoder feedback. This provides position verification or stabilization by implementation of some additional software. Further, the TMC423 allows dynamic resolution adaptation for direct comparison of encoder counters with motors using different micro step resolution.

All encoder counters can be latched synchronously, or whenever a null channel event occurs, providing a position on strobe holding function. The TMC423 also provides a step / direction output with programmable signal shaping for the TMC428 as well as a multiplexer function for the TMC428 reference switches. Additionally, the TMC423 can drive an LED matrix and read out a switch matrix, to support systems with keyboard user interaction.



MAIN CHARACTERISTICS

- incremental encoder interface for three 2 or 3 channel encoders
- TMC428 step / direction interface extension
- TMC428 reference switch interface
- TMC428 interrupt de-multiplexer
- control of LED 6 x 4 Matrix
- control of key 6 x 4 matrix

INTERFACE
- SPI interface to microcontroller

ELECTRICAL DATA
- 2.5V and 5V supply required
- 20mA LED driver outputs
- 5V CMOS / TTL compatible IOs

PACKAGE
- TQFP100
- RoHS compliant

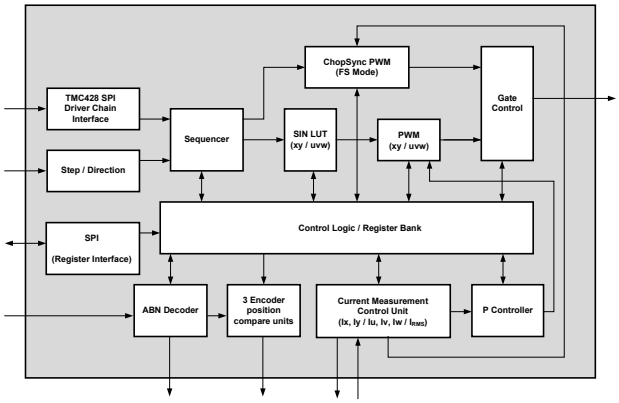
ORDER CODE	DESCRIPTION
TMC423	3-axis encoder interface TQFP100 package

TMC332

Microstep Sequencer for 2-phase and 3-phase Motors with Integrated PWM Units and Closed Loop Current Regulator

INFO

The TMC332 is a high precision micro step sequencer with integrated PWM units. Internal micro step counters with programmable step width make the handling of the physical units comfortable. The TMC428 step direction interface of the TMC332 is directly compatible to the driver chain interface of the TMC428 motion controller. The other step direction interface is a classical two wire step direction interface. Parameterizing of the TMC332 takes place over a common SPI micro controller interface.
The integrated sine wave look up table can output either 2 sine waves with a phase shift of 90° for 2-phase stepper motors or 3 sine waves with +/- 120° phase shift for 3-phase motors.
The gate control block of the TMC332 provides the gate control signals for the power stage half bridges, including programmable break before make timing and over current protection. Incremental encoders (ABN) to evaluate the physical motor position can be connected to the TMC332. The TMC332 also contains a current measurement unit and a current regulator, requiring only a few inexpensive external components. Switching to fullstep and the chopSync™ feature allow high velocity operation.



MAIN CHARACTERISTICS

- high precision micro step sequencer for smooth motion applications
- 2-phase stepper motor control
- 3-phase stepper motor control
- 9 bit PWM units, 8 bit PWM scaler
- 4 bit PWM sub-modulation for scaling quantization compensation
- PWM frequency programmable
- programmable break-before-make timing
- integrated current measurement ADC (just 2 LM339, 1 LM324 and some RC required)
- integrated current regulation
- manual or automatic microstep to fullstep switching for higher speeds
- chopSync™ for high velocity operation

ELECTRICAL DATA
- operation with 3.3V compatible IOs / 1.5V core voltage
- 16 MHz clock frequency

INTERFACE
- classical two wire step direction interface
- TMC428 driver chain step direction interface
- common SPI interface for parameterizing of TMC332 and TMC428

PACKAGE
- FBGA144 package 13 x 13 mm²
- RoHS compliant

ORDER CODE	DESCRIPTION
TMC332-BC	Micro step sequencer, FBGA144 package
Related product:	
TMC332-Eval	Evaluation board for TMC332

TMC236

Microstep Driver for up to 1.5A

INFO The TMC236 is a smart power microstepping driver for bipolar stepper motors. It provides an SPI™ interface as well as the classical analog/digital control. A full set of protection and diagnostic features makes this device very rugged. The integrated low-RDS-ON TrenchFET® power MOSFETs give an extremely high efficiency and allow driving of a high motor current of up to 1.5A per phase without cooling measures even at high environment temperatures.

The small footprint and high efficiency make the device a perfect solution for embedded motion control and even for battery powered designs.

The evaluation can be done with the TMC246, as the only difference is the additional stallGuard™ feature.

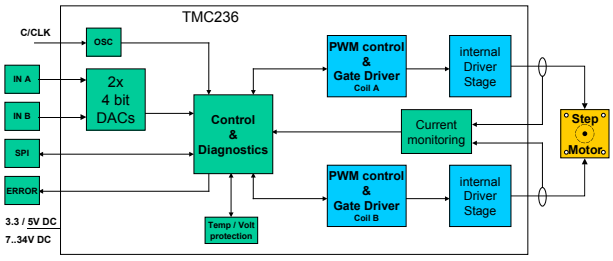
MAIN CHARACTERISTICS

- full protection and diagnostics
- low power dissipation
- 16 times microstepping via SPI, 64 times using additional shift register, even more via analog control
- mixed decay for smooth operation
- programmable slope control for low EME
- internal or external chopper clock
- standby and shutdown mode

INTERFACE
- easy-to-use SPI™ interface
- classical analog interface

ELECTRICAL DATA
- up to 1500 mA coil current (peak)
- 7V to 34V motor supply (TMC236A)
- 3.3V or 5V operation for digital part

PACKAGE
- standard PQFP-44 package
- RoHS compliant



10 mm

ORDER CODE	DESCRIPTION
TMC236A-PA	1.5A driver, PQFP-44
TMC428A-EVAL	Evaluation board for TMC428, TMC246A and TMC249A with stallGuard™

TMC246

Microstep Driver for up to 1.5A with stallGuard™

INFO

The TMC246 is a smart power microstepping driver for bipolar stepper motors. The integrated unique sensorless stall detection stallGuard™ makes it a good choice for applications where a reference point is needed, but where a switch cannot be used. The ability to predict an overload makes the TMC246 an optimum choice for drives, where a high reliability is desired. It provides an SPI™ interface as well as the classical analog / digital control. A full set of protection and diagnostic features makes this device very rugged. The integrated low-RDS-ON TrenchFET® power MOSFETs give an extremely high efficiency and allow driving of a high motor current of up to 1.5A per phase without cooling measures even at high environment temperatures.

The small footprint and high efficiency make the device a perfect solution for embedded motion control and even for battery powered designs.

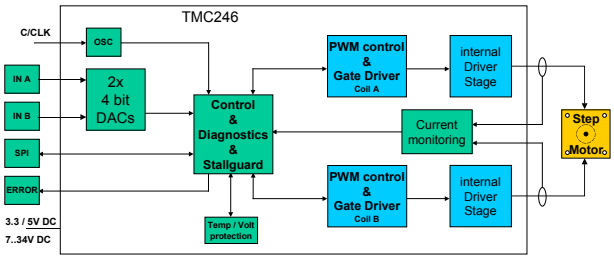
MAIN CHARACTERISTICS

- sensorless stall detection StallGuard™
- full protection and diagnostics
- low power dissipation
- 16 times microstepping via SPI, 64 times using additional shift register, even more via analog control
- mixed decay for smooth operation
- programmable slope control for low EME
- internal or external chopper clock
- standby and shutdown mode

INTERFACE
- easy-to-use SPI™ interface
- classical analog interface

ELECTRICAL DATA
- up to 1500 mA coil current (peak)
- 7V to 34V motor supply (TMC246A)
- 3.3V or 5V operation for digital part

PACKAGE
- standard PQFP-44 package
- RoHS compliant



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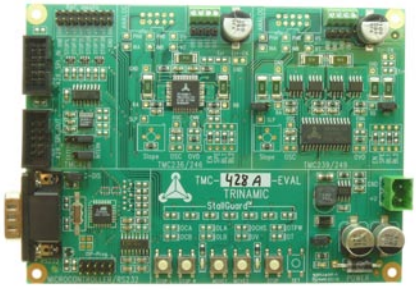
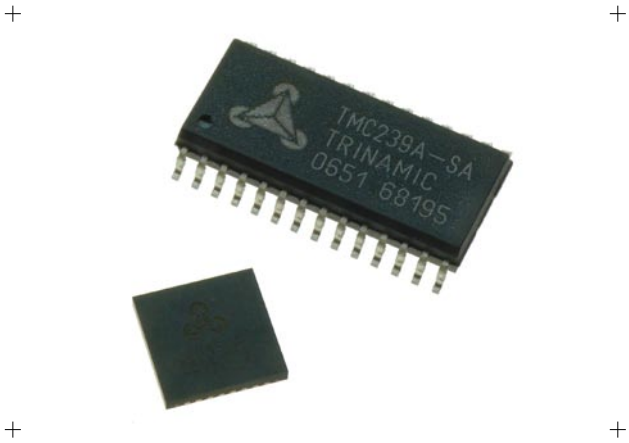


ORDER CODE	DESCRIPTION
TMC246A-PA	1.5A driver with stallGuard™, PQFP-44
TMC428A-EVAL	Evaluation board for TMC428, TMC246A and TMC249A with stallGuard™



TMC239

**Microstep Driver
for External MOSFETs
for up to 4A**

INFO

The TMC239 is a smart high current microstepping driver for bipolar stepper motors. It provides an SPI™ interface as well as the classical analog / digital control. A full set of protection and diagnostic features makes this device very rugged. It directly drives external MOSFETs for currents of up to 4A. (A list of compatible power MOSFETs is given within the datasheet.) This way it reaches an extremely high efficiency and allows driving of a high motor current without cooling measures even at high environment temperatures. With the new chip-scale QFN package a 4A motor driver can be realized on the size of a stamp!

The high motor current makes this device ideal for miniaturized highly dynamic and high torque drive systems.

The evaluation can be done with the TMC249 as the only difference is the additional stallGuard™ feature.

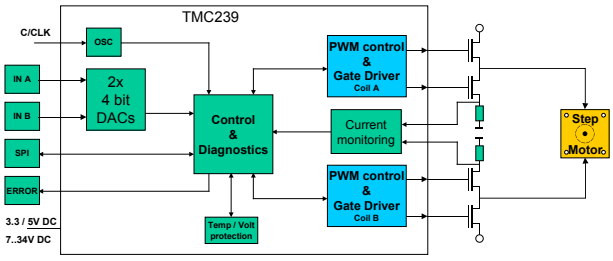
MAIN CHARACTERISTICS

- full protection and diagnostics
- low power dissipation
- 16 times microstepping via SPI, 64 times using additional shift register, even more via analog control
- mixed decay for smooth operation
- programmable slope control for low EME
- internal or external chopper clock
- standby and shutdown mode

INTERFACE
- easy-to-use SPI™ interface
- classical analog interface

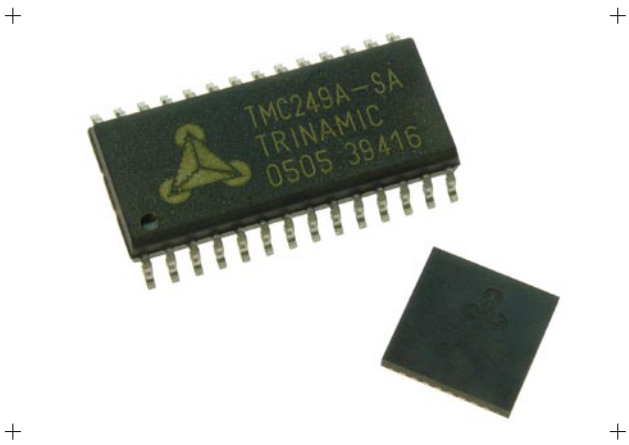
ELECTRICAL DATA
- up to 4000 mA coil current (peak) with just 4 external dual MOSFETS
- 7V to 34V motor supply (TMC239A), up to 60V using a few add. components
- higher current / voltage using additional gate drivers
- 3.3V or 5V operation for digital part

PACKAGE
- standard SO28 package
- chip size QFN32 package
- RoHS compliant



10 mm

ORDER CODE	DESCRIPTION
TMC239A-SA	4A driver for external MOSFETs, SO28
TMC239A-LA	4A driver for external MOSFETs, QFN32
Related product:	TMC32NP, TMC32NP2, TMC34NP
TMC428A-EVAL	Evaluation board for TMC428, TMC246A and TMC249A with stallGuard™



TMC249

**Microstep Driver
for External MOSFETs
for up to 4A
with stallGuard™**

INFO

The TMC249 is a smart high current microstepping driver for bipolar stepper motors. The integrated unique sensorless stall detection stallGuard™ makes it a good choice for applications where a reference point is needed, but where a switch cannot be used. The ability to predict an overload makes the TMC249 an optimum choice for drives where a high reliability is desired. It provides an SPI™ interface as well as the classical analog/ digital control. A full set of protection and diagnostic features makes this device very rugged. It directly drives external MOSFETs for currents of up to 4A. (A list of compatible power MOSFETs is given within the datasheet.) This way it reaches an extremely high efficiency and allows driving of a high motor current without cooling measures even at high environment temperatures. With the new chip-scale QFN package a 4A motor driver can be realized on the size of a stamp!

The high motor current makes this device ideal for miniaturized highly dynamic and high torque drive systems.

MAIN CHARACTERISTICS

- sensorless stall detection StallGuard™
- full protection and diagnostics
- low power dissipation
- 16 times microstepping via SPI, 64 times using additional shift register, even more via analog control
- mixed decay for smooth operation
- programmable slope control for low EME
- internal or external chopper clock
- standby and shutdown mode

INTERFACE

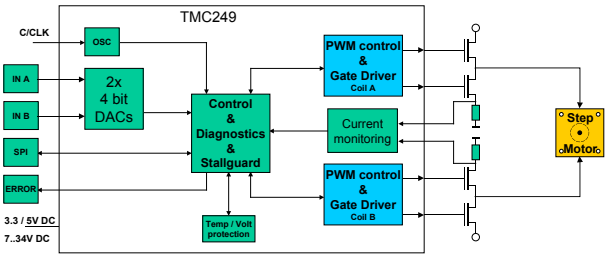
- easy-to-use SPI™ interface
- classical analog interface

ELECTRICAL DATA

- up to 4000 mA coil current (peak) with just 4 external dual MOSFETS
- 7V to 34V motor supply (TMC249A), up to 60V using a few add. components
- higher current / voltage using additional gate drivers
- 3.3V or 5V operation for digital part

PACKAGE

- standard SO28 package
- chip size QFN32 7x7 mm² package
- RoHS compliant



10 mm

ORDER CODE	DESCRIPTION
TMC249A-SA	4A driver with stallGuard™ for external MOSFETs, SO28
TMC249A-LA	4A driver with stallGuard™ for external MOSFETs, QFN32
Related product:	TMC32NP, TMC32NP2, TMC34NP
TMC428A-EVAL	Evaluation board for TMC428, TMC246A and TMC249A with stallGuard™

TMC603

Three Phase Motor Driver with BLDC Back EMF Commutation hallFX™ and Current Sensing

INFO The TMC603 is a three phase BLDC motor driver IC for highly compact and energy efficient drive solutions. Control algorithms previously only found in much more complex servo drives can now be realized with a minimum of external components. The TMC603 directly drives 6 external N-channel MOSFETs for motor currents up to 20A and up to 50V. It integrates current measurement without the need for high current sense resistors, and the sensorless commutation circuitry hallFX™. Its integrated support for sine commutation as well as for back EMF sensing and commutation saves cost and allows for maximum drive efficiency. Depending on the desired commutation scheme and the bus interface requirements, the TMC603 forms a complete motor driver system in combination with an external 8 bit processor or with a more powerful 32 bit processor. Protection and diagnostic features as well as a step down switching regulator further reduce system cost and increase reliability.

The TMC603 also supports control of three phase stepper motors as well as two phase stepper motors using two devices.

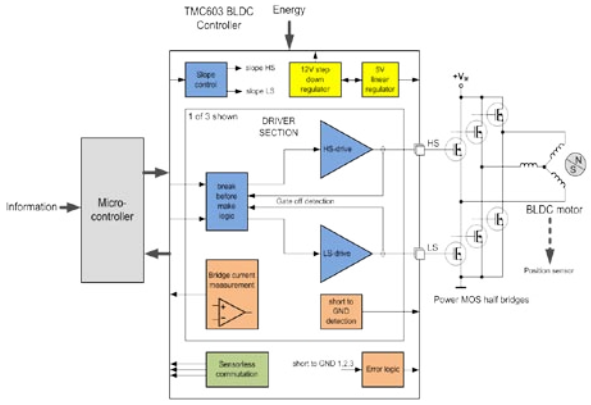
MAIN CHARACTERISTICS

- low power dissipation
- integrated phase current measurement via R_{DSon} of power MOSFETs
- sensorless back EMF commutation hallFX™ (hall sensor like signals - phase shift free)
- integrated break-before-make logic: no special microcontroller PWM hardware required
- integrated overcurrent / short to GND and undervoltage protection and diagnostics
- integrated step down switching regulator up to 500mA / 300kHz

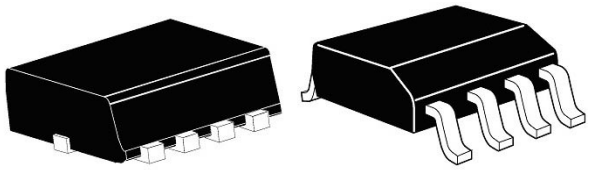
ELECTRICAL DATA
- up to 20A motor current
- 9V to 50V operating voltage
- EMV optimized current controlled gate drivers - up to 150mA
- internal Q_{GD} protection: Supports latest generation of power MOSFETs

INTERFACE
- 3.3V or 5V interface

PACKAGE
- QFN52 package 8 x 8 mm²
- RoHS compliant



ORDER CODE	DESCRIPTION
TMC603-LA	Driver for external 20A MOSFETs, QFN52 package
Related product:	
TMC603-Eval	Evaluation board for TMC603



TMC32NP-MLP
TMC32NP2-SM8

Complementary 30V MOSFET
Half Bridge / Full Bridge

INFO

The TMC32NP-MLP is a miniature N & P channel MOSFET complementary pair, ideally suited for motor drive applications. It perfectly complements the TMC239A-LA / TMC249A-LA stepper motor drivers, in order to build a 2A (4 devices) / 4A (8 devices) stepper motor driver the size of a stamp.

The TMC32NP2-SM8 is a miniature N & P channel MOSFET full bridge, ideally suited for motor drive applications. It perfectly complements the TMC239A-SA / TMC249A-SA stepper motor drivers, in order to build a 1.5A / 2.5A peak current capability (5 seconds) stepper motor driver on a two layer PCB. Using just one small fullbridge, a DC motor can be operated in four quadrant mode.

The evaluation board has different stepper driver MOSFET configurations and allows SPI control via a TMC428A-EVAL board as well as step / direction control using a TMC401.

MAIN CHARACTERISTICS

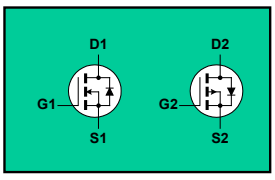
ELECTRICAL DATA N TYPE
- 0.12 Ω RDSon max. @ VGS= 10V
  0.18 Ω RDSon max. @ VGS= 4.5V
- ID= 2.9A max. cont. current (MLP)
  ID= 2.7A max. cont. current (SM8)
- 30V VBRDSS max.

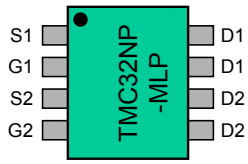
ELECTRICAL DATA N TYPE
- 0.21 Ω RDSon max. @ VGS= -10V
  0.33 Ω RDSon max. @ VGS= -4.5V
- ID= -2.1A max. cont. current (MLP)
  ID= -2.0A max. cont. current (SM8)
- -30V VBRDSS max.

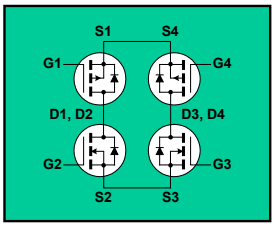
HIGHLIGHTS
- extremly compact package
- low on resistance
- low gate charge

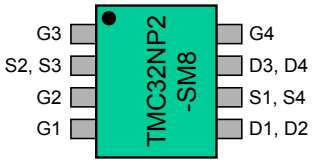
APPLICATIONS
- stepper motor drives
- DC motor drives

PACKAGE
- chip size 2x3 mm² dual die package MLP
- 8 pin SOT223 6.7x7 mm² package SM8
- RoHS compliant







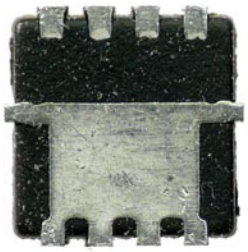


10 mm

ORDER CODE	DESCRIPTION
TMC32NP-MLP	Complementary 30V MOSFET half bridge (MLP package)
TMC32NP2-MLP	Complementary 30V MOSFET full bridge (SM8 package)
Related product:	*These devices ideally complement the TMC239 & TMC249*
TMC32NPx-EVAL	Evaluation board for TMC401-PI, TMC249A-LA & TMC32NP-MLP, TMC249A-SA & TMC32NP2-SM8 and TMC249A-LA & TMC34NP-PSO

TMC34NP-PSO

Complementary 30V MOSFET
Half Bridge / Full Bridge



INFO

The TMC34NP-PSO is a miniature N & P channel MOSFET complementary pair, ideally suited for motor drive applications.
It perfectly complements the TMC239A-LA / TMC249A-LA stepper motor drivers, in order to build a 4A stepper motor driver the size of a stamp.

The evaluation board has different stepper driver MOSFET configurations and allows SPI control via a TMC428A-EVAL board as well as step / direction control using a TMC401.

MAIN CHARACTERISTICS

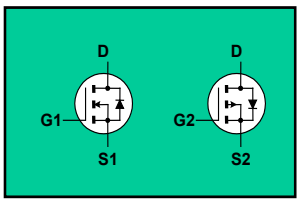
ELECTRICAL DATA N TYPE
- 35mΩ R_{DS}on max. @ V_{GS}= 10V
  50mΩ R_{DS}on max. @ V_{GS}= 4.5V
- I_D= 7.7A max. cont. current
- 30V V_{BRDSS} max.

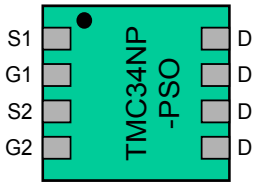
ELECTRICAL DATA P TYPE
- 51mΩ R_{DS}on max. @ V_{GS}= -10V
  75mΩ R_{DS}on max. @ V_{GS}= -6V
- I_D= -6.4A max. cont. current
- -30V V_{BRDSS} max.

HIGHLIGHTS
- extremly compact package with good thermal properties
- low on resistance
- low gate charge

APPLICATIONS
- stepper motor drives
- DC motor drives

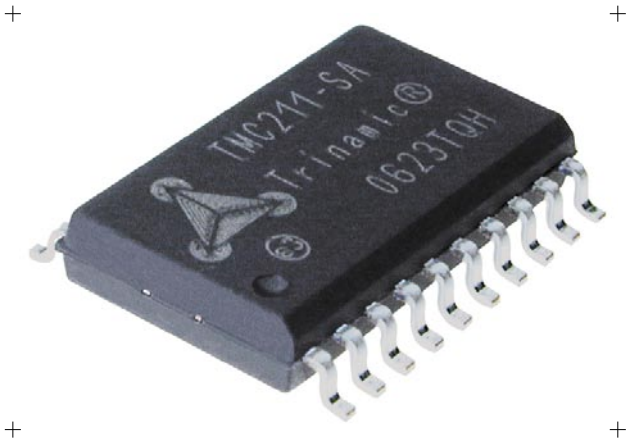
PACKAGE
- 3.3 x 3.3 mm² dual die SMT package PPAK 1212
- RoHS compliant





10 mm

ORDER CODE	DESCRIPTION
TMC34NP-PSO	complementary 30V MOSFET half bridge (PPAK1212 package)
Related product:	*These devices ideally complement the TMC239 & TMC249*
TMC32NPx-EVAL	Evaluation board for TMC401-PI, TMC249A-LA & TMC32NP-MLP, TMC249A-SA & TMC32NP2-SM8 and TMC249A-LA & TMC34NP-PSO



TMC211

**Microstep
Controller / Driver
for up to 0.8A
with LIN Interface**

INFO The TMC211 is a single chip microstepping motor driver and motion controller with integrated sequencer, bipolar stepper motor driver and LIN slave interface. It is specially intended for de-centralized mechatronic functions. A user-programmable OTP memory is integrated to store motor parameters and configuration settings. The TMC211 allows up to four bit of micro stepping and is capable of driving a phase current of up to 800 mA peak. After initialization, it performs all time critical tasks autonomously based on target positions and velocity parameters. Together with an inexpensive microcontroller the TMC211 forms a complete motion control system.

For using the evaluation board together with the PC software a USB-2-X interface is needed.

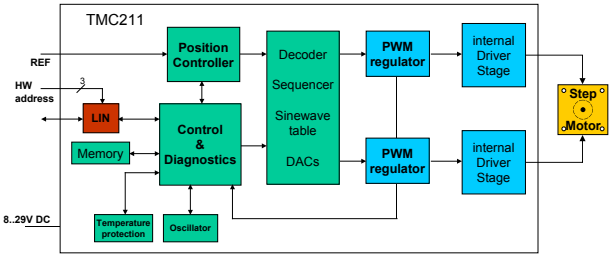
MAIN CHARACTERISTICS

- build-in ramp generator for autonomous positioning
- programmable speed and acceleration
- on-the-fly alteration of target position
- up to 16 times microstepping
- reference switch input read out
- full protection and diagnostics
- automatic fast decay and slow decay
- low power stand-by mode

INTERFACE
- physical and data link layers conform to LIN rev. 1.2
- field programmable node addresses

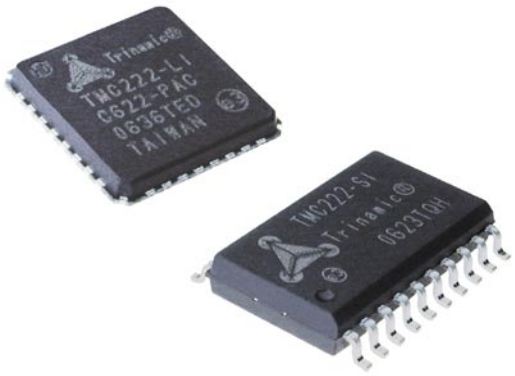
ELECTRICAL DATA
- up to 800 mA coil current (peak)
- supply voltage 8V to 29V

PACKAGE
- standard SO20 package
- RoHS compliant



10 mm

ORDER CODE	DESCRIPTION
TMC211-SA	Stepper IC with LIN in SO20 package
TMC211-EvalBoard	Evaluation board for TMC211
Related product:	USB-2-X V2 interface converter, TMCM-Motor



TMC222

Microstep Controller / Driver for up to 0.8A with IIC Interface

INFO The TMC222 is a single chip micro stepping motor driver and motion controller with integrated sequencer, bipolar stepper motor driver and two wire serial slave interface (IIC). It is specially intended for de-centralized mechatronic functions. A user-programmable OTP memory is integrated to store motor parameters and configuration settings. The TMC222 allows up to four bit of micro stepping and is capable of driving a phase current of up to 800 mA peak. After initialization, it performs all time critical tasks autonomously based on target positions and velocity parameters. Together with an inexpensive microcontroller the TMC222 forms a complete motion control system.

For using the evaluation board together with the PC software a USB-2-X interface is needed.

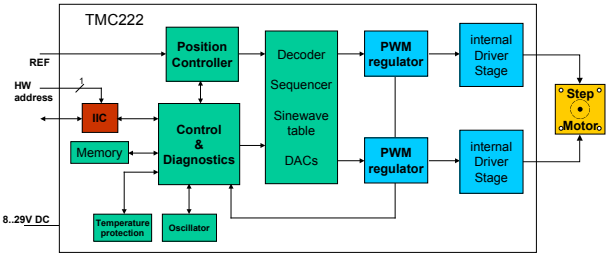
MAIN CHARACTERISTICS

- build-in ramp generator for autonomous positioning
- programmable speed and acceleration
- on-the-fly alteration of target position
- up to 16 times microstepping
- reference switch input read out
- full protection and diagnostics
- automatic fast decay and slow decay
- low power stand-by mode

INTERFACE
- two wire serial interface (IIC bus)
- field programmable node addresses (32)

ELECTRICAL DATA
- up to 800 mA coil current (peak)
- supply voltage 8V to 29V

PACKAGE
- standard SO20 package
- chip size QFN32 7x7 mm² package
- RoHS compliant



10 mm

ORDER CODE	DESCRIPTION
TMC222-SI	Stepper IC with I2C in SO20 package
TMC222-LI	Stepper IC with I2C in QFN32 package
TMC222-EvalBoard	Evaluation board for TMC222
Related product:	USB-2-X V2 interface converter, TMCM-Motor

TMC223

Microstep Controller / Driver for up to 0.8A with IIC Interface and Stall Detection

INFO The TMC223 is a single chip micro stepping motor driver and motion controller with integrated sequencer, bipolar stepper motor driver and two wire serial slave interface (IIC). It is compatible to the TMC222, but features an additonal sensorless stall detection, eliminating the need for mechanical reference switches. The TMC223 is specially intended for de-centralized mechatronic functions. A user-programmable OTP memory is integrated to store motor parameters and configuration settings. The TMC223 allows up to four bit of micro stepping and is capable of driving a phase current of up to 800 mA peak. After initialization, it performs all time critical tasks autonomously based on target positions and velocity parameters. Together with an inexpensive microcontroller the TMC223 forms a complete motion control system.

For using the evaluation board together with the PC software a USB-2-X interface is needed.

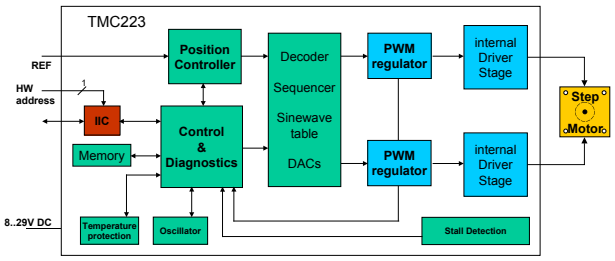
MAIN CHARACTERISTICS

- sensorless stall detection
- build-in ramp generator for autonomous positioning
- programmable speed and acceleration
- on-the-fly alteration of target position
- up to 16 times microstepping
- reference switch input read out
- full protection and diagnostics
- automatic fast decay and slow decay
- low power stand-by mode

INTERFACE
- two wire serial interface (IIC bus)
- field programmable node addresses (32)

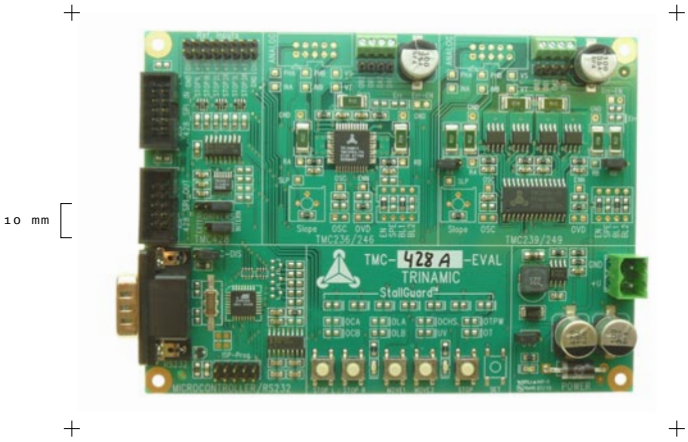
ELECTRICAL DATA
- up to 800 mA coil current (peak)
- supply voltage 8V to 29V

PACKAGE
- standard SO20 package
- chip size QFN32 7x7 mm² package
- RoHS compliant



10 mm

ORDER CODE	DESCRIPTION
TMC223-SI	Stepper IC with LIN in SO20 package
TMC223-LI	Stepper IC with I2C in QFN32 package
TMC223-EVAL	Evaluation board for TMC223
Related product:	USB-2-X V2 interface converter, TMCM-Motor



TMC428A-EVAL

Evaluation Board with TMC428, TMC246A & TMC249A and stallGuard™

INFO

The TMC428A evaluation board allows you to explore all functions of the TMC428 and to develop your TMC428 applications. It is equipped with the TMC246A and TMC249A motor drivers for high performance motor control. You will learn everything about the usage and features of the chipset and get the possibility to explore your motion control application and to optimize its parameters. The evaluation board comes with a PC software which gives you access to every bit of the TMC428.

The TMC428A-Eval is a complete „plug and play" solution, additionally only a PC, a motor and a power supply are required!

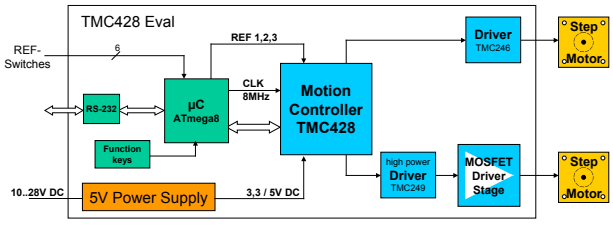
MAIN CHARACTERISTICS

ELECTRICAL DATA
- motor coil current 1A RMS (TMC246) and 1A / 2A RMS (TMC249)
- power supply 12V to 30V DC

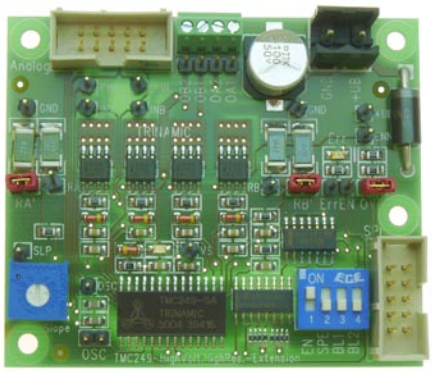
INTERFACE
- RS232 interface to PC
- user CPU board and / or user driver board can be attached via SPI

FEATURES
- PC control or stand alone operation
- all parameters can be displayed on the PC and modified interactively
- test specific motion profiles
- microstep curve can be optimized to match your motor parameters
- allows to use integrated or external reference switches
- driver ICs: Trinamic TMC246 and TMC249
- allows to evaluate stallGuard™
- allows to evaluate all driver specific settings

OTHER
- RoHS compliant



ORDER CODE	DESCRIPTION
TMC428A-EVAL	Evaluation board for TMC428, TMC246A and TMC249A with stallGuard™
TMCM-MOTOR	Testmotor with 42 mm flange and about 1A maximum coil current



TMC249-HVHR

Evaluation Board for TMC249 with High Voltage and High Resolution

INFO The TMC249-HVHR is an add on-board for the TMC428A-EVAL, which demonstrates operation of the TMC249 with an increased voltage of up to 45V and add-on circuitry for 64 microsteps.

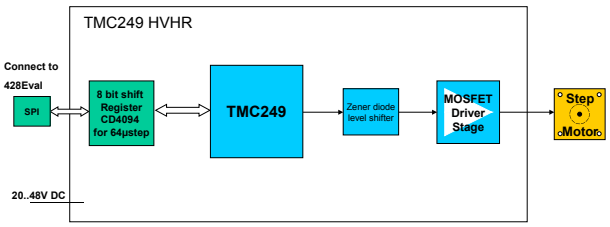
MAIN CHARACTERISTICS

FEATURES
- 64 times microstepping via SPI
- sensorless stall detection stallGuard™

INTERFACE
- SPI and analog signals on connectors

ELECTRICAL DATA
- 0.7A / 1.4A RMS coil current
- 20V to 45V motor supply voltage
- 3.3V or 5V operation for digital part
- power supply 12V to 30V DC

OTHER
- RoHS compliant



ORDER CODE	DESCRIPTION
TMC249-HVHR	High voltage / high resolution evaluation board for TMC249 as an add-on for TMC428A-EVAL (incl. 10 pin cable)

Modules for stepper motors

Stand alone operation (screw terminal connectors or similar)

Motor mountable

For mounting on base board

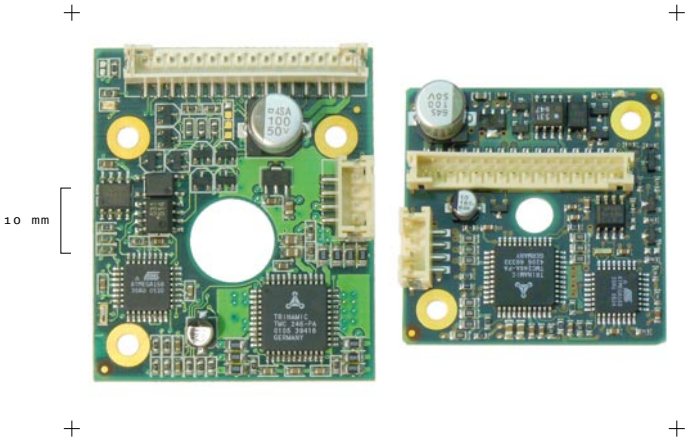
Modules for BLDC motors

Modules for piezo motors

Baseboards for modules

Accessoires for modules

Software for modules



TMCM-013-42

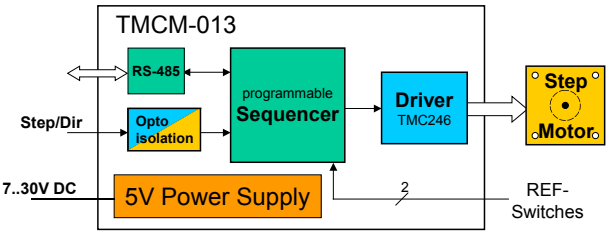
1-Axis
Motor Mounted
Step / Direction Driver
1.1A / 30V
with RS-485

INFO

The TMCM-013-42 is a step / direction stepper motor driver for integration directly on a 42 mm / NEMA-17 motor. The TMCM-013-LA supports 42 mm / NEMA-17 linear actuators. The parameters like motor current and µStep resolution can be changed easily using the RS-485 interface with an ASCII protocol (e.g. with Hyperterminal). Also the firmware of the module can be updated via the serial interface. All settings are stored in an internal EEPROM, so that no bus system is required in the application. The module is fully protected and comes with a stand-alone reference search feature, using the integrated reference switch input or stallGuard™.

The module can be used in step-/direction mode, remote controlled via a RS485 interface, or even as an option in a pseudo DC motor mode.

The possibility to adjust the micro step resolution delivers either very high accuracy or high speed.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 1.1A RMS coil current (1.5A peak)
- supply voltage 7V to 30V DC

SUPPORTED MOTORS
- two-phase bipolar motors with 0.3A to 1A coil current

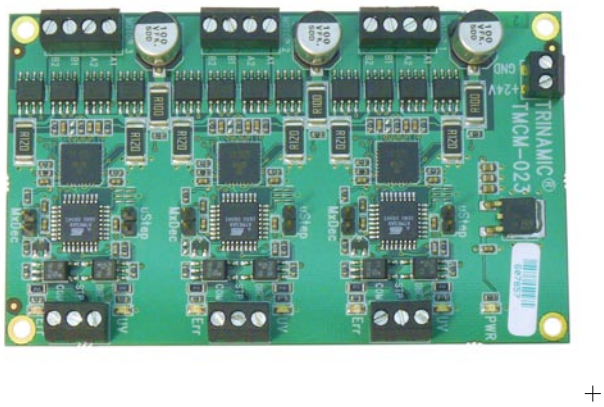
INTERFACE
- Step / Direction input (5 – 24V signal) with up to 350kHz microstep frequency
- driver disable input
- RS485 host interface (optional use / use for parameterization)
- local input for reference switches

FEATURES
- optically isolated inputs for Step, Direction and Disable
- up to 256 times adjustable microstep resolution
- adjustable standby current
- reference search and turn CW / CCW via RS485
- TRINAMIC driver technology: no heatsink required
- stallGuard™ for reference search full protection / diagnostics

SOFTWARE
- ASCII protocol controlled using simple terminal software

OTHER
- Piggy back for 42 mm (NEMA-17) motor or NEMA-17 linear actuator (axis protrudes through board)
- RoHS compliant

ORDER CODE	DESCRIPTION
TMCM-013-42	1-axis step / direction driver module 1.1A / 30V
TMCM-013-42-LA	1-axis step / direction driver module 1.1A / 30V for linear actuator
TMCM-013-CABLE	Cable loom



TMCM-023

3-Axis
Step / Direction Driver
2A / 28.5V

INFO

The TMCM-023 is a simple and very compact step / direction driver for 3 stepper motors. It allows motor control via step and direction signals and automatically goes into a stand by mode. The drivers are very efficient, so that no heatsink is required if operated in room temperature environment.

The module can be directly controlled by a PLC or by a step/direction controller module like the TMCM-302. All drivers operate completely independent.

Please request for different motor current, different microstep resolution or different step/direction control voltage.

MAIN CHARACTERISTICS

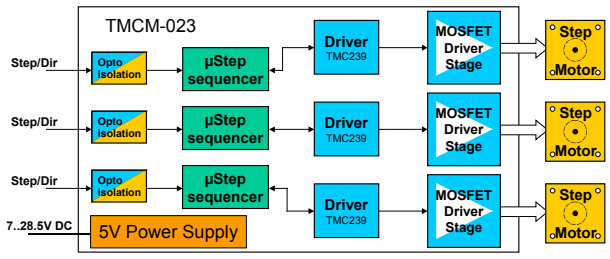
ELECTRICAL DATA
- 2.0A RMS coil current (2.8A peak)
- 7V to 28.5V DC supply voltage

SUPPORTED MOTORS
- two-phase bipolar motors with about 2A coil current (or sligthly more)

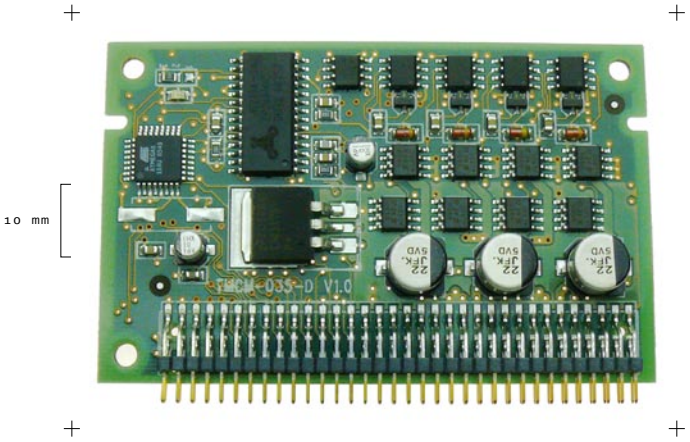
INTERFACE
- Step / Direction input (24V signal) (5V upon request)

FEATURES
- optically isolated inputs for Step and Direction
- 1/4 or 1/8 step resolution (selected by jumper) (1/16 upon request)
- up to 245kHz microstep frequency
- TRINAMIC driver technology: no heatsink required
- standby current reduction to 0.5A
- jumper for „mixed-decay" mode
- diagnostic LEDs signal failure status

OTHER
- RoHS compliant
- size: 60 x 100 mm²



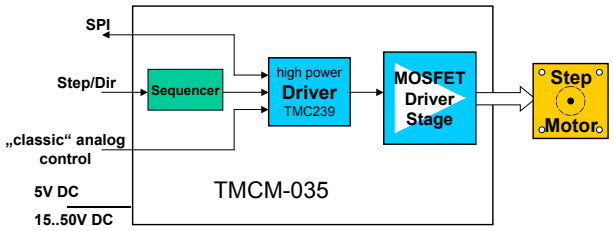
ORDER CODE	DESCRIPTION
TMCM-023	3-axis step / direction driver module 2A / 28.5V



TMCM-035

1-Axis
Step / Direction or SPI
Driver
3.5A / 48V

INFO The TMCM-035 is a compact motor driver module for highly dynamic or high-torque axis. It can be combined with the driver-less modules TMCM-301 or TMCM-302, or with any step / direction controller. Its small size and low power dissipation, together with the variety of three different control interfaces, make it an optimum solution for integration on any user board. The board can be connected to a baseboard or customized electronics with a pin connector. Applications are consumer and industrial controls, CNC power stages, lab automatization, robotics, pick- and place machines.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 3.5A RMS coil current (5A peak)
- 14V to 50V DC motor supply voltage
- 5V DC logic supply voltage

SUPPORTED MOTORS
- two-phase bipolar motors with 0.3A to 3.5A coil current

INTERFACE
- Step / Direction input (TTL/CMOS signal)
- SPI™ interface
- classical analog interface

FEATURES
- up to 64 times microstepping via SPI 8, 16, 32 or 64 microstep resolution via step / direction interface (32 and 64 microsteps with new version V2.0), high resolution via analog control
- motor current setting via internal and / or external resistors
- up to 245kHz microstep frequency
- TRINAMIC driver technology: No heatsink required
- StallGuard™ optional for SPI operation
- standby current reduction programmable
- "mixed-decay" mode for good microstep performance mode
- low EMC design for ease of use

OTHER
- 68 pin connector carries all signals
- RoHS compliant
- size: 80 x 50 mm² (credit card)

ORDER CODE	DESCRIPTION
TMCM-035/SG (-option)	1-axis driver 3.5A / 50V with StallGuard™ (V2.0)
Related products	*BB-035, BB-301, BB-301S, BB-100*
OPTIONS	
H	Horizontal pin connector (standard)
V	Vertical pin connector (on request)

10 mm

TMCM-078

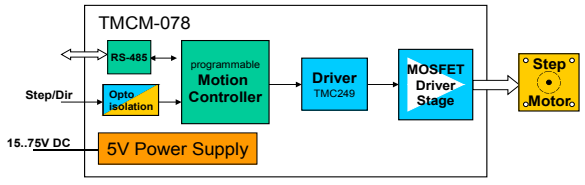
1-Axis
Step / Direction Driver
7A / 75V

INFO

The TMCM-078 is a high power single axis step / direction stepper motor driver. The TMCM-078 can be operated with supply voltages of up to 75V and up to 7A RMS (9.8A peak) motor coil currents. All major parameters can be set via DIP switches.

Up to 256 micro-steps are supported for either high accuracy or high speed. The system features sensorless stall detection (stallGuard™). The module is fully protected and comes with a stand-alone reference search feature. The housing is based on an aluminium plate which is used as a heatsink.

All inputs and outputs are accessible either via screw connectors or by high density (2 mm) JST connectors.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 7A RMS coil current (9.8A peak)
- supply voltage 15V to 75V DC

SUPPORTED MOTORS
- two-phase bipolar stepper motor with 0.7A to 7A RMS coil current

INTERFACE
- differential Step / Direction input
- driver disable input
- input for reference switches
- general purpose input / output

FEATURES
- optically isolated inputs for Step, Direction and Disable
- up to 256 micro-step resolution (adjustable)
- adjustable standby current
- stallGuard™ for reference search
- full protection / diagnostics
- RS485 host interface for optional use

OTHER
- pluggable screw terminal connectors for all signals with high density JST alternative
- robust aluminum housing
- RoHS compliant
- size: 145 x 96 x 33 mm

ORDER CODE	DESCRIPTION
TMCM-078	1-axis step / direction driver module 75V, 7A
Related products:	*USB-2-485*

10 mm

IDX 7505

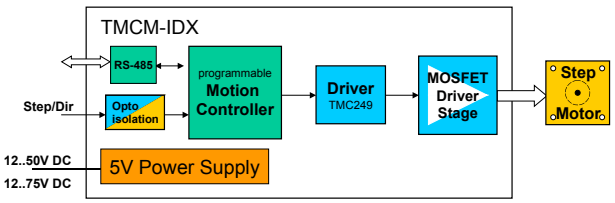
1-Axis
Step / Direction Driver
5A / 75V
with RS-485

INFO

The IDX 7505 is a small and rugged step-/ direction stepper motor driver system with a supply voltage of up to 75V and up to 5A RMS motor coil current (ratings for IDX 7505; standard IDX ratings are 3.5A and max. 50V). The parameters of the IDX like motor current and µStep resolution can be changed easily using the RS-485 interface with an ASCII protocol (e.g. with Hyperterminal). Also the firmware of the module can be updated via the serial interface. All settings are stored in an internal EEPROM, so that no bus system is required in the application.

The module is fully protected and comes with a stand-alone reference search feature, using the integrated reference switch input or stallGuard™.

The motor, switches and power supply can be connected easily with screw terminal connectors. The housing is based on an aluminium plate which is used as a heatsink.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 5A RMS coil current (7A peak)
- supply voltage 12V to 75V DC

SUPPORTED MOTORS
- two-phase bipolar motors with 0.7A to 5A coil current

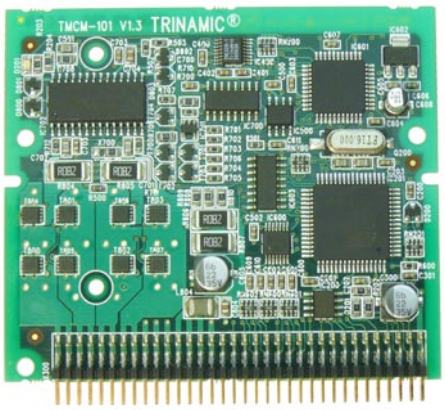
INTERFACE
- Step / Direction input (5 – 24V signal) with up to 350kHz microstep frequency
- driver disable input
- RS485 host interface (optional use / use for parameterization)
- local input for reference switches

FEATURES
- optically isolated inputs for Step, Direction and Disable
- up to 256 times adjustable microstep resolution
- adjustable standby current
- reference search and turn CW / CCW via RS485
- stallGuard™ for reference search
- full protection / diagnostics

SOFTWARE
- ASCII protocol controlled using simpleterminal software

OTHER
- Pluggable screw terminal connectors for all signals
- robust housing
- RoHS compliant
- size: 65 x 64 x 24 mm³

ORDER CODE	DESCRIPTION
TMC IDX 7505	1-axis step / direction driver 5A / 75V with RS-485
Related products:	*USB-2-485*



10 mm

TMCM-101

**1-Axis
Controller / Driver
3A / 28.5V
with Encoder Inf.**

INFO

The TMCM-101 is a single axis 2-phase stepper motor controller and driver module. The built in encoder feedback makes it an optimum solution for high-reliability drives. It provides a complete motion control solution at a very small size for embedded applications. The board can be connected to a baseboard or customized electronics with a pin connector. The TMCM-101 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" rapid and fast development of motion control applications is guaranteed. The TMCM-101 can be controlled via the serial UART interface (e.g. using a RS-232 or RS-485 level shifter) or via CAN. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation, are performed on board. The TMCL program can be stored in the on-board EEPROM for stand-alone operation. The firmware of the module can be updated via the serial interface. With the stallGuard™ feature it is possible to detect motor overload or motor stall. The TMCM-101 is compatible to the TMCM-series of credit card sized module, but has an increased height of 70 mm.

MAIN CHARACTERISTICS

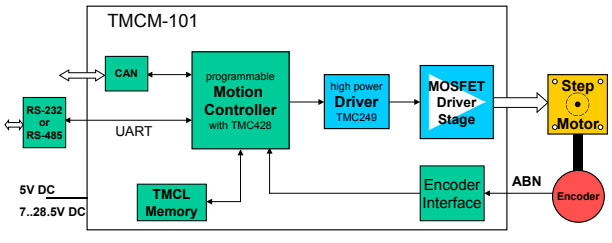
ELECTRICAL DATA
- up to 3A coil current RMS (4.2A peak)
- 7V to 28.5V motor supply voltage
- 5V DC logic supply voltage

SUPPORTED MOTORS
- two-phase bipolar motors with 1A to 3A coil current
- incremental encoder (2 or 3 channel)

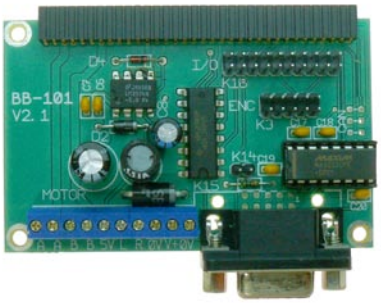
INTERFACE
- RS232, RS485 or CAN 2.0b host interface
- inputs for reference and stop switches
- general purpose analog and digital I/Os

FEATURES
- 64 times microstepping
- memory for 2048 TMCL commands
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- closed loop for highly dependable drives
- stallGuard™ for sensorless motor stall detection

OTHER
- 68 pin connector carries all signals
- RoHS compliant
- size: 80x70 mm²



10 mm



ORDER CODE	DESCRIPTION
TMCM-101 (-option)	1-axis controller / driver 3A, 28.5V
Related products:	*BB-101*
OPTIONS	
H	Horizontal pin connector (standard)
V	Vertical pin connector (on request)

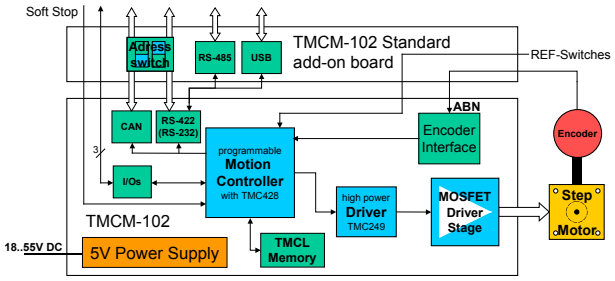
10 mm

TMCM-102

**1-Axis
Controller / Driver
3.5A / 48V
with Encoder Inf.**

INFO

The TMCM-102 is a single axis 2-phase stepper motor controller and driver module with an aluminium profile for quick and robust mounting. The built in encoder feedback makes it an optimum solution for high-reliability drives. This drive is optimally suited for industrial high-reliability applications. The power stage has very low dissipation when compared to competitors' products. Its interface add-on board concept allows for customer specific interface / connector selection. The TMCM-102 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" rapid and fast development of motion control applications is guaranteed. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation, are performed on board. The TMCL program can be stored in the on-board EEPROM for stand-alone operation. The firmware of the module can be updated via the serial interface. With the stallGuard™ feature it is possible to detect motor overload or motor stall.



MAIN CHARACTERISTICS

ELECTRICAL DATA	· up to 3.5A RMS coil current (5A peak) · 18V to 55V motor supply voltage
SUPPORTED MOTORS	· two-phase bipolar motors with 1A to 3.5A coil current · incremental encoder (2 or 3 channel, single ended)
INTERFACE (WITH ADD ON-BOARD)	· RS232, RS485, RS422, USB or CAN 2.0b host interface · inputs for reference and stop switches · general purpose analog and digital I/Os
FEATURES	· 64 times microstepping · memory for 2048 TMCL commands · automatic ramp generation in hardware · on the fly alteration of motion parameters (e.g. position, velocity, acceleration) · closed loop for highly dependable drives · stallGuard™ for sensorless motor stall detection
SOFTWARE	· stand-alone operation using TMCL or remote controlled operation · PC-based application development software TMCL-IDE included · optional simple to use ASCII protocol · optional cmd. set similar to IMS IM483IE
OTHER	· RoHS compliant · size: 76 x 70 mm²

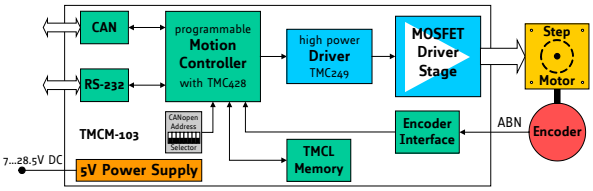
ORDER CODE	DESCRIPTION
TMCM-102-IF	1-axis controller / driver 3.5A / 48V with interface add-on board (standard)
TMCM-102	1-axis controller / driver 3.5A / 48V (on request)

TMCM-103

**1-Axis
Controller / Driver
2.0A / 28.5V
with Encoder Inf.**

INFO

The TMCM-103 is a single axis 2-phase stepper motor controller and driver module. The built in encoder feedback makes it an optimum solution for high-reliability drives. It provides a complete motion control solution at a very small size for embedded applications. The board can be connected to a baseboard or customized electronics with its pin connectors. The TMCM-103 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" rapid and fast development of motion control applications is guaranteed. In addition CANopen is available for this product. The TMCM-103 can be controlled via RS-232 and via CAN. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation, are performed on board. The TMCL program can be stored in the on-board EEPROM for stand-alone operation. The firmware of the module can be updated via the RS-232 or the CAN interface. With the StallGuard™ feature it is possible to detect motor overload or motor stall.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 2.0A coil current RMS (2.8A peak)
- 7V to 28.5V motor supply voltage

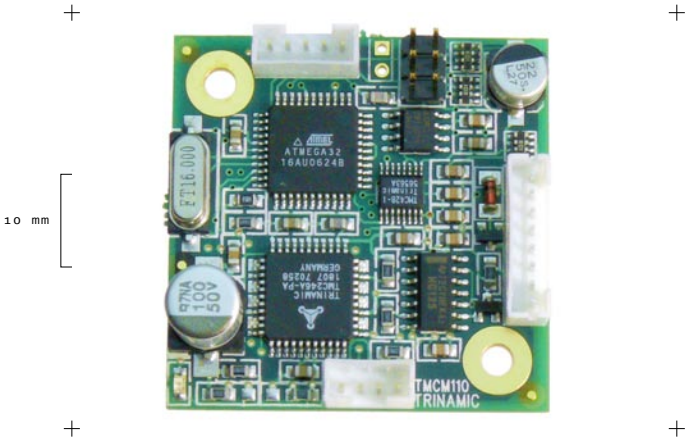
SUPPORTED MOTORS
- two-phase bipolar motors with 1A to 2.0A coil current
- incremental encoder (2 or 3 channel)

INTERFACE
- RS232 and CAN 2.0b host interface
- inputs for reference and stop switches
- general purpose analog and digital I/Os

FEATURES
- dip-switches to adjust CAN-ID
- 64 times microstepping
- memory for 2048 TMCL commands
- ready for CANopen
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- closed loop for highly dependable drives possible
- stallGuard™ for sensorless motor stall detection
- chopSync™ for high motor velocity

OTHER
- 2 x 16 pin connectors carry all signals
- RoHS compliant
- size: 43x49.53 mm²

ORDER CODE	DESCRIPTION
TMCM-103 (-option)	1-axis controller / driver 2.8A, 28.5V
Related products:	*BB-103*
OPTIONS	
TMCL	TMCL firmware
CANopen	CANopen firmware

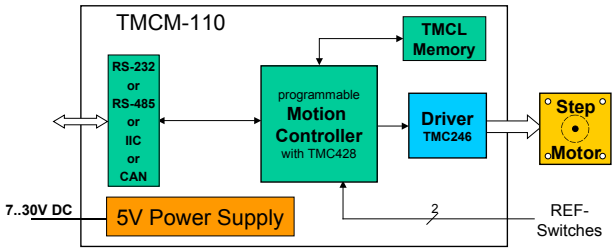


TMCM-110-42

**1-Axis
Motor Mounted
Controller / Driver
1.1A / 34V**

INFO

The TMCM-110-42 is an intelligent stepper motor controller and driver module to be mounted directly on a 42 mm flange motor. This module converts the motor into a compact mechatronic device with bus oriented or stand-alone control. The motor, switches, power and the multi purpose I/Os can be connected with small pluggable connectors. The TMCM-110-42 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" a rapid and fast development of motion control applications is guaranteed. The TMCM-110-42 can be controlled via an RS-232, RS-485, I2C or CAN interface. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation are performed onboard. The TMCL program can be stored in the on board EEPROM for stand-alone operation. The firmware of the module can be updated via the serial interface. With the optional stallGuard™ feature it is possible to detect motor overload or motor stall.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 1.1A coil current RMS (1.5A peak)
- 7V to 34V motor supply voltage

SUPPORTED MOTORS
- two-phase bipolar motors with 0.3A to 1.1A coil current

INTERFACE
- RS232, RS485, I²C or CAN 2.0b host interface
- 2 inputs for reference and stop switches
- 1 general purpose input and 1 output

FEATURES
- up to 16 times microstepping
- memory for 2048 TMCL commands
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- stallGuard™ for sensorless motor stall detection
- full step frequencies up to 20kHz
- dynamic current control
- TRINAMIC driver technology:
- no heatsink required

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

OTHER
- pluggable JST connectors
- RoHS compliant
- size: 42x42 mm²

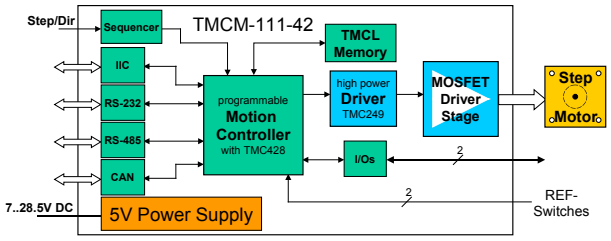
ORDER CODE	DESCRIPTION
TMCM-110-42 (-option)	1-axis controller / driver module 1.1A / 34V
TMCM-110-CABLE	Cable loom (3pcs)
OPTIONS	
232	RS-232 interface
485	RS-485 interface
IIC	I²C interface
CAN	CAN interface

TMCM-111-42

**1-Axis
Motor Mounted
Controller / Driver
2.8A / 28.5V**

INFO

The TMCM-111-42 is an intelligent stepper motor controller and driver module to be mounted directly on a 42 mm flange motor. This dual-PCB module converts the motor into a compact mechatronic device with bus oriented or stand-alone control. The motor, switches, power and the multi purpose I/Os can be connected with small pluggable connectors. The TMCM-111 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" a rapid and fast development of motion control applications is guaranteed. The TMCM-111 can be controlled via an RS-232, RS-485, I2C or CAN interface. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation are performed on board. The TMCL program can be stored in the on-board EEPROM for stand-alone operation. The firmware of the module can be updated via the serial interface. With the stallGuard™ feature it is possible to detect motor overload or motor stall.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 2.8A coil current RMS (4A peak)
- 7V to 28.5V motor supply voltage

SUPPORTED MOTORS
- two-phase bipolar motors with 1A to 2.8A coil current

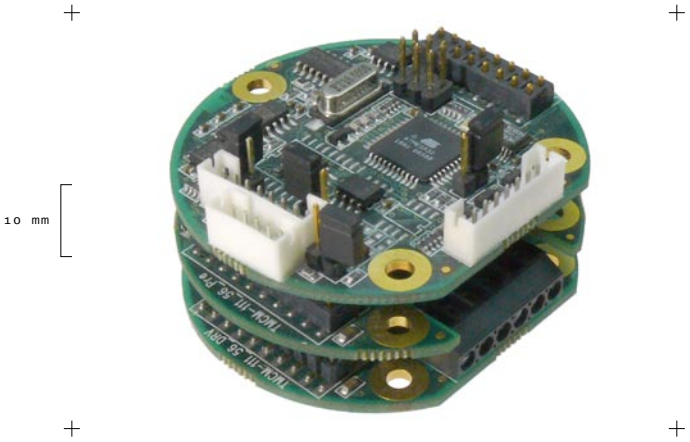
INTERFACE
- RS-232, RS-485, I²C, or CAN 2.0b host interface
- 2 inputs for reference and stop switches
- 1 general purpose input and 1 output

FEATURES
- high accuracy 64 times microstepping
- high current for highly dynamic drive
- memory for 2048 TMCL commands
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- stallGuard™ for sensorless motor stall detection
- full step frequencies up to 20kHz
- dynamic current control
- TRINAMIC driver technology: low power dissipation

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

OTHER
- pluggable connectors
- RoHS compliant
- size: 42 x 42 mm² (2 stacked PCBs)

ORDER CODE	DESCRIPTION
TMCM-111-42 (-option)	1-axis 1-axis controller / driver module 2.8A / 28.5V
TMCM-111-42-CABLE	Cable loom for TMCM-111-42 + motor conn.
OPTIONS	
485	RS-232, IIC and RS-485 interface
CAN	RS-232, IIC and CAN interface

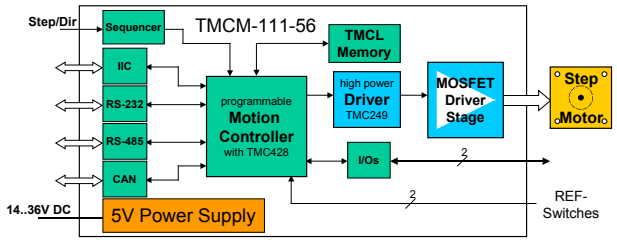


TMCM-111-56

1-Axis
Motor Mounted
Controller / Driver
5.0A / 36V

INFO

The TMCM-111-56 is an intelligent stepper motor controller and driver module to be mounted directly on a 56 mm flange motor. (Mechanical adaptation required – please contact TRINAMIC.) This triple-PCB module converts the motor into a compact mechatronic device with bus-oriented or stand-alone control. The switches, interface and the multi purpose I/Os can be connected with small pluggable connectors. The TMCM-111 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" a rapid and fast development of motion control applications is guaranteed. The TMCM-111 can be controlled via an RS-232, RS-485, I2C or CAN interface. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation are performed onboard. The TMCL program can be stored in the on board EEPROM for stand-alone operation. The firmware of the module can be updated via the serial interface. With the stallGuard™ feature it is possible to detect motor overload or motor stall.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 5A coil current RMS (7A peak)
- 15V to 36V motor supply voltage

SUPPORTED MOTORS
- two-phase bipolar motors with 2A to 5A coil current

INTERFACE
- RS-232, RS-485, I²C or CAN 2.0b host interface
- 2 inputs for reference and stop switches
- 1 general purpose input and 1 output

FEATURES
- high accuracy 64 times microstepping
- high current for highly dynamic drive
- memory for 2048 TMCL commands
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- stallGuard™ for sensorless motor stall detection
- full step frequencies up to 20kHz
- dynamic current control
- TRINAMIC driver technology: low power dissipation

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

OTHER
- pluggable connectors / screw-terminals
- RoHS compliant
- diameter: 55 mm (3 stacked PCBs)

ORDER CODE	DESCRIPTION
TMCM-111-56 (-option)	1-axis module
TMCM-111-56-CABLE	Cable loom for TMCM-111-56
OPTIONS	
485	RS-232, IIC and RS-485 interface
CAN	RS-232, IIC and CAN interface

MONOpack2

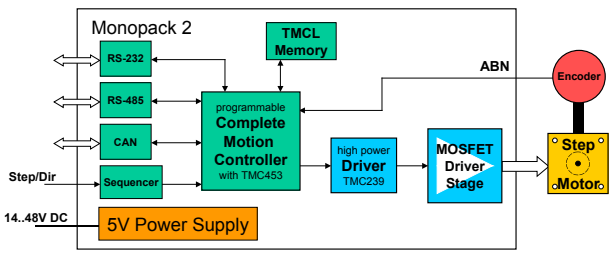
1-Axis
Controller / Driver
3.5A / 48V
with Encoder Inf.

INFO

The MONOpack2 2 is a highly integrated stepper motor controller unit in a robust housing. It provides a high motor power and dynamics. A variety of control interfaces and protocols provide a simple means of remote control or stand alone functionality for all purposes. Its optional incremental encoder feedback and a number of protection features makes drives very dependant and reliable.

A Windows 95/98/ME/NT/2000/XP based PC software is supplied to explore the possibilities of the MONOpack2. When operated in TMCL mode (optional download / firmware update) you can program its stand-alone functionality using simple TMCL commands.

In terms of software and current settings the new MONOpack2 is fully compatible to the old MONOpack and MONOpack Lt while providing a number of enhanced features.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 3.5A RMS coil current (5A peak)
- supply voltage 12V to 48V
- up to 406 times microstepping

SUPPORTED MOTORS
- two-phase bipolar motors with 1A to 3.5A coil current
- optional incremental encoder (2 or 3 channel)

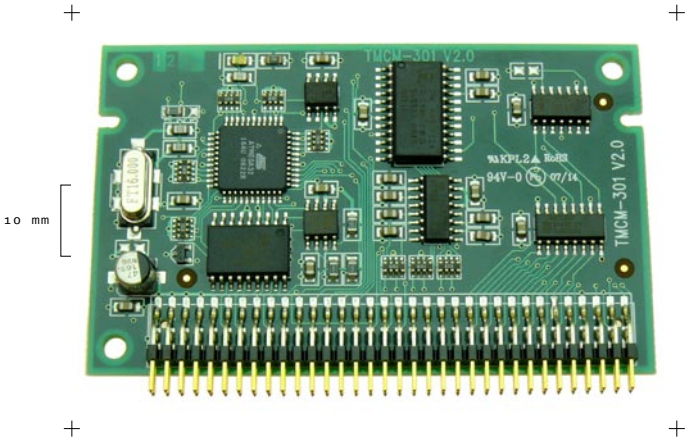
INTERFACE
- CAN, RS485 and RS232 and step / direction (differential)
- I/Os: Limit and reference switch inputs
- incremental encoder input

FEATURES
- highly dynamic and fast response drive
- automatic S-shaped ramp generation
- closed loop for exact position maintenance or positioning check / retry
- fully protected driver

SOFTWARE
- 3 Firmware modes:
  - TMCL based stand-alone mode
  - ASCII terminal mode
  - MONOpack and Lt compatibility mode
- comes with PC-based demonstration and application development software

OTHER
- pluggable screw terminal connectors for all signals
- robust aluminum housing
- RoHS compatible
- size: 132 x 130 x 45 mm³

ORDER CODE	DESCRIPTION
TMC MONOpack2	1-axis controller / driver 3.5A / 48V with encoder interface

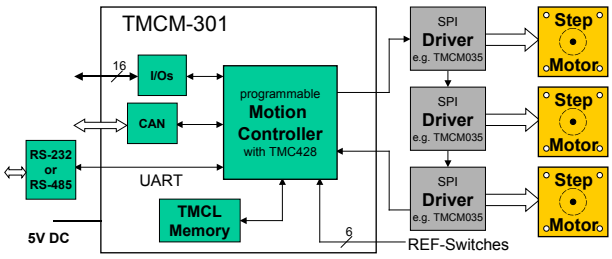


TMCM-301

3-Axis Controller for SPI Drivers

INFO

The TMCM-301 is a triple axis stepper motor controller module for external power drivers with SPI interface. With its very small size it is dedicated to embedded applications. The board can be connected to a baseboard or customized electronics with a pin connector. The TMCM-301 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" rapid and fast development of motion control applications is guaranteed. The TMCM-301 can be controlled via its serial UART interface (e.g. using a RS-232 or RS-485 level shifter) or via CAN. A user TMCL program can be stored in the on board EEPROM for stand-alone operation. The firmware of the module can be updated via the serial interface. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation, are performed on board.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- 5V DC logic supply voltage

SUPPORTED MOTORS/ DRIVERS
- two-phase bipolar motors using external SPI drivers (e.g. TMCM-035 or TMC249)

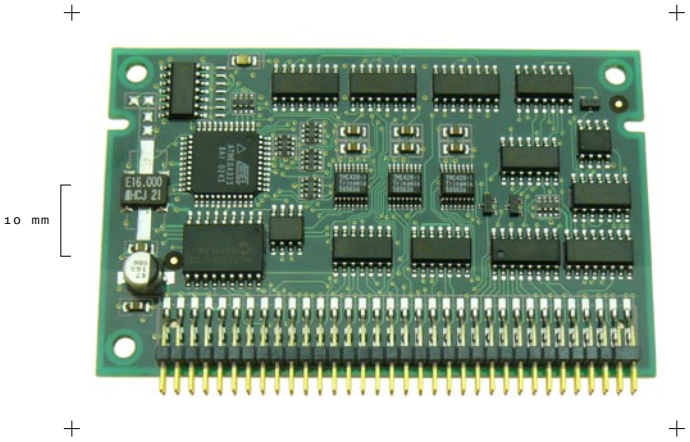
INTERFACE
- UART (RS-232, RS-485) or CAN 2.0b host interface
- inputs for reference and stop switches
- general purpose analog and digital I/Os

FEATURES
- up to 64 times microstepping
- memory for 2048 TMCL commands
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- supports stallGuard™ option for sensor-less motor stall detection
- full step frequencies up to 20kHz
- dynamic current control
- can be adapted to any SPI driver type

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

OTHER
- 68 pin connector carries all signals
- RoHS compliant
- size: 80 x 50 mm²

ORDER CODE	DESCRIPTION
TMCM-301 (-option)	3-axis controller module with SPI out
Related products:	*BB-301, BB-301S, TMCM-EVAL*
OPTIONS	
H	Horizontal pin connector (standard)
V	Vertical pin connector (on request)

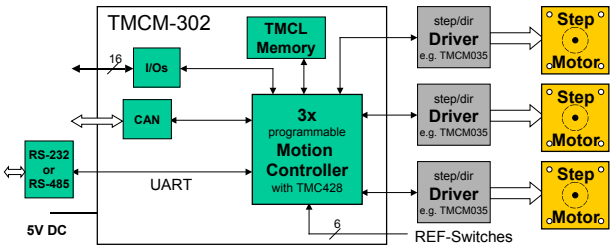


TMCM-302

3-Axis
Step / Direction
Controller

INFO

The TMCM-302 is a triple axis stepper motor controller module for external power drivers with step / direction interface. With its very small size it is dedicated to embedded applications, where de-centralized high power drivers are desired. The board can be connected to a baseboard or customized electronics with a pin connector. The TMCM-302 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" rapid and fast development of motion control applications is guaranteed. The TMCM-302 can be controlled via the serial UART interface (e.g. using a RS-232 or RS-485 level shifter) or via CAN. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation, are performed on board. The TMCL operations can be stored in the on board EEPROM for stand-alone operation. The firmware of the module can be updated via the serial interface.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- 5V DC logic supply voltage
- TTL / CMOS step / direction outputs

SUPPORTED DRIVERS
- step / direction drivers (e.g. TMC401, TMCM-013, TMCM-023, TMCM-078, IDX7505 or TMCM-171)

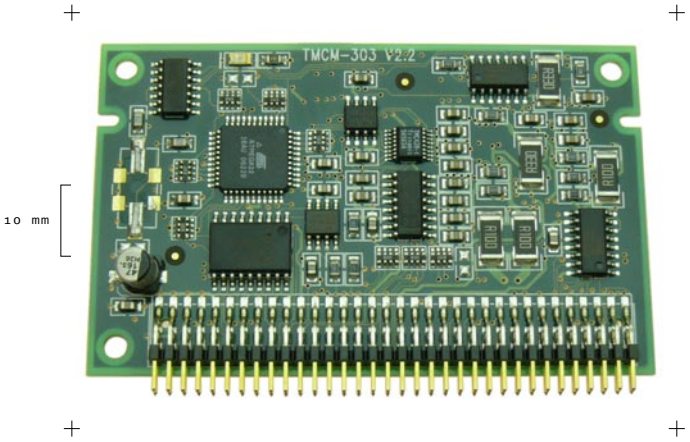
INTERFACE
- UART (RS-232, RS-485) or CAN 2.0b host interface
- inputs for reference and stop switches
- general purpose analog and digital I/Os

FEATURES
- three motion controllers for high step frequency
- memory for 2048 TMCL commands
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- high dynamics: step frequencies up to 300kHz
- 1.8µs step pulse length and step to direction delay

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

OTHER
- 68 pin connector carries all signals
- RoHS compliant
- size: 80 x 50 mm²

ORDER CODE	DESCRIPTION
TMCM-302 (-option)	3-axis step / direction controller module
Related products:	*BB-302, BB-323-02, TMCM-EVAL, TMCM driver with step / direction input*
OPTIONS	
H	Horizontal pin connector (standard)
V	Vertical pin connector (on request)

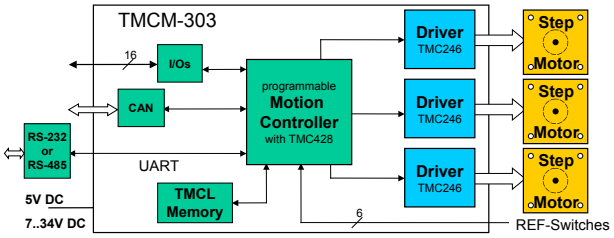


TMCM-303

3-Axis
Controller / Driver
1.1A / 34V

INFO

The TMCM-303 is a compact and versatile triple axis 2-phase stepper motor controller and driver module. It provides a complete motion control solution at a very small size for embedded applications. Using the integrated additional I/Os it even can do complete system control applications. The board can be connected to a baseboard or customized electronics with a pin connector. The TMCM-303 comes with the PC based software development environment TMCL-IDE. Using predefined TMCL (Trinamic Motion Control Language) high level commands like „move to position" or „constant rotation" rapid and fast development of motion control applications is guaranteed. Host communication is possible via the serial UART interface (e.g. using a RS-232 or RS-485 level shifter) or via CAN. All time critical operations, e.g. ramp calculation are performed on board. A user TMCL program can be stored in the on board EEPROM for stand-alone operation. The firmware of the module can be updated via the serial interface. With the optional stallGuard™ feature it is possible to detect overload and stall of the motor.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 1.1A coil current RMS (1.5A peak)
- 7V to 34V motor supply voltage
- 5V DC logic supply voltage

SUPPORTED MOTORS
- two-phase bipolar motors with 0.3A to 1.1A coil current

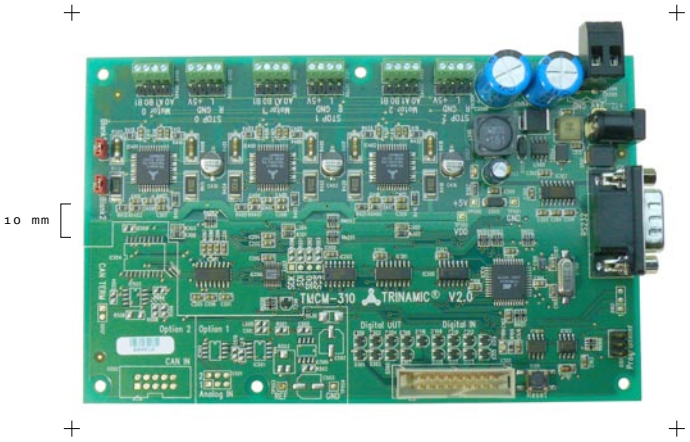
INTERFACE
- UART (RS-232, RS-485) or CAN 2.0b host interface
- inputs for reference and stop switches
- general purpose analog and digital I/Os

FEATURES
- up to 16 times microstepping
- memory for 2048 TMCL commands
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- stallGuard™ option for sensorless motor stall detection
- full step frequencies up to 20kHz
- dynamic current control
- TRINAMIC driver technology: no heatsink required

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

OTHER
- 68 pin connector carries all signals
- RoHS compliant
- size: 80 x 50 mm²

ORDER CODE	DESCRIPTION
TMCM-303/SG (-option)	3-axis controller / driver 1.1A / 34V with stallGuard™
Related products:	*BB-303, BB-323-03, TMCM-EVAL*
OPTIONS	
H	Horizontal pin connector (standard)
V	Vertical pin connector (on request)

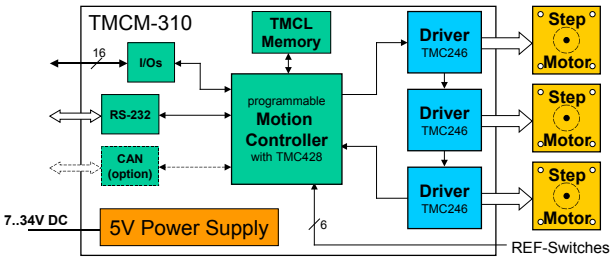


TMCM-310

3-Axis
Controller / Driver
1.1A / 34V

INFO

The TMCM-310 is a triple axis 2-phase stepper motor controller and driver module. It provides a complete single board motion control solution at low cost. Using the integrated additional I/Os it even can do complete system control applications.
The motors and switches can be connected easily with screw terminals. The connection of the multi purpose I/Os can be done via a dual-in-line pin connector. The TMCM-310 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" rapid and fast development of motion control applications is guaranteed. The TMCM-310 can be controlled via the RS-232 or the optional CAN interface. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation are performed on board. A user TMCL program can be stored in the on board EEPROM for stand-alone operation. The firmware of the module can be updated via the serial interface. With the stallGuard™ feature it is possible to detect overload and stall of the motor.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 1.1A coil current RMS (1.5A peak)
- 8V to 34V supply voltage

SUPPORTED MOTORS
- two-phase bipolar motors with 0.3A to 1.1A coil current

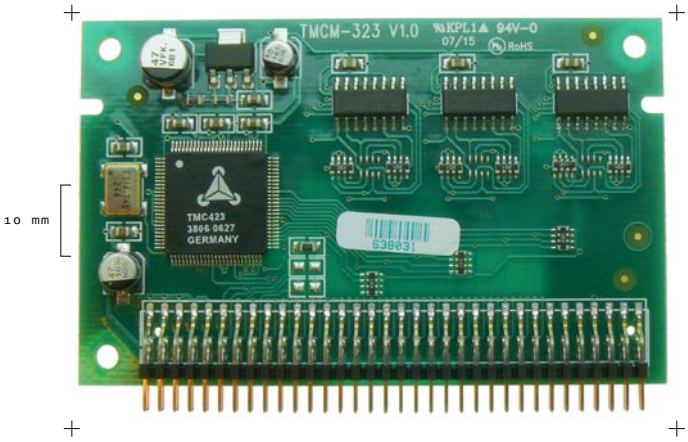
INTERFACE
- RS-232 and optional CAN 2.0b host interface
- inputs for reference and stop switches
- general purpose analog and digital I/Os

FEATURES
- up to 16 times microstepping
- memory for 2048 TMCL commands
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- stallGuard™ feature for sensorless stall detection
- full step frequencies up to 20kHz
- dynamic current control
- TRINAMIC driver technology: no heatsink required

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

OTHER
- pluggable / screw terminal connectors
- RoHS compliant
- size: 160 x 100 mm²

ORDER CODE	DESCRIPTION
TMCM-310/SG	3-axis controller / driver module 1.1A / 34V with stallGuard™
TMCM-310/SG-CAN	3-axis controller / driver module 1.1A / 34V with stallGuard™ and CAN



TMCM-323

3-Axis
Encoder Interface
with SPI

INFO

The TMCM-323 is a triple axis encoder interface module. It extends the three-axis motion control modules for closed loop operation. With its very small size it is dedicated to embedded applications. The board can be connected to a baseboard or to customized electronics with a pin connector. The TMCM-323 interfaces the 3-axis TMCM modules TMCM-301, TMCM-302 or TMCM-303 via SPI. The TMCM-323 contains three real time counters for the incremental encoders so that the actual position data is available without software timing problems.

MAIN CHARACTERISTICS

ELECTRICAL DATA
- 5V DC logic supply voltage

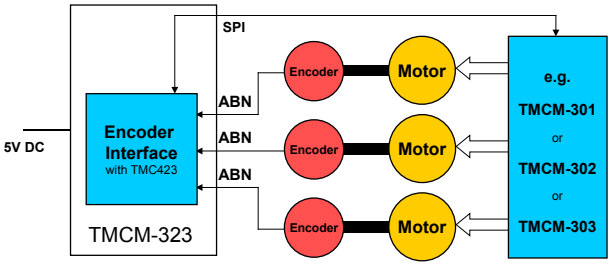
SUPPORTED ENCODERS
- two or three channel encoders (differential or TTL/CMOS)

INTERFACE
- SPI to host processor

FEATURES
- resolution option adapts encoder resolution to motor microstep resolution in fast hardware
- extends TMCM-301, TMCM-302 or TMCM-303 for position feedback (already integrated in the operating system)
- encoder frequencies up to 4M count/s
- N-channel event can snapshoot encoder counter
- 24 bit encoder counter resolution

SOFTWARE
- no additional SW required

OTHER
- 68 pin connector carries all signals
- RoHS compliant
- size: 80 x 50 mm²



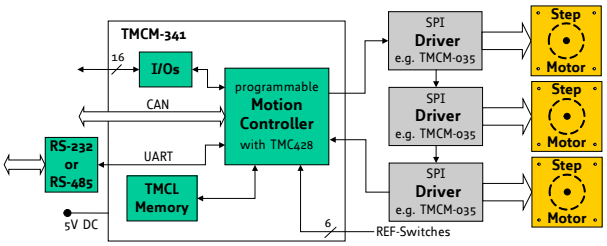
ORDER CODE	DESCRIPTION
TMCM-323 (-option)	3-axis Encoder
Related products:	*BB-323*
OPTIONS	
H	Horizontal pin connector (standard)
V	Vertical pin connector (on request)

TMCM-341

3-Axis Controller for SPI Drivers

INFO

The TMCM-341 is a triple axis stepper motor controller module for external power drivers with SPI interface (e.g. TMCM-035). With its very small size it is dedicated to embedded applications, where a compact solution is required. The board can be connected to a baseboard or customized electronics with a pin connector. The TMCM-341 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" rapid and fast development of motion control applications is guaranteed. The TMCM-341 can be controlled via the serial UART interface (e.g. using a RS-232 or RS-485 level shifter), via CAN or optinal via USB. A user TMCL program can be stored in the on board EEPROM for stand-alone applications. An optional firmware allows to control the TMCM-341 via CANopen. The firmware of the module can be updated via the serial or the CAN interface. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation, are performed on board.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- 5V DC logic supply voltage

SUPPORTED MOTORS/ DRIVERS
- two-phase bipolar motors using external SPI drivers (e.g. TMCM-035 or TMC249)

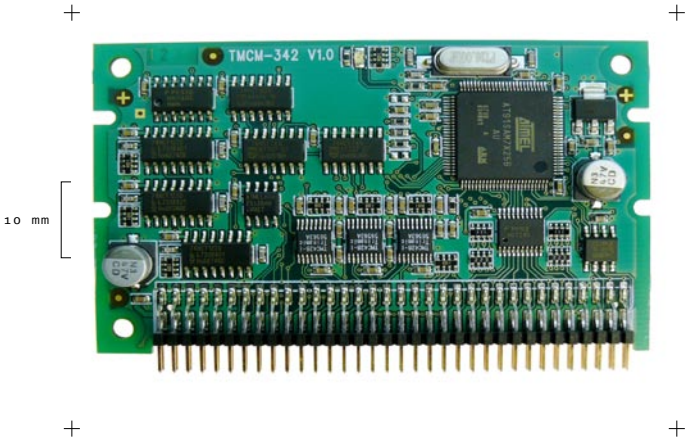
INTERFACE
- UART (RS-232, RS-485, up to 115200 bit/s) or CAN 2.0b host interface (up to 1Mbit/s) or USB (optional)
- inputs for reference and stop switches
- general purpose analog and digital I/Os

FEATURES
- up to 64 times microstepping
- memory for 2048 TMCL commands
- ready for CANopen
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- supports stallGuard™ option for sensor-less motor stall detection
- full step frequencies up to 20kHz
- dynamic current control
- can be adapted to any SPI driver type

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

OTHER
- 68 pin connector carries all signals
- RoHS compliant
- size: 80 x 50 mm²

ORDER CODE	DESCRIPTION
TMCM-341 (-option)	3-axis controller module with SPI out
Related products:	*BB-301, BB-301S, TMCM-EVAL*
OPTIONS	
H-TMCL	Horizontal pin connector with TMCL firmware
V-TMCL	Vertical pin connector with TMCL firmware
H-CANopen	Horizontal pin connector with CANopen firmware
V-CANopen	Vertical pin connector with CANopen firmware

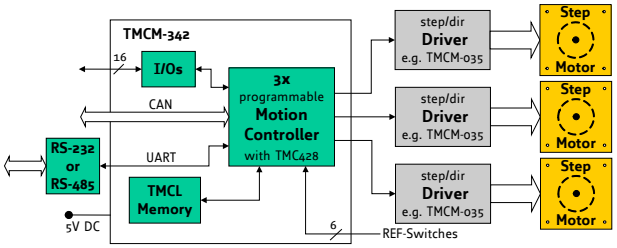


TMCM-342

3-Axis
Step / Direction
Controller

INFO

The TMCM-342 is a triple axis stepper motor controller module for external power drivers with step / direction interface. With its very small size it is dedicated to embedded applications, where de-centralized high power drivers are desired. The board can be connected to a baseboard or customized electronics with a pin connector. The TMCM-342 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" rapid and fast development of motion control applications is guaranteed. The TMCM-342 can be controlled via the serial UART interface (e.g. using a RS-232 or RS-485 level shifter), via CAN or optinal via USB. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation, are performed on board. The TMCL operations can be stored in the on board EEPROM for stand-alone operation. An optional firmware allows to control the TMCM-342 via CANopen. The firmware of the module can be updated via the serial or via CAN interface.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- 5V DC logic supply voltage
- TTL / CMOS step / direction outputs

SUPPORTED DRIVERS
- step / direction drivers (e.g. TMC401, TMCM-013, TMCM-023, TMCM-078, IDX7505 or TMCM-171)

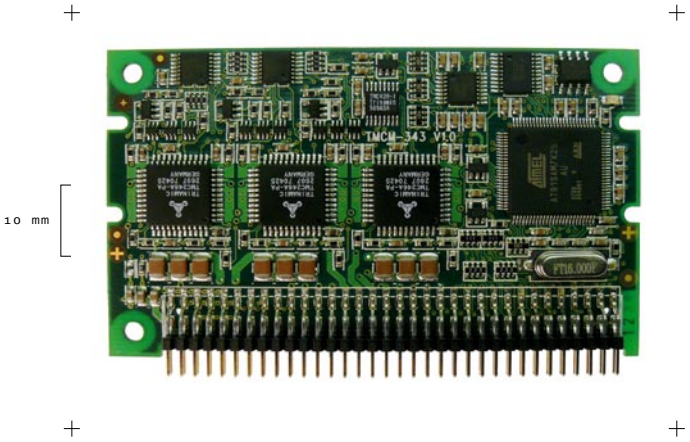
INTERFACE
- UART (RS-232, RS-485, up to 115200 bit/s) or CAN 2.0b host interface (up to 1 Mbit/s) or USB (optional)
- inputs for reference and stop switches
- general purpose analog and digital I/Os

FEATURES
- three motion controllers for high step frequency
- memory for 2048 TMCL commands
- ready for CANopen
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- high dynamics: step frequencies up to 300kHz
- 1.8µs step pulse length and step to direction delay

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

OTHER
- 68 pin connector carries all signals
- RoHS compliant
- size: 80 x 50 mm²

ORDER CODE	DESCRIPTION
TMCM-342 (-option)	3-axis step / direction controller module
Related products:	*BB-302, BB-323-02, TMCM-EVAL, TMCM driver with step / direction input*
OPTIONS	
H-TMCL	Horizontal pin connector with TMCL firmware
V-TMCL	Vertical pin connector with TMCL firmware
H-CANopen	Horizontal pin connector with CANopen firmware
V-CANopen	Vertical pin connector with CANopen firmware

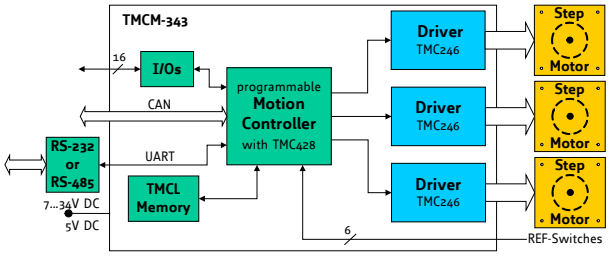


TMCM-343

3-Axis
Controller / Driver
1.1A / 34V

INFO

The TMCM-343 is a compact and versatile triple axis 2-phase stepper motor controller and driver module. It provides a complete motion control solution at a very small size for embedded applications. Using the integrated additional I/Os it even can do complete system control applications. The board can be connected to a baseboard or customized electronics with a pin connector. The TMCM-343 comes with the PC based software development environment TMCL-IDE. Using predefined TMCL (Trinamic Motion Control Language) high level commands like „move to position" or „constant rotation" rapid and fast development of motion control applications is guaranteed. Host communication is possible via the serial UART interface (e.g. using a RS-232 or RS-485 level shifter), via CAN or optional via USB. All time critical operations, e.g. ramp calculation are performed on board. A user TMCL program can be stored in the on board EEPROM for stand-alone operation. An optional firmware allows to control the TMCM-342 via CANopen. The firmware of the module can be updated via the serial or the CAN interface.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 1.1A coil current RMS (1.5A peak)
- 7V to 34V motor supply voltage
- 5V DC logic supply voltage

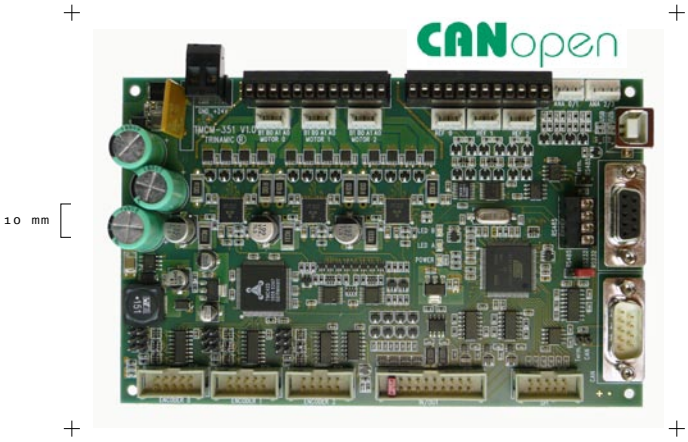
SUPPORTED MOTORS
- two-phase bipolar motors with 0.3A to 1.1A coil current

INTERFACE
- UART (RS-232, RS-485, up to 115200 bit/s) or CAN 2.0b host interface (up to 1Mbit/s) or USB (optional)
- inputs for reference and stop switches
- general purpose analog and digital I/Os

FEATURES
- up to 64 times microstepping
- memory for 2048 TMCL commands
- ready for CANopen
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- stallGuard™ for sensorless motor stall detection
- full step frequencies up to 20kHz
- dynamic current control
- TRINAMIC driver technology: no heatsink required

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

ORDER CODE	DESCRIPTION
TMCM-343 (-option)	3-axis controller / driver 1.1A / 34V
Related products:	*BB-303, BB-323-03, TMCM-EVAL*
OPTIONS	
H-TMCL	Horizontal pin connector with TMCL firmware
V-TMCL	Vertical pin connector with TMCL firmware
H-CANopen	Horizontal pin connector with CANopen firmware
V-CANopen	Vertical pin connector with CANopen firmware

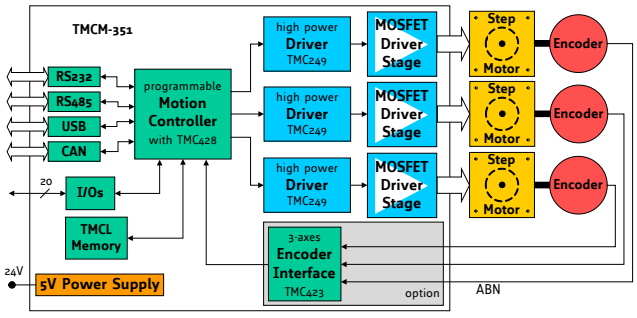


TMCM-351

3-Axis
Controller / Driver
2.8A / 24V
Optional Encoder Interface
Optional CANopen Firmware

INFO

The TMCM-351 is a powerful triple axis 2-phase stepper motor controller/driver module with optional encoder interface. Using the integrated additional I/Os it even can do complete system control applications. The motors and switches can be connected easily with screw or crimp style connectors. The connection of the I/Os, the encoder and SPI can be done via a two row header. The TMCM-351 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" rapid and fast development of motion control applications is guaranteed. The TMCM-351 can be controlled via RS-232, RS485, CAN or USB interface. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation are performed on board. A user TMCL program can be stored in the on board EEPROM for stand-alone operation. An optional firmware allows to control the TMCM-351 via CANopen. The firmware of the module can be updated via the serial interface. With the stallGuard™ feature it is possible to detect overload and stall of the motor.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 2.8A coil current RMS
- nom. 24V DC supply voltage (28.5V DC max)

SUPPORTED MOTORS
- two-phase bipolar motors with up-to 2.8A coil current

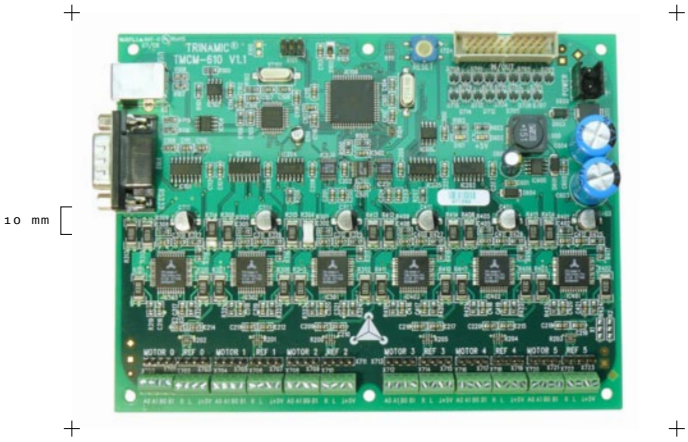
INTERFACE
- RS-232, RS-485, CAN 2.0b host and USB serial communication interfaces
- inputs for reference and stop switches
- general purpose analog and digital I/Os
- SPI connector with three chip select signals for I/O extension

FEATURES
- each axis individually programmable
- closed loop operation with TMCL possible
- up to 64 times microstepping
- memory for 2048 TMCL commands
- motion profile generation in real-time
- on the fly alteration of motion parameters
- dynamic current control
- stallGuard™ for sensorless stall detection
- integrated protection
- TRINAMIC driver technology: low power dissipation, no heatsink required

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included
- optional CANopen firmware (CiA 301, 402)

OTHER
- pluggable screw or crimp style connectors
- RoHS compliant
- size: 160 x 100 mm²

ORDER CODE	DESCRIPTION
TMCM-351 (-option)	TMCM-351 without encoder interface
TMCM-351-E (-opt.)	TMCM-351 with encoder interface
OPTIONS	
TMCL	with TMCL firmware
CANopen	with CANopen firmware

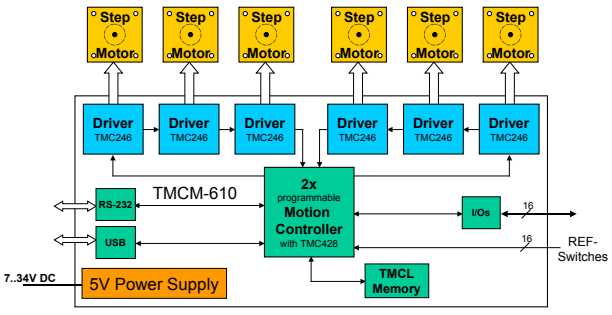


TMCM-610

6-Axis
Controller / Driver
1.1A / 34V

INFO

The TMCM-610 is a six axis 2-phase stepper motor controller and driver module. It provides a complete single board motion control solution at low cost. Using the integrated additional I/Os it even can do complete system control applications. The motors and switches can be connected easily with screw terminals. The connection of the multi purpose I/Os can be done via a dual-in-line pin connector. The TMCM-610 comes with the PC based software development environment TMCL-IDE. Using predefined TMCL (Trinamic Motion Control Language) high level commands like „move to position" or „constant rotation" rapid and fast development of motion control applications is guaranteed. The TMCM-610 can be controlled via the USB or RS-232 interface. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation are performed on board. A user TMCL program can be stored in the on board EEPROM for stand-alone operation. The firmware of the module can be updated via the serial interface. With the stallGuard™ feature it is possible to detect overload and stall of the motor.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 1.1A coil current RMS (1.5A peak)
- 7V to 34V supply voltage

SUPPORTED MOTORS
- two-phase bipolar motors with 0.3A to 1.1A coil current

INTERFACE
- RS-232 and USB host interface
- inputs for reference and stop switches
- general purpose analog and digital I/Os

FEATURES
- up to 16 times microstepping
- memory for 2048 TMCL commands
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- stallGuard™ for sensorless stall detection
- full step frequencies up to 20kHz
- dynamic current control
- TRINAMIC driver technology: no heatsink required

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

OTHER
- pluggable / screw terminal connectors
- RoHS compliant
- size: 160 x 120 mm

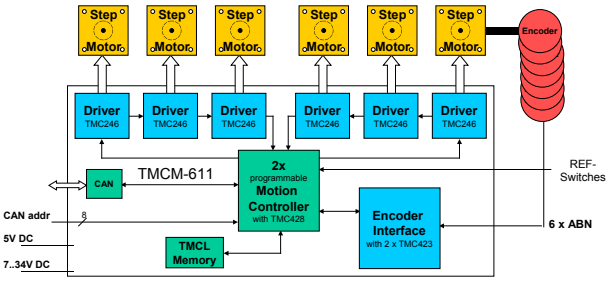
ORDER CODE	DESCRIPTION
TMCM-610/SG	6-axis controller / driver module 1.1A / 34V with stallGuard™

TMCM-611

**6-Axis
Controller / Driver
1.1A / 34V
with Encoder Inf.
for 19" Rack**

INFO

The TMCM-611 is a six axis 2-phase stepper motor controller and driver module for mounting in a 19 inch rack. It provides optional encoder feedback for every motor. The module allows a very high density multi axis control solution at aggressive pricing. The motors and encoders are connected directly via the front panel using 15 pin Mini DSUB connectors. An integrated seven segment status display and two status outputs on the back plane connector allow for quick diagnostics. The TMCM-611 comes with the PC based software development environment TMCL-IDE. It can be controlled via its CAN interface. Using predefined TMCL (Trinamic Motion Control Language) high level commands like „move to position" or „constant rotation" rapid and fast development of motion control applications is guaranteed. Communication traffic is kept very low since all time critical operations are performed on board. A user TMCL program can be stored in the on board EEPROM for stand-alone operation. The firmware of the module can be updated via the CAN interface. With the stallGuard™ feature it is possible to detect overload and stall of the motor.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 1.1A coil current RMS (1.5A peak)
- 7V to 34V supply voltage

SUPPORTED MOTORS
- two-phase bipolar motors with 0.3A to 1.1A coil current (plus optional encoder)

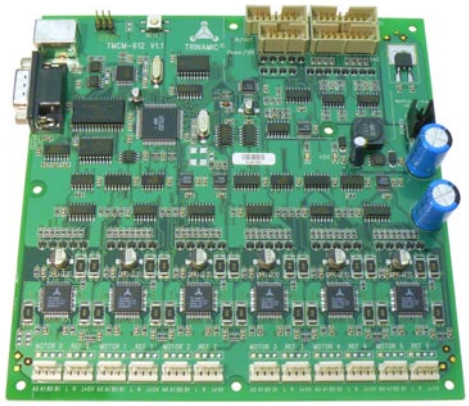
INTERFACE
- CAN or RS-485 interface via backplane, 8 address bits set via backplane
- inputs for reference and stop switches
- incremental encoder (2 or 3 channel) single ended / filtered inputs

FEATURES
- up to 78 axis in one rack (using one busconnector board)
- integrated display shows error / user status information
- up to 16 times microstepping
- memory for 2048 TMCL commands
- automatic ramp generation in hardware
- on the fly alteration of motion parameters
- stallGuard™ sensorless stall detection
- dynamic current control

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

OTHER
- Mini DSUB 15 connectors combined for motor and encoder, 64 pin for backplane
- RoHS compliant
- size: 6U (6HE), 4TE

ORDER CODE	DESCRIPTION
TMCM-611/SG-CAN	6-axis controller / driver module 1.1A / 34V with stallGuard™ and CAN
TMCM-611/SG-485	6-axis controller / driver module 1.1A / 34V with stallGuard™ and RS-485
Related products:	*BB-611-1, BB-611-2*



TMCM-612

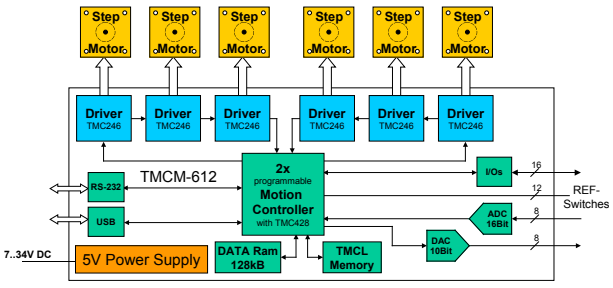
6-Axis
Controller / Driver
1.1A / 34V
+ Data Aquisition

INFO

The TMCM-612 is a six axis 2-phase stepper motor controller and driver module with a high performance data acquisition part. The integrated 8 channel 16 bit ADC converter can be programmed to do a step-synchronous input voltage scan and store values at a high data rate. The module provides a high microstep resolution in order to do very exact positioning and measurement tasks. The measurement results can be transferred to a PC using the high-speed USB interface. A number of analog output channels and digital I/Os can be used to control further instrumentation.

This feature set makes the module pre-destined for analytical instruments.

The TMCM-612 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). User specific data acquisition extensions are available upon request. The TMCM-612 can be controlled via the high-speed USB interface or via its RS-232 interface.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 1.1A coil current RMS (1.5A peak)
- 12V to 34V supply voltage

SUPPORTED MOTORS
- two-phase bipolar motors with 0.3A to 1.1A coil current

INTERFACE
- RS-232 and USB host interface
- inputs for reference and stop switches
- general purpose analog and digital I/Os
- eight 16 bit ADC inputs (0...10V)
- eight 10 bit DAC outputs (0...10V)

FEATURES
- up to 64 times microstepping
- memory for 2048 TMCL commands
- automatic ramp generation in hardware
- 500kHz, 16 bit AD converter
- 128kbyte RAM for data aquisition
- stallGuard™ for sensorless motor stall detection
- full step frequencies up to 20kHz
- dynamic current control
- TRINAMIC driver technology: no heatsink required

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development
- software TMCL-IDE included

OTHER
- pluggable connectors
- RoHS compliant
- size: 160 x 160 mm²

ORDER CODE	DESCRIPTION
TMCM-612/SG	6-axis controller/driver and data aquisition module, stallGuard™

10 mm

SIXpack2

6-Axis
Controller / Driver
1.4A / 48V

INFO

The SIXpack2 is a highly integrated stepper motor controller unit in a small and robust housing. Up to six 2-phase motors can be driven independently or with linear interpolation in any combination. With three interface options and integrated drivers it is easily integrated in all kinds of automatization environment where motion control is desired. The SIXpack can be remote-controlled using a simple command set, which is identical for all inteface options.

An assembled cable for motor and reference switch connectors is available as an accessory.

In terms of software and current settings the new SIXpack2 is fully upward-compatible to the old SIXpack and QUADpack.

MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 1.4A RMS coil current (2A peak)
- supply voltage 15V to 48V
- up to 16-times microstepping

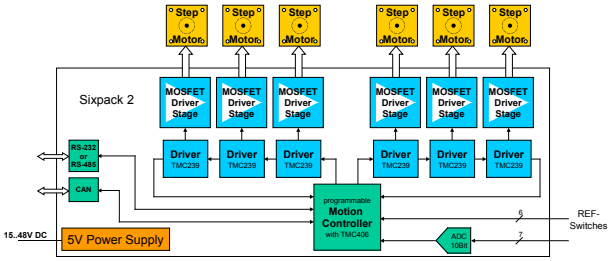
SUPPORTED MOTORS
- two-phase bipolar motors with 0.3A to 1.4A coil current

INTERFACE
- CAN, RS-485 and RS-232
- I/Os: Limit and reference switch input for each motor, one analog input per motor

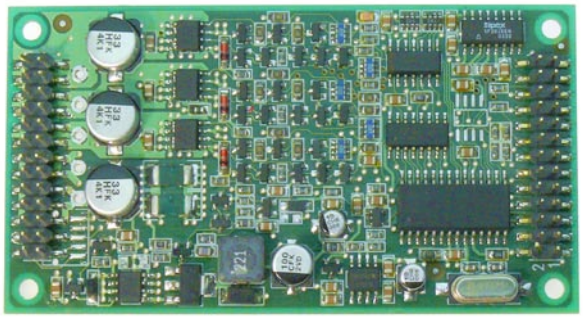
FEATURES
- highly dynamic and fast response drive
- on-the-fly change of position and velocity
- automatic ramp generation
- linear interpolation of up to 6 axis

SOFTWARE
- simple software protocol
- comes with PC evaluation software

OTHER
- robust steel housing
- RoHS compliant
- size: 180 x 152 x 35 mm



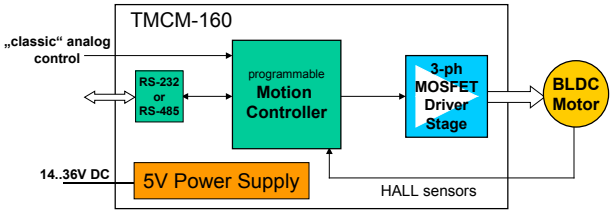
ORDER CODE	DESCRIPTION
TMC SIXpack2	6-axis controller / driver unit 1.4A /48V
TMC SIXpack2-CABLE	SIXpack 2 motor connector cable



TMCM-160

1-Axis BLDC Controller / Driver 5A / 40V

INFO The TMCM-160 is a controller / driver module for general brushless DC motor applications. It integrates velocity and torque control as well as a hall sensor based positioning mode. The position resolution depends on the motor, i.e. a standard 8 pole motor gives a motor axis resolution of 15 degrees. The module can be used in stand alone operation or remote controlled via a RS232 or RS485 interface (ordering option). Its small form factor (50 x 92 mm²) allows for integration onto a user board as a plug-on module or for panel mounting, by connecting flat ribbon cables to the two 2x13 2.54 mm standard header connectors. Multi-axis drives can be easily realized by integrating multiple modules on one baseboard. For Evaluation and small series the BB-160 baseboard has all needed features. The TMCM-160 fits perfectly to the QBL4208 BLDC motors.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 5A coil current (airflow might be required if operated cont. above 3A)
- 12V to 40V motor supply voltage (ask for 48V option)

SUPPORTED MOTORS
- three phase BLDC motors with hall sensors from a few watts up to 180W
- velocity up to 100,000 rpm (el. field)

INTERFACE
- RS232 or RS485 host interface
- analog and digital control inputs

FEATURES
- constant velocity drives, constant torque drives or positioning
- automatic positioning ramp generation
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- high efficiency, low power dissipation
- integrated protection: reverse polarity, overload / overtemperature

SOFTWARE
- stand-alone operation or remote controlled operation
- PC based demonstration software allowssetting of all parameters

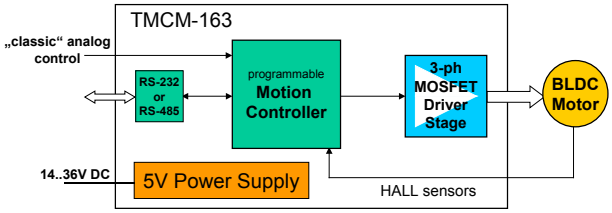
OTHER
- two 2-row 2.54 mm connectors
- RoHS compliant
- size: 50 x 92 mm²

ORDER CODE	DESCRIPTION
TMCM-160 (-option)	1-axis BLDC controller / driver module 5A / 40V
Related products:	*BB-160, QMot QBL4208*
OPTIONS	
232	RS-232 interface
485	RS-485 interface

TMCM-163

1-Axis Motor Mounted BLDC Controller / Driver 12A / 38V

INFO The TMCM-163 is a controller / driver module for general brushless DC motor applications. It integrates velocity and torque control as well as a hall sensor based positioning mode. The position resolution depends on the motor, i.e. a standard 8 pole motor gives a motor axis resolution of 15 degrees. The module can be used in stand alone operation or remote controlled via RS-232 or RS-485 interfaces (ordering option). Its small form factor (43 x 43 x 20 mm³) allows for mounting directly at the motor. The TMCM-163 fits perfectly to the QBL4208 BLDC motors.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 12A coil current (contact to cooling plane might be required using gap pad)
- 14V to 38V motor supply voltage
- NEMA 17 mounting configuration

SUPPORTED MOTORS
- three phase BLDC motors with hall sensors from a few watts up to 360W
- velocity up to 100,000 rpm (el. field)

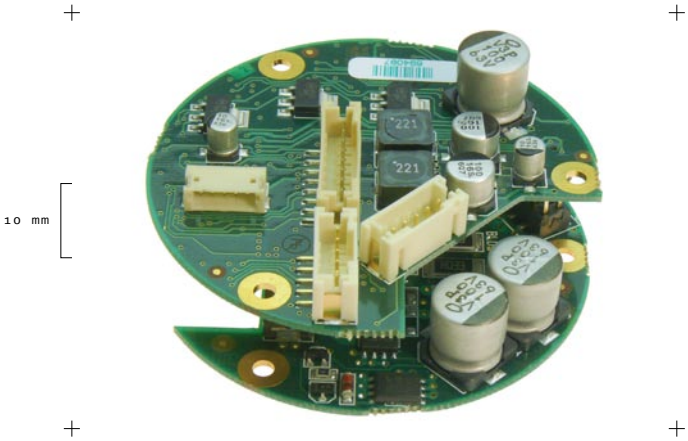
INTERFACE
- RS232 or RS485 host interface
- analog and digital control inputs

FEATURES
- constant velocity drives, constant torque drives or positioning
- automatic positioning ramp generation
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- high efficiency, low power dissipation
- integrated protection: overload / overtemperature

SOFTWARE
- stand-alone operation or remote controlled operation
- PC-based demonstration software allows setting of all parameters

OTHER
- pluggable connectors for interface
- flat connectors for motor and supply
- RoHS compliant
- size: 43 x 43 x 20 mm³ (two stacked PCBs)

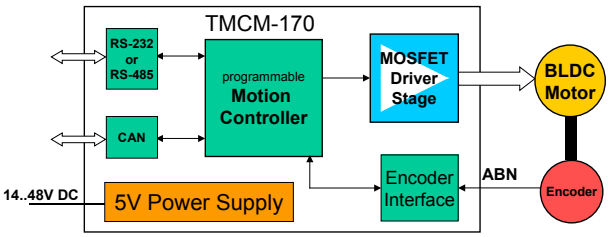
ORDER CODE	DESCRIPTION
TMCM-163 (-option) V2	1-axis BLDC controller / driver module 12A / 38V
TMCM-163-CABLE	Cable loom for TMCM-163
Related products:	*QMot QBL 4208*
OPTIONS	
232	RS-232 interface
485	RS-485 interface



TMCM-170

1-Axis Motor Mounted BLDC Servo Controller / Driver with Encoder Inf. 10A / 48V

INFO The TMCM-170 is a controller / driver module for high performance servo drives based on brushless DC motors. It gives a high resolution like a stepper motor coupled with the high dynamic, high velocity and high reliability of a BLDC drive. A built-in ramp generator allows parameterized smooth positioning, with an external switch in order to provide for an absolute position reference. Its small form factor allows direct mounting on or into a motor-encoder assembly. The TMCM-170 integrates a position regulator and a ramp generator, to allow for velocity modes. The module can be remote controlled via an RS-232, RS-485 or via a CAN interface (ordering option). The TMCM-170 fits perfectly to the QBL5704 BLDC motors.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 10A coil current (contact to cooling plane might be required using gap pad)
- 12V to 48V motor supply voltage

SUPPORTED MOTORS
- three phase BLDC motors from a few watts up to 500W, optional hall sensors
- two or three channel encoder attached to mechanical axis min 256 steps resol.
- velocity up to 100,000 rpm (el. field)

INTERFACE
- CAN and RS-232 or CAN and RS-485
- digital input for absolute pos. reference

FEATURES
- servo drive allows ultra precise and fastpositioning
- automatic positioning ramp generation with all parameters changable on-the-fly
- different start-up modes for commutation
- 1024 entry 10 bit motor sine commutation table
- high efficiency, low power dissipation
- integrated protection: reverse polarity, overload / overtemperature

SOFTWARE
- stand alone operation (analog control or TMCL program) or remote controlled operation
- PC-based demonstration software allows setting of all parameters

OTHER
- pluggable connectors for interface
- RoHS compliant
- diameter: 61 mm (two stacked PCBs)

ORDER CODE	DESCRIPTION
TMCM-170 (-option)	1-axis BLDC servo controller / driver module 10A / 48V
TMCM-170-CABLE	Cable loom for TMCM-170
Related products:	*QMot QBL 5704*
OPTIONS	
232	RS232 and CAN interface
485	RS485 and CAN interface

10 mm

TMCM-171

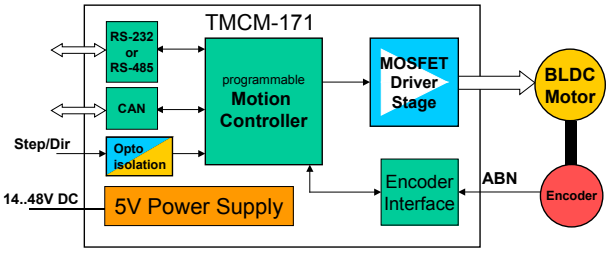
**1-Axis
BLDC Servo
Controller / Driver
20A / 48V
with Encoder Inf.**

INFO

The TMCM-171 is a controller / driver module for high performance servo drives based on brushless DC motors. It combines the high resolution of a stepper motor coupled with the high dynamic, high velocity and high reliability of a BLDC drive. The motor and switches can be connected easily with pluggable screw terminals. A build-in ramp generator allows parameterized smooth positioning. The TMCM-171 supports BLDC motors with nearly any number of poles and incremental encoders with nearly any resolution.

The TMCM-171 integrates a velocity regulator, a position regulator and a ramp generator. The module can be controlled remotely via CAN or RS-485 interface. Additionally, the TMCM-171 is equipped with a step direction interface. Stand alone operation (either via TMCL program or via analog control) is also possible.

The housing is based on an aluminium plate which is used as a heatsink. The TMCM-171 fits perfectly to the QBL5704 BLDC motors.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- up to 20A coil current
- supply voltage 12V to 48V DC

SUPPORTED MOTORS
- three phase BLDC motors from a few watts up to 1kW, optional hall sensors
- two or three channel encoders attached to mechanical axis min 256 steps resolution
- velocity up to 100,000 rpm (el. field)

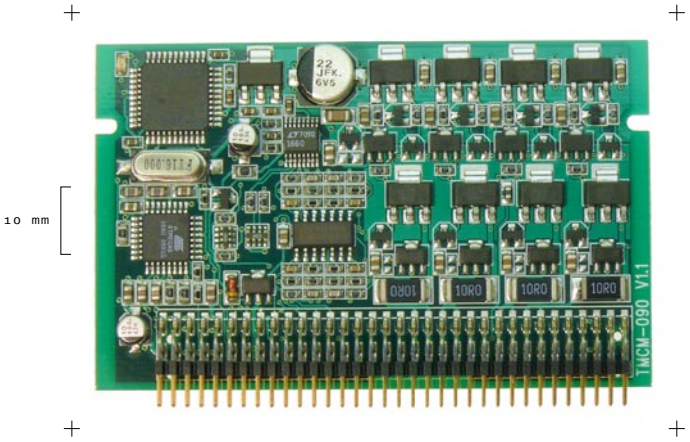
INTERFACE
- differential Step / Direction input
- CAN and RS-485
- 4 user programmable inputs (analog / digital) and 2 digital user programmable outputs (up to 50V/2A)

FEATURES
- servo drive allows ultra precise and fast positioning
- automatic positioning ramp generation with all parameters changeable on-the-fly
- different start-up modes for commutation
- adaptable 256 entry 10 bit motor sine commutation table
- high efficiency , low power dissipation

SOFTWARE
- stand alone operation (analog or TMCL program) or remote controlled operation
- PC-based demonstration software allows setting of all parameters

OTHER
- pluggable screw terminal connectors for all signals with a small JST alternative
- robust aluminum housing
- RoHS compliant
- size: 145 x 96 x 33 mm

ORDER CODE	DESCRIPTION
TMCM-171	1-axis BLDC controller / driver module 20A / 48V
Related products:	*USB-2-X, QMot QBL 5704*



TMCM-090

1-Axis
Piezo Motor Driver
3kHz / 48V

INFO The TMCM-090 is a compact piezo motor driver module for high precision and highly dynamic piezo axis. It is specially designed for four phase piezo motors, like the PIEZO MOTOR „Piezo Legs". It can be combined with the driver-less modules TMCM-301 or TMCM-302 or with any step/direction controller. The TMCM-323 can be added for encoder feedback. Its small size makes it an optimum solution for integration on any user board. The board can be connected to a baseboard or customized electronics with a pin connector. Applications are optical and analytical instruments. Its high microstep resolution leads to a linear motor resolution of about 2nm per microstep.

MAIN CHARACTERISTICS

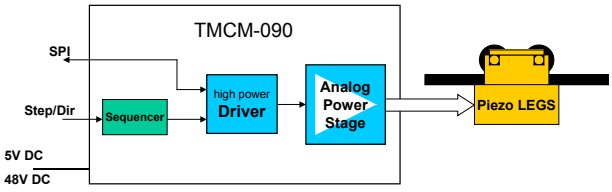
ELECTRICAL DATA
- up to 3 kHz cont. fullstepping rate (400nF load)
- 48V DC motor supply voltage
- 5V DC logic supply voltage

SUPPORTED MOTORS
- Piezo Legs four phase motor

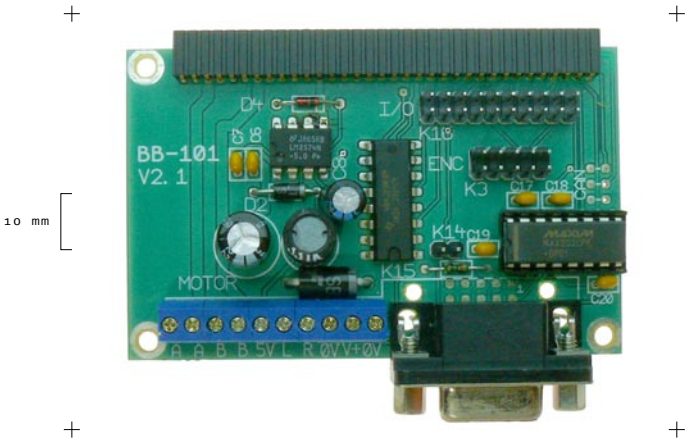
INTERFACE
- Step / Direction input (TTL/CMOS signal)
- SPI™ interface

FEATURES
- up to 2048 times microstepping for highest motor precision
- supports four different waveforms: omega564, sine1s85, Rhomb, Rhomb F
- low EME design for the ease of use

OTHER
- the module is pin compatible to the TMCM-035, and can be used on a baseboard designed for the TMCM-035
- 68 pin connector carries all signals
- RoHS compliant
- Size: 80 x 50 mm² (credit card)



ORDER CODE	DESCRIPTION
TMCM-090 (-option)	1-axis piezo motor driver 3kHz / 48V
Related products:	BB-035, BB-301, BB-100
OPTIONS	
H	Horizontal pin connector (standard)
V	Vertical pin connector (on request)



BB-101

Baseboard for TMCM-101

INFO

The BB-101 is designed for the TMCM-101 single axis 2-phase stepper motor controller and driver module with encoder interface. This encoder feedback makes it an optimum solution for high-reliability closed loop drives. The BB-101 gives easy access to all important signals of the TMCM-101. Motor connection, power supply and limit switches are accessible via screw terminals while encoder connection and the I/Os of the TMCM-101 have 2 row RM2.54 industry standard connectors. The integrated switch-mode regulator provides the required 5V supply voltage for the TMCM-101. Thus only one power supply is required. The integrated level shifter enables direct connection to a PC or host controller via different interfaces.

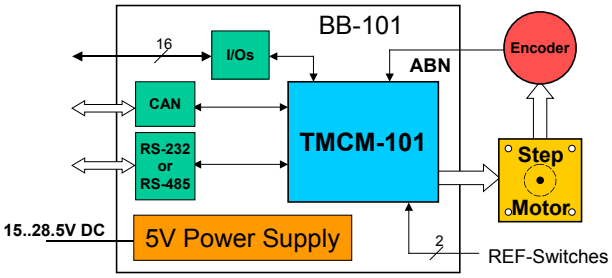
MAIN CHARACTERISTICS

ELECTRICAL DATA
- 15V to 28V DC power supply
- up to 3A coil current RMS (4.2A peak)

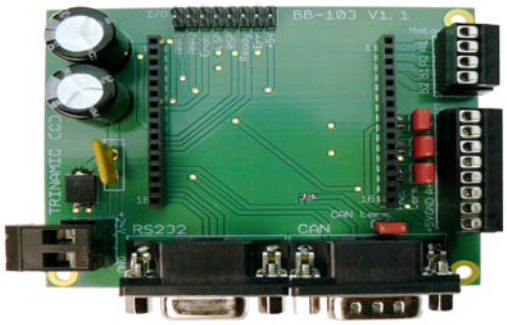
INTERFACE
- RS-232 (optionally RS-485, CAN)
- 2x limit switches, all 16 general purpose analog or digital I/Os of the TMCM-101 supported
- local input

FEATURES
- 1 slot for TMCM-101 closed loop motion control and driver module, 3A / 28V
- up to 64 times adjustable microstep resolution
- integrated 5V power supply
- stallGuard™ for reference search

OTHER
- screw terminal connectors for power supply, motor and reference switch connection
- RoHS compliant
- size: 80 x 60 mm²
  with TMCM-101 plugged in:
  80 x 130 mm²



ORDER CODE	DESCRIPTION
BB-101 (-option)	Baseboard for TMCM-101
OPTIONS	
232	RS-232 / CAN interface
485	RS-485 / CAN interface



BB-103

Baseboard for TMCM-103

INFO The baseboard BB-103 provides a simple setup featuring the TMCM-103 1-axis stepper controller and driver with support for encoder feedback. This encoder feedback makes it an optimum solution for highly reliable closed loop drives. The BB-103 gives easy access to all important signals of the TMCM-103. Motor connection, power supply and encoder connection are accessible via pluggable screw terminals while the I/Os of the TMCM-103 have a 2 row RM2.54 industry standard connector.

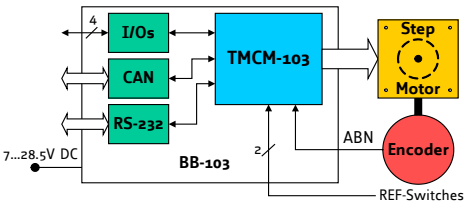
MAIN CHARACTERISTICS

ELECTRICAL DATA
- 24V DC supply voltage

INTERFACE
- Interface: RS-232 or CAN (D-SUB)
- 2 inputs for reference and stop switches
- 2 general purpose analog and digital I/Os
- 2 digital outputs

FEATURES
- supports one TMCM-103 1-axis stepper controller / driver
- jumper for differential encoder termination
- jumper for CAN termination
- pluggable screw terminal connectors for power supply, motor and encoder
- reverse voltage / short circuit protection

OTHER
- RoHS compliant
- size: 85 x 71 mm², 24 mm height



ORDER CODE	DESCRIPTION
BB-103	Baseboard for TMCM-103

BB-160

Baseboard for TMCM-160

INFO

The baseboard BB-160 allows to build a ready to use BLDC motor driver unit using the TMCM-160 driver module. It integrates velocity and torque (via current) control as well as a hall sensor based positioning mode. The position resolution depends on the motor, i.e. a standard 8 pole motor gives a motor axis resolution of 15 degrees. The module can be used in stand alone operation (analog control) or it can be remotely controlled via RS-232 (or RS-485).

All important signals and the power supply lines can be connected easily. For motor, power supply and hall sensors screw terminals are available and for RS232 (or RS485) a 9-pin D-SUB connector. Some signals like the analog inputs are adjustable either onboard or they can be remote controlled.

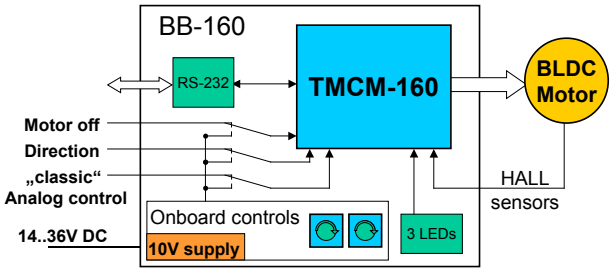
MAIN CHARACTERISTICS

ELECTRICAL DATA
- 14V to 40V supply voltage

FEATURES
- fast prototyping of motion control applications with BLDC motors (e.g. lab use)
- ad-hoc evaluation of the TMCM-160 module without the need for developing a custom PCB
- BB-160 + TMCM-160 suitable even for series production
- RS-232 or RS-485 Interface

HIGHLIGHTS
- screw connectors for motors and hall sensors for fast prototyping
- access to all control inputs of the TMCM-160
- screw holes for reliable mounting beyond prototyping
- setting of motor voltage and current by two potentiometers

OTHER
- RoHS compliant
- size: 120 x 85 mm²



ORDER CODE	DESCRIPTION
BB-160	Baseboard for TMCM-160

BB-035

Baseboard for TMCM-035

INFO The baseboard BB-035 allows to build a ready to use stepper driver unit using the TMCM-035 driver module. All important signal and power lines are accessible via screw terminals, the step and direction inputs are equipped with opto couplers. The integrated switch-mode regulator provides the required 5V supply voltage for the TMCM-035.

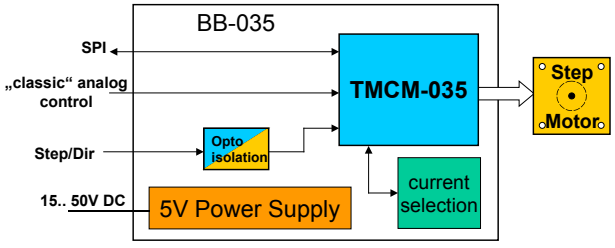
MAIN CHARACTERISTICS

ELECTRICAL DATA
- 15V to 50V DC supply voltage

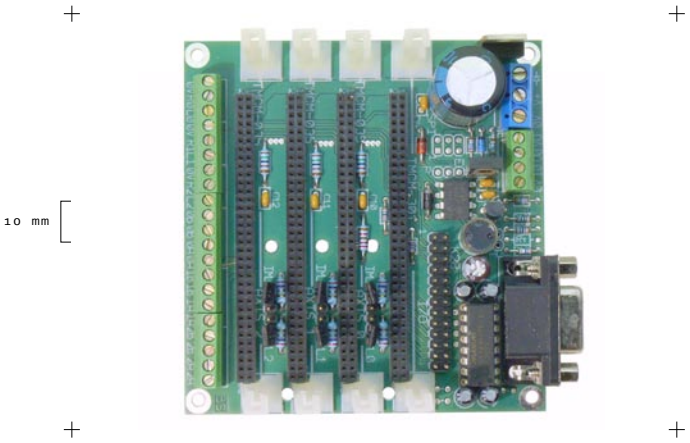
INTERFACE
- optically de-coupled step/direction input (differential / optical)
- SPI and analog inputs accessible via additional connector

FEATURES
- 1 slot for TMCM-035 power driver
- integrated 5V power supply
- protection: overvoltage suppressor and inverse polarity

OTHER
- RoHS compliant
- size: 90 x 60 mm², 60 mm height



ORDER CODE	DESCRIPTION
BB-035	Baseboard for TMCM-035



BB-301

**Baseboard
for one TMCM-301/TMCM-341
and up to 3 TMCM-035**

INFO

The BB-301 baseboard is designed for the TMCM-301 or TMCM-341 stepper controller to operate with up to three TMCM-035 power drivers. It provides a very small and cost effective solution for a motion control application for up to three size 57 mm stepper motors.

All motor, switch and power lines are accessible via screw terminals. For the general purpose I/Os there is a dual-in-line pin connector. The integrated switch-mode regulator provides the required 5V supply voltage for the modules. The supply voltage input is protected against wrong polarity. The integrated level shifter enables direct connection to a PC or host controller via different interfaces.

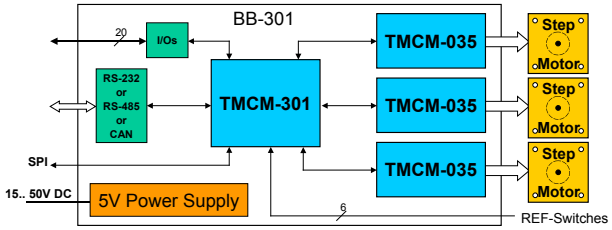
MAIN CHARACTERISTICS

ELECTRICAL DATA
- 15V to 50V DC supply voltage

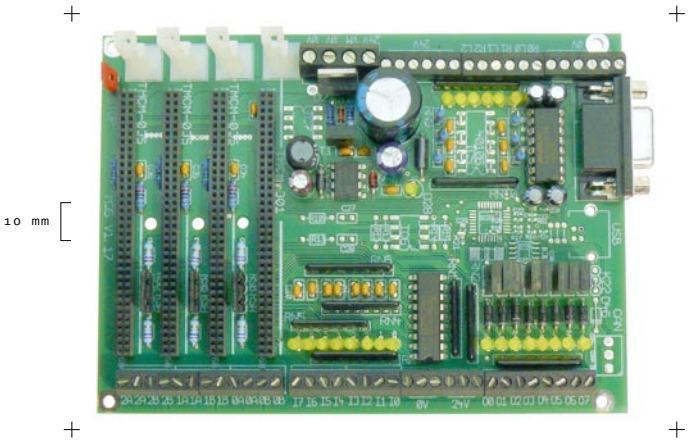
INTERFACE
- all options of the TMCM-301 are supported, additionally a USB interface type is available
- 6 x limit switch,
  8 general purpose digital/analog in,
  8 general purpose digital out

FEATURES
- 1 slot for the TMCM-301/TMCM-341 motion control module
- 3 slots for TMCM-035 power drivers
- 16 times microstepping for the motors
- integrated 5V power supply
- protection: overvoltage suppressor and inverse polarity

OTHER
- screw terminal connectors for I/O signals
- RoHS compliant
- size: 90 x 87 mm², 60 mm height



ORDER CODE	DESCRIPTION
BB-301 (-option)	Baseboard for TMCM-301/TMCM-341 + 3x TMCM-035
OPTIONS	
232	RS-232 interface
485	RS-485 interface
CAN	CAN interface
USB	USB interface (on request)



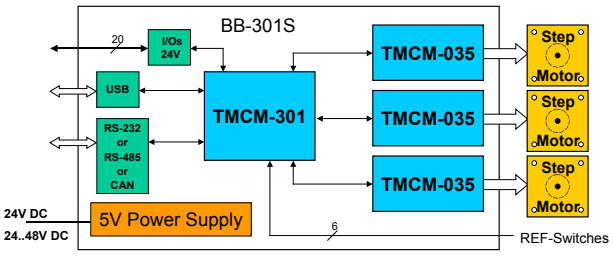
BB-301S

**Baseboard
for one TMCM-301
and up to 3 TMCM-035
with 24V I/Os**

INFO

The BB-301S baseboard is designed for the TMCM-301 or TMCM-341 stepper controller to operate with up to three TMCM-035 power drivers in a 24V industrial environment. It provides a small and cost effective solution for a motion control application for up to three size 57 mm stepper motors.

All motor, switch, I/O and power lines are accessible via screw terminals. For each I/O there is a control LED. The integrated switch-mode regulator provides the required 5V supply voltage for the modules. The supply voltage input is protected against wrong polarity. The integrated level shifter enables direct connection to a PC, PLC or host controller via different interfaces. Several options are available.



MAIN CHARACTERISTICS

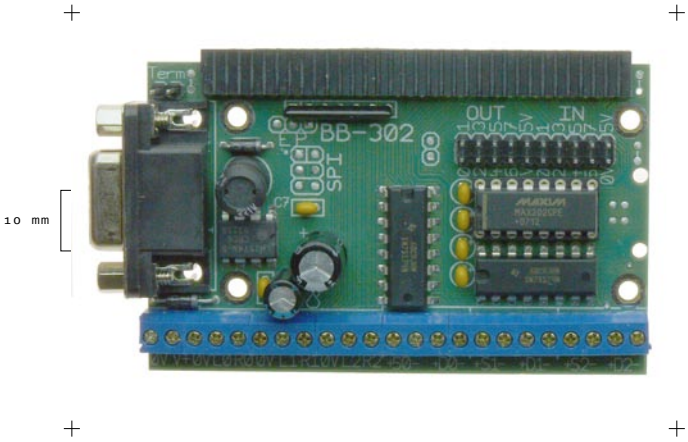
ELECTRICAL DATA
- 15V to 50V DC supply voltage
- seperate +24V supply for I/Os

INTERFACE
- all options of the TMCM-301 are supported
- 6 x limit switch (two per axis) (24V)
  8 general purpose digital/analog in (24V),
  8 general purpose digital out (24V, 1A,
  PNP transistor type output)
- 2 DAC outputs optional

FEATURES
- 1 slot for the TMCM-301/TMCM-341 motion control module
- 3 slots for TMCM-035 power drivers
- control LED for each input and output
- 16 microstep motor driver resolution
- integrated 5V power supply
- protection: overvoltage suppressor and inverse polarity

OTHER
- screw terminal connectors for I/O signals
- RoHS compliant
- size: 133 x 100 mm², 60 mm height

ORDER CODE	DESCRIPTION
BB-301S (-option)	Baseboard for TMCM-301/TMCM-341 + 3x TMCM-035
OPTIONS	
232	RS-232 interface
485	RS-485 interface
USB	USB interface (on request)
LAN	LAN/Ethernet interface (on request)
2ND OPTION	(ADDITIONAL)
+A	Analog-Outputs (on request)
+E	Encoder-Feedback with TMCM-323 (on request)



BB-302

Baseboard
for TMCM-302/TMCM-342

INFO

The baseboard BB-302 provides a simple setup featuring the TMCM-302 or the TMCM-342 high performance controller for external power motor driver with step / direction Interface. The step and direction outputs, switch inputs and the power lines are accessible via screw terminals. For the general purpose I/Os there is a dual-in-line pin connector. The step and direction outputs are equipped with differential drivers. The integrated switch-mode regulator provides the required 5V supply voltage for the module. The supply voltage input is protected against wrong polarity. The integrated level shifter enables direct connection to a PC or other host controller.

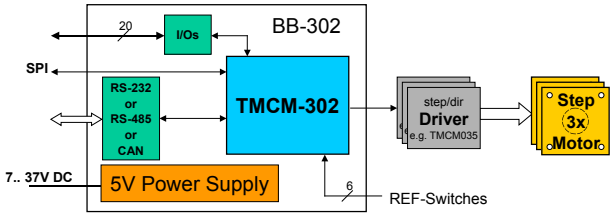
MAIN CHARACTERISTICS

ELECTRICAL DATA
- 7V to 37V DC supply voltage

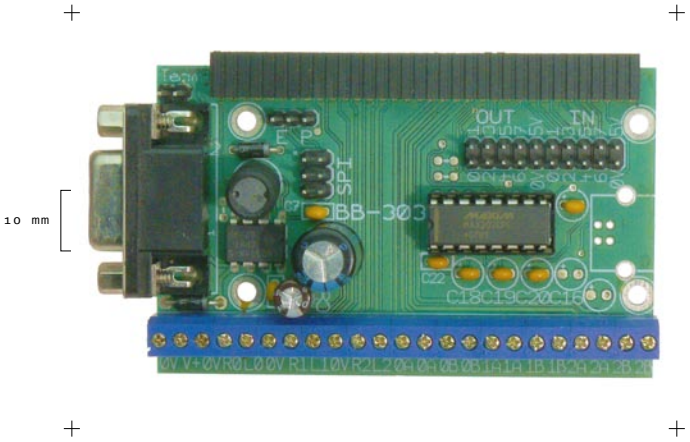
INTERFACE
- all options of the TMCM-302 are supported
- 6 x limit switch (two per axis) ,
  8 general purpose digital/analog in,
  8 general purpose digital out
- 5V differential step/direction outputs
  (can also be used as single ended outputs)

FEATURES
- 1 slot for the TMCM-302/TMCM-342 motion control module
- integrated 5V power supply
- differential step and direction outputs

OTHER
- screw terminal connectors
  for motor control signals
- RoHS compliant
- size: 80 x 50 mm², 15 mm height



ORDER CODE	DESCRIPTION
BB-302 (-option)	Baseboard for TMCM-302/TMCM-342
OPTIONS	
232	RS-232 interface (standard)
485	RS-485 interface
CAN	CAN interface



BB-303

Baseboard for TMCM-303/TMCM-343

INFO The BB-303 provides a simple setup featuring the TMCM-303 or TMCM-343 controller/driver. All important signal and power lines are accessible via screw terminals. The integrated switch-mode regulator provides the required 5V supply voltage for the module. The supply voltage input is protected against wrong polarity. The integrated level shifter enables direct connection to a PC via
RS-232 cable (RS-485 or CAN optionally). A USB option is

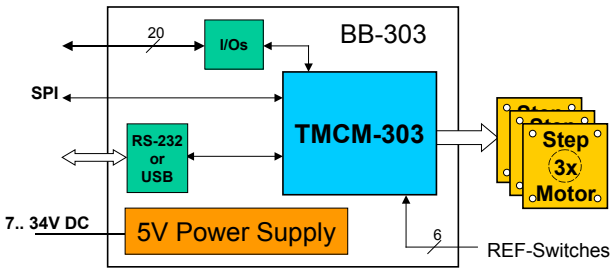
MAIN CHARACTERISTICS

ELECTRICAL DATA
- 7V to 34V DC supply voltage

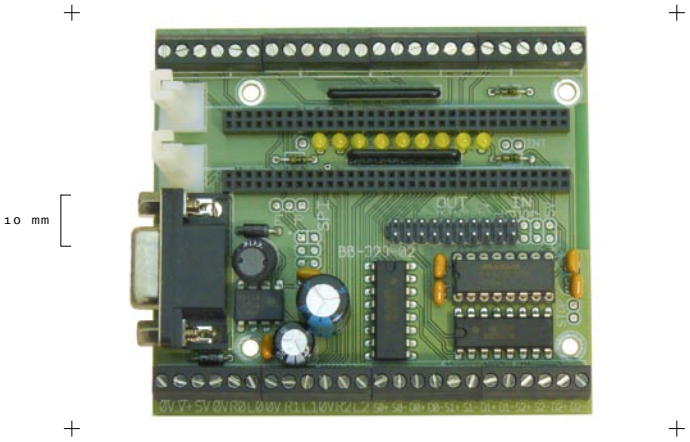
INTERFACE
- all options of the TMCM-303 are supported, an USB interface is available as an option
- 6 x limit switch (two per axis) ,
  8 general purpose digital/analog in,
  8 general purpose digital out

FEATURES
- 1 slot for the TMCM-303/TMCM-343 motion control and driver module
- integrated 5V power supply

OTHER
- screw terminal connectors for motor signals
- RoHS compliant
- size: 80 x 50 mm², 15 mm height



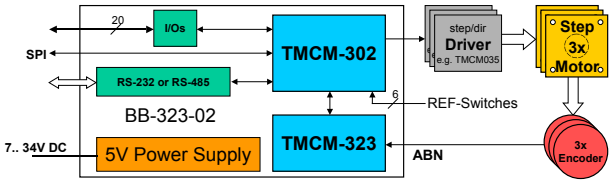
ORDER CODE	DESCRIPTION
BB-303 (-option)	Baseboard for TMCM-303/TMCM-343
OPTIONS	
232	RS-232 interface (standard)
485	RS-486 Interface
CAN	CAN interface
USB	USB interface (on request)

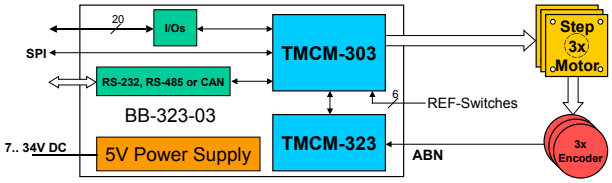


BB-323

Baseboard for TMCM-323 and TMCM-302/TMCM-342 or TMCM-303/TMCM-343

INFO The BB-323 provides a simple setup featuring a TMCM high performance controller and the TMCM-323 incremental encoder module. All important signal and power lines are accessible via screw terminals. Encoder input levels are indicated by LEDs. The integrated switch-mode regulator provides the required 5V supply voltage for the modules. The supply voltage input is protected against wrong polarity. The integrated level shifter enables direct connection to a PC via RS-232 cable (RS-485 or CAN on request).





MAIN CHARACTERISTICS

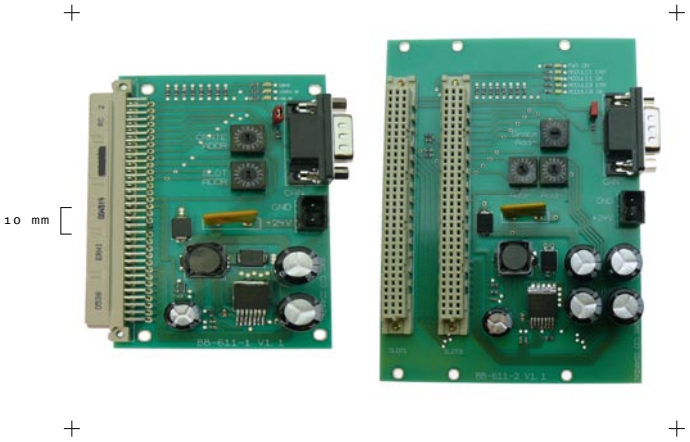
ELECTRICAL DATA
- 7V to 34V DC supply voltage

INTERFACE
- 5V differential or single ended inputs for the incremental encoder signals
- 5V differential step/direction outputs (can also be used as single ended outputs)
- all options of the TMCM controller are supported
- 6 x limit switch (two per axis) , 8 general purpose digital/analog in, 8 general purpose digital out

FEATURES
- 1 slot for the TMCM-323 encoder feedback module and 1 slot for the TMCM-302/TMCM-342 motion control module (option -02) or 1 slot for the TMCM-303/TMCM-343 motion control module (option -03)
- integrated 5V power supply
- differential step and direction outputs

OTHER
- screw terminal connectors for motor control signals and encoder signals
- RoHS compliant
- size:
  - 87 x 77 mm², 60 mm height (-02)
  - 96.5 x 79 mm², 60 mm height (-03)

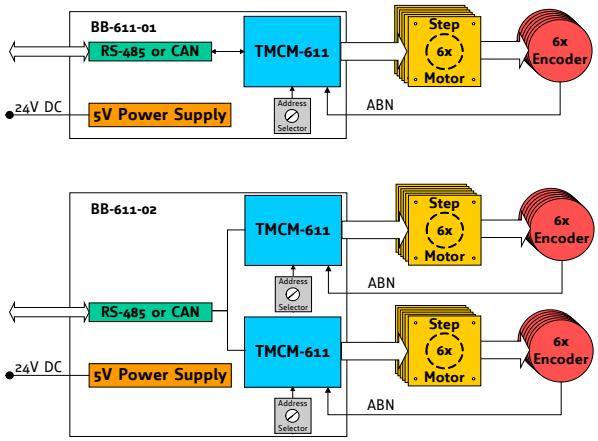
ORDER CODE	DESCRIPTION
BB-323 (-option)	Baseboard for TMCM-323 and TMCM-302/TMCM-342 or TMCM-303/TMCM-343
OPTIONS	
02	Slot for TMCM-302/TMCM-342 controller module
03	Slot for TMCM-303/TMCM-343 controller/driver module



BB-611

Baseboard for TMCM-611

INFO The BB-611-1 and BB-611-2 provide a simple setup featuring one and two TMCM-611 6-axis stepper controller and driver with support for encoder feedback. The integrated switch-mode regulator provides the required 5V supply voltage for the modules. The supply voltage input is protected against wrong polarity. The integrated level shifter enables direct connection to a PC via CAN or RS-485 cable.



MAIN CHARACTERISTICS

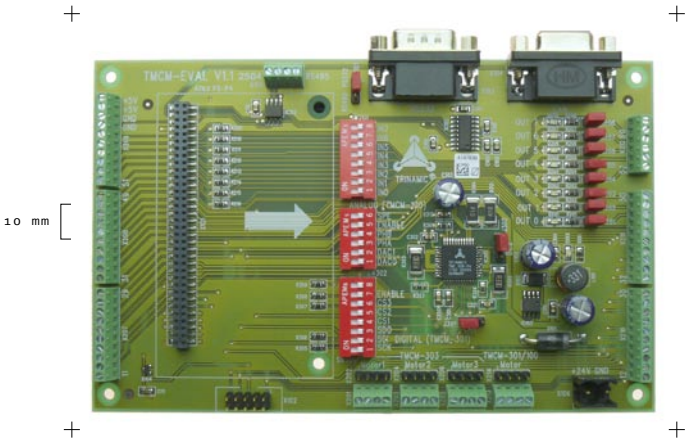
ELECTRICAL DATA
- 24V DC supply voltage

INTERFACE
- Interface: RS-485 or CAN (D-SUB)

FEATURES
- one (-1) or two (-2) slots for the TMCM-611 6-axis stepper controller / driver
- one rotary selector for "crate" address
- one (-1) or two (-2) rotary selector for "slot" address
- integrated 5V power supply
- filter capacitors
- reverse voltage / short circuit protection
- mounting holes 19" rack (-2)

OTHER
- RoHS compliant
- size:
  - 64 x 100 mm², 60 mm height (-1)
  - 95 x 129 mm², 60 mm height (-2)

ORDER CODE	DESCRIPTION
BB-611 (-option)	Baseboard for TMCM-611
OPTIONS	
-1	one slot for TMCM-611 stepper controller / driver
-2	two slots for TMCM-611 stepper controller / driver



TMCM-EVAL

Evaluation Baseboard for TMCM-100, TMCM-301, TMCM-302 or TMCM-303

INFO The TMCM-EVAL is a baseboard which allows to evaluate the operation of the TMCM-Modules. All interface signals of the respective are available on screw terminal connectors. The inputs can be switched and the outputs are seen via LEDs. An integrated stepper motor driver TMC236 allows the operation of a 2 phase stepper motor when using the TMCM-100 or to the TMCM-301.

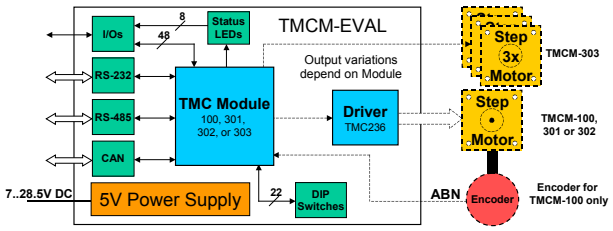
MAIN CHARACTERISTICS

ELECTRICAL DATA
- single DC supply voltage required (7V to 34V)

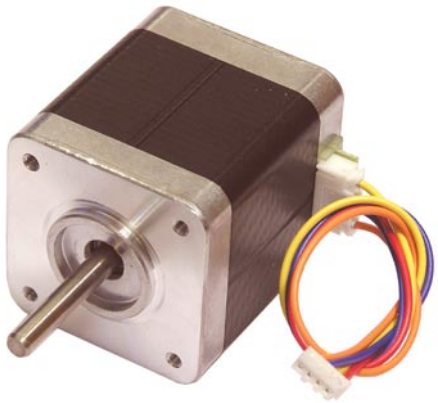
INTERFACE
- Interface: RS-232, RS-485, CAN
- 8 digital/analog inputs (5V), with DIP-switch and screw connectors
- 8 digital outputs (5V) with control LEDs and screw connectors
- 2 switch inputs (5V) per axis on screw terminals

FEATURES
- 1 slot for TMCM-Module (TMCM-100, -301, -302 or -303)
- integrated 5V switching voltage regulator
- 1 axis motor driver with 1.1A/34V (TMC236) used with TMCM-100, -301

OTHER
- RoHS compliant
- size: 160 x 100 mm²



ORDER CODE	DESCRIPTION
TMCM-EVAL or TMCM-Baseboard	Evaluation baseboard for TMCM-100, TMCM-301, TMCM-302 or TMCM-303
TMCM-MOTOR	Testmotor: 2-phase hybrid stepper motor with 42 mm flange



TMCM-MOTOR

Test Motor for TMCM Modules up to 1.1A coil current

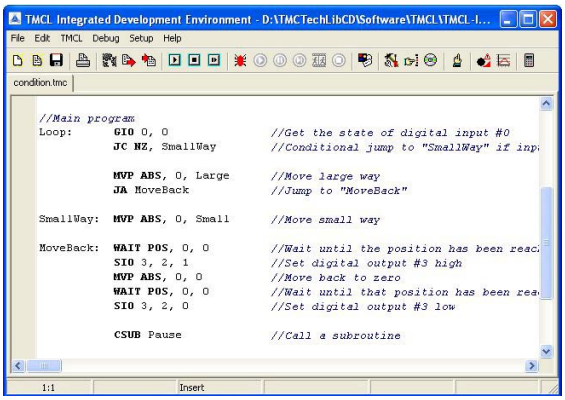
INFO The TMCM-MOTOR allows to test the TMCM modules with a coil current of up to 1.1A RMS. The motor is a selected type from running production. Length, axis length and torque, as well as electrical parameters may vary. The modules can be adapted to the actual motor current rating. Please see motor label for actual data.

MAIN CHARACTERISTICS

ELECTRICAL DATA
- 0.8A to 1.2A RMS coil current (may vary)

FEATURES
- NEMA 17 mounting configuration
- flange 42.2 mm * 42.2 mm
- 5 mm axis diameter
- step angle 1.8°
- optimized for microstep operation
- 4 wire connection

ORDER CODE	DESCRIPTION
TMCM-Motor	Testmotor: 2-phase hybrid stepper motor with 42 mm flange



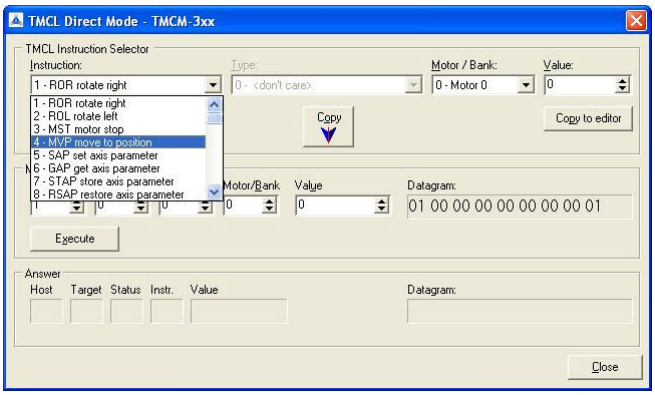
TMCL-IDE

PC Tools: Integrated Development Environment for TMCL (Trinamic Motion Control Language)

INFO

The TMCL-IDE is an integrated development environment for developing stand-alone TMCL applications and for configuring TMCM modules. The built-in editor with TMCL syntax highlighting allows comfortable editing of TMCL programs. TMCL programs can be assembled, debugged and downloaded into the module using all possible interfaces (RS232, RS485, USB, CAN or IIC). From version 1.70 the TMCL-IDE has an integrated true inSystem debugging tool. It is also possible to read back TMCL programs from a module for analyzing and modifying them. These features make it easy to develop and test even larger TMCL applications. The TMCL-IDE also contains other powerful tools that make it possible to easily find the best parameters for StallGuard™ and to calculate velocity and acceleration parameters.

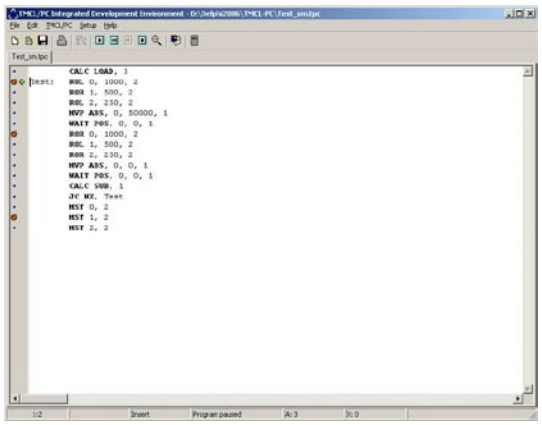
The TMCL-IDE comes free of charge with all Trinamic modules and can be downloaded from the website.



MAIN CHARACTERISTICS

- powerful TMCL editor with syntax highlighting
- TMCL assembler and disassembler
- "Direct Mode" dialogue for online execution of TMCL commands
- "Configure Module" dialogue for setting all important parameters of a module
- StallGuard™ Adjusting Tool for trying StallGuard™ parameters on-line
- StallGuard™ Profiler for finding the best StallGuard™ parameters easily
- parameter calculation tool that allows to calculate velocity and acceleration parameters easily
- tool for updating the firmware of a TMCM module
- integrated true inSystem debugging tool
- possible interfaces:
  RS232, RS485
  (via RS232-RS485 converter,
  USB to RS485 converter or USB2X),
  CAN (via CANnes card or USB2X),
  IIC (via USB2X),
  USB (for TMCM-610 or TMCM-612)
- works with Windows 98, ME, NT4, 2000 and XP
- free download

ORDER CODE	DESCRIPTION
TMCL-IDE	TMCL Integrated Develpoment Environment (free download)



TMCL-PC

PC based TMCL interpreter for multiple module control

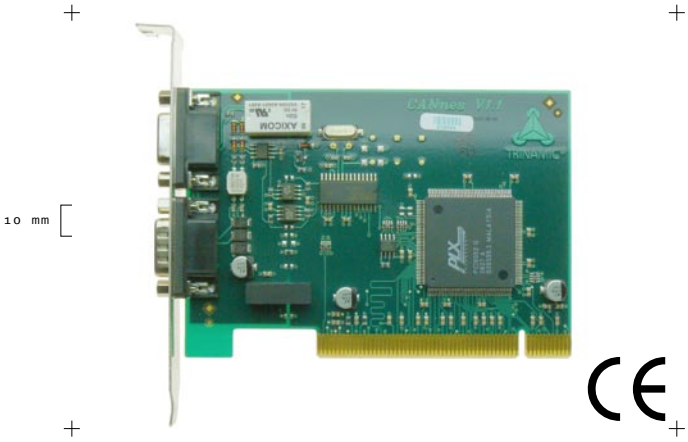
INFO TMCL-PC is a PC based version of the simple-to-use TMCL software. It allows the control of multiple modules via one PC, so that any kind of interaction between the motors and I/Os available on the different modules can be realized. This for example allows the BLDC motor modules to be inter-operated with stepper motor modules.

MAIN CHARACTERISTICS

FEATURES
- executes the simple-to-use TMCL commands on a PC
- can inter-operate any combination of TMCL based modules from a central computer
- single stepping and debugging mode
- supports all interface options using the TRINAMIC interface adapters
- free download

ORDER CODE	DESCRIPTION
TMCL-PC	PC based TMCL interpreter (free download)

Bus interface converters



CANnes

CAN interface
PCI Card

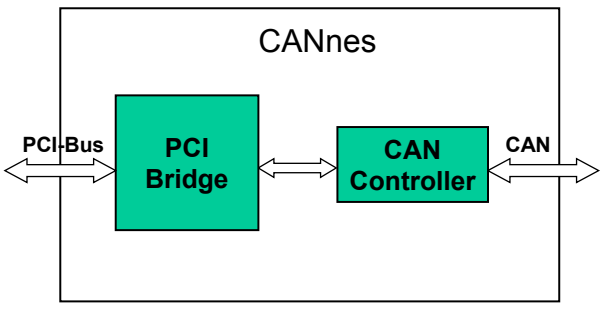
INFO The CANnes card is a PCI card which provides a simple, easy to use CAN interface. It is equipped with a male and a female 9 pin Sub-D connector with standard CAN pin assignments. CAN bit rates between 10 and 1000 kBit/s (1MBit/s) are possible. The industry standard CAN controller SJA1000 is used together with the CAN bus driver 82C250 and optical isolation between the CAN controller and the CAN bus driver. A 120 ohms termination resistor is also provided. This resistor can be switched on and off either by a software controlled relay. Device drivers and function libraries are provided for the Windows (98/ME/2000 and NT4) operating systems and also for the Linux operating system. The CANnes cards is CE-approved and also meets FCC specifications. It can be used with every PC which is equipped with PCI slots fulfilling at least the PCI 2.1 standard.

MAIN CHARACTERISTICS

FEATURES
- supports CAN V2.0a and V2.0b (11 bit and 29 bit identifiers)
- CAN bit rates of up to 1Mbit/s
- 120 ohms termination resistor that can be switched on or off by software

SOFTWARE
- simple CAN monitoring software supplied with this product
- easy programming and integration into user applications via simple DLL functions

OTHER
- RoHS compliant



ORDER CODE	DESCRIPTION
TMC CANnes	CAN interface PCI-card

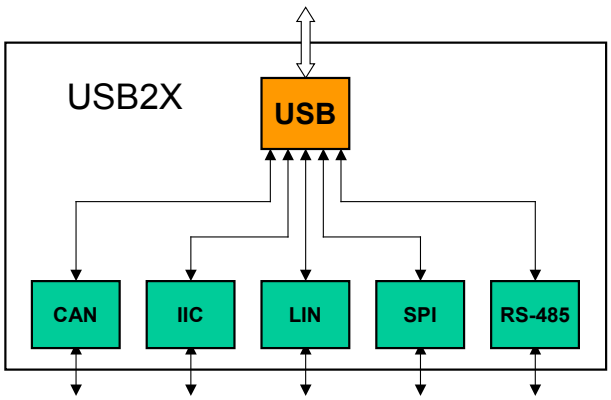
USB-2-X

USB
to CAN, IIC, RS485, SPI, LIN
Interface Converter

INFO

The Engineer's „Swiss Army Knife" for Serial Bus Systems

The USB-2-X device is an interface converter that is equipped with a CAN interface, an IIC interface, a LIN interface, an SPI interface and an RS-485 interface. It is connected to the PC via an USB interface. The USB-2-X device is mainly designed for use with some of the Trinamic evaluation kits, but it can also be used in any other purpose where a connection between a PC and a CAN interface, an IIC interface, a LIN interface, an SPI interface or an RS485 interface is needed. The software supplied with this product can be used with every version of the Windows operating system that supports USB (Windows 98, Windows ME, Windows 2000, Windows XP). The USB-2-X device can be connected to USB 1.1 or USB 2.0 hosts and supports the full bitrate of 12MBit/s. It is fully powered by the bus, so no extra power supply is needed.



MAIN CHARACTERISTICS

- **USB host interface**
  connection to USB 1.1 or USB 2.0 hosts possible (a cable is included)
  USB full speed device (12MBit/s)
  bus powered (no extra power supply needed)
- **CAN**
  CAN 2.0A and 2.0B compatible
  standard (11 bit) and extended (29 bit) identifier possible
  transceiver: ISO 11898 compatible
  maximum bit rate: 1MBit/s
  120 ohms termination resistor can be activated with a jumper
- **LIN**
  compatible with LIN specification rev 1.3
  up to 20kBit/s
  Industry standard transceiver
- **I²C**
  single master
  up to 400kBit/s
  7-bit addressing
- **RS-485**
  · half duplex communication mode
  · industry standard 75176 transceiver
  · 2400, 9600 and 19200 bps supported
- **SPI**
  · master functionality
  · user defined bit rate up to 3.7MBit/s
- RoHS compliant

ORDER CODE	DESCRIPTION
TMC USB-2-X V2	USB interface converter (with USB cable)

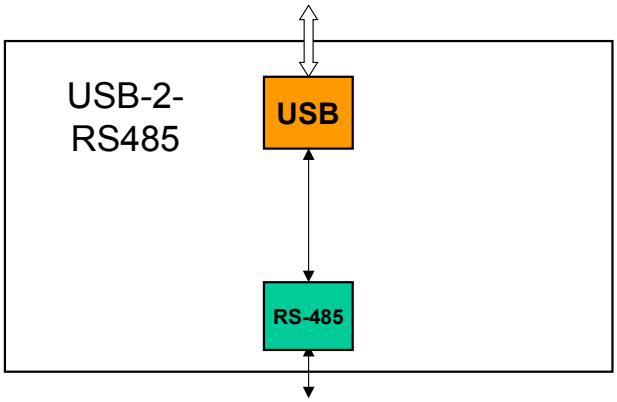
USB-2-485

**USB to RS485
Interface Converter
with Virtual COM Port Driver**

INFO The USB-2-485 device is a low-cost interface converter that supplies a simple-to-use RS485 interface to a PC with an USB port. The USB-2-485 device can be used erverywhere where an RS485 interface is needed, since it does not require special software. It can be operated with most simple terminal programes supporting the serial interface. The software supplied with this product can be used with every version of the Windows operating system that supports USB (Windows 98, Windows ME, Windows 2000, Windows XP). The USB-2-485 device can be connected to USB 1.1 or USB 2.0 hosts and supports the full bitrate of 12MBit/s. It is fully powered by the bus, so no extra power supply is needed.

MAIN CHARACTERISTICS

- **USB host interface**
  connection to USB 1.1 or USB 2.0 hosts possible (a cable is included)
  USB full speed device (12MBit/s)
  bus powered (no extra power supply needed)
- **RS485**
  half duplex communication mode
  supports all standard baud rates
  up to 3Mb/s supported
- **Software**
  virtual COM port driver included
  can be used with standard terminal programs, e.g. Hyperterminal
- RoHS compliant



ORDER CODE	DESCRIPTION
TMC USB-2-485	USB interface converter (with USB Cable)

Mechatronic drives with stepper motor

Mechatronic drives with BLCD motor

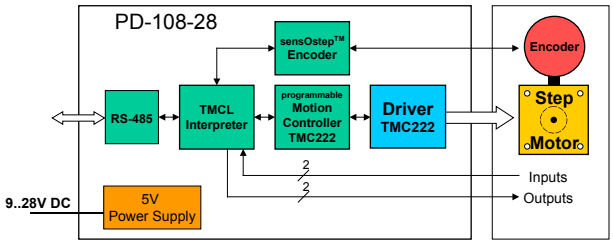
10 mm

PD-108-28

**28mm / NEMA11
Stepper Motor with
Controller / Driver
and Serial Interface**

INFO

The PD-108-28 is a full mechatronic solution including a 28 mm flange motor (NEMA11). It joins a convenient controller electronic and a sensOstep™ encoder with a range of different motor torques. The PD-108-28 offers two motor torque options and can be controlled via RS-485 serial interface. The power supply, interface and the multi purpose I/Os can be connected via a single small JST connectors. The PD-108-28 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" a rapid and fast development of motion control applications is guaranteed. Communication traffic is kept low since all time critical operations, e.g. ramp calculation are performed on board. Full remote control of device with feedback is possible. The firmware of the module can be updated via the serial interface.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- 9V to 28V supply voltage

MOTOR DATA
- motor length: 32 mm / 51 mm
  max. torque 0.06 Nm / 0.12 Nm
- please also refer to the motor datasheet

INTERFACE
- RS-485
- 2 general purpose inputs
- 2 general purpose outputs

FEATURES
- up to 16 times microstepping
- memory for 64 TMCL commands
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- sensOstep™ Encoder for motor stall detection (e.g. end position reached, overload)
- dynamic current control

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

OTHER
- 8-pin pluggable JST connectors / cables included
- RoHS compliant

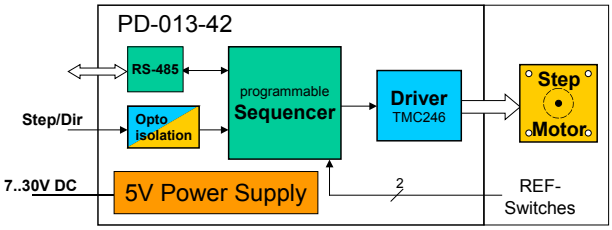
ORDER CODE	DESCRIPTION
PD1-108-28-SE (-option)	PANdrive 0.06 Nm with QSH2818-32-07-006 motor and sensOstep encoder
PD3-108-28-SE (-option)	PANdrive 0.12 Nm with QSH2818-51-07-012 motor and sensOstep encoder
OPTIONS	
485	RS-485 interface

10 mm

PD-013-42

**42mm / NEMA17
Stepper Motor with
Step / Direction Driver**

INFO The PD-013-42 is a full mechatronic solution including a 42 mm flange motor. It joins a convenient controller electronic with a range of different motor torques. The PD-013-42 offers three motor torques options and can be controlled via an optical isolated Step / Direction interface. The power supply, interface and the multi purpose I/Os can be connected with small JST connectors. The firmware of the module can be updated via the serial interface. With the integrated stallGuard™ feature it is possible to detect overload and stall of the motor.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- 7V to 30V supply voltage

MOTOR TYPES
- motor length: 53 mm / 59 mm / 69 mm: max. torque 0.27Nm / 0.35Nm / 0.49Nm

INTERFACE
- Step / Direction input (5 – 24V signal) with up to 350kHz microstep frequency
- driver disable input
- RS485 host interface (optional use / use for parameterization)
- 2 local inputs for reference switches

FEATURES
- optically isolated inputs for step, direction and disable
- up to 256 times adjustable microstep resolution
- adjustable standby current
- reference move and turn CW / CCW via RS-485
- stallGuard™ for reference search

SOFTWARE
- ASCII protocol controlled using simple terminal software

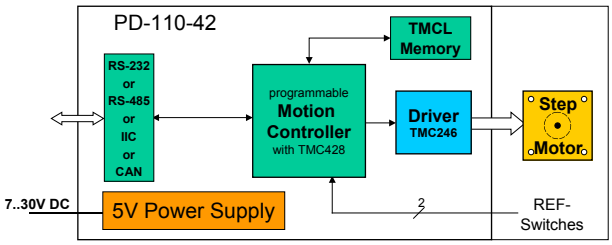
OTHER
- pluggable connectors for all signals / cable included
- RoHS compliant

ORDER CODE	DESCRIPTION
PD1-013-42	PANdrive 0.27 Nm with QSH4218-35-10-027 motor and step / direction
PD2-013-42	PANdrive 0.35 Nm with QSH4218-41-10-035 motor and step / direction
PD3-013-42	PANdrive 0.49 Nm with QSH4218-51-10-049 motor and step / direction

PD-110-42

42mm / NEMA17 Stepper Motor with Controller / Driver and Serial Interface

INFO The PD-110-42 is a full mechatronic solution including a 42 mm flange motor. It joins a convenient controller electronic with a range of different motor torques. The PD-110-42 offers three motor torque options and can be controlled via RS-232, RS-485, CAN or IIC interface. The power supply, interface and the multi purpose I/Os can be connected with small JST connectors. The PD-110-42 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" a rapid and fast development of motion control applications is guaranteed. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation are performed on board. The TMCL program can be stored in the on board EEPROM for stand-alone operation. The firmware of the module can be updated via the serial interface. With the stallGuard™ feature it is possible to detect motor overload or motor stall.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- 7V to 34V supply voltage

MOTOR DATA
- total length: 53mm / 59mm / 69mm: max. torque 0.27Nm / 0.35Nm / 0.49Nm
- please also refer to the motor datasheet

INTERFACE
- RS-232, RS-485, I²C or CAN 2.0b host interface
- 2 inputs for reference and stop switches
- 1 general purpose input and 1 output

FEATURES
- up to 16 times microstepping
- memory for 2048 TMCL commands
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- stallGuard™ for sensorless motor stall detection
- dynamic current control

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

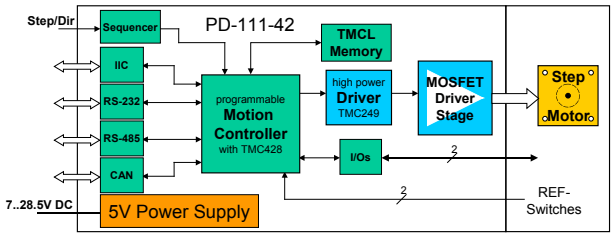
OTHER
- pluggable JST connectors / cables included
- RoHS compliant

ORDER CODE	DESCRIPTION
PD1-110-42 (-option)	PANdrive 0.27Nm with QSH4218-35-10-027 motor
PD2-110-42 (-option)	PANdrive 0.35Nm with QSH4218-41-10-035 motor
PD3-110-42 (-option)	PANdrive 0.49Nm with QSH4218-51-10-049 motor
OPTIONS	
232	RS-232 interface
485	RS-485 interface
IIC	I²C interface
CAN	CAN interface

PD-111-42

**42mm / NEMA17
High Performance
Stepper Motor with
Controller / Driver
and Serial Interface**

INFO The PD-111-42 is a full mechatronic solution including a 42 mm flange high torque motor. Its high motor current allows up to 1200 RPM movement and high precision 64 microsteps. The PD-111-42 can be controlled via RS232, IIC, RS485 or CAN interface. The power supply, interface and the multi purpose I/Os can be connected with small JST connectors. The PD-111-42 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL).
Using predefined TMCL high level commands like „move to position" or „constant rotation" a rapid and fast development of motion control applications is guaranteed. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation are performed on board. The TMCL program can be stored in the on board EEPROM for stand-alone operation. The firmware of the module can be updated via the serial interface. With the stallGuard™ feature it is possible to detect motor overload or motor stall.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- 7V to 28.5V supply voltage

MOTOR DATA
- total length: 74 mm: max. torque 0.46Nm
- up to 1200 RPM at 0.25Nm
- motor uses 2.8A RMS current

INTERFACE
- RS-232, I²C, RS-485 or CAN 2.0b host interface
- 2 inputs for reference and stop switches
- 1 general purpose input and 1 output

FEATURES
- up to 64 times microstepping
- memory for 2048 TMCL commands
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- stallGuard™ for sensorless motor stall detection
- dynamic current control

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

OTHER
- pluggable JST connectors / cables included
- RoHS compliant

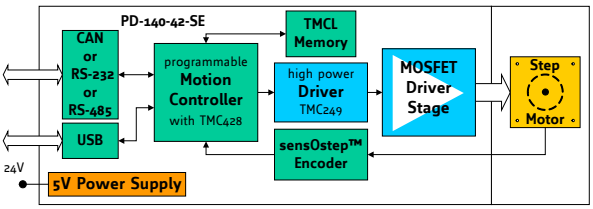
ORDER CODE	DESCRIPTION
PD-111-42 (-option)	PANdrive 0.46 Nm with high speed motor
OPTIONS	
485	RS-485, RS-232 and I2C interface
CAN	CAN, RS-232 and I2C interface

PD-140-42-SE

42mm / NEMA17 Stepper Motor with Controller / Driver, Encoder and Serial Interface Optional CANopen

INFO

The PANdrive PD-140-42-SE is a mechatronic solution including a 42 mm flange motor, a controller board and a sensOstep™ encoder. It offers four motor torque options and can be controlled via CAN, RS-232, RS-485 or USB interface. Power supply, interface and multi purpose I/Os can be connected with small JST connectors. The chopSync™ feature allows high speed movement avoiding resonances. The PD-140-42-SE comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" a rapid and fast development of motion control applications is guaranteed. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation are performed on board. The TMCL program can be stored in the onboard EEPROM for stand-alone operation. An optional firmware allows to control the PANdrive via CANopen.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- 7V to 28.5V supply voltage

MOTOR DATA
- holding torque 0.22 / 0.36 / 0.44 / 0.70 Nm

INTERFACE
- CAN 2.0b (up to 1Mbit/s) host, RS232 or RS485 interface and USB interface
- two inputs for reference and stop switches
- two 24V compatible general purpose inputs and two open-collector outputs

FEATURES
- integrated sensOstep™ encoder for position identification and stall detection
- chopSync™ for high speed movement
- up to 16 times microstepping
- memory for 2048 TMCL commands
- motion profile calculation in hardware (RT)
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- dynamic current control

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included
- optional CANopen firmware (CiA 301, 402)

OTHER
- pluggable JST connectors / cables included
- RoHS compliant

ORDER CODE	DESCRIPTION
PD1-140-42-SE (-option)	PANdrive 0.22 Nm, 48 mm length with QSH4218-34-20-022 motor
PD2-140-42-SE (-option)	PANdrive 0.36 Nm, 52 mm length with QSH4218-38-20-036 motor
PD3-140-42-SE (-option)	PANdrive 0.44 Nm, 61 mm length with QSH4218-47-20-044 motor
PD4-140-42-SE (-option)	PANdrive 0.70 Nm, 74 mm length with QSH4218-60-20-070 motor
INTERFACE OPTIONS	
232	USB & RS-232 interface (TMCL firmware)
485	USB & RS-485 interface (TMCL firmware)
CAN	USB & CAN interface (TMCL firmware)
CANopen	USB & CAN interface (CANopen firmware)

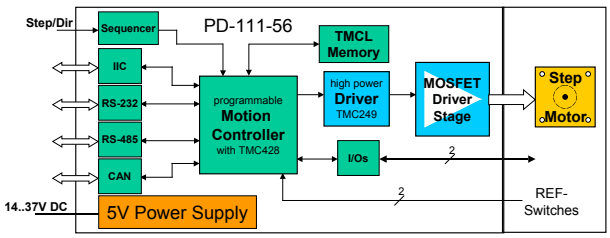
PD-111-56

**56mm / NEMA23
High Performance
Stepper Motor with
with Controller / Driver
and Serial Interface**

INFO

The PD-111-56 is a full mechatronic solution including a 56mm flange high torque motor. The low resistance of the motor coils and the supported high motor current allows highly dynamic operation. The driver electronics supports up-to 64 micro-steps. The PD-111-56 can be controlled via RS-232, IIC, RS-485 or CAN, interfaces. For connection of power supply and motor coils screw connectors are available. Communication interfaces and multi purpose I/Os can be connected via small JST connectors.

The PD-111-56 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" a rapid and fast development of motion control applications is guaranteed. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation are performed on board. The TMCL program can be stored in the on board EEPROM for stand-alone operation. With the stallGuard™ feature it is possible to detect motor overload or motor stall.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- 15V to 36V supply voltage
- 5A RMS nominal motor current (7A peak)

MOTOR DATA
- total length 85mm
- max. torque 0.78Nm
- up to 1200 RPM at 0,56Nm
- 5A RMS max. coil current

INTERFACE
- RS-232, RS-485 or CAN 2.0b, I2C
- two inputs for reference and stop switches
- 1 general purpose input and output

FEATURES
- high accuracy 64 times micro-stepping
- high current for highly dynamic drive
- EEPROM for 2048 TMCL commands
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- stallGuard™ for sensorless motor stall detection
- full step frequencies up to 20kHz
- dynamic current control

SOFTWARE
- stand alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

OTHER
- pluggable JST connectors / cables included
- RoHS compliant

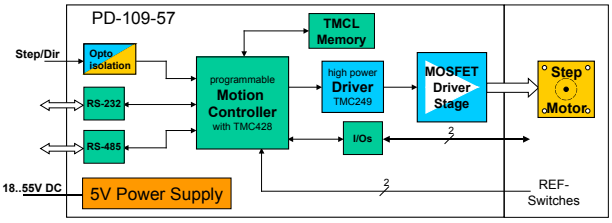
ORDER CODE	DESCRIPTION
PD-111-56 (-option)	PANdrive 0.78 Nm with high speed motor
OPTIONS	
485	RS-232, I2C and RS-485 interface
CAN	RS-232, I2C and CAN interface

PD-109-57

57mm / NEMA23 Stepper Motor with Controller / Driver and Serial Interface

INFO

The PD-109-57 is a full mechatronic solution including a 57 mm flange motor (NEMA23). It combines a convenient controller electronic with a range of different motor types. The PD-109-57 offers three motor torque options and can be controlled via RS-232 or RS-485 interface. The power supply, interface and the multi purpose I/Os can be connected via two pluggable screw connectors. The PD-109-57 comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" a rapid and fast development of motion control applications is guaranteed. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation are performed onboard. The TMCL program can be stored in the on-board EEPROM for stand-alone operation. The firmware of the module can be updated via the serial interface. With the stallGuard™ feature it is possible to detect motor overload or motor stall.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- 18V to 55V supply voltage
- 3A RMS nominal motor current (5A peak possible)

MOTOR DATA
- total length: 71 mm / 85 mm / 108 mm: max. torque 0.47Nm / 0.98Nm / 1.63Nm
- please also refer to the motor datasheet

INTERFACE
- RS232 and RS485 host interface
- 2 inputs for reference and stop switches
- 1 general purpose input and 1 output

FEATURES
- up to 16 times microstepping
- memory for 2048 TMCL commands
- automatic ramp generation in hardware
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- stallGuard™ for sensorless motor stall detection
- optically isolated inputs
- dynamic current control

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

OTHER
- pluggable screw terminal connectors for all external signals
- RoHS compliant

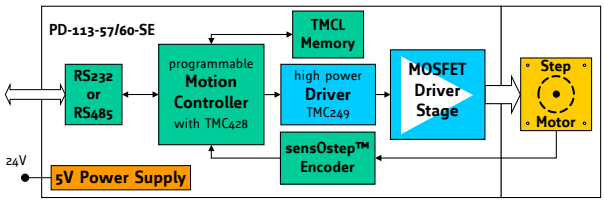
ORDER CODE	DESCRIPTION
PD1-109-57 (-option)	PANdrive 0.47 Nm with motor QSH5718-41-30-047
PD2-109-57 (-option)	PANdrive 0.98 Nm with motor QSH5718-55-30-098
PD3-109-57 (-option)	PANdrive 1.63 Nm with motor QSH5718-79-30-163
OPTIONS	
RS	RS-232 and RS-485 interface
CAN	CAN interface (ask for availability)

PD-113-57-SE
PD-113-60-SE

57mm / NEMA23 or 60mm / NEMA24 Stepper Motor with Controller / Driver, with Encoder and Serial Interface

INFO

The PD-113-57/60-SE is a full mechatronic solution including a 57 or 60 mm flange motor (NEMA23/NEMA24). It combines a convenient controller electronic and a sensOstep™ encoder with a range of different motor types and can be controlled via RS-232 or RS485 interface. The chopSync™ feature allows high velocity operation avoiding resonances. The PD-113-57/60-SE comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" a rapid and fast development of motion control applications is guaranteed. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation are performed onboard.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- nom. 24V DC supply voltage (±8.5V max.)
- up to 2.8A RMS coil current

MOTOR DATA
- please also refer to the motor datasheet

INTERFACE
- RS232 or RS485 interface
- 2 inputs for reference switches
- 2 general purpose inputs (+24V compatible)
- 2 general purpose outputs (open-collector)

FEATURES
- sensOstep™ encoder (max. 256 incr./rot.)
- chopSync™ for high velocity operation
- stallGuard™ for motor stall detection
- up to 16 times microstepping
- memory for 2048 TMCL commands
- motion profile calculation in real-time
- on the fly alteration of motion parameters
- dynamic current control
- integrated protection

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included

OTHER
- RoHS compliant

ORDER CODE	DESCRIPTION
PD1-113-57-SE (-option)	PANdrive 0.55 Nm, 65 mm length with motor QSH5718-41-28-055
PD2-113-57-SE (-option)	PANdrive 1.01 Nm, 75 mm length with motor QSH5718-51-28-101
PD1-113-60-SE (-option)	PANdrive 1.10 Nm, 69 mm length with motor QSH6018-45-28-110
PD2-113-60-SE (-option)	PANdrive 1.65 Nm, 80 mm length with motor QSH6018-56-28-165
PD3-113-60-SE (-option)	PANdrive 2.10 Nm, 89 mm length with motor QSH6018-65-28-210
PD4-113-60-SE (-option)	PANdrive 3.10 Nm, 110 mm length with motor QSH6018-86-28-310
OPTIONS	
232	RS232 interface
485	RS485 interface

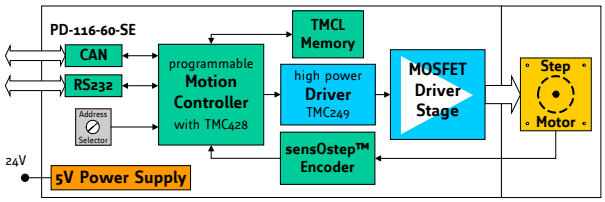
10 mm

PD-116-60-SE

60mm / NEMA24 Stepper Motor with Controller / Driver, with Encoder and Serial Interface

INFO

The PD-116-60-SE is a full mechatronic solution including a 60 mm flange motor (NEMA24). It combines a convenient controller electronic and a sensOstep™ encoder with a range of different motor types. The PD-116-60-SE offers four motor torque options and can be controlled via RS-232 or CAN interface. Power supply, RS232 interface and multi purpose I/Os can be connected via a 15-pin D-Sub connector and CAN via a 9-pin D-Sub connector. The chopSync™ feature allows high speed movement avoiding resonances. The PD-116-60-SE comes with the PC based software development environment TMCL-IDE for the Trinamic Motion Control Language (TMCL). Using predefined TMCL high level commands like „move to position" or „constant rotation" a rapid and fast development of motion control applications is guaranteed. Communication traffic is kept very low since all time critical operations, e.g. ramp calculation are performed onboard. The TMCL program can be stored in the on-board EEPROM for stand-alone operation. An optional firmware allows to control the PD-116-60-SE via CANopen. The firmware of the module can be updated via the serial interface.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- nom. 24V DC supply voltage (±8.5V max.)
- up to 2.8A RMS coil current

MOTOR DATA
- holding torque 1.10 / 1.65 / 2.10 / 3.10 Nm
- please also refer to the motor datasheet

INTERFACE
- CAN 2.0b (up-to 1Mbit/s) and RS232 interface
- five 24V compatible inputs (stop- and home-switch) and 3 open-collector outputs

FEATURES
- sensOstep™ encoder (max. 4096 incr./rot.)
- chopSync™ for high velocity operation
- stallGuard™ for motor stall detection
- up to 64 times microstepping
- memory for 2048 TMCL commands
- rotary switches to adjust CAN-ID
- motion profile calculation in real-time
- on the fly alteration of motion parameters
- dynamic current control
- integrated protection
- TRINAMIC driver technology: low power dissipation, no heatsink required

SOFTWARE
- stand-alone operation using TMCL or remote controlled operation
- PC-based application development software TMCL-IDE included
- optional CANopen firmware (CiA 301, 402)

OTHER
- 15-pin D-Sub connector (male)
- 9-pin D-Sub connector (male)
- RoHS compliant

ORDER CODE	DESCRIPTION
PD1-116-60-SE (-option)	PANdrive 1.10 Nm, 77 mm length with motor QSH6018-45-28-110
PD2-116-60-SE (-option)	PANdrive 1.65 Nm, 88 mm length with motor QSH6018-56-28-165
PD3-116-60-SE (-option)	PANdrive 2.10 Nm, 97 mm length with motor QSH6018-65-28-210
PD4-116-60-SE (-option)	PANdrive 3.10 Nm, 118 mm length with motor QSH6018-86-28-310
OPTIONS	
TMCL	with TMCL firmware
CANopen	with CANopen firmware

PD-163-42

**42mm / NEMA17
High Performance
BLDC Motor with
Controller / Driver
and Serial Interface**

INFO The PD-163-42 is a full mechatronic solution including a 42 mm brushless DC motor (NEMA 17). It combines a convenient BLDC controller/driver electronic (TMCM-163-42) with a range of different motor types with internal HALL sensor.
The PD-163-42 offers two motor torque options and can be controlled via RS232 or RS485 interface. Power supply and motor coils are connected via flat connectors and communication interface and the multi-purpose I/Os can be connected via high density JST connectors. It integrates a PID-regulator for velocity control. In addition, the module supports positioning based on the motors hall sensor information.

MAIN CHARACTERISTICS

ELECTRICAL DATA
- 12V to 38V supply voltage
- up to 12A coil current

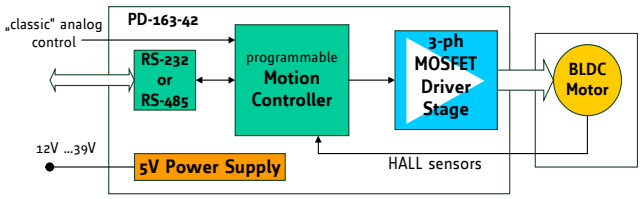
MOTOR DATA
- total length: 81 mm / 100 mm + module
- rated torque 0.185 Nm / 0.25 Nm
- max. peak torque 0.56 Nm / 0.75 Nm
- nominal 4000 RPM at rated torque
- number of poles: 8
- please also refer to the motor datasheet

INTERFACE
- RS-232 or RS-485 interface

FEATURES
- on the fly alteration of motion parameters (e.g. position, velocity, acceleration)
- remote controlled using TMCL commands
- high efficiency, low power dissipation electronics
- integrated protection: overload / overtemperature

SOFTWARE
- stand-alone (analog) operation or remote controlled operation
- PC-based demonstration software allows setting of all parameters

OTHER
- pluggable conectors
- RoHS compliant

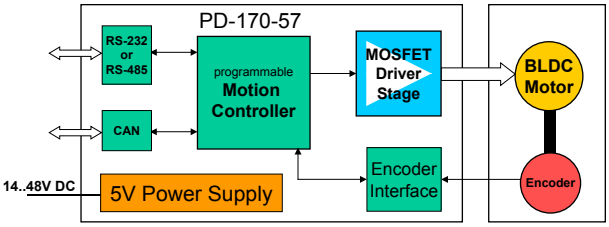


ORDER CODE	DESCRIPTION
PD3-163-42 (-option)	PANdrive 0.185 Nm with BLDC motor
PD4-163-42 (-option)	PANdrive 0.250 Nm with BLDC motor
OPTIONS	
232	RS-232 interface
485	RS-485 interface

PD-170-57

**57mm diameter
BLDC Encoder Motor with
Controller / Driver
and Serial Interface**

INFO The PD-170-57 is a full mechatronic solution including a 57 mm brushless DC motor. It combines a convenient servo controller electronic (TMCM-170) and an optical encoder with a range of different motor types. The PD-170-57 offers two motor torque options and can be controlled via RS232, RS485 or CAN interface. The power supply can be connected via screw connectors and the interface and the multi-purpose I/Os can be connected via high density JST connectors. This PANdrive combines the high resolution commonly known from stepper motors with the high dynamic, high velocity and high reliability of a BLDC drive. It integrates a position regulator and a ramp generator. The ramp generators supports parameterized smooth positioning also with an external switch in order to support an absolute position reference.



MAIN CHARACTERISTICS

ELECTRICAL DATA
- 12V to 48V supply voltage
- up to 10A coil current

MOTOR DATA
- total length: 144 mm / 156 mm
- rated torque: 0.32 / 0.42 Nm
- number of poles: 4
- please also refer to the motor datasheet

INTERFACE
- RS-232, RS-485 or CAN 2.0b host interface

FEATURES
- servo drive allows ultra precise and fast positioning
- automatic positioning ramp generation with all parameters changeable on-the-fly
- different start up-modes for commutation and initialization
- high efficiency, low power dissipation electronics
- integrated protection: reverse polarity, overload / overtemperature
- 3 channel encoder with 500 CPR giving a resolution of 2000 positions per revolution

SOFTWARE
- stand alone operation (analog control or TMCL program) or remote controlled operation
- PC-based demostration software allows setting of all parameters

OTHER
- Pluggable connectors for interface
- RoHS compliant

ORDER CODE	DESCRIPTION
PD4-170-57-E (-option)	BLDC servo module with motor QBL5704-94-04-032
PD5-170-57-E (-option)	BLDC servo module with motor QBL5704-116-04-042
OPTIONS	
232	RS-232 and CAN interface
485	RS-485 and CAN interface

QMot stepper motors

QMot BLDC motors

10 mm

QSH 2818

28 mm / NEMA11
1.8° step angle
high torque
hybrid stepper motor

INFO These two phase hybrid stepper motors are optimized for micro-stepping and give a good fit to the TRINAMIC family of motor controllers and drivers. They can be used in very space critical applications and allow high RPM due to their low back EMF. They are also used in the 28mm PANdrive mechatronics familiy.

MAIN CHARACTERISTICS

- NEMA 11 mounting configuration
- flange max. 28 mm * 28 mm
- 5 mm axis diameter, 20 mm length, D-Cut
- step angle: 1.8°
- optimized for microstep operation
- optimum fit for TMC222 / TMC236 / TMC246 based driver circuits
- 4 wire connection
- neodymium magnets for maximum torque
- CE approved
- RoHS compliant

SPECIFICATIONS	UNIT	-32-07-006	-51-07-012
Rated phase current	A	0.67	0.67
Ph. resistance at 20°C		5.6	9.2
Ph. inductance (typ.)	mH	3.4	7.2
Holding torque (typ.)	Ncm	6	12
Detent torque	Ncm		
Rotor inertia	gcm²	9	18
Weight (mass)	kg	0.11	0.20
Motor length	mm	32.0	51.0
Related PAN-drive	Type	PD1-...-42	PD3-...-42

ORDER CODE	DESCRIPTION
QSH2818-32-07-006	QMot Steppermotor 28 mm, 0.67A, 0.06 Nm
QSH2818-51-07-012	QMot Steppermotor 28 mm, 0.67A, 0.12 Nm

QSH 4218

42 mm / NEMA17
1.8° step angle
high torque
hybrid stepper motor

INFO These two phase hybrid stepper motors are optimized for microstepping and give a good fit to the TRINAMIC family of motor controllers and drivers. They are also used in the 42 mm PANdrive mechatronics family.

MAIN CHARACTERISTICS

- NEMA 17 mounting configuration
- flange max. 42.2 mm * 42.2 mm
- 5 mm axis diameter, 20 mm length
- Step angle: 1.8°
- optimized for microstep operation
- optimum fit for TMC236 / TMC246 based driver circuits
- up to 40V operating voltage
- 4 wire connection
- neodymium magnets for maximum torque
- RoHS compliant

SPECIFICATIONS	UNIT	-35-10-027	-41-10-035	-51-10-049
Rated phase current	A	1.0	1.0	1.0
Ph. resistance at 20°C		2.95	2.86	3.00
Ph. inductance (typ.)	mH	4.45	6.74	5.5
Holding torque (typ.)	Ncm	27	35	49
Detent torque	Ncm	1.6	1.6	2.5
Rotor inertia	gcm²	45	66	90
Weight (mass)	kg	0.23	0.30	0.38
Motor length	mm	34.5	39	49
Related PAN-drive	Type	PD1-...-42	PD2-...-42	PD3-...-42

ORDER CODE	DESCRIPTION
QSH4218-35-10-027	QMot Steppermotor 42 mm, 1A, 0.27 Nm
QSH4218-41-10-035	QMot Steppermotor 42 mm, 1A, 0.35 Nm
QSH4218-51-10-049	QMot Steppermotor 42 mm, 1A, 0.49 Nm

QSH 5718

57 mm / NEMA23
1.8° step angle
high torque
hybrid stepper motor

INFO These two phase hybrid stepper motors are optimized for microstepping and give a good fit to the TRINAMIC family of motor controllers and drivers. They are also used in the 57 mm PANdrive mechatronics family.

MAIN CHARACTERISTICS

- NEMA 23 mounting configuration
- flange max. 57.2 mm * 57.2 mm
- 6.35 mm axis diameter, 20.6 mm length
- step angle: 1.8°
- optimized for microstep operation
- optimum fit for TMC239 / TMC249 based driver circuits
- up to 84V operating voltage
- 4 wire connection
- neodymium magnets for maximum torque
- CE approved
- RoHS compliant

SPECIFICATIONS	UNIT	-41-30-047	-55-30-098	-79-30-163
Rated phase current	A	3.0	3.0	3.0
Ph. resistance at 20°C		0.8	0.8	0.8
Ph. inductance (typ.)	mH	1.5	2.1	3.2
Holding torque (typ.)	Ncm	47	98	163
Detent torque	Ncm	2.1	3.0	3.0
Rotor inertia	gcm²	77	209	335
Weight (mass)	kg	0.50	0.70	1.00
Motor length	mm	41.0	55.0	78.5
Related PAN-drive	Type	PD1-...-57	PD2-...-57	PD3-...-57

ORDER CODE	DESCRIPTION
QSH5718-41-30-047	QMot Steppermotor 57 mm, 3.0A, 0.47 Nm
QSH5718-55-30-098	QMot Steppermotor 57 mm, 3.0A, 0.98 Nm
QSH5718-79-30-163	QMot Steppermotor 57 mm, 3.0A, 1.63 Nm

10 mm

QSH 6018

60 mm / NEMA24
1.8° step angle
high torque
hybrid stepper motor

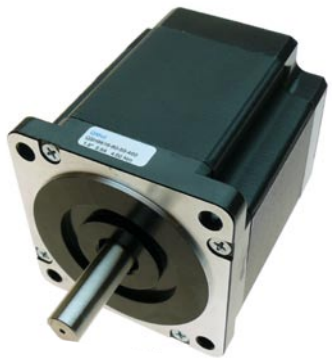
INFO These two phase hybrid stepper motors are optimized for microstepping and give a good fit to the TRINAMIC family of motor controllers and drivers.

MAIN CHARACTERISTICS

- NEMA 23 mounting configuration
- flange max. 60.5 mm * 60.5 mm
- 8 mm axis diameter, 25 mm length, D-Cut
- step angle: 1.8°
- optimized for microstep operation
- optimum fit for TMC239 / TMC249 base driver circuits
- up to 75V operating voltage
- 4 wire connection
- neodymium magnets for maximum torque
- CE approved
- RoHS compliant

SPECIFICATIONS	UNIT	-45-28-110	-56-28-165	-65-28-210	-86-28-310
Rated phase current	A	2.8	2.8	2.8	2.8
Ph. resistance at 20°C		0.75	0.9	1.2	1.5
Ph. inductance (typ.)	mH	2	3.6	4.6	6.8
Holding torque (typ.)	Ncm	110	165	210	310
Rotor inertia	gcm²	275	400	570	840
Weight (mass)	kg	0.6	0.77	1.20	1.40
Motor length	mm	45.0	56.0	65.0	86.0

ORDER CODE	DESCRIPTION
QSH6018-45-28-110	QMot Steppermotor 60 mm, 2.8A, 1.10 Nm
QSH6018-56-28-165	QMot Steppermotor 60 mm, 2.8A, 1.65 Nm
QSH6018-65-28-210	QMot Steppermotor 60 mm, 2.8A, 2.10 Nm
QSH6018-86-28-310	QMot Steppermotor 60 mm, 2.8A, 3.10 Nm



10 mm

QSH 8618

86 mm / NEMA34
1.8° step angle
high torque
hybrid stepper motor

INFO These two phase hybrid stepper motors are optimized for microstepping and give a good fit to the TRINAMIC family of motor controllers and drivers.

MAIN CHARACTERISTICS

- NEMA 34 mounting configuration
- flange max. 85.85 mm * 85.85 mm
- step angle: 1.8°
- optimized for microstep operation
- optimum fit for TMCM-078 driver module
- insulation class: B
- max. radial / axial force 220N / 60N
- neodymium magnets for maximum torque
- CE approved
- RoHS compliant

SPECIFICATIONS	UNIT	-65-59-340		-80-55-460	-118-60-870	-156-62-1280
Number of leads	N°	8		4	4	4
Wiring		SER	PAR			
Rated phase current	A	3.0	5.9	5.5	6.0	6.2
Ph. resistance at 20°C		1.14	0.28	0.42	0.45	0.75
Ph. inductance (typ.)	mH	6.8	1.7	3.5	5.1	9
Holding torque (typ.)	Ncm	340	340	460	870	1280
Max. operating voltage	V	100		140	140	160
Axis diameter	mm	12		12.7 (D-cut)	12.7 (notch)	15.875(notch)
Axis length	mm	31.75		31.75	31.75	31.75
Rotor inertia	gcm²	1000		1400	2700	4000
Weight (mass)	kg	1.7		2.3	3.8	5.4
Motor length	mm	65.0		80.0	118.0	156.0

ORDER CODE	DESCRIPTION
QSH8618-65-59-340	QMot Steppermotor 86 mm, 3.0A (SER) / 5.9A (PAR), 3.40 Nm
QSH8618-80-55-460	QMot Steppermotor 86 mm, 5.5A, 4.60 Nm
QSH8618-118-60-870	QMot Steppermotor 86 mm, 6.0A, 8.70 Nm
QSH8618-156-62-1280	QMot Steppermotor 86 mm, 6.2A, 12.80 Nm

QBL 4208

42 mm
8 pole
BLDC motor

INFO These BLDC motors give a good fit to the TRINAMIC family of medium and high current BLDC motor modules.

MAIN CHARACTERISTICS

- No. of poles: 8
- No. of phases: 3
- nominal 4000 RPM at rated torque
- stepper compatible 42 mm flange
- 5 mm axis diameter, 20 mm length
- typical 24V operating voltage up to 48V possible
- integrated hall sensors
- CE approved
- RoHS compliant

SPECIFICATIONS	UNIT	-41-04-006	-61-04-013	-81-04-019	-100-04-025
Rated current (typ.)	A	1.8	3.5	5.2	6.9
Line resistance		1.8	0.72	0.55	0.28
Line inductance	mH	2.6	1.2	0.8	0.54
Rated torque (typ.)	Nm	0.0625	0.125	0.185	0.25
Max. peak torque	Nm	0.19	0.38	0.56	0.75
Max. peak current	A	5.4	10.6	15.5	20
Torque constant	Nm/A	0.035	0.036	0.036	0.036
Weight (mass)	kg	0.30	0.45	0.65	0.80
Motor length	mm	41	61	81	100
Related PAN-drive	Type	PD1-...-42	PD2-...-42	PD3-...-42	PD4-...-42

ORDER CODE	DESCRIPTION
QBL4208-41-04-006	QMot BLDC motor 42 mm, 4000RPM, 0.06Nm
QBL4208-61-04-013	QMot BLDC motor 42 mm, 4000RPM, 0.13Nm
QBL4208-81-04-019	QMot BLDC motor 42 mm, 4000RPM, 0.19Nm
QBL4208-100-04-025	QMot BLDC motor 42 mm, 4000RPM, 0.25Nm

10 mm

QBL 5704

57 mm
4 pole
BLDC motor

INFO These BLDC motors give a good fit to the TRINAMIC family of high current BLDC motor modules. They are also used in the PANdrive mechatronics family.

MAIN CHARACTERISTICS

- No. of poles: 4
- No. of phases: 3
- nominal 4000 RPM at rated torque
- round flange max. 57 mm
- 8 mm shaft diameter, 25 mm length
- 2nd shaft for encoder mounting
- typical 36V operating voltage, 24V or 48V possible
- integrated hall sensors
- CE approved
- RoHS compliant

SPECIFICATIONS	UNIT	-94-04-32	-116-04-42
Rated current (typ.)	A	5	6.6
Line resistance at 20°C		0.45	0.35
Line inductance (typ.)	mH	1.4	1
Rated torque (typ.)	Nm	0.32	0.42
Max. peak torque	Nm	0.98	1.30
Max. peak current	A	16.5	20.5
Torque constant	Nm/A	0.063	0.063
Weight (mass)	kg	1.20	1.40
Motor length	mm	94.0	116.0
Related PAN-drive	Type	PD4-...-57	PD5-...-57

ORDER CODE	DESCRIPTION
QBL5704-94-04-032	QMot BLDC motor 57 mm, 4000RPM, 0.32Nm
QBL5704-116-04-042	QMot BLDC motor 57 mm, 4000RPM, 0.42Nm

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