

Magellan® MC58113

Series Motion Control ICs



Magellan® MC58113 Series Motion Control ICs

provide high performance motion control with an integrated digital current loop. Available as a single, one-axis IC, the MC58113 IC is a programmable device that provides positioning, velocity, and torque control for Brushless DC, DC Brush, and step motors.

A Powerful Motion Controller

Magellan Motion ICs are complete motion controllers requiring only an external bridge circuit or amplifier to be functional. They are driven by a host using either a parallel bus, SPI (Serial Peripheral Interface), CANbus 2.0B, or RS232/485 serial. User selectable profiling modes include S-curve, trapezoidal, velocity contouring and electronic gearing. PID servo loop compensation utilizes a 32-bit position error and includes velocity and acceleration feedforward. High performance FOC (field oriented control) provides high accuracy, ultra-low noise motor operation.

Easy to Use and Program

All Magellan Motion Control ICs provide a flexible and powerful instruction set to initialize and control motion axes, monitor performance, and synchronize overall machine behavior. Working with Magellan ICs, and Pro-Motion® development software makes it fast and easy to graph and analyze system performance; while C-Motion® language allows you to develop your own application using C/C++.

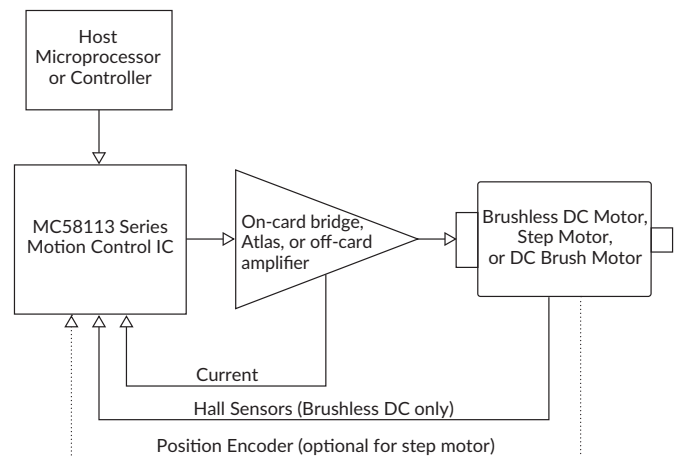
Flexible Offering

There are four MC58113 Series ICs, each packaged in a single 100-pin TQFP operating at 3.3 V. The MC51113 provides dedicated control of DC Brush motors, the MC53113 provides control of three-phase Brushless DC motors, the MC54113 provides control of two-phase step motors, and the MC58113 can be software selected to provide control of any of these motor types.

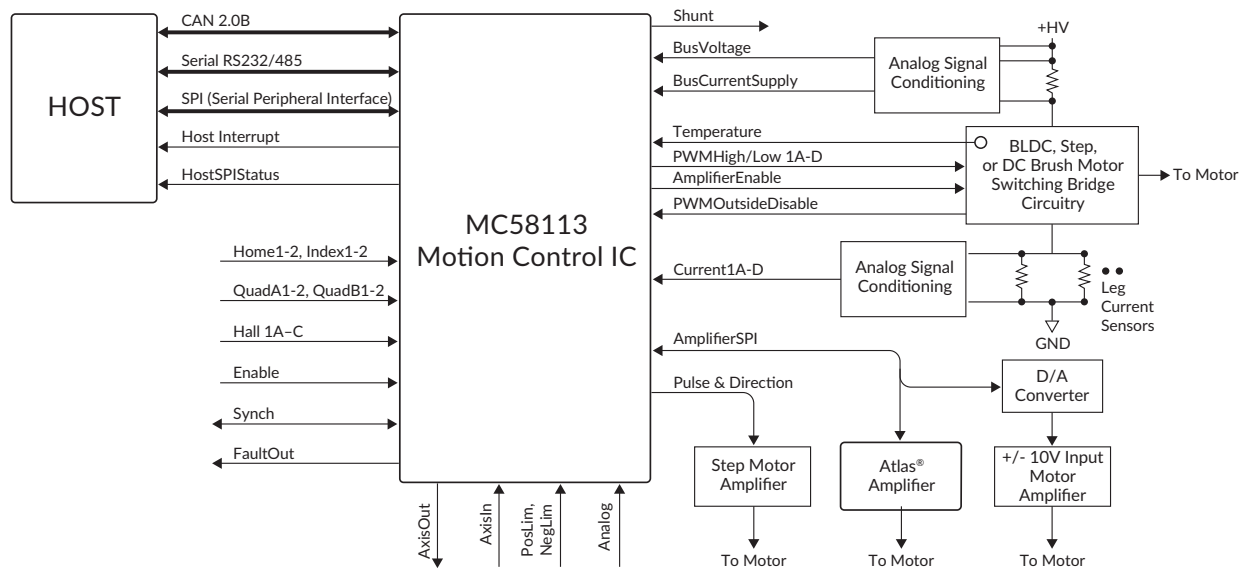
FEATURES

- Single axis, single IC
- Position, velocity, and torque control
- Brushless DC, DC Brush, and step motor control
- S-curve, trapezoidal, velocity contouring, and electronic gearing profiles
- SPI (Serial Peripheral Interface), serial RS232/485, and CANbus communications
- 1.5 axes (primary and auxiliary encoder) control
- Advanced PID filter with velocity and acceleration feedforward
- High performance current control of each motor phase
- High/Low switching amplifier control with programmable deadtime and charge pump refresh
- Velocity, position and acceleration changes on-the-fly
- Programmable position loop time from 50 μ sec to 1.1 sec
- FOC (field oriented control)
- Incremental encoder quadrature input (up to 25 Mcounts/sec)
- Synch pin feature allows multiple axes to be synchronized to <1 μ sec
- Internal motion trace NVRAM for performance optimization
- Overcurrent, over/undervoltage and overtemperature detect
- Directional limit switch, index, and home inputs
- Axis settled indicator, tracking window and automatic motion error detection
- General-purpose analog input
- Programmable dual biquad filters
- Programmable acceleration and deceleration values
- Compact 100-pin TQFP package

CONFIGURATION



TECHNICAL OVERVIEW



MC58113 SERIES SPECIFICATIONS

| Parameters | Value |
|---|--|
| Configurations | MC51113 - DC Brush motor MC51113 - Brushless DC motor MC54113 - Step motor MC58113 - Motor type software selectable |
| Host communication options | Serial RS232/485 CANbus 2.0B SPI (Serial Peripheral Interface) |
| Position range | -2,147,483,648 to +2,147,483,647 counts |
| Velocity range | -32,767 to 32,767 counts/sample |
| Acceleration and deceleration range | 0 to 32,767 counts/sample ² |
| Jerk range | 0 to 1/2 counts/sample ³ |
| Servo loop range | 50 usec to 1.1 sec |
| Position error resolution | 32 bits |
| Commutation rate | 20 kHz |
| Microsteps per full step | Programmable, up to 256 |
| Signal inputs axis 1 | QuadA/B, Index, Home, Hall A/B/C AxisIn, Pos/NegLimit |
| Signal inputs axis 2 | QuadA/B, Index, Home |
| Maximum encoder rate | 25 Mcounts/sec |
| Internal trace buffer | 32 KB |
| Internal NVRAM buffer | 2 KB |
| Operating temperature (Ta) | -40° C to 85° C |
| Supply voltage operating range (Vcc) | 3.0 V to 3.6 V |
| Package and dimensions | 100-pin TQFP, 14 x 14mm |

AMPLIFIER CONNECTION OPTIONS

| On-board PWM amplifier circuitry | |
|----------------------------------|---|
| PWM output rate | 20, 40, or 80 kHz |
| Current control modes | FOC (field oriented control), A/B, third leg floating, voltage modefloating, voltage mode |
| Current loop rate | 20 kHz |
| PWM output modes | High/Low, Sign/Magnitude, 50/50 |

| External +/- 10V input amplifier | |
|-------------------------------------|---------|
| Amplifier SPI bus serial DAC | 16 bits |

| Pulse & direction input amplifier | |
|--|-----------------------|
| Pulse and direction output rate | up to 1.0 Mpulses/sec |

| ATLAS® Digital Amplifiers | |
|---|--|
| ATLAS® Digital amplifiers are compact single-axis amplifiers that provide high performance torque control of DC brush, brushless DC, and step motors. They are packaged in a Compact or Ultra Compact solderable module and utilize standard through-hole pins for all connections. | |
| Voltage Input | 12-56 VDC |
| Microstepping resolution | 256 |
| PWM frequency | 20, 40, 80 kHz |
| Current Loop rate | 20 kHz |
| Power rating options | 75W, 250W, 500W |
| Mechanical Dimensions | Ultra Compact size: 1.05" x 1.05" x .53" (27mm x 27mm x 13mm) |
| | Compact size: 1.52" x 1.52" x .60" (39mm x 39mm x 15mm) |



Development Tools

1 EASY START-UP Developers Kit

INCLUDES

- MC58113 Developer Kit board
- Pro-Motion software
- Software Development Kit (SDK) with C-Motion
- Complete manual set
- Complete cable and prototyping connector set

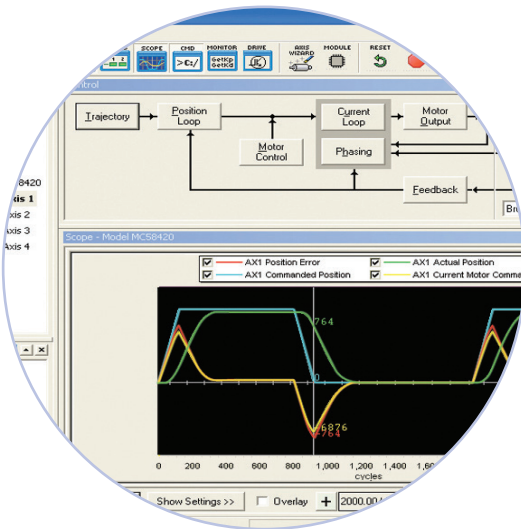


2 TUNE & OPTIMIZE Pro-Motion® GUI

Pro-Motion is a sophisticated, easy-to-use Windows-based exerciser program for use with PMD motion control ICs, modules, and cards.

FEATURES

- Motion oscilloscope graphically displays processor parameters in real-time
- Autotuning
- Ability to save and load settings
- Axis wizard
- Distance and time units conversion
- Motor-specific parameter setup
- Axis shuttle performs programmable motion between two positions
- Communications monitor echoes all commands sent by Pro-Motion to the board
- Advanced Bode analysis for frequency machine response



3 BUILD THE APP C-Motion®

C-Motion is a complete, easy-to-use, motion programming language that includes a source library containing all the code required for communicating with PMD motion ICs, boards, and modules.

C-MOTION FEATURES INCLUDE:

- Extensive library of commands for virtually all motion design needs
- Develop embeddable C/C++ applications
- Complete, functional examples
- Supports PC/104, serial, CAN, Ethernet, and SPI communications

```
// code for executing a profile and tracing
// the profile captured in this example could be used for tuning the PMD motion system
// set the trace buffer wrap mode to a one time trace
PMDTraceMode(hAxis1, PMDTraceOneTime);

// set the processor variables that we want to capture
PMDSetTraceVariable(hAxis1, PMDTraceVariable1, PMDAxis1);
PMDSetTraceVariable(hAxis1, PMDTraceVariable2, PMDAxis1);
PMDSetTraceVariable(hAxis1, PMDTraceVariable3, PMDAxis1);

// set the trace to begin when we issue the next update command
PMDSetTraceStart(hAxis1, PMDTraceConditionNextUpdate);

// set the trace to stop when the MotionComplete event occurs
PMDSetTraceStop(hAxis1, PMDTraceConditionEventStatus,
PMDEventMotionCompleteBit, PMDTraceStateHigh);
PMDSetProfileMode(hAxis1, PMDTrapezoidalProfile);

// set the profile parameters
PMDSetPosition(hAxis1, 200000);
PMDSetVelocity(hAxis1, 0x200000);
PMDSetAcceleration(hAxis1, 0x1000);
PMDSetDeceleration(hAxis1, 0x1000);

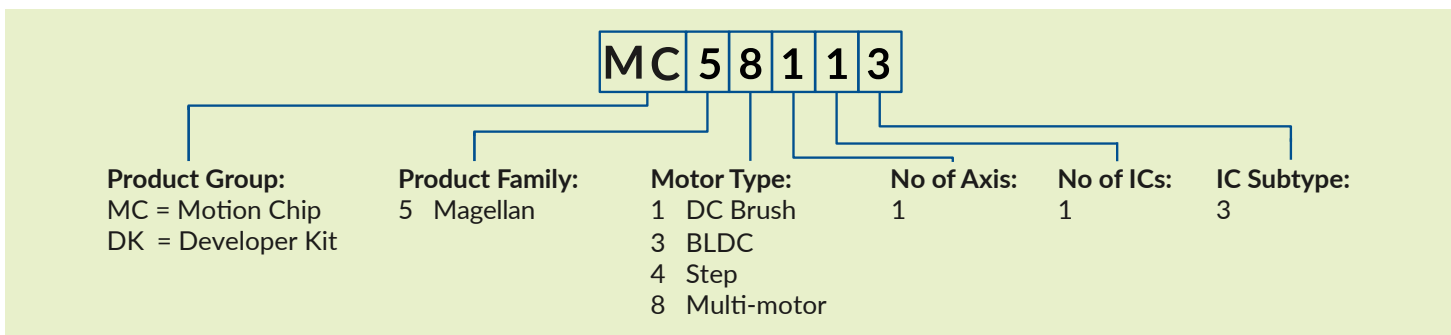
// end of profile
PMDEndProfile(hAxis1);
```

PMD PRODUCT FAMILY OVERVIEW

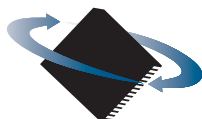
| | # Axes | Motor Types | Format | Voltage | Communication | Features |
|---|---------|--|--|---|---|--|
| JUNO® VELOCITY & TORQUE CONTROL ICs  | 1 | <ul style="list-style-type: none"> Brushless DC DC Brush Step Motor | <ul style="list-style-type: none"> 64-pin TQFP 56-pin VQFN | 3.3 V | <ul style="list-style-type: none"> RS232/485 CANbus SPI | <ul style="list-style-type: none"> Velocity control Current control Field oriented control |
| MAGELLAN® MOTION CONTROL ICs  | 1,2,3,4 | <ul style="list-style-type: none"> Brushless DC DC Brush Step Motor | <ul style="list-style-type: none"> 144-pin TQFP 100-pin TQF | 3.3 V | <ul style="list-style-type: none"> RS232/485 CANbus SPI Parallel | <ul style="list-style-type: none"> Position control Torque/current control Field oriented control Profile generation |
| ATLAS® DIGITAL AMPLIFIERS  | 1 | <ul style="list-style-type: none"> Brushless DC DC Brush Step Motor | <ul style="list-style-type: none"> 20-pin solderable module | 12-56 V | <ul style="list-style-type: none"> SPI Pulse and direction | <ul style="list-style-type: none"> Torque/current control Field oriented control MOSFET amplifier |
| ION®/CME N-SERIES DIGITAL DRIVES  | 1 | <ul style="list-style-type: none"> Brushless DC DC Brush Step Motor | <ul style="list-style-type: none"> Fully enclosed PCB-mounted module | 12-56 V | <ul style="list-style-type: none"> Ethernet RS232/485 CAN FD SPI | <ul style="list-style-type: none"> Position control Torque/current control Field oriented control Profile generation MOSFET amplifier Downloadable user code |
| ION® 500 & 3000 DIGITAL DRIVES  | 1 | <ul style="list-style-type: none"> Brushless DC DC Brush Step Motor | <ul style="list-style-type: none"> Fully enclosed cable-connected module | 12-56 V 20-195 V | <ul style="list-style-type: none"> Ethernet RS232/485 CANbus | <ul style="list-style-type: none"> Position control Torque/current control Field oriented control Profile generation MOSFET amplifier Downloadable user code |
| PRODIGY® MOTION BOARDS  | 1,2,3,4 | <ul style="list-style-type: none"> Brushless DC DC Brush Step Motor | <ul style="list-style-type: none"> Machine Controller PC/104 Standalone | <ul style="list-style-type: none"> 5 V: PC/104 and Standalone 12-56 V: Machine Controller | <ul style="list-style-type: none"> Ethernet RS232/485 CANbus PC/104 bus | <ul style="list-style-type: none"> Position control Torque/current control Field oriented control Profile generation Downloadable user code |

C-Motion® is the common motion language for all Performance Motion Devices products.

INFORMATION ORDERING



To place an order email purchaseorders@pmdcorp.com. For questions email support@pmdcorp.com



**PERFORMANCE
MOTION DEVICES**
MOTION CONTROL AT ITS CORE

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About Performance Motion Devices

Performance Motion Devices (PMD) is a worldwide leader in motion control ICs, boards and modules. Dedicated to providing cost-effective, high performance motion systems to OEM customers, PMD utilizes extensive in-house expertise to minimize time-to-market and maximize customer satisfaction.

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