

Magellan[®] Family of Motion Control ICs



The **Magellan Family of Motion Control ICs** provide advanced motion control for medical, scientific, automation, industrial, and robotic applications. Available in 1, 2, 3, and 4-axis versions, these flexible, programmable devices control 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

Magellan ICs are offered in three series:

- Magellan MC58000 Series*
- Magellan MC55000 Series
- Magellan MC58113 Series

*Magellan MC58000 and MC55000 Series are packaged in a two-IC 144/100-pin TQFP while the MC58113 Series is a single-IC 100-pin TQFP. All devices operate at 3.3 V.

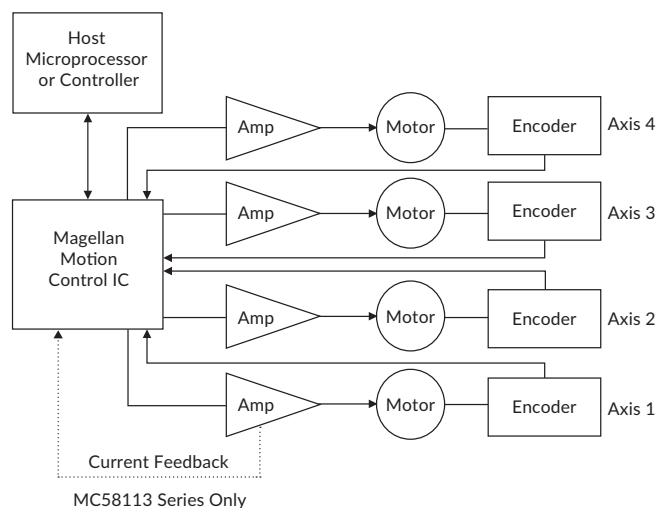
MEET THE FAMILY

- **MC58000 Series:** Positioning Motion Control ICs for Brushless DC, DC Brush and step motors in a 1 to 4-axis package.
- **MC55000 Series:** Pulse and direction output positioning ICs for step motors in a 1 to 4-axis package.
- **MC58113 Series:** Positioning motion control ICs with integrated current control for Brushless DC, DC Brush and step motors in a single axis package.

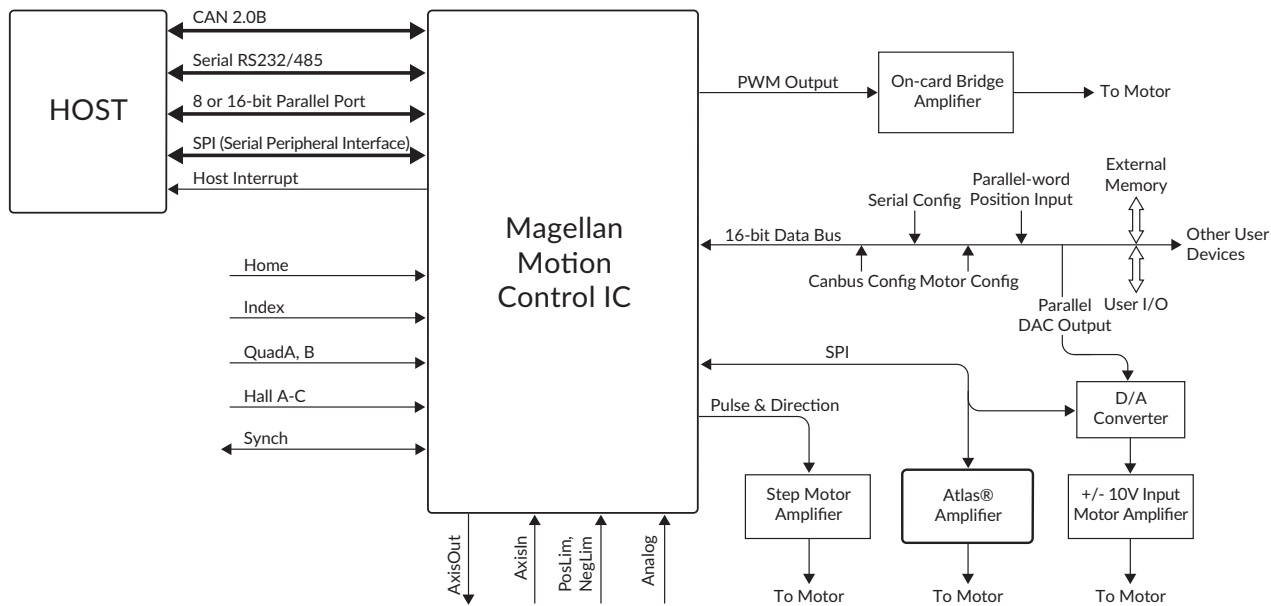
FEATURES

- S-curve, trapezoidal, velocity contouring, and electronic gearing profiles
- Serial RS232/485, Parallel, CANbus, and SPI (Serial Peripheral Interface) communications
- Advanced PID filter with velocity and acceleration feedforward
- High performance current control & PWM signal generation
- Velocity, position and acceleration changes on-the-fly
- Field oriented control
- High speed (up to 5 Mpulses/sec) pulse & direction output
- Incremental encoder quadrature input (up to 25 Mcounts/sec)
- Programmable loop time to 50 μ sec
- Dedicated motion trace function for performance optimization
- Overcurrent, overvoltage, and overtemperature monitoring
- Two directional limit switches, index input, and home indicator per axis
- Axis settled indicator, tracking window and automatic motion error detection
- Programmable dual biquad filters
- Programmable acceleration and deceleration values
- Dual loop encoder input
- 3.3 V operation, packaged in 144- or 100-pin TQFP

CONFIGURATION



TECHNICAL OVERVIEW



MAGELLAN SPECIFICATIONS

Parameters	Value
Motors supported	Brushless DC, DC Brush, Step motor
Host communication options	Serial RS232/485 CANbus 2.0B Parallel bus (8 or 16 bits) (MC5X000 only) SPI (Serial Peripheral Interface)
Position range	-2,147,483,648 to +2,147,483,647 counts
Velocity range	0 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 µsec to 1.1 sec
Position error resolution	32 bits
Commutation rate	20 kHz
Signals per axis	QuadA/B, Index, Home, Hall A/B/C AxisIn, Pos/NegLimit, AxisOut, FaultOut
Max encoder rate	Incremental: Up to 25 Mcounts/sec Parallel-word: Up to 160 Mcounts/sec
Operating temperature (Ta)	-40° C to 85° C
Supply voltage operating range (Vcc)	3.0 V to 3.6 V
Dimensions, MC5XX20	CP: 20 x 20 mm, IO: 14 x 14 mm
Dimensions, MC58113	14 x 14 mm

AMPLIFIER CONNECTION OPTIONS

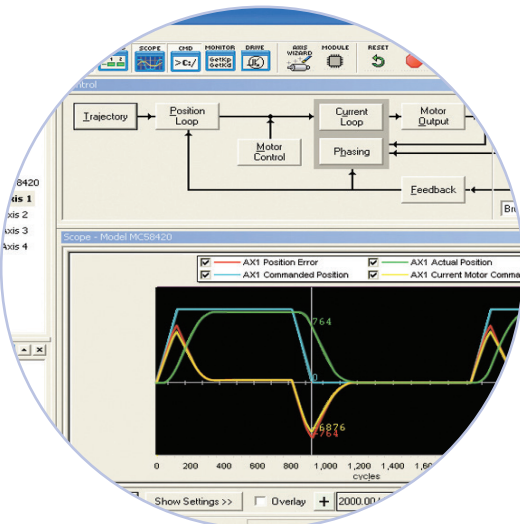
On-board PWM amplifier circuitry		
PWM output rate	20, 40, or 80 kHz	
Current control modes (MC58113 only)	FOC (field oriented control), A/B, third leg floating	
Current loop rate	20 kHz	
PWM output modes	High/Low, Sign/Magnitude, 50/50	
External +/- 10V input amplifier		
Amplifier SPI bus serial DAC	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

- MC58420, MC55420, or MC58113 Developer Kit boards
- Pro-Motion software
- Software Development Kit (SDK) with C-Motion
- Complete manual set
- Complete cable & 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 boards.

FEATURES

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

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 PC104, serial, CAN, Ethernet, and SPI communications

```
...code for executing a profile and tracing...
...captured in this example could be used for tuning the Pro-Motion...

PMDTraceMode(hAxis1, PMDTraceOneTime);

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

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

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

// set the profile parameters
PMDTracePosition(hAxis1, 200000);
PMDTraceVelocity(hAxis1, 0x200000);
PMDTraceAcceleration(hAxis1, 0x1000);
PMDTraceDeceleration(hAxis1, 0x1000);

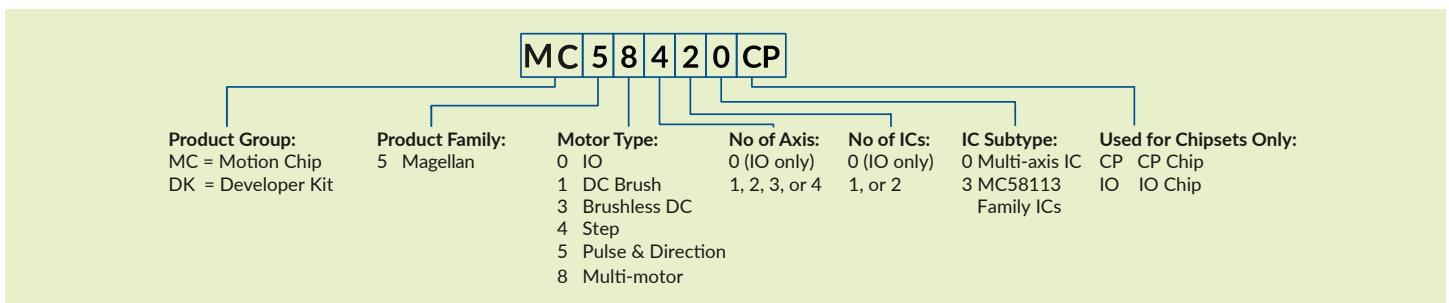
PMDTraceStart(hAxis1);
```

PMD PRODUCT FAMILY OVERVIEW

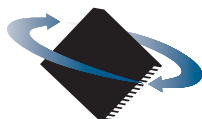
	# Axes	Motor Types	Format	Voltage	Communication	Features
JUNO® VELOCITY & TORQUE CONTROL ICs 	1	<ul style="list-style-type: none"> Brushless DC DC Brush Step Motor 	<ul style="list-style-type: none"> 64-pin TQFP 56-pin VQFN 	3.3 V	<ul style="list-style-type: none"> RS232/485 CANbus SPI 	<ul style="list-style-type: 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.

FOR ORDERING



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



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

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.

ATLAS, ION, Juno, Magellan, Navigator, Pilot, Prodigy, C-Motion and Pro-Motion are trademarks of Performance Motion Devices, Inc. All other trade names, brand names and company names are the property of their respective owners. 2021 Performance Motion Devices, Inc.

1 Technology Park Dr, Westford, MA 01886
Tel: 978.266.1210 Fax: 978.266.1211
e-mail: info@pmdcorp.com
www.pmdcorp.com