Magellan® Family of Motion Control ICs

PERFORMANCE MOTION DEVICES

MOTION CONTROL AT ITS CORE

PERFORMANCE MOTION DEVICES
MC50000IO

PERFORMANCE MOTION DEVICES
MC58420

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.
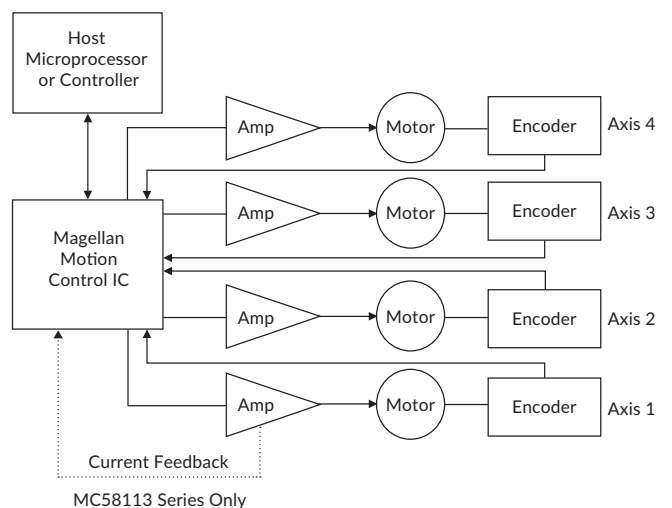
MEET THE FAMILY

• **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.
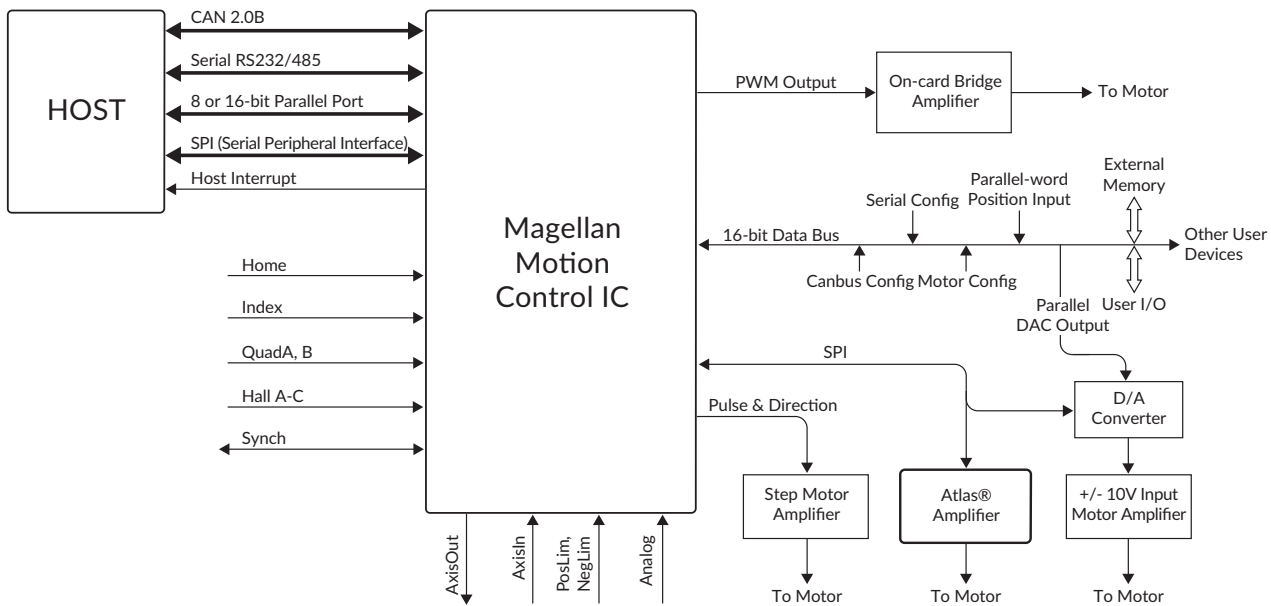
FEATURES

• 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 µsec
• 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

Host Microprocessor or Controller

Magellan Motion Control IC

Amp — Motor — Encoder — Axis 4
Amp — Motor — Encoder — Axis 3
Amp — Motor — Encoder — Axis 2
Amp — Motor — Encoder — Axis 1

Current Feedback
MC58113 Series Only

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)	-40º C to 85º 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	
AmplifierSPI 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
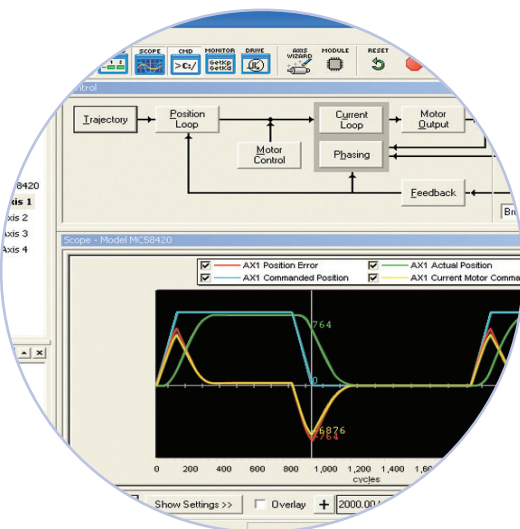
② TUNE & OPTIMIZE
Pro-Motion® GUI

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
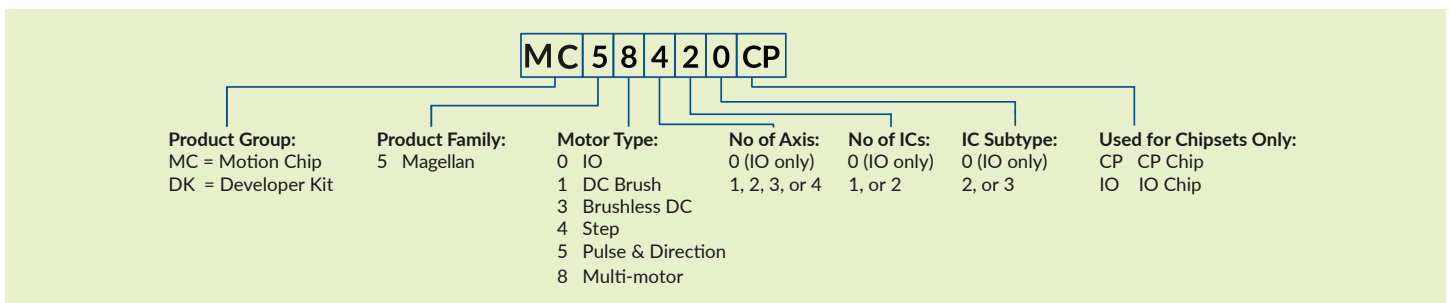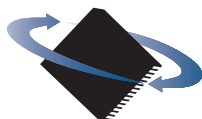- Supports PC104, serial, CAN, Ethernet, and SPI communications

```
code for executing a profile and trac...
...captured in this example could be used for tuning the P...

...trace buffer wrap mode to a one time trace
...raceMode(hAxis1, PMDTraceOneTime);

...t the processor variables that we want to capture
...tTraceVariable(hAxis1, PMDTraceVariable1, PMDAxis1,
...etTraceVariable(hAxis1, PMDTraceVariable2, PMDAxis1,
...etTraceVariable(hAxis1, PMDTraceVariable3, PMDAxis1, P...

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

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

...set the profile parameters
...tPosition(hAxis1, 200000);
...Velocity(hAxis1, 0x200000);
...celeration(hAxis1, 0x1000);
...eleration(hAxis1, 0x1000);
   ...tion
   ...);
```

PMD PRODUCT FAMILY OVERVIEW

	# Axes	Motor Types	Format	Voltage	Communication	Features
JUNO® VELOCITY & TORQUE CONTROL ICS	1	• Brushless DC • DC Brush • Step Motor	• 64-pin TQFP • 56-pin VQFN	3.3 V	• RS232/485 • CANbus • SPI	• Velocity control • Current control • Field oriented control
MAGELLAN® MOTION CONTROL ICS	1,2,3,4	• Brushless DC • DC Brush • Step Motor	• 144-pin TQFP • 100-pin TQF	3.3 V	• RS232/485 • CANbus • SPI • Parallel	• Position control • Torque/current control • Field oriented control • Profile generation
ATLAS® DIGITAL AMPLIFIERS	1	• Brushless DC • DC Brush • Step Motor	• 20-pin solderable module	12-56 V	• SPI • Pulse and direction	• Torque/current control • Field oriented control • MOSFET amplifier
ION®/CME N-SERIES DIGITAL DRIVES	1	• Brushless DC • DC Brush • Step Motor	• Fully enclosed PCB-mounted module	12-56 V	• Ethernet • RS232/485 • CAN FD • SPI	• Position control • Torque/current control • Field oriented control • Profile generation • MOSFET amplifier • Downloadable user code
ION® 500 & 3000 DIGITAL DRIVES	1	• Brushless DC • DC Brush • Step Motor	• Fully enclosed cable-connected module	12-56 V 20-195 V	• Ethernet • RS232/485 • CANbus	• Position control • Torque/current control • Field oriented control • Profile generation • MOSFET amplifier • Downloadable user code
PRODIGY® MOTION BOARDS	1,2,3,4	• Brushless DC • DC Brush • Step Motor	• Machine Controller • PC/104 • Standalone	• 5 V: PC/104 and Standalone • 12-56 V: Machine Controller	• Ethernet • RS232/485 • CANbus • PC/104 bus	• 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

MC 5 8 4 2 0 CP

Product Group:
MC = Motion Chip
DK = Developer Kit

Product Family:
5   Magellan

Motor Type:
0   IO
1   DC Brush
3   Brushless DC
4   Step
5   Pulse & Direction
8   Multi-motor

No of Axis:
0 (IO only)
1, 2, 3, or 4

No of ICs:
0 (IO only)
1, or 2

IC Subtype:
0 (IO only)
2, or 3

Used for Chipsets Only:
CP   CP Chip
IO   IO Chip

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

PERFORMANCE MOTION DEVICES
MOTION CONTROL AT ITS CORE

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

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.

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Interface - I/O Expanders *category:*

Click to view products by Performance Motion Devices *manufacturer:*

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PI4IOE5V9555LEX PI4IOE5V6534Q2ZLWEX PI4IOE5V6416Q2LEX 41700-100 MCP25050-E/P MIC74YQS ADP5585ACBZ-00-R7

ADP5585ACBZ-04-R7 EM4095HMSO16A HTRC11001T/02EE ADP5587ACPZ-1-R7 ADP5587ACPZ-R7 ADP5585ACPZ-01-R7

ADP5586ACBZ-00-R7 PCF8574P XD8574AP XD8574P XD8255-2 XD82C55-5 XD71055 ECE1088-DZK KTS1620EWA-TR

MAX7311AWG+ MCP25025-ISL MCP25020-I/SL PI4IOE5V9555ZDEX MAX7300ATL+ MCP23008-E/SS MCP23009-E/SS

MAX7325ATG+T MCP23016-I/SO MCP23S17-E/SO MAX7300AAI+ MAX7301AAI+ MAX7312AUG+ MAX7315AEE+

MAX7317AEE+ MAX7321AEE+ MCP25020-I/P PCA9554APW,118 MAX7310AUE+ PI4IOE5V9538LE PI4IOE5V9554LE