Magellan®
Motion Control
IC Family

Intelligent, Multi-Axis, High Performance ICs
The Magellan Motion Control IC family provides 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.

Programmable
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.

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 M pulses/sec) pulse & direction output
• Incremental encoder quadrature input (up to 25 Mcounts/sec)

CONFIGURATION

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.
### MAGELLAN SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motors supported</td>
<td>Brushless DC, DC Brush, Step motor</td>
</tr>
<tr>
<td>Host communication options</td>
<td>Serial RS232/485, CANbus 2.0B, Parallel bus (8 or 16 bits) (MC5X000 only), SPI (Serial Peripheral Interface)</td>
</tr>
<tr>
<td>Position range</td>
<td>-2,147,483,648 to +2,147,483,647 counts</td>
</tr>
<tr>
<td>Velocity range</td>
<td>0 to 32,767 counts/sample</td>
</tr>
<tr>
<td>Acceleration and deceleration range</td>
<td>0 to 32,767 counts/sample</td>
</tr>
<tr>
<td>Jerk range</td>
<td>0 to 1/2 counts/sample</td>
</tr>
<tr>
<td>Servo loop range</td>
<td>50 µsec to 1.1 sec</td>
</tr>
<tr>
<td>Position error resolution</td>
<td>32 bits</td>
</tr>
<tr>
<td>Commutation rate</td>
<td>20 kHz</td>
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<tr>
<td>Signals per axis</td>
<td>QuadA/B, Index, Home, Hall A/B/C, AxisIn, Pos/NegLimit, AxisOut, FaultOut</td>
</tr>
<tr>
<td>Max encoder rate</td>
<td>Incremental: Up to 25 Mcounts/sec</td>
</tr>
<tr>
<td>Operating temperature (Ta)</td>
<td>-40ºC to 85ºC</td>
</tr>
<tr>
<td>Supply voltage operating range (Vcc)</td>
<td>3.0 V to 3.6 V</td>
</tr>
<tr>
<td>Dimensions, MC5XX20</td>
<td>CP: 20 x 20 mm, IO: 14 x 14 mm</td>
</tr>
<tr>
<td>Dimensions, MC58113</td>
<td>14 x 14 mm</td>
</tr>
</tbody>
</table>

### 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)
**MAGELLAN® IC FAMILY AT-A-GLANCE**

<table>
<thead>
<tr>
<th>IC Part Number</th>
<th>Axes</th>
<th>Developer Kit Part Number</th>
<th>No. ICs</th>
<th>Motors Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC58110</td>
<td>1</td>
<td>DK58110</td>
<td>1</td>
<td>Brushless DC, DC Brush, Step Motor</td>
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<tr>
<td>MC58120</td>
<td>1</td>
<td>DK58120</td>
<td>2</td>
<td>Brushless DC, DC Brush, Step Motor</td>
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<td>MC58220</td>
<td>2</td>
<td>DK58220</td>
<td>1</td>
<td>Brushless DC, DC Brush, Step Motor</td>
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<td>MC58320</td>
<td>3</td>
<td>DK58320</td>
<td>2</td>
<td>Brushless DC, DC Brush, Step Motor</td>
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<tr>
<td>MC58420</td>
<td>4</td>
<td>DK58420</td>
<td>2</td>
<td>Brushless DC, DC Brush, Step Motor</td>
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<tr>
<td>MC55110</td>
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<td>DK55110</td>
<td>1</td>
<td>Step Motor</td>
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<tr>
<td>MC55120</td>
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<td>DK55120</td>
<td>2</td>
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<tr>
<td>MC55220</td>
<td>2</td>
<td>DK55220</td>
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<tr>
<td>MC55320</td>
<td>3</td>
<td>DK55320</td>
<td>2</td>
<td>Step Motor</td>
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<tr>
<td>MC55420</td>
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<td>DK55420</td>
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<td>Step Motor</td>
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<td>MC58113</td>
<td>1+</td>
<td>DK58113</td>
<td>1</td>
<td>Brushless DC, DC Brush, Step Motor*</td>
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</tbody>
</table>

**DEVELOPMENT TOOLS**

1. **EASY START-UP** Developer Kits

Get your motor running in hours not days with easy to use board and software packages.

**Everything you need:**

- Developer Kit board
- Manual
- Pro-Motion® Axis set-up wizard and User Guide
- Development software with C-Motion® Language
- Layout and schematic examples

Developer Kits enable concurrent software and hardware development. While your hardware team develops your board, your software team can develop the system controls on the Developer Kit board.

2. **TUNE & OPTIMIZE** Pro-Motion Software

Intuitive Pro-Motion Development Software makes motor set-up, profile entry, and system tuning straightforward.

- Axis set-up wizard
- Motion oscilloscope graphically displays parameters in real-time
- Autotuning
- Ability to save and load settings
- Distance, time, current, and voltage units conversion
- Motor-specific parameter setup
- Communications monitor echoes all commands sent by Pro-Motion to the board
- Advanced Bode analysis for machine frequency response
- Extensive library of commands for virtually all motion design needs
- Develop embedded C/C++ applications
- Complete, functional examples
- Supports serial, CAN and SPI communications
- Start/Stop
- Motor control

3. **BUILD THE APP** C-Motion Language

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

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

**NEED ASSISTANCE?**

We offer expert service and consultation with schematic & layout reviews, complete design examples (BOM, Gerber, schematics), set-up and tuning assistance. Call or email support@pmdcorp.com to inquire.
## PMD PRODUCT FAMILY OVERVIEW

### FOR ORDERING

### FOR ORDERING

<table>
<thead>
<tr>
<th>No. Axes</th>
<th>JUNO® VELOCITY &amp; TORQUE CONTROL ICS</th>
<th>MAGELLAN® MOTION CONTROL ICS</th>
<th>ATLAS® DIGITAL AMPLIFIERS</th>
<th>PRODIGY® MOTION BOARDS</th>
<th>ION® DIGITAL DRIVES</th>
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<td>1</td>
<td>1, 2, 3, 4</td>
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<td>1</td>
<td>1</td>
<td>1</td>
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### Motor Types

- Brushless DC
- DC Brush
- Step Motor
- Brushless DC
- DC Brush
- Step Motor
- Brushless DC
- DC Brush
- Step Motor
- Brushless DC
- DC Brush
- Step Motor

### Format

- 64-pin TQFP
- 56-pin VQFN
- 144-pin TQFP
- 100-pin TQFP
- 20-pin solderable module
- 19-pin solderable module
- Fully enclosed module

### Voltage

- 3.3 V
- 3.3 V
- 12-56 V
- 5 V: PCI, PC/104 and Standalone
- 12-56 V: Machine Controller
- 12-56 V / 20-195 V

### Communication

- Standalone
- RS232/485
- CANbus
- SPI
- Parallel
- RS232/485
- CANbus
- SPI
- SPI
- SPI
- SPI
- Ethernet
- RS232/485
- CANbus
- PCI and PC/104 bus
- Ethernet
- RS232/485
- CANbus
- Ethernet
- RS232/485
- CANbus

### Features

- Velocity control
- Torque/current control
- Field oriented control
- Multi-motor support
- Position control
- Torque/current control
- Field oriented control
- Profile generation
- Multi-motor support
- Network communications
- Torque/current control
- Field-oriented control
- Profile generation
- Pulse & direction input
- Multi-motor support
- SPI Interface
- MOSFET amplifier
- Position control
- Torque/current control
- Field oriented control
- Profile generation
- Trace buffer
- MOSFET amplifier
- Pulse & direction input
- Programmable (CME)

### Motion Language

**C-Motion® easy-to-use Language** with a library of over 250 commands is the common motion language for all PMD Corp. products.

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