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 M pulses/sec) pulse & direction output
- Incremental encoder quadrature input (up to 25 M counts/sec)
- Programmable loop time up 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
### 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^2</td>
</tr>
<tr>
<td>Jerk range</td>
<td>0 to 1/2 counts/sample^3</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>
</tr>
<tr>
<td>Signals per axis</td>
<td>QuadA/B, Index, Home, Hall A/B/C, AxIn, Pos/Neg_Limit, AxisOut, FaultOut</td>
</tr>
<tr>
<td>Max encoder rate</td>
<td>Incremental: Up to 25 Mcounts/sec, Parallel-word: Up to 160 Mcounts/sec</td>
</tr>
<tr>
<td>Operating temperature (Ta)</td>
<td>-40º C to 85º C</td>
</tr>
<tr>
<td>Supply voltage</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**: FOC (field oriented control), A/B, third leg floating
- **Current loop rate**: 20 kHz
- **PWM output modes**: High/Low, Sgnr/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**: 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

Example C-Motion code for executing a profile and tracing:

```c
// code for executing a profile and tracing
// traced in this example could be used for tuning the PID filter
SetTraceMode(hAxis1, PMDTraceOneTime);
SetProfileMode(hAxis1, PMDTrapezoidalProfile);
SetPosition(hAxis1, 200000);
SetVelocity(hAxis1, 0x200000);
SetAcceleration(hAxis1, 0x1000);
SetDeceleration(hAxis1, 0x1000);
Update(hAxis1);
```
## PMD PRODUCT FAMILY OVERVIEW

<table>
<thead>
<tr>
<th>Product Group</th>
<th>Product Family</th>
<th>No. of Axes</th>
<th>Motor Types</th>
<th>Format</th>
<th>Voltage</th>
<th>Communication</th>
<th>Features</th>
<th>Motion Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>JUNO® VELOCITY &amp; TORQUE CONTROL ICS</td>
<td>1</td>
<td>1</td>
<td>Brushless DC</td>
<td>64-pin TQFP</td>
<td>3.3 V</td>
<td>Standalone</td>
<td>Velocity control</td>
<td>C-Motion®</td>
</tr>
<tr>
<td>MAGELLAN® MOTION CONTROL ICS</td>
<td>1.2.3.4</td>
<td>1</td>
<td>Brushless DC</td>
<td>144-pin TQFP</td>
<td>3.3 V</td>
<td>Parallel</td>
<td>Position control</td>
<td></td>
</tr>
<tr>
<td>ATLAS® DIGITAL AMPLIFIERS</td>
<td>1</td>
<td>1</td>
<td>Brushless DC</td>
<td>20-pin solderable module</td>
<td>12-56 V</td>
<td>SPI</td>
<td>Torque/current control</td>
<td></td>
</tr>
<tr>
<td>PRODIGY® MOTION BOARDS</td>
<td>1</td>
<td>1</td>
<td>Brushless DC</td>
<td>5 V: PC/104 and Standalone</td>
<td>12-56 V</td>
<td>Ethernet</td>
<td>Position control</td>
<td></td>
</tr>
<tr>
<td>ION® DIGITAL DRIVES</td>
<td>1</td>
<td>1</td>
<td>Brushless DC</td>
<td>Fully enclosed module</td>
<td>12-56 V / 20-195 V</td>
<td>RS232/485</td>
<td>Velocity control</td>
<td></td>
</tr>
</tbody>
</table>

**FOR ORDERING**

**MC58420CP**

Product Group:
- MC = Motion Chip
- DK = Developer Kit

Product Family:
- Magellan

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

No of Axes:
- 0 (IO only)
- 1, 2, 3, or 4
- 1, or 2
- 2, or 3
- Multi-motor

No of ICs:
- 0 (IO only)
- 1
- 2
- 3

IC Subtype:
- 0 (IO only)
- 0 (IO only)
- 0 (IO only)
- 0 (IO only)

Used for Chips Only:
- CP = CP Chip
- IO = IO Chip

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