The Magellan® Family of Motion Control ICs provides high performance chip-based motion control for medical, scientific, automation, industrial, and robotic applications. Available in 1, 2, 3, and 4-axis versions, these flexible, programmable devices control DC brush, brushless DC, and step motors.

**Programmability**
All of PMD’s 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, PMD’s powerful Pro-Motion® GUI makes it easy to graph and analyze system performance; while C-Motion® allows you to develop your own application using C/C++.

**Flexibility**
Two versions of the Magellan ICs are offered: the MC5x000 series controls up to four axes of DC brush, brushless DC, or step motors in a two-IC chipset. The MC58113 series controls one axis while adding high performance current and PWM bridge control. The Magellan Motion Control IC’s are packaged in a two-IC 144/100-pin TQFP (MC5x000 series) or in a single-IC 100-pin TQFP (MC58113 series). These devices operate at 3.3 V.

**Features**
- Available in 1, 2, 3, and 4-axis versions
- Supports DC brush, brushless DC, and step motors
- Multi-motor version allows motor type to be programmed by user
- 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
- FOC (field oriented control)
- High Speed (up to 5 M pulses/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
- Supports PMD’s ATLAS® digital amplifier
- General-purpose analog inputs
- Programmable dual biquad filters
- Programmable acceleration and deceleration values
- Dual loop encoder input
- PLC-style programmable inputs and outputs
- Parallel input for absolute encoder or resolver
- Single-IC (single axis) or two-IC (multi-axis) versions
- 3.3 V operation, packaged in 144 or 100 pin TQFP

**Configuration**
**SPECIFICATIONS**

**Supported Motor types**
- Brushless DC, step motor, DC Brush

**Configurations**
- MC58x20: 1, 2, 3, or 4 axes (all motor types)
- MC55x20: 1, 2, 3, or 4 axes (pulse & direction output only)
- MC58113 Series: 1.5 axes with current control (all motor types)

**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

**Jerk Range**
- 0 to 1/2 counts/sample

**Position Error Resolution**
- 32 bits

**Commutation Rate**
- 20 kHz

**Signals per axis**
- QuadA+B, Index, Home, Hall A/B/C, Index
- Home, Index
- 4, 8, or 16-bit Parallel
- SPI (Serial Peripheral Interface)

**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, MC58x20**
- CP: 20 x 20 mm, ID: 14 x 14 mm

**Dimensions, MC58113**
- 14 x 14 mm

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**AMPLIFIER CONNECTION OPTIONS**

**On-board PWM amplifier circuitry (DK Only)**

- **PWM output rate**: 20, 40, or 80 kHz
- **Current control modes**: FOC (field oriented control), A/B, third leg floating, voltage mode
- **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 M pulses/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

**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
   - MC58X20, MC55X20, or MC58113 Developer’s Kit board
   - Pro-Motion CD and User’s Guide
   - Development software CD with C-Motion and VB-Motion software
   - 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
   - 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, board, 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 serial, CAN, Ethernet, and SPI communications

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

```c
// set the trace buffer wrap mode to a one time trace
SetTraceMode(hAxis1, PMDTraceOneTime);

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

// 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
SetPosition(hAxis1, 200000);
SetVelocity(hAxis1, 0x200000);
SetAcceleration(hAxis1, 0x1000);
SetDeceleration(hAxis1, 0x1000);

// start the motion
Update(hAxis1);
```
### PMD PRODUCT OVERVIEW

<table>
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<tr>
<th>No. Axes</th>
<th>Format</th>
<th>Voltage</th>
<th>Features</th>
<th>Motor Types</th>
<th>Communication</th>
<th>Loop Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>• 64-pin TQFP</td>
<td>3.3 V</td>
<td>• Velocity control</td>
<td>• Brushless DC</td>
<td>• Standalone</td>
<td>• 20 kHz – current</td>
</tr>
<tr>
<td>1, 2, 3, 4</td>
<td>• 144-pin TQFP</td>
<td>3.3 V</td>
<td>• Position control</td>
<td>• DC brush</td>
<td>• Parallel</td>
<td>• 10 kHz – velocity</td>
</tr>
<tr>
<td>1</td>
<td>• 100-pin TQFP</td>
<td>12 - 56 V</td>
<td>• Field-oriented control</td>
<td>• Brushless DC</td>
<td>• RS232/485</td>
<td>50 – 75 μs/axis</td>
</tr>
<tr>
<td>1</td>
<td>• Compact: 20-pin solderable module</td>
<td>12 - 56 V</td>
<td>• Trace buffer</td>
<td>• Step Motor</td>
<td>• CANbus</td>
<td>20 kHz – current</td>
</tr>
<tr>
<td>1</td>
<td>• Ultra Compact: 19-pin solderable module</td>
<td>Machine Controller</td>
<td>• Pulse &amp; direction input</td>
<td>• SPI</td>
<td>• SPI</td>
<td>10 kHz – position</td>
</tr>
<tr>
<td>1</td>
<td>• PCI</td>
<td>12 - 56 V / 20 - 195 V</td>
<td>• Field-oriented control</td>
<td>• DC brush</td>
<td>• Ethernet</td>
<td>50 – 150 μs/axis</td>
</tr>
<tr>
<td>1</td>
<td>• PC/104</td>
<td>Machine Controller: 12 - 56 V</td>
<td>• Multi-motor support</td>
<td>• Brushless DC</td>
<td>• RS232/485</td>
<td>20 kHz – current</td>
</tr>
<tr>
<td>1</td>
<td>• Standalone</td>
<td>12 - 56 V</td>
<td>• SPI Interface</td>
<td>• Step Motor</td>
<td>• CANbus</td>
<td>10 kHz – position</td>
</tr>
<tr>
<td>1</td>
<td>• Machine Controller</td>
<td>12 - 56 V / 20 - 195 V</td>
<td>• MOSFET amplifier</td>
<td>• Pulse &amp; direction input</td>
<td>• PCI and PC/104 bus</td>
<td>20 kHz – current</td>
</tr>
<tr>
<td>1</td>
<td>• Fully enclosed module</td>
<td>12 - 56 V / 20 - 195 V</td>
<td>• Position control</td>
<td>• Programmable (ION/CME only)</td>
<td>• General purpose user I/Os</td>
<td>10 kHz – position</td>
</tr>
<tr>
<td>1</td>
<td>• Field-oriented control</td>
<td>12 - 56 V / 20 - 195 V</td>
<td>• Commutation</td>
<td>• Network communications</td>
<td>• General purpose user I/Os</td>
<td>10 kHz – position</td>
</tr>
<tr>
<td>1</td>
<td>• Profile generation</td>
<td>12 - 56 V / 20 - 195 V</td>
<td>• Network communications</td>
<td>• Torque/current control</td>
<td>• General purpose user I/Os</td>
<td>10 kHz – position</td>
</tr>
</tbody>
</table>

### FOR ORDERING MAGELLAN ICs

**MC 58113 CP**

- **Product Group:** DK = Development Kit  
- **Product Family:** Magellan  
- **Motor Type:**  
  - 0: IO  
  - 1: DC Brush  
  - 2: BLD  
  - 3: (Micro) Step  
  - 4: Pulse & Direction  
  - 5: Multi-motor  
- **# of Axes:**  
  - 0 (IO only)  
  - 1, 2, 3, or 4  
- **# of ICs:**  
  - 0 (IO only)  
  - 1 or 2  
- **IC Subtype:**  
  - 1 or 2  
  - CP  
  - CP Chip  
  - IO  
  - IO Chip  

**To place an order or for additional information and questions, contact PMD customer service.**

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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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