P M D PERFORMANCE**MOTION**DEVICES

The **Magellan** Family of **Motion Control ICs**

FEATURES

- Available in 1, 2, 3 and 4-axis versions
- Supports DC brush, brushless DC, and step motors
- S-curve, trapezoidal, velocity contouring, and electronic gearing profiles
- Serial RS232/485, Parallel, CANbus, and SPI (Serial Peripheral Interface) communications
- Advanced position 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 Mpulses/sec) pulse & direction output
- Incremental encoder quadrature input (up to 25 Mcounts/sec)
- Dedicated motion trace function for performance optimization
- Programmable loop time to 50 uSec
- 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 (multiaxis) versions
- 3.3 V operation, packaged in 144 or 100 pin TQFP

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.

Powerful Features

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.

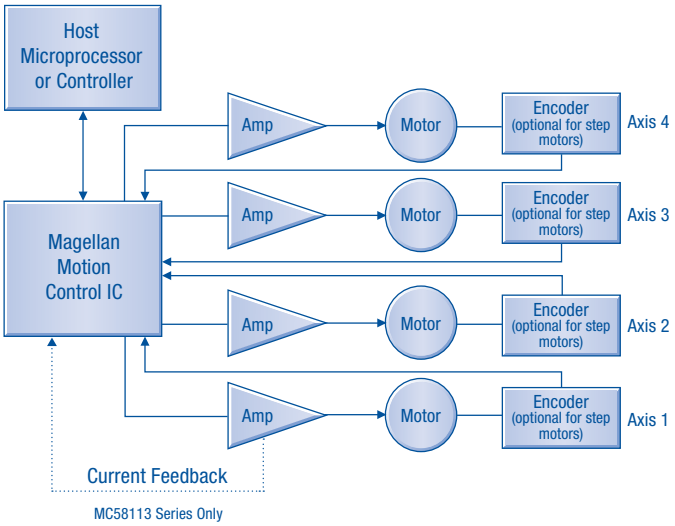
Programmability

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++.

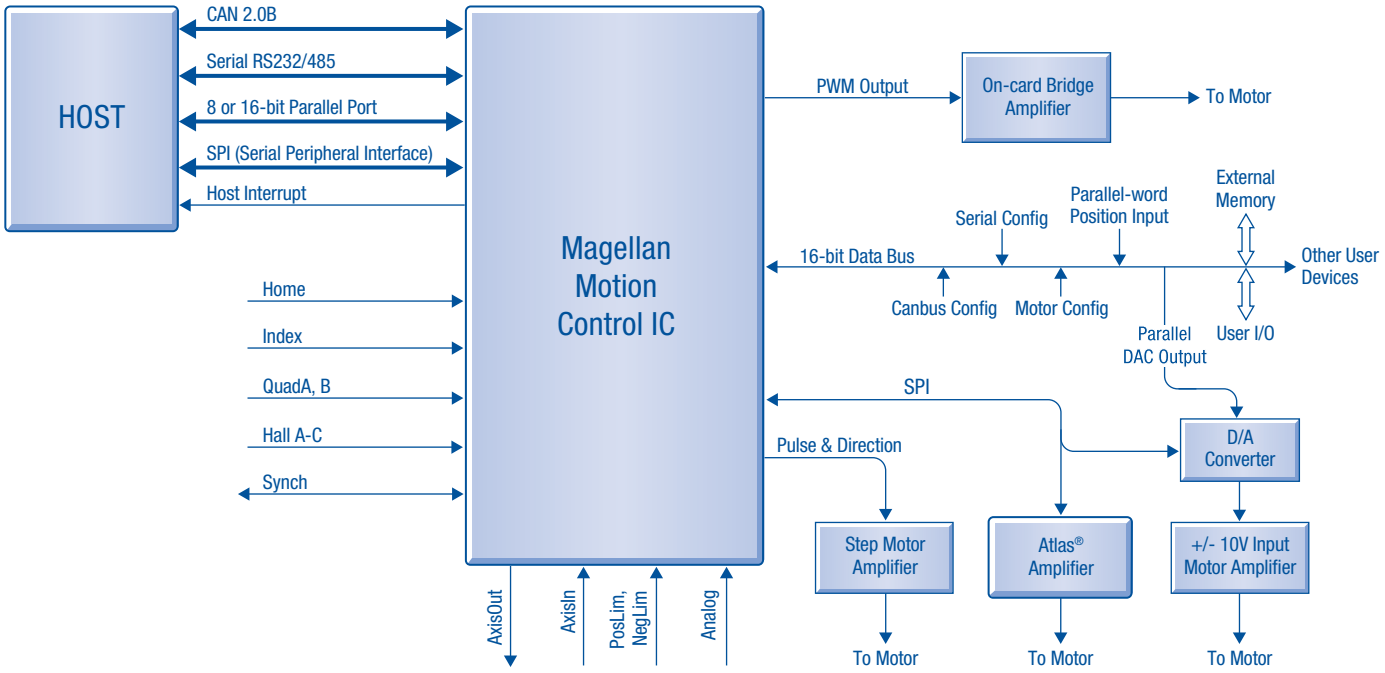
Flexibility

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 leg 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.

CONFIGURATION



Technical**Overview**



› 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) 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 1,600 msec
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-card ATLAS digital amplifier			
Voltage Input	12-56 VDC		
Current Loop rate	20 kHz		
Mechanical Dimensions	1.52" (38.5 mm) x 1.52" (38.6 mm) x .60" (15.2 mm)		
Weight	1.0 oz (28.5 g)		
	Continuous current output	**Peak current output**	**Continuous power output**
Brushless DC	10 Arms	25 A	590 W
DC Brush	14 ADC	25 A	670 W
Step Motor	9 Arms	25 A	610 W

On-card amplifier circuitry	
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

External +/- 10V input amplifier	
Parallel & Serial DAC output	16 bits

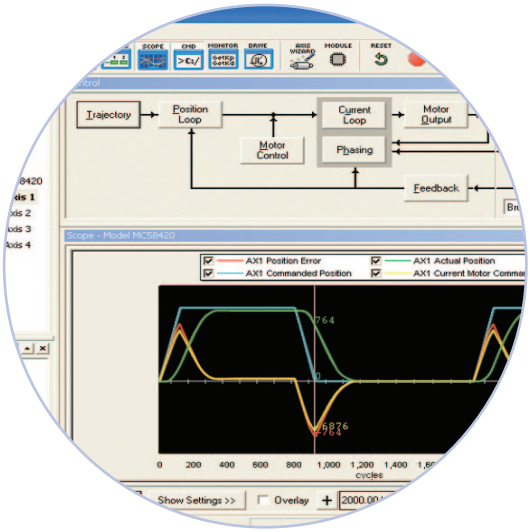
Pulse & Direction input amplifier	
Pulse and Direction output rate	up to 5.0 Mpulses/sec
Related signals	Pulse, Direction, AtRest

DevelopmentTools

1 EASY START-UP
Developers Kit

Includes

- MC58X20, MC55X20, or MC58113 Developers Kit card
- 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 cards.

Features

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

3 BUILD THE APP
C-Motion

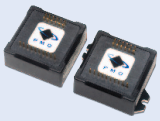
C-Motion is a complete, easy-to-use, motion programming language that includes a source library containing all the code required for communicating with PMD motion ICs, cards, and modules.

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

```
code for executing a profile and trac
captured in this example could be used for tuning the Pr
race 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,
SetTraceVariable(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
```

› FAMILY FEATURES

	MOTOR CONTROL IC	MAGELLAN MOTION CONTROL ICs	ATLAS® DIGITAL AMPLIFIERS	PRODIGY® MOTION CARDS	ION® DIGITAL DRIVES
					
No. Axes	1, 2, 3, 4	1, 2, 3, 4	1	1, 2, 3, 4	1
Format	• 64-pin TQFP	• 144-pin TQFP • 100-pin TQFP	• 20-pin solderable module	• PCI • PC/104 • Standalone • Machine Controller	• Fully enclosed module
Voltage	3.3 V	3.3 V	12 - 56 V	PCI, PC/104, Standalone: 5 V Machine Controller: 12 - 56 V	12 - 56 V / 20 - 195 V
Function	• Velocity control • Commutation • Torque/current control • Field-oriented control	• Position control • Commutation • Network communications • Torque/current control • Field oriented control • Profile generation • Multi-motor support	• Torque/current control • Field oriented control • Trace buffer • Amplification • Pulse & direction input	• Position control • Commutation • Network communications • Torque/current control • Field oriented control • Profile generation • Multi-motor support • Trace buffer • Programmable • Signal conditioning • General purpose user I/Os	• Position control • Commutation • Network communications • Torque/current control • Field oriented control • Profile generation • Trace buffer • Amplification • Pulse & direction input • Programmable • General purpose user I/Os
Motor Types	• Brushless DC	• DC brush • Brushless DC • Step Motor	• DC brush • Brushless DC • Step Motor	• DC brush • Brushless DC • Step Motor	• DC brush • Brushless DC • Step Motor
Communication	• Standalone • RS232/485	• Parallel • RS232/485 • CANbus • SPI (Serial Peripheral Interface)	• SPI (Serial Peripheral Interface)	• Ethernet • RS232/485 • CANbus • PCI and PC/104 bus	• Ethernet • RS232/485 • CANbus

› PART ORDERING

1 DEVELOPER'S KIT

DK5 □ □ □ □ STD

Motor Type	# Axes	# Chips	Series
8 = Multi Motor 5 = Step Motor	1,2,3,4	1 (CP only) 2 (CP & IO)	0 = MC5x000 3 = MC58113

2 MAGELLAN CHIP SET

MC5 □ □ 20STD

Motor Type	# Axes
8 = Multi Motor 5 = Step Motor	1,2,3,4

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

P M D

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About Performance Motion Devices

Performance Motion Devices (PMD) is a worldwide leader in motion control ICs, boards and amplifiers. 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.