DATASHEET

PERFORMANCE MOTION DEVICES
MOTION CONTROL AT ITS CORE

Magellan® Family of Motion Control ICs

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.

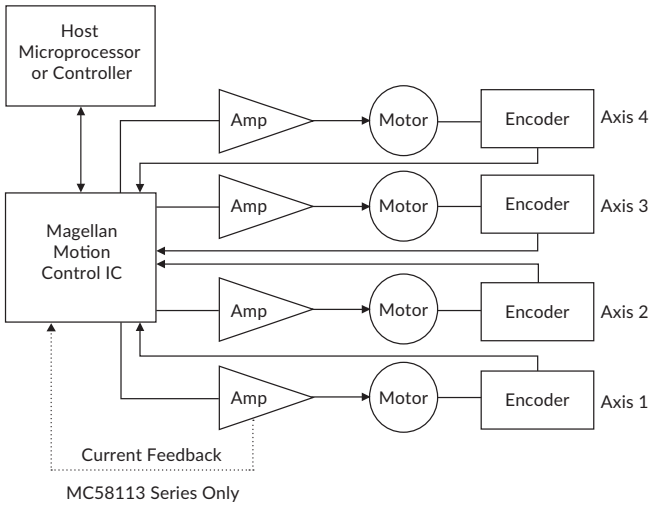
MEET THE FAMILY

- **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.

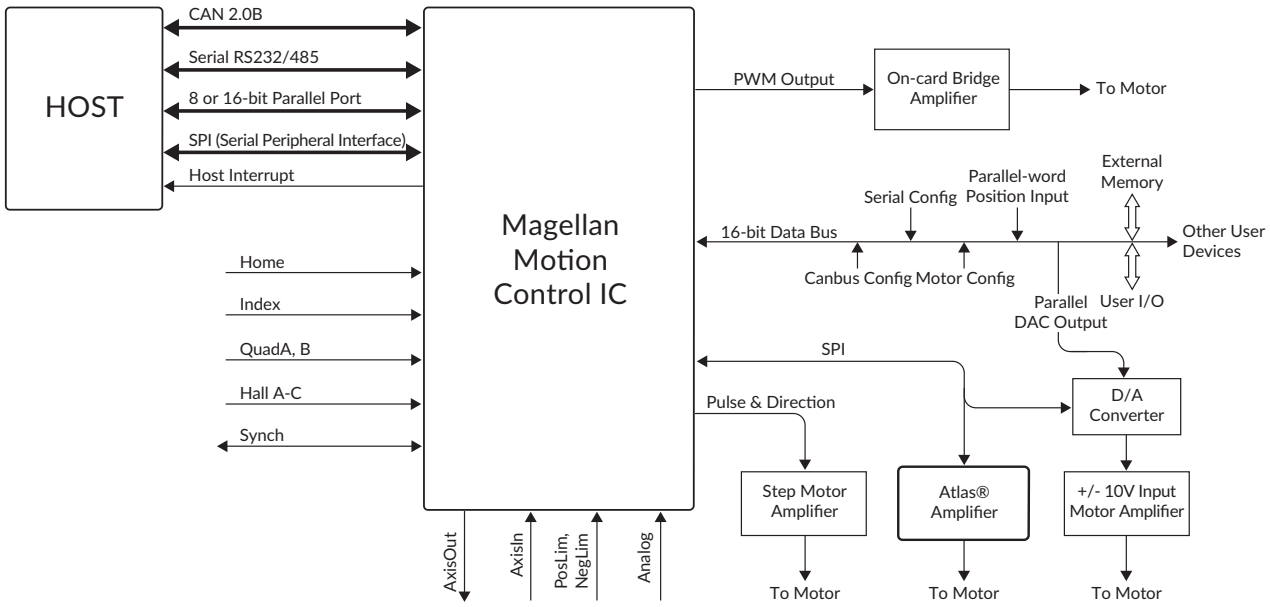
FEATURES

- 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



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.

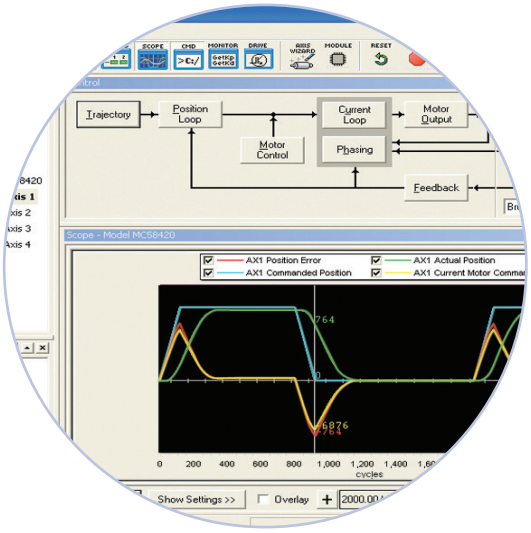
Voltage Input	12-56 VDC
Microstepping resolution	256
PWM frequency	20, 40, 80 kHz
Current Loop rate	20 kHz
Power rating options	75W, 250W, 500W
Mechanical Dimensions	Ultra Compact size: 1.05” x 1.05” x .53” (27mm x 27mm x 13mm)
	Compact size: 1.52” x 1.52” x .60” (39mm x 39mm x 15mm)

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 tracing
// captured in this example could be used for tuning the PID
// 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, 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
SetPosition(hAxis1, 200000);
SetVelocity(hAxis1, 0x200000);
SetAcceleration(hAxis1, 0x1000);
SetDeceleration(hAxis1, 0x1000);
```