



PERFORMANCE**MOTION**DEVICES

MC58113 Series Motion Control ICs



MC58113 Series Motion Control ICs

are members of PMD's third-generation Magellan-family and provide high-performance chip-based motion control for medical, scientific, automation, and robotic applications. Available in single IC, single axis versions, the MC58113 Series ICs are programmable devices which provide positioning, velocity, and torque control for DC brush, brushless DC, and step motors.

Powerful Features

MC58113 Series ICs are driven by a host device using either an SPI (Serial Peripheral Interface), CANbus 2.0B, or RS232/485 serial interface. User selectable profiling modes include S-curve, trapezoidal, velocity contouring and electronic gearing. Depending on the type of motor controlled, the MC58113 ICs provide servo-loop closure, commutation, and pulse & direction output. They provide advanced digital current control for smooth and ultra quiet

operation, along with amplifier management features such as overcurrent, over/undervoltage, and overtemperature sense.

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++.

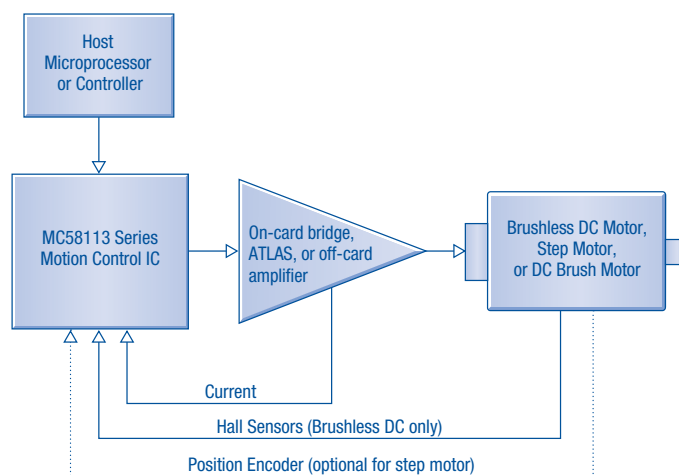
Flexibility

There are four MC58113 Series ICs, each packaged in a single 100-pin TQFP operating at 3.3 V. The MC51113 provides dedicated control of DC-Brush motors, the MC53113 provides control of three-phase Brushless DC motors, the MC54113 provides control of two-phase step motors, and the MC58113 can be software selected to provide control of any of these motor types.

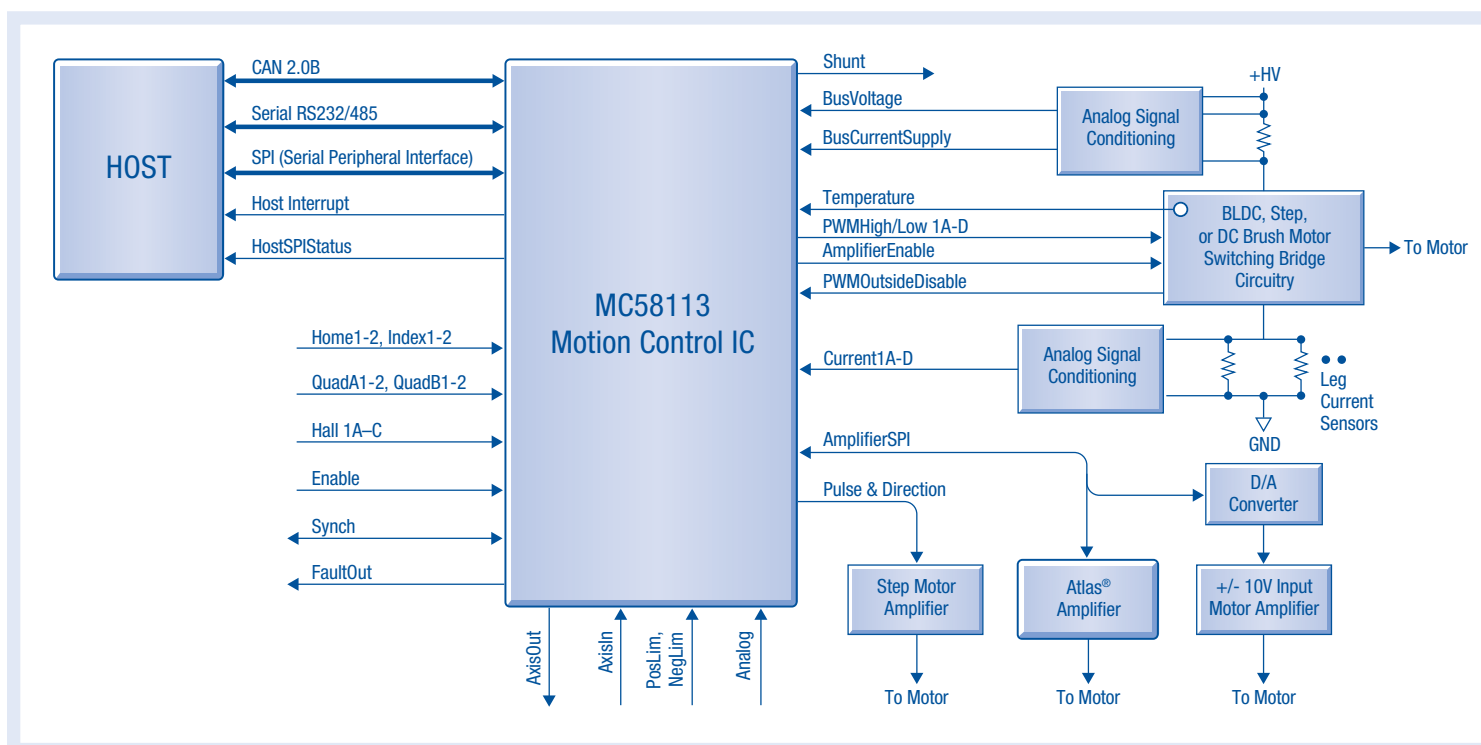
> FEATURES

- Single axis, single IC members of PMD's Magellan Motion IC family
- Position, velocity, and torque control
- DC brush, brushless DC, and step motor control
- S-curve, trapezoidal, velocity contouring, and electronic gearing profiles
- SPI (Serial Peripheral Interface), serial RS232/485, and CANbus communications
- 1.5 axes (primary and auxiliary axis) control
- Advanced PID filter with velocity and acceleration feedforward
- High performance current control of each motor phase
- High/Low switching amplifier control with programmable dead-time and charge pump refresh
- Velocity, position and acceleration changes on-the-fly
- Programmable loop time to 50 μ Sec
- FOC (field oriented control)
- Incremental encoder quadrature input (up to 25 Mcounts/sec)
- Synch pin feature allows multiple axes to be synchronized
- Internal motion trace buffer for performance optimization
- Overcurrent, over/undervoltage and overtemperature detect
- Directional limit switch, index, and home inputs
- Axis settled indicator, tracking window and automatic motion error detection
- Supports PMD's Atlas Digital Amplifier
- General-purpose analog input
- Programmable dual biquad filters
- Programmable acceleration and deceleration values
- Compact 100 pin TQFP package

> CONFIGURATION



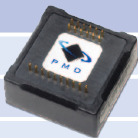
Technical Overview

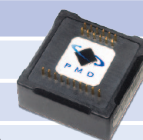


> SPECIFICATIONS

Parameter	Value
Configurations	MC58113 - DC Brush motor version MC58113 - Brushless DC motor version MC58113 - Step motor version MC58113 - all motor version (software selectable)
Host communication options	Serial RS232/485 CANbus 2.0B SPI (Serial Peripheral Interconnect)
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
Microsteps per full step	Programmable, up to 256
Signal inputs axis 1	QuadA/B, Index, Home, Hall A/B/C AxisIn, Pos/NegLimit
Signal inputs axis 2	QuadA/B, Index, Home
Maximum Encoder Rate	25 Mcounts/sec
Internal trace buffer	32 KB
Internal NVRAM buffer	2 KB
Operating Temperature (Ta)	-40° C to 85° C
Supply Voltage Operating Range (Vcc)	3.0 V to 3.6 V
Package & Dimensions	100 pin TQFP, 14 x 14mm

> AMPLIFIER CONNECTION OPTIONS

On-card PWM 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		
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		
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



Development Tools

1 EASY START-UP

Developers Kit

Includes

- MC58113 Developer's 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



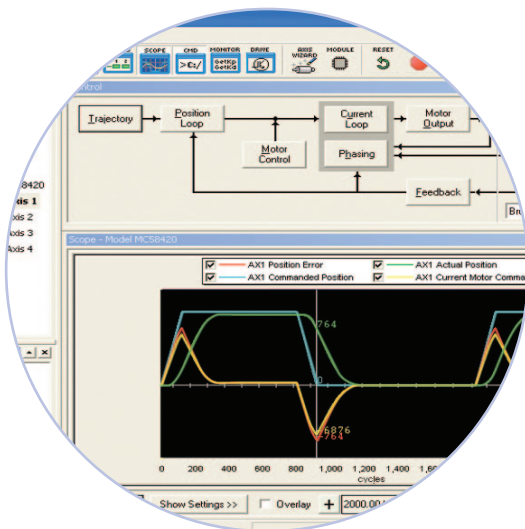
2 TUNE & OPTIMIZE

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 tracing
// captured in this example could be used for tuning the PMD
// set trace buffer wrap mode to a one time trace
PMDTraceMode(hAxis1, PMDTraceOneTime);

// set the processor variables that we want to capture
PMDSetTraceVariable(hAxis1, PMDTraceVariable1, PMDAxis1,
PMDSetTraceVariable(hAxis1, PMDTraceVariable2, PMDAxis1,
PMDSetTraceVariable(hAxis1, PMDTraceVariable3, PMDAxis1, P

// set the trace to begin when we issue the next update command
PMDSetTraceStart(hAxis1, PMDTraceConditionNextUpdate);

// set the trace to stop when the MotionComplete event occurs
PMDSetTraceStop(hAxis1, PMDTraceConditionEventStatus,
PMDEventMotionCompleteBit, PMDTraceStateHigh);
PMDSetProfileMode(hAxis1, PMDTrapezoidalProfile);

// set the profile parameters
PMDSetPosition(hAxis1, 200000);
PMDSetVelocity(hAxis1, 0x200000);
PMDSetAcceleration(hAxis1, 0x1000);
PMDSetDeceleration(hAxis1, 0x1000);

// motion
//
```

> 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

> ORDERING

1 DEVELOPER'S KIT

DK5 ☐ 113 ☐

Motor Type

1 = DC Brush
3 = Brushless DC
4 = Step Motor
8 = Multi-motor

Version

STD = Standard
X.Y = Specific version (contact PMD)

2 IC

MC5 ☐ 113 ☐

Motor Type

1 = DC Brush
3 = Brushless DC
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Version

STD = Standard
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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.

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