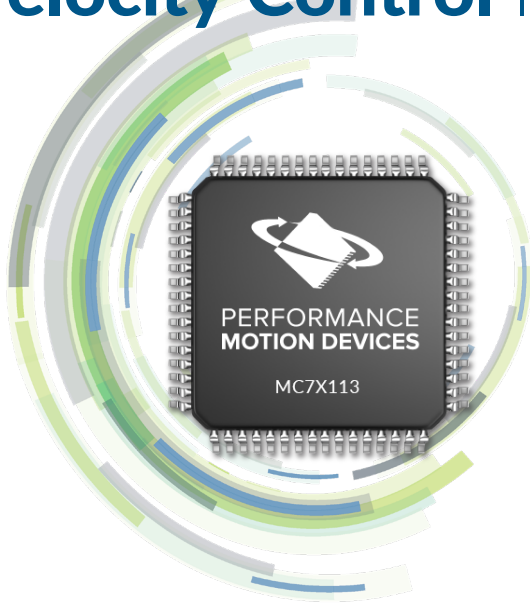


Juno® MC7X113

Velocity Control ICs



Juno® MC71113 and MC73113-series ICs provide advanced velocity control of Brushless DC and DC Brush motors. Available as a single one-axis IC in two different package options, these products provide ultra-efficient FOC control and are ideal for a wide range of applications including mobile robotics, spindle control, semiconductor equipment, pumping, lab automation, industrial control and aerospace applications.

Easy Integration

Juno ICs interface to external bridge-type switching amplifiers and utilize Performance Motion Device's advanced current and switch-signal generation technology for ultra smooth operation. Bridge settings such as charge pump refresh time, dead time, and minimum current read time are all user programmable.

Intelligent Drive Management

Juno ICs are equipped with advanced amplifier management features such as overcurrent, overvoltage, undervoltage, and overtemperature detect. Onboard i2T current foldback provides an additional level of safety which can protect motors and actuators from overheating.

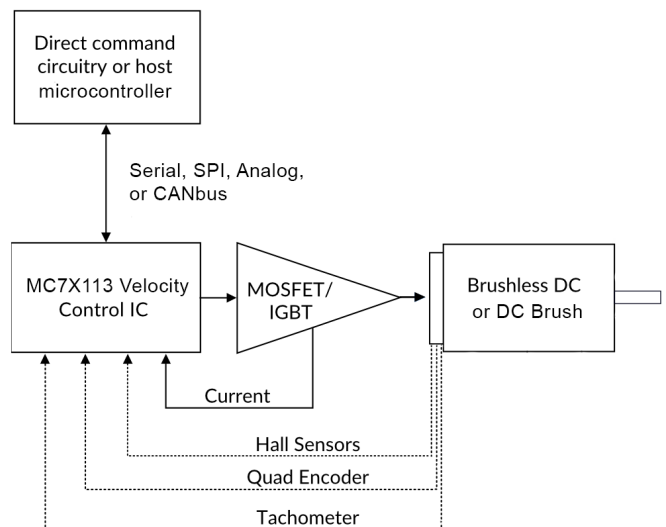
Accurate & Smooth Motion

Utilizing PI (Proportional, Integral) control, an advanced velocity estimator algorithm, a bandpass filter, and dual biquad filters the MC7x113's velocity loop delivers smooth, accurate motion. Coupled with an onboard profile generator that has settable velocity, acceleration, deceleration parameters these ICs can handle even the most demanding motion control applications.

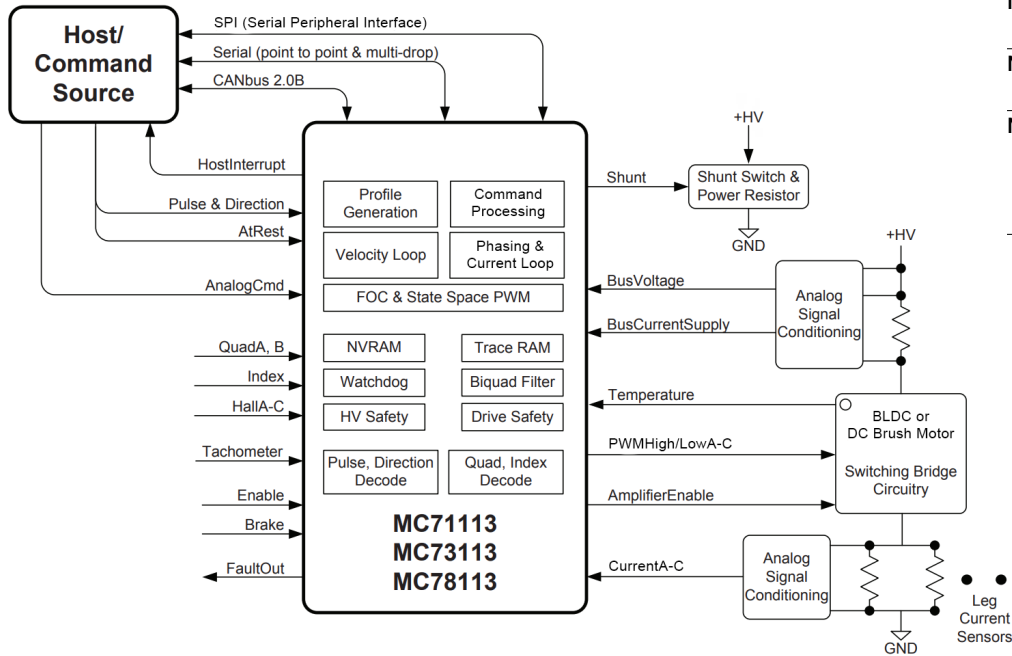
FEATURES

- Controls 3-phase Brushless DC and DC Brush motors
- High performance digital current loop
- Internal profile generator
- Velocity loop with encoder or tachometer feedback
- Sinusoidal or 6-step commutation
- Field oriented control
- Hall sensor inputs
- PWM output with shoot-through protection
- Direct analog signal input
- SPI, Serial, and CANbus communications
- Quadrature encoder input up to 40 Mcounts/sec
- NVRAM configuration load and trace memory
- Compact 64-pin TQFP package
- High speed index input and capture
- SPI (Serial Peripheral Interface) or direct analog signal command input
- Brake signal input
- 10 kHz velocity loop
- 20, 40, 80, 120 kHz PWM rate
- 20 kHz commutation and current loop rate
- i2t current foldback protection
- Overcurrent, Over/under voltage, and overtemperature detect

CONFIGURATION



TECHNICAL OVERVIEW



PART NUMBERS

MC71113	64-pin TQFP DC Brush
MC73113	64-pin TQFP Brushless DC
MC78113	64-pin TQFP DC Brush Brushless DC (motor type user set)

Parameters	Value
Motors supported	3-phase Brushless DC, DC Brush
Operating modes	Standalone: direct command input via external circuitry (onboard NVRAM holds configuration) Host command: microprocessor command input
Control loops	Velocity loop, current loop
Current control modes	FOC (Field Oriented Control), Third leg floating, Phase A/B, Voltage mode (no current control)
Commutation modes	6-step (using Hall sensors) Sinusoidal (with quadrature encoder input)
Motor output modes	High/low PWM, Sign/Magnitude PWM
Profile generator parameters	Velocity, acceleration, deceleration
Communication modes	Point-to-point asynchronous serial, Multi-drop asynchronous serial, SPI, or CANbus 2.0
Serial baud rate range	1,200 to 460,800 baud
CANbus baud rate range	10,000 to 1,000,000 baud
Internal trace RAM	6,144 16-bit words
Internal NVRAM	8,192 16-bit words

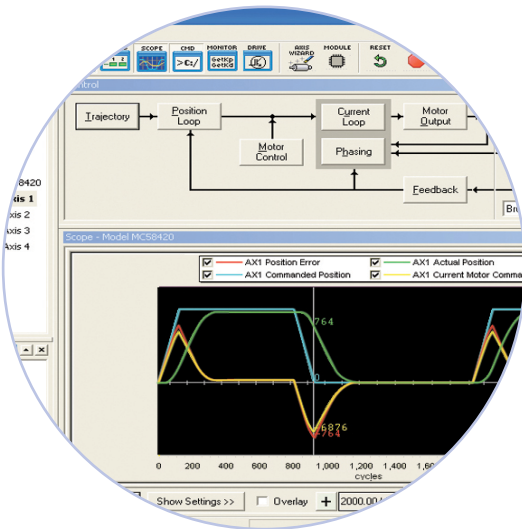
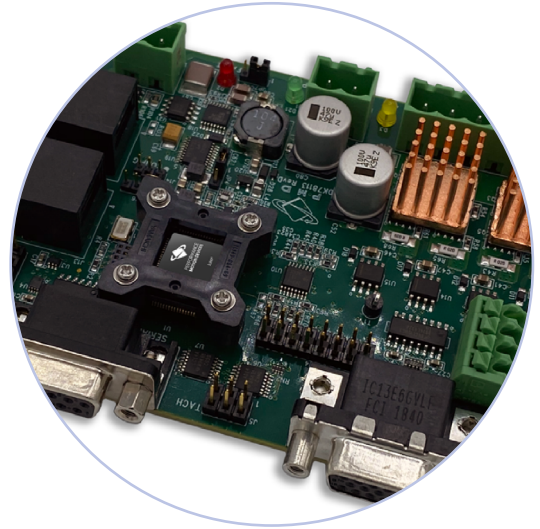
Parameters	Value
Velocity feedback options	Quadrature encoder Hall sensors Analog tachometer signal (12-bit A/D resolution)
Velocity and torque command options	Analog signal (12-bit A/D resolution) Digital SPI (16-bit resolution) Internal profile generator
Control/status signals	Enable, FaultOut, Hostinterrupt, Brake
Motor drive signals	PWM High/LowA-C, AmplifierEnable, CurrentA-C
DC Bus safety signals	Shunt, BusVoltage, BusCurrentSupply, Temperature
Motor feedback signals	QuadA, QuadB, Index, HallA-C, Tachometer, digital SPI
Max quadrature rate	40 Mcounts/second
Max SPI frequency	10 MHz
Velocity loop rate	Programmable up to 10 kHz
Current loop rate	20 kHz
Commutation rate	20 kHz
PWM rate	20, 40, 80, 120 kHz
Dimension	64-pin TQFP: 12 mm x 12 mm including leads

Development Tools

1 EASY START-UP Developers Kit

INCLUDES

- Standalone developer kit board
- Pro-Motion software
- Software Development Kit (SDK) with C-Motion
- Complete documentation



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 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, 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 serial, CAN, Ethernet, and SPI communications

```
// code for executing a profile and tracing
// captured in this example could be used for tuning the Pro-Motion GUI

// set the trace buffer wrap mode to a one time trace
PMDTraceMode(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);

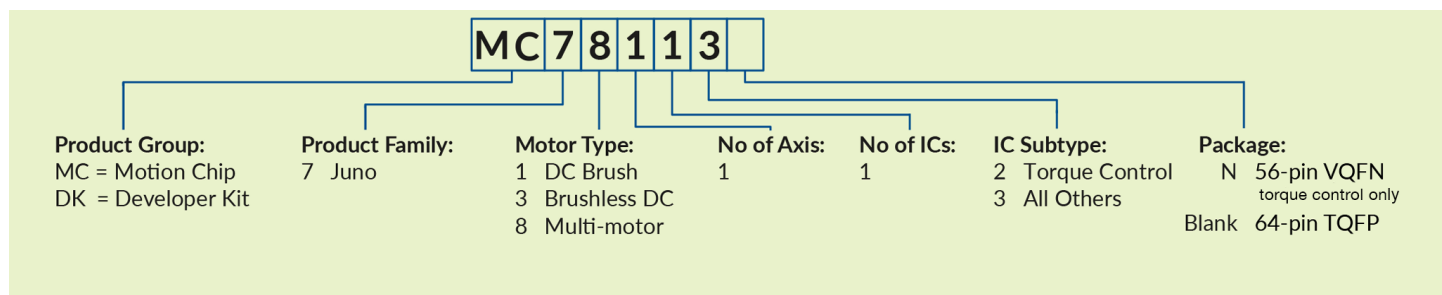
// execute the profile
PMDExecuteProfile(hAxis1);
```

PMD PRODUCT FAMILY OVERVIEW

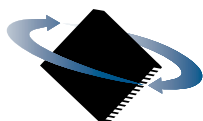
	# Axes	Motor Types	Format	Voltage	Communication	Features
JUNO® VELOCITY & TORQUE CONTROL ICs 	1	<ul style="list-style-type: none"> Brushless DC DC Brush 	<ul style="list-style-type: none"> 64-pin TQFP 56-pin VQFN 	3.3 V	<ul style="list-style-type: none"> RS232/485 CANbus SPI 	<ul style="list-style-type: none"> Velocity control Current control Field oriented control
MAGELLAN® MOTION CONTROL ICs 	1,2,3,4	<ul style="list-style-type: none"> Brushless DC DC Brush Step Motor 	<ul style="list-style-type: none"> 144-pin TQFP 100-pin TQF 	3.3 V	<ul style="list-style-type: none"> RS232/485 CANbus SPI Parallel 	<ul style="list-style-type: none"> Position control Torque/current control Field oriented control Profile generation
ATLAS® DIGITAL AMPLIFIERS 	1	<ul style="list-style-type: none"> Brushless DC DC Brush Step Motor 	<ul style="list-style-type: none"> 20-pin solderable module 	12-56 V	<ul style="list-style-type: none"> SPI Pulse and direction 	<ul style="list-style-type: none"> Torque/current control Field oriented control MOSFET amplifier
ION®/CME N-SERIES DIGITAL DRIVES 	1	<ul style="list-style-type: none"> Brushless DC DC Brush Step Motor 	<ul style="list-style-type: none"> Fully enclosed PCB-mounted module 	12-56 V	<ul style="list-style-type: none"> Ethernet RS232/485 CAN FD SPI 	<ul style="list-style-type: none"> Position control Torque/current control Field oriented control Profile generation MOSFET amplifier Downloadable user code
ION® 500 & 3000 DIGITAL DRIVES 	1	<ul style="list-style-type: none"> Brushless DC DC Brush Step Motor 	<ul style="list-style-type: none"> Fully enclosed cable-connected module 	12-56 V 20-195 V	<ul style="list-style-type: none"> Ethernet RS232/485 CANbus 	<ul style="list-style-type: none"> Position control Torque/current control Field oriented control Profile generation MOSFET amplifier Downloadable user code
PRODIGY® MOTION BOARDS 	1,2,3,4	<ul style="list-style-type: none"> Brushless DC DC Brush Step Motor 	<ul style="list-style-type: none"> Machine Controller 	<ul style="list-style-type: none"> 12-56 V: Machine Controller 	<ul style="list-style-type: none"> Ethernet RS232/485 CANbus 	<ul style="list-style-type: none"> Position control Torque/current control Field oriented control Profile generation Downloadable user code

C-Motion® is the common motion language for all Performance Motion Devices products.

FOR ORDERING



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



**PERFORMANCE
MOTION DEVICES**
MOTION CONTROL AT ITS CORE

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e-mail: info@pmdcorp.com
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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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