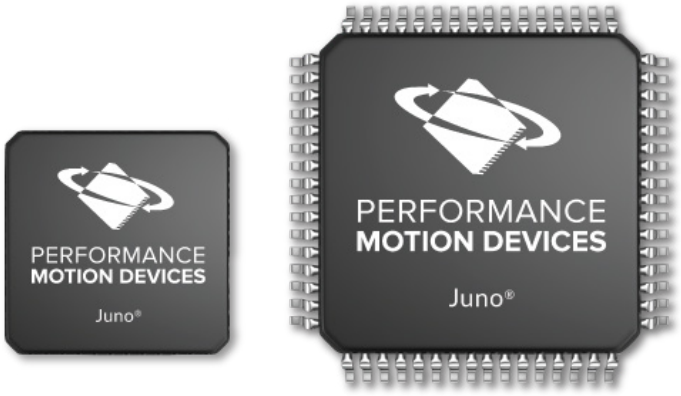
Juno® Velocity & Torque Control IC Family

PERFORMANCE MOTION DEVICES
MOTION CONTROL AT ITS CORE



Advanced Motor Control, Compact Size

The Juno® family of ICs provide advanced velocity and torque control for Brushless DC, DC Brush, and step motors. They are the industry's first family of compact ICs with full four quadrant motion control, direct input quadrature encoder, profile generation, and advanced current control.

Juno ICs are targeted for medical, scientific, industrial, and robotic applications that need to minimize motor noise, vibration and power consumption. Juno ICs are easy to deploy with embedded motion commands, on-board intelligence, and direct analog and digital amplifier signal interfacing.

Easy Integration

Juno ICs interface to external bridge-type switching amplifiers and utilize Performance Motion Device's proprietary current and switch-signal technology for ultra smooth operation. Depending on the type of motor controlled, Juno ICs provide motor commutation, microstep generation, pulse and direction input, internal profile generation, and much more.

Integrated Safety Features

Juno ICs are equipped with advanced amplifier management features such as overcurrent, over/undervoltage, and overtemperature sense. A special outer control loop allows a wide range of motor-related control applications, including pressure, flow rate and temperature control.

Flexible Offering

Juno ICs are offered in three major product groups:

- Juno Velocity Control ICs
- Juno Step Motor Control ICs
- Juno Torque Control ICs

No matter what your motor control application, there is a Juno IC that will take your application to a higher level.

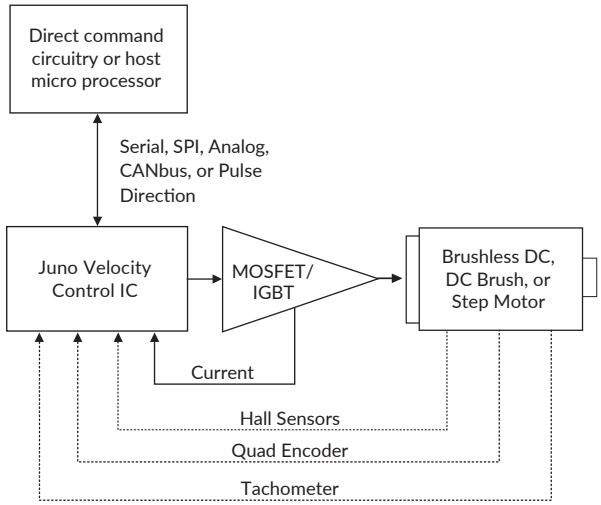
MEET THE FAMILY

- **Velocity Control ICs:** Sophisticated velocity and torque control of 3-phase DC Brush, Brushless DC and step motors
- **Step Motor Control ICs:** State of the art step motor control with pulse and direction or SPI command input
- **Torque Control ICs:** Ultra precise torque control for 3-phase Brushless DC and DC Brush motors with direct analog or SPI command input

FEATURES

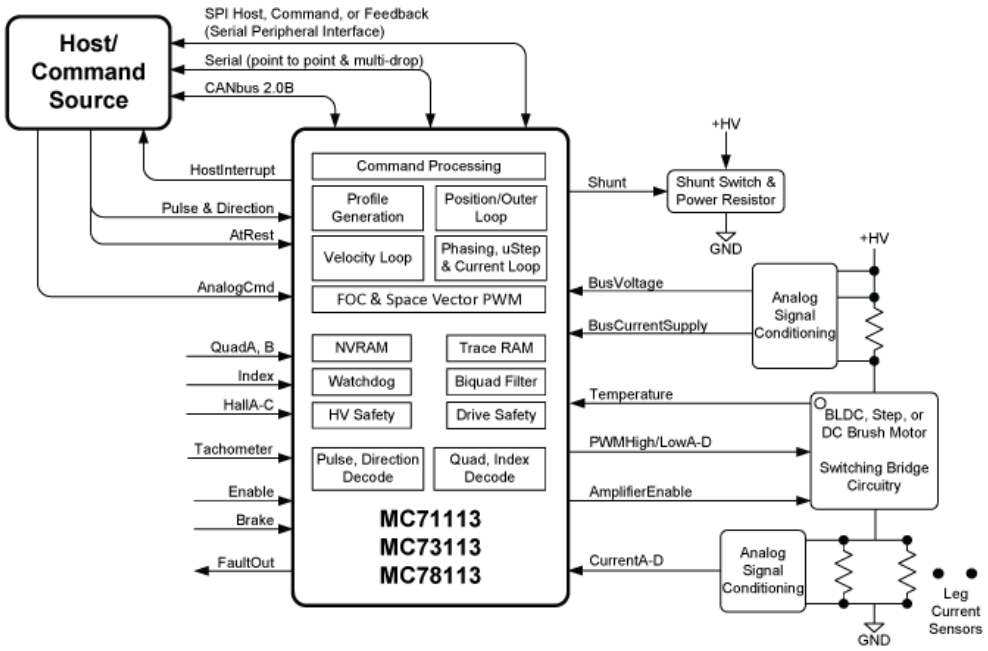
- Controls 3-phase DC Brush, Brushless DC, or step motors
- High performance digital current loop
- Velocity loop with encoder or tachometer feedback
- Internal profile generator
- Sinusoidal or 6-step commutation
- Field Oriented Control
- Hall sensor inputs
- PWM output with shoot-through protection
- Direct analog signal input
- Serial port up to 416 kBaud
- Quadrature encoder input up to 40 Mcounts/sec
- NVRAM configuration load and trace memory
- Compact 64-pin TQFP and ultra-compact 56-pin VQFN packages
- High speed index input & capture
- SPI (serial peripheral interface) command input
- Brake signal input
- 10 kHz velocity loop
- 20, 40, 80, 120 kHz PWM rate
- 20 or 40 kHz commutation and current loop rate
- i^2t current foldback protection
- Over and under-voltage protection
- Pulse and direction input

VELOCITY CONFIGURATION



JUNO® VELOCITY CONTROL ICs

TECHNICAL OVERVIEW



PART NUMBERS

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

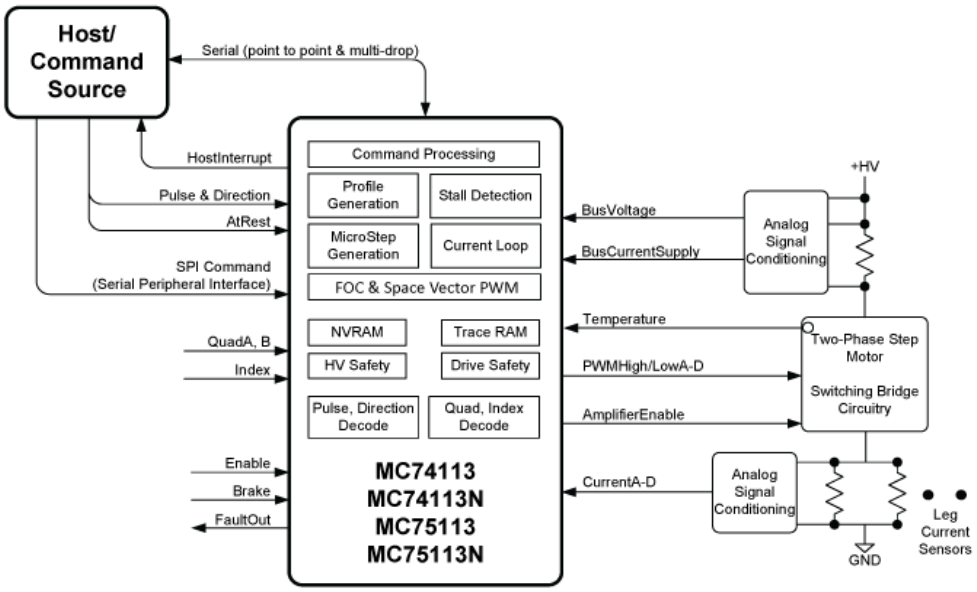
SPECIFICATIONS — JUNO VELOCITY CONTROL ICS

Parameters	Value
Motors supported	3-phase Brushless DC, DC Brush, 2-phase step motor
Operating modes	Standalone: direct command input via external circuitry (onboard NVRAM holds configuration), Host command: microprocessor command input
Control loops	Position/outer loop, velocity loop, current loop
Current control modes	FOC (field oriented control), Third leg floating, Single-phase, Voltage mode (no current control)
Commutation modes	6-step (using Hall sensors) Sinusoidal (with quadrature encoder input)
Motor output modes	Individual high/low PWM, Sign/Magnitude PWM
Microstep per full step	Programmable up to 256 microsteps/full step
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	1,024 16-bit words

Parameters	Value
Velocity feedback options	Quadrature encoder, Hall sensors, analog tachometer signal (12-bit A/D resolution)
Position command options	Pulse and direction, Digital SPI (16-bit resolution), Internal profile generator
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-D, AmplifierEnable, CurrentA-D
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
Position/outer loop rate	Programmable up to 10 kHz
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

JUNO® STEP MOTOR CONTROL ICs

TECHNICAL OVERVIEW



PART NUMBERS

MC74113	64-pin TQFP Step motor with encoder
MC74113N	56-pin VQFN Step motor with encoder
MC75113	64-pin TQFP Step motor
MC75113N	56-pin VQFN Step motor

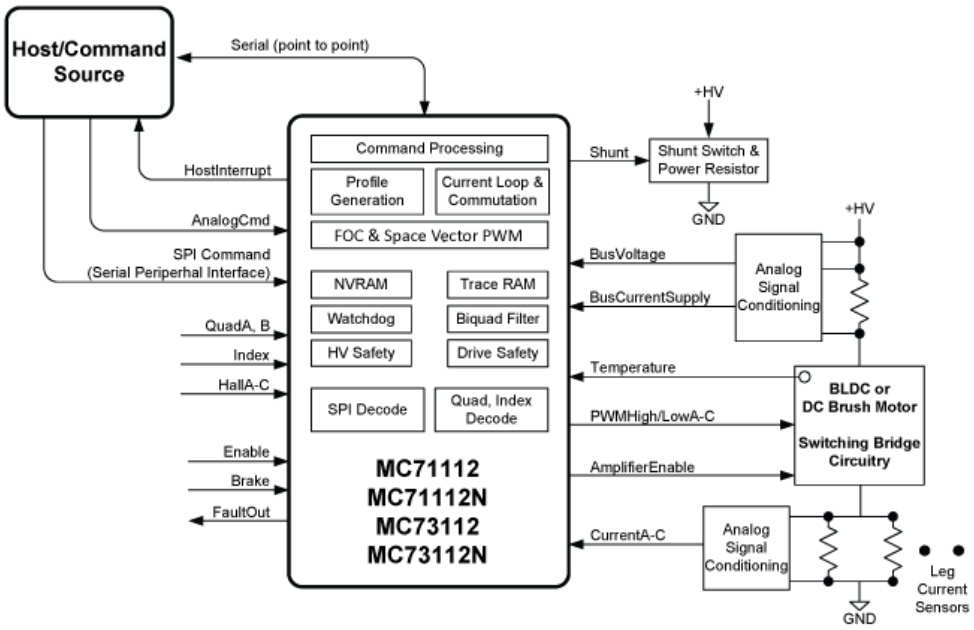
SPECIFICATIONS — JUNO STEP MOTOR CONTROL ICS

Parameters	Value
Motors supported	2-phase step motor
Operating modes	Standalone: direct command input via external circuitry (onboard NVRAM holds configuration), Host command: microprocessor command input via serial
Control loops	Current loop
Current control modes	FOC (field oriented control), Voltage mode (no current control)
Motor output modes	Individual high/low PWM, Sign/Magnitude PWM
Microstep per full step	Programmable up to 256 microsteps/full step
Stall detection	Via encoder
Profile generator parameters	Velocity, acceleration, deceleration
Communication modes	Point-to-point asynchronous serial
Serial baud rate range	1,200 to 460,800 baud
Internal trace RAM	6,144 16-bit words
Internal NVRAM	1,024 16-bit words

Parameters	Value
Position command options (with AtRest signal)	Pulse and direction, Digital SPI (16-bit resolution), Internal profile generator
Control/status signals	Enable, FaultOut, Hostinterrupt, Brake
Motor drive signals	PWM High/LowA-D, AmplifierEnable, CurrentA-D
DC Bus safety signals	BusVoltage, BusCurrentSupply, Temperature
Motor feedback signals	QuadA, QuadB, Index
Max quadrature rate	40 Mcounts/second
Max SPI frequency	10 MHz
Current loop rate	20 kHz
Microstep synthesis rate	40 kHz
PWM rate	20, 40, 80, 120 kHz
Dimension	64-pin TQFP: 12 mm x 12 mm including leads 56-pin VQFN: 7.2 mm x 7.2 mm

JUNO® TORQUE CONTROL ICs

TECHNICAL OVERVIEW



PART NUMBERS

MC71112	64-pin TQFP DC Brush
MC71112N	56-pin VQFN DC Brush
MC73112	64-pin TQFP Brushless DC
MC73112N	56-pin VQFN Brushless DC

SPECIFICATIONS — JUNO TORQUE CONTROL ICS

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 via serial
Control loops	Current loop
Commutation modes	6-step (using Hall sensors), Sinusoidal (with quadrature encoder input)
Current control modes	FOC (field oriented control), Third leg floating, Single-phase, Voltage mode (no current control)
Motor output modes	Individual high/low PWM, Sign/Magnitude PWM
Communication modes	Point-to-point asynchronous serial
Serial baud rate range	1,200 to 460,800 baud
Internal trace RAM	6,144 16-bit words
Internal NVRAM	1,024 16-bit words

Parameters	Value
Torque command options	Analog signal (12-bit A/D resolution), Digital SPI (16-bit resolution), Internal profile generator, Direct set register
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
Max quadrature rate	40 Mcounts/second
Max SPI frequency	10 MHz
Current loop rate	20 kHz
Commutation rate	40 kHz
PWM rate	20, 40, 80, 120 kHz
Dimension	64-pin TQFP: 12 mm x 12 mm including leads 56-pin VQFN: 7.2 mm x 7.2 mm

JUNO® IC FAMILY AT-A-GLANCE

IC Part Number	IC Package	Developer Kit Part Number	Juno® Group/Subtype	Motors Supported
MC71113	64-pin TQFP	DK71113	Velocity Control	DC Brush
MC73113	64-pin TQFP	DK73113	Velocity Control	Brushless DC
MC78113	64-pin TQFP	DK78113	Velocity Control	DC Brush, Brushless DC, Step
MC74113	64-pin TQFP	DK74113	Step Motor Control	Step Motor with encoder
MC75113	64-pin TQFP	DK75113	Step Motor Control	Step Motor
MC74113N	56-pin VQFN	DK74113N	Step Motor Control	Step Motor with encoder
MC75113N	56-pin VQFN	DK75113N	Step Motor Control	Step Motor
MC71112	64-pin TQFP	DK71112	Torque Control	DC Brush
MC73112	64-pin TQFP	DK73112	Torque Control	Brushless DC
MC71112N	56-pin VQFN	DK71112N	Torque Control	DC Brush
MC73112N	56-pin VQFN	DK73112N	Torque Control	Brushless DC

DEVELOPMENT TOOLS

1. EASY START-UP Developer Kits

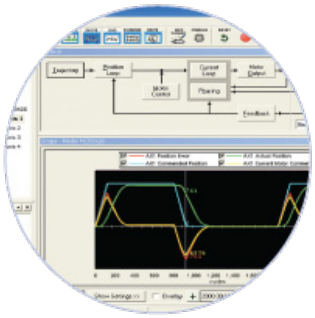
Get your motor running in hours not days with easy to use board and software packages.

Everything you need:

- Developer Kit board
- Manual
- Pro-Motion® Axis set-up wizard and User Guide
- Development software with C-Motion® Language
- Layout and schematic examples

Developer Kits enable concurrent software and hardware development. While your hardware team develops your board, your software team can develop the system controls on the Developer Kit board.

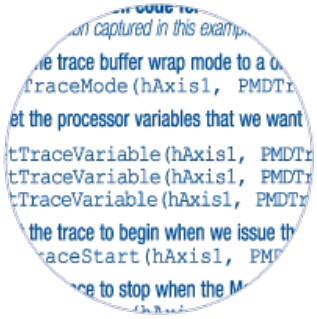
2. TUNE & OPTIMIZE Pro-Motion Software



Intuitive Pro-Motion Development Software makes motor set-up, profile entry, and system tuning straightforward.

- Axis set-up wizard
- Motion oscilloscope graphically displays parameters in real-time
- Autotuning
- Ability to save and load settings
- Distance, time, current, and voltage units conversion
- Motor-specific parameter setup
- Communications monitor echoes all commands sent by Pro-Motion to the board
- Advanced Bode analysis for machine frequency response

3. BUILD THE APP C-Motion Language



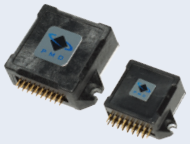
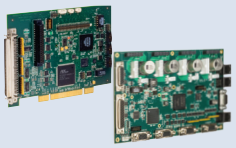
C-Motion is a complete, easy to use motion programming language that includes a library containing all the source code required for communicating with PMD Corp. motion ICs, boards, and modules.

- Extensive library of commands for virtually all motion design needs
- Develop embedded C/C++ applications
- Complete, functional examples
- Supports serial, CAN and SPI communications

[NEED ASSISTANCE?]

We offer expert service and consultation with: schematic & layout reviews, complete design examples (BOM, Gerber, schematics), set-up and tuning assistance.
Call or email support@pmdcorp.com to inquire.

PMD PRODUCT FAMILY OVERVIEW

	JUNO® VELOCITY & TORQUE CONTROL ICS	MAGELLAN® MOTION CONTROL ICS	ATLAS® DIGITAL AMPLIFIERS	PRODIGY® MOTION BOARDS	ION® DIGITAL DRIVES
					
No. Axes	1	1,2,3,4	1	1,2,3,4	1
Motor Types	• Brushless DC • DC Brush • Step Motor	• Brushless DC • DC Brush • Step Motor	• Brushless DC • DC Brush • Step Motor	• Brushless DC • DC Brush • Step Motor	• Brushless DC • DC Brush • Step Motor
Format	• 64-pin TQFP • 56-pin VQFN	• 144-pin TQFP • 100-pin TQF	• 20-pin solderable module • 19-pin solderable module	• PCI • PC/104 • Standalone • Machine Controller	• Fully enclosed module
Voltage	3.3 V	3.3 V	12-56 V	5 V: PCI, PC/104 and Standalone 12-56 V: Machine Controller	12-56 V / 20-195 V
Communication	• Standalone • RS232/485 • CANbus • SPI	• Parallel • RS232/485 • CANbus • SPI	• SPI	• Ethernet • RS232/485 • CANbus • PCI and PC/104 bus	• Ethernet • RS232/485 • CANbus
Features	• Velocity control • Torque/current control • Field oriented control • Multi-motor support	• Position control • Torque/current control • Field oriented control • Profile generation • Multi-motor support • Network communications	• Torque/current control • Field-oriented control • Pulse & direction input • Multi-motor support • SPI Interface • MOSFET amplifier	• Position control • Torque/current control • Field oriented control • Profile generation • Multi-motor support • Programmable/CME	• Position control • Torque/current control • Field oriented control • Profile generation • Trace buffer • MOSFET amplifier • Pulse & direction input • Programmable (CME)
Motion Language	**C-Motion® easy-to-use Language** with a library of over 250 commands is the common motion language for all PMD Corp. products.				

FOR ORDERING

MC	7	8	1	1	3	

Product Group:
MC = Motion Chip
DK = Developer Kit

Product Family:
7 Juno

Motor Type:
1 DC Brush
3 Brushless DC
4 Step with Encoder
5 Step
8 Multi-motor

No of Axis:
1

No of ICs:
1

IC Subtype:
2 Torque Control
3 All Others

Package:
N 56-pin VQFN *step and torque control only*
Blank 64-pin TQFP

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

PERFORMANCE MOTION DEVICES
MOTION CONTROL AT ITS CORE
pmdcorp.com

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