

Juno® Velocity & Torque Control IC Family



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 utilizes Performance Motion Device's proprietary current- and switch signal-technology for ultra smooth operation. Depending on the type of motor controlled, Juno ICs provide 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 two major product groups:

- Juno Velocity Control ICs
- Juno Step Motor Control ICs

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

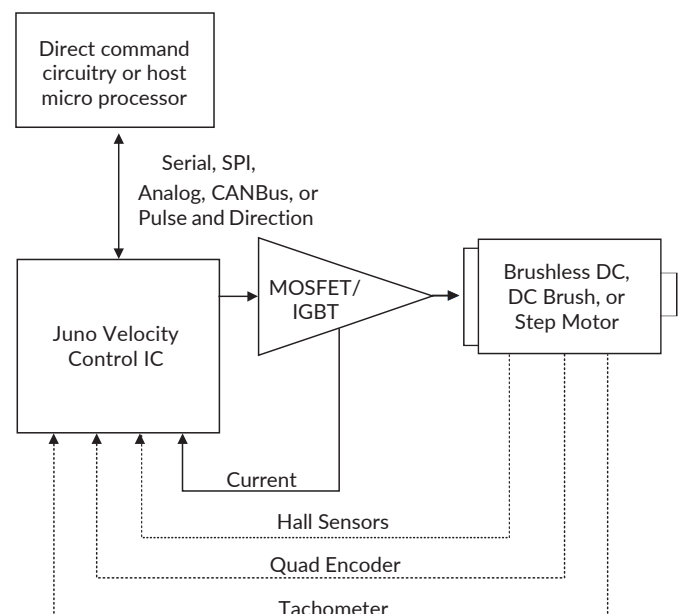
> MEET THE FAMILY

- **Velocity Control ICs:** Sophisticated velocity and torque control of 3-phase brushless DC, DC brush, step motors or multi-motor.
- **Step Motor Control ICs:** State of the art step motor control with pulse and direction or SPI command input.

> FEATURES

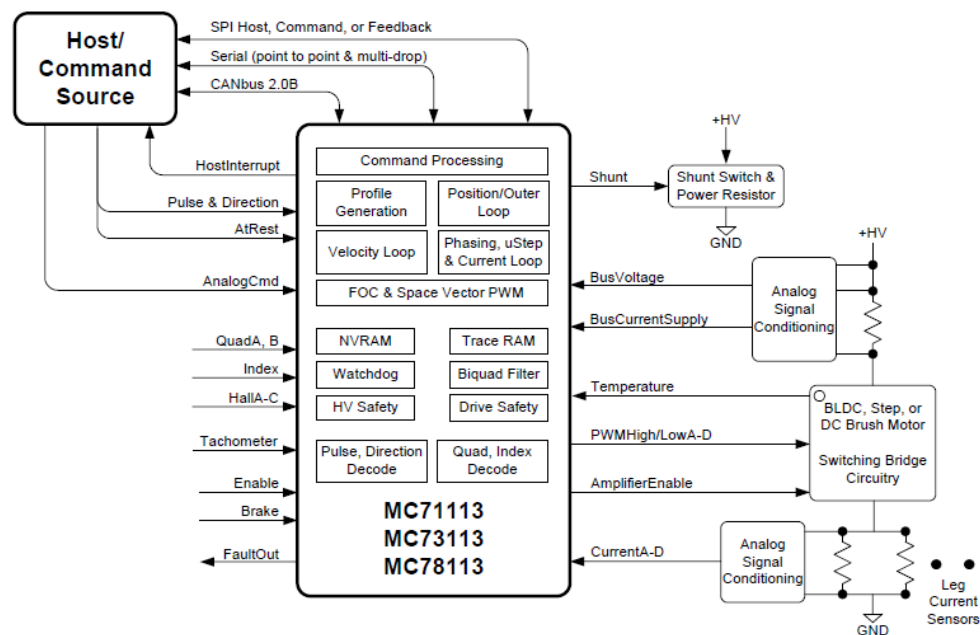
- High-performance digital current control
- Velocity loop with encoder or tachometer feedback
- Internal profile generator and estimator
- Pulse and direction input and microstep waveform generation
- Sinusoidal or 6-step commutation
- FOC and space vector PWM
- Hall sensor input
- 8-signal PWM output with shoot-through protection
- Direct analog signal input
- Point-to-point and multi-drop serial up to 416 kBaud
- Quadrature encoder input up to 40 Mcounts/second
- High speed index input & capture control
- SPI communication
- Brake signal input
- 10 kHz velocity loop
- 20 kHz commutation and current loop rate
- 20, 40, 80, or 120 kHz PWM selectable frequency
- Stall detection
- Over- and under-voltage protection; overcurrent and overtemperature protection
- Shunt control output
- Outer loop capability controls pressure, temperature, liquid levels
- Onboard NVRAM for custom configuration
- CANbus 2.0B

> VELOCITY CONFIGURATION



Juno Velocity Control ICs

> TECHNICAL OVERVIEW



> PART NUMBERS

IC	Motor	Comment
MC71113	DC Brush	
MC73113	Brushless DC	
MC78113	Multi-motor	User settable Brushless DC, DC Brush or Step Motor

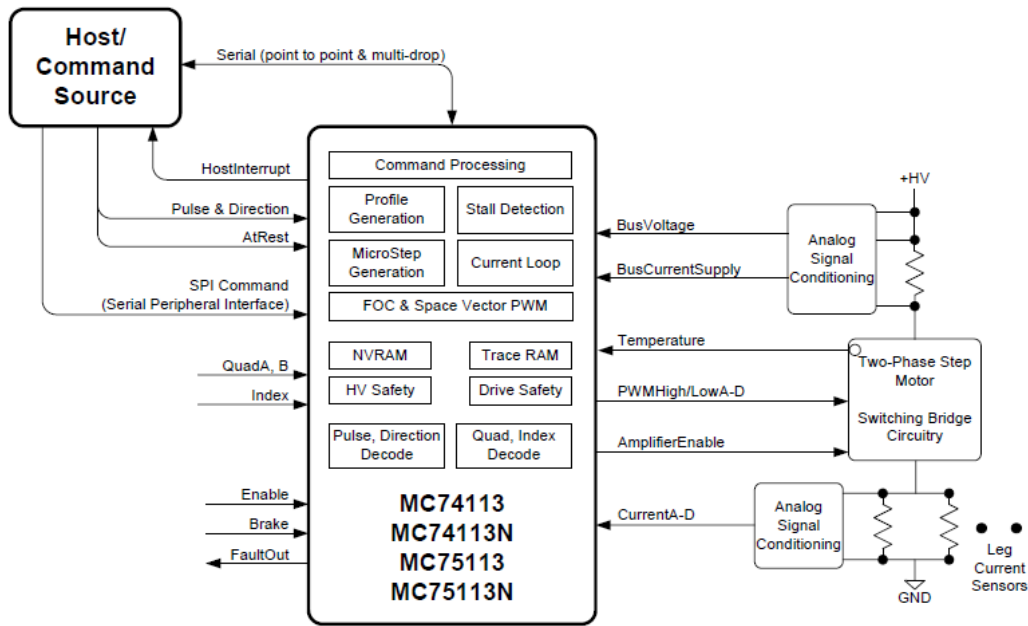
> SPECIFICATIONS

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 via SPI, serial, or CANbus 2.0
Control types	Position/outer loop, velocity loop, current loop
Communication 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
Microstep per full step	Programmable up to 256 microsteps/second
Profile generator parameters	Velocity, acceleration, deceleration
Serial communication modes	Point-to-point asynchronous Multi-drop asynchronous
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

Parameter	Value
Velocity feedback options	Quadrature encoder, Hall sensors, analog tachometer signal (12-bit A/D resolution)
Position command options (with AtRest signal)	Pulse and direction signals 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) Host command via microprocessor for internal profile generator
Control/status signals	Enable, FaultOut, Hostinterrupt, Brake
Motor drive signals	PWM High/LowA-D, amplifier enable, current A-D
DC Bus safety signals	Shunt, BusVoltage, BusCurrentSupply, Temperature
Motor feedback signals	QuadA, QuadB, Index, HallA-C, Tachometer, digital SPI
Max quadrature rate (A, B, Index)	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

Juno Step Motor Control ICs

> TECHNICAL OVERVIEW



> PART NUMBERS

IC	Pkg.	Motor
MC74113N	56-pin VQFN	Step motor with encoder
MC74113	64-pin TQFP	Step motor with encoder
MC75113N	56-pin VQFN	Step motor no encoder input
MC75113	64-pin TQFP	Step motor no encoder input

> SPECIFICATIONS

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 types	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/second
Stall detection	Via encoder
Profile generator parameters	Velocity, acceleration, deceleration
Serial communication modes	Point-to-point asynchronous
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

Parameter	Value
Position command options (with AtRest signal)	Pulse and direction signals Digital SPI (16-bit resolution) Internal profile generator
Control/status signals	Enable, FaultOut, Hostinterrupt, Brake
Motor drive signals	PWM High/LowA-D, amplifier enable, current A-D
DC Bus safety signals	BusVoltage, BusCurrentSupply, Temperature
Motor feedback signals	QuadA, QuadB, Index
Max quadrature rate (A, B, Index)	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

Development Tools

1 EASY START-UP **Developers Kits**

- Developer Kit board
- Pro-Motion® Axis set-up wizard and User Guide
- Development software with C-Motion® and VB-Motion® software
- Complete manual set
- Cable and prototyping connector set



2 TUNE & OPTIMIZE **Pro-Motion Software**

Pro-Motion is an easy-to-use Windows-based exerciser program for use with PMD Corp. ICs, modules, and boards.

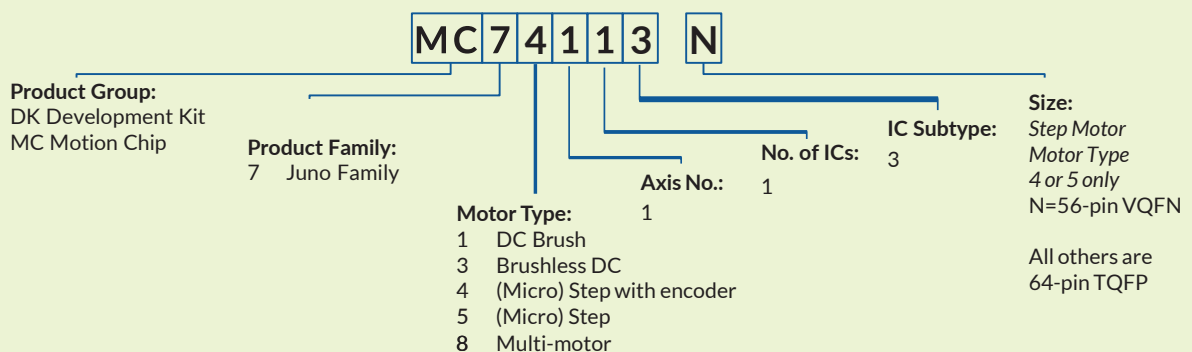
- Motion oscilloscope graphically displays parameters in real-time
- Autotuning
- Ability to save and load settings
- Axis wizard
- Distance, time, current, and voltage units conversion
- Motor-specific parameter setup
- Communications monitor echoes all commands sent by Pro-Motion to the board
- Advanced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

3 BUILD THE APP **C-MotionLanguage Library**

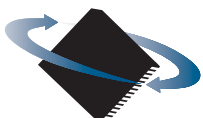
C-Motion is a complete, easy-to-use, motion programming language that includes a source library containing all the code required for communicating with PMD Corp. motion ICs, cards, and modules.

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

> FOR ORDERING JUNO CONTROL ICs



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



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

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