

Nova Electronics MCX314As

MCX314As

Motion Controller IC for up to 4 Axes for Stepper Motors and Stepper-like Servo Systems



The MCX314As is a high-speed 4-axes motion control chip for stepper or pulse-type servo motor drives. Its very powerful functions simplify complex motion control. The MCX314As is a highly advanced ASIC. Here are some of its key features:

- * 4-axes independent position/speed control for stepper/pulse-type servo motor drives
- * Max. speed of 4 MHz, pulse output and encoder feedback frequency
- * 4 MHz speed available for point to point, linear, and circular moves
- * Selectable pulse and direction or up/down outputs for each axis
- * 32-bit command and actual position registers
- * Programmable S-curve, trapezoidal or contoured profiles
- * Hardware linear interpolation of any 2 or 3 axes out of 4
- * Hardware circular interpolation of any 2 axes out of 4
- * Hardware bit pattern interpolation of any 2 or 3 axes out of 4
- * 32-bit compare registers (breakpoints) for each axis
- * On the fly control of position and speed
- * Dedicated inputs for each axis (limits, In-position from amplifier, amplifier alarm)
- * Emergency OFF input for all axes
- * Dedicated outputs for each axis (in motion, accelerating, decelerating, compare + and -)

Specifications

.. 4 Axes of control

.. Data Bus 16/8 bits selectable

Interpolation Functions

.. 2-axes / 3-axes Linear Interpolation

.. Interpolation Range Each axis .2,147,483,646 ~ +2,147,483,646

.. Interpolation Speed 1 PPS ~ 4 MPPS

.. Interpolation Accuracy ± 0.5 LSB (Within the range of whole interpolation)

.. Circular Interpolation

.. Interpolation Range Each axis .2,147,483,646 ~ +2,147,483,646

.. Interpolation Speed 1 PPS ~ 4 MPPS

.. Interpolation Accuracy ± 1 LSB (Within the range of whole interpolation)

.. 2 axes / 3 axes Bit Pattern Interpolation

.. Interpolation Speed 1PPS ~ 4 MPPS (Dependent on CPU data writing time)

.. **Related Functions of Interpolation** ..Can select any axis ..Constant vector speed

..Continuous interpolation ..Single step interpolation (Command/external signals)

Common Specifications of Each Axis

.. **Drive Pulses Output** (When CLK = 16 MHz)

.. Pulse Output Speed Range 1PPS ~ 4MPPS

.. Pulse Output Accuracy within $\pm 0.1\%$ (according to the setting speed)

.. S-curve Jerk 954 ~ 62.5 x 106 PPS/S2 (Multiple = 1) 477 x 103 ~ 31.25 x 109PPS/S2

(Multiple =500)

.. Accelerating / Decelerating Speed 125 ~ 1 x 106 PPS/S (Multiple = 1) 62.5x103 ~ 500 x 106 PPS/S (Multiple = 500)

.. Initial Speed 1 ~ 8,000PPS (Multiple = 1) 500PPS ~ 4x106 PPS (Multiple = 500)

.. Drive Speed 1 ~ 8,000PPS (Multiple = 1) 500PPS ~ 4x106 PPS (Multiple = 500)

.. Output-pulse Number 0 ~ 4,294,967,295 / unlimited

.. Speed Curve Constant speed, symmetrical/non-symmetrical linear acceleration, symmetrical/non-symmetrical parabola S-curve acceleration/deceleration drive

.. Index Pulse Drive Deceleration Mode auto (non-symmetrical linear acceleration is also allowed) / manual

.. Output-pulse numbers and drive speeds changeable during the driving

.. Triangle form prevention of linear acceleration fixed pulse drive and S-curve acceleration/ deceleration fixed pulse drive

.. Independent 2-pulse system or 1-pulse 1-direction system selectable

.. Logical levels of drive pulse selectable, output pin switchable

.. Encoder Input

.. A/B quadrature pulse style or Up/Down pulse style selectable

.. Pulse of 1, 2 and 4 divisions selectable (A/B quadrature pulse style)

.. Position Counter

.. Logic Position Counter (for output pulse t) range .2,147,483,648 ~ +2,147,483,647

.. Real Position Counter (for feedback pulse) range .2,147,483,648 ~ +2,147,483,647

Variable ring counter function, real position counter increase/decrease inversion function, and real position counter clear function by the IN2 signal

Data read and write possible

.. Comparison Register

.. COMP + Register Position comparison range .2,147,483,648 ~ +2,147,483,647

.. COMP - Register Position comparison range .2,147,483,648 ~ +2,147,483,647

.. Status and signal outputs for the comparisons of position counters

.. Software limit functioned

.. Automatic home search

.. Automatic execution of Step 1 (high-speed near home search)

• Step 2 (low-speed home search)

• Step 3 (low-speed encoder Z-phase search)

• Step 4 (high-speed offset drive). Enable/Disable of each step and search direction selectable

.. Deviation counter clear output : Clear pulse width within the range of 10 μ ~ 20,

•sec and logical level selectable

.. Synchronous Action

.. Activation factor

Position counter . COMP+ variation, position counter < COMP+ variation, position counter < COMP - variation, position counter . COMP - variation, start of driving, termination of driving, IN3 signal•*, IN3 signal•«, LP read command, activation command.

.. Action

Start of +/- fixed pulse drive, start of +/- continuous pulse drive, drive decelerating stop, drive instant stop, saving position counter values, setting position counter values, setting an output pulse number, setting a drive speed, external signal output (DCC), and interrupt

Any action of other axes can be activated from the factor of the own axis.

.. Interrupt (Interpolations Excluded)

.. The factors of occurring interrupt:

..the drive-pulse outputting

..the start / finish of a constant-speed drive during the acceleration / deceleration driving

..the end of the driving

..the volume of position counter . the volume of COMP

..the volume of position counter < the volume of COMP

..the volume of position counter . the volume of COMP+

..the volume of position counter < the volume of COMP+

..terminating of automatic home search, synchronous action

Enable / disable for these factors selectable

.. External Signal for Driving

.. EXPP and EXPM signals for fixed pulse / continuous drive

.. Driving in manual pulsar mode (encoder input)

.. External Deceleration / Sudden Stop Signal

.. INO ~ 3 4 points for each axis

Enable / disable and logical levels selectable

.. Servo Motor Input Signal

.. ALARM (Alarm), INPOS (In Position Check), DCC (Pin shared between deviation counter clear output and DRIVE)

Enable / disable and logical levels selectable

.. General Output Signal

.. OUTO ~ 7 8 points for each axis (wherein 4 points use with drive status output signal pin)

.. Driving Status Signal Output

.. ASND (speed accelerating), DSND (speed decelerating), CMPP (position . COMP+), CMPM (position < COMP)

Drive status and status registers readable

.. Limit Signals Input

.. 2 points, for each + and - side

Logical levels and decelerating / sudden stop selectable

.. Emergency Stop Signal Input

.. EMG, 1 point for 4 axes

.. Contents of integral type filters

.. Equipped with integral filters in the input column of each input signal. One time constant can be selected from eight types.

.. Electrical Characters

.. Temperature Range for Driving 0 ~ + 85°C (32°F ~ 185°F)

.. Power Voltage for Driving +5V $\pm 5\%$

.. Consumption current 70mA typ (112mA max)

.. Input / Output Signal Level CMOS, TTL connectable

.. Input Clock Pulse 16,000 MHz (Standard)

.. **Package** 144-pin plastic LQFP, pitch = 0.5mm lead free item

Dimension : 20 x 20 x 1.4 mm (External size including pins : 22 x 22 x 1.6 mm)