PCI Bus 4-Axis Motion Control Board with circular/linear interpolation

PbFree

MC8043P is a PCI-bus compliant PC/AT compatible circuit board equipped with 4-axis motion control IC with interpolation function “MCX314As".
It can independently control 4-axis of either stepper motor or pulse type servo motor for position and speed controls. In addition, this IC can perform 2/3 axes linear interpolation, CW/CCW circular interpolationand 2/3 axes bit pattern interpolation.

●Circular/Linear Interpolation

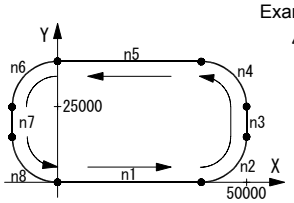
MC8043P calculates circular/linear interpolation by hardware in MCX314As. Setting each parameter, finish and center point of circle and speed, writing the command of interpolation drive, it operates Interpolation drive immediately. It can perform continuous interpolation combined circular/linear interpolation as the lower-right figure,"Example of continuous interpolation.".

●Max driving speed:4Mpps

Each axis can perform Max.4Mpps in acceleration/decceleration drive and circular/linear interpolation drive.

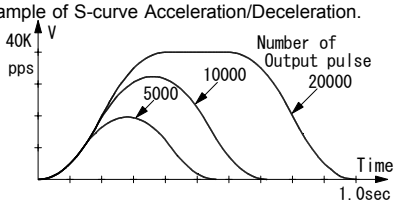
●S-curve Acceleration/Deceleration

In addition to trapezodial acceleration/deceleration drive, it can also operate S-curve drive. S-curve drive can keep its smoothness as the right figure "Example of S-curve Acceleration/Deceleration". Even though the number of output pulse is small.

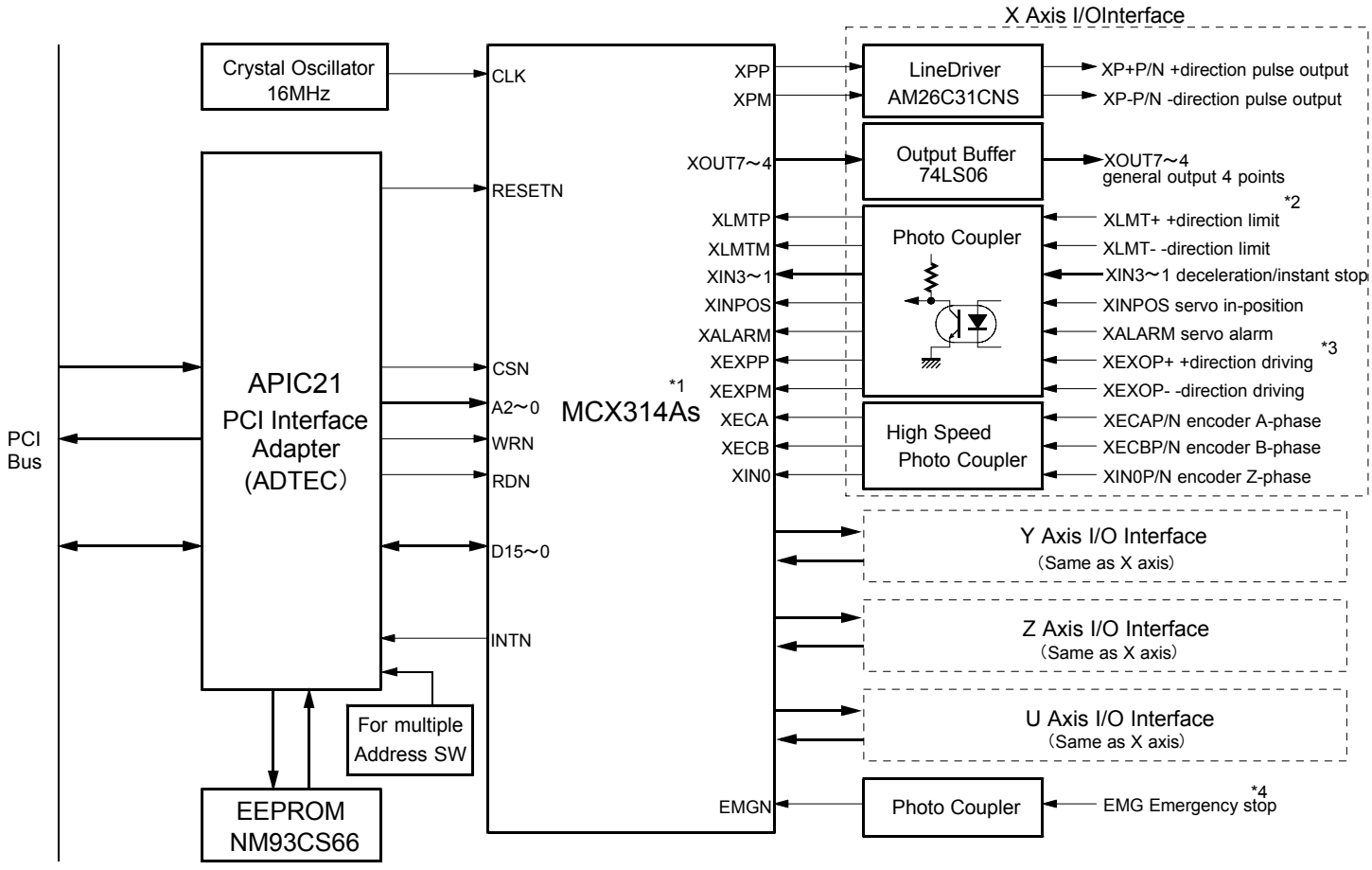


Example of Continuous Interpolation.

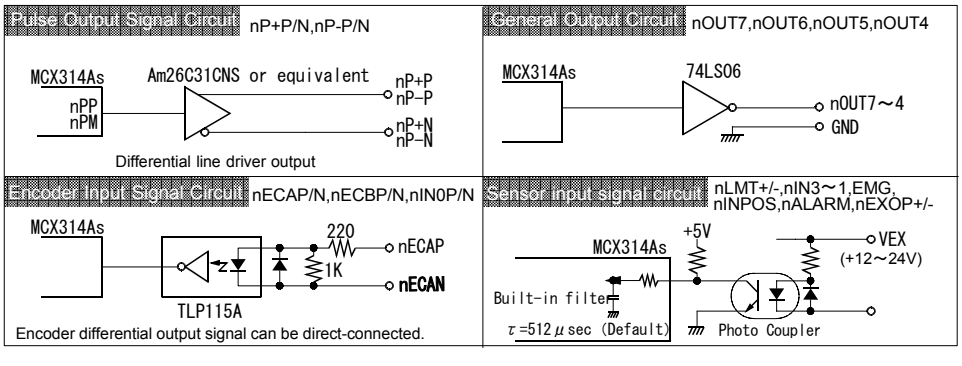
Example of S-curve Acceleration/Deceleration.



Circuit Block Diagram and I/O Signal



*1 Regarding MCX314As, please refer to the catalog and user's manual of MCX314As.
MC8043P does not support the following signals of MCX314As, BUSYN, EXPLSN, SCLK, nDRIVE, nOUT3~0.
*2 Sensor input signals as +/- direction limit are isolated from PhotoCoupler. DC 12~24V external p ower supply is needed to drive these signals.
*3 nEXOP+/-(+/- direction drive) is the input signal which can control each axis fixed pulse and continuous driving externally.
*4 The driving logic of EMG (Emergency stop) signal can be changed with jumper on MC8043P.



Specification

■ **Control Axis** 4 axes(Each axis can be controled independently.)

PCI Bus Interface

■ **Data bit width** 16bit
■ **Occupied I/O Address** 16byte(Depend on Plug and Play function.)
■ **Interrupt** IRQ(Depend on Plug and Play function.)

Interpolation Functions

■ **2-axis/3-axis Linear Interpolation**
● Interpolation Range Each axis -2,147,483,646 ~ +2,147,483,646
● Interpolation Speed 1PPS ~ 4 MPPS
● Interpolation Accuration ±0.5LSB(Within the range of whole interpolation)

■ **Circular Interpolation**
● Interpolation Range Each axis -2,147,483,646 ~ +2,147,483,646
● Interpolation Speed 1PPS ~ 4MPPS
● Interpolation Accuration ±1LSB (Within the range of whole interpolation)

■ **2-axis/3-axis Bit Pattern Interpolation**
● Interpolation Speed 1PPS ~ 4MPPS(Depend on CPU data writing time)

■ **Related function of Interpolation**
●Can select any axis ●Constant vector speed
●Continuous interpolation ●Single step interpolation(Command)

Common Specification of Each Axis

■ **Drive Pulse Output**
● Pulse output circuit Differential line-drive (AM26C31) output
● Pulse output speed 1PPS ~ 4MPPS
● Pulse output speed accuracy ±0.1%(Depend on the setting speed)
● S-curve Jerk 954 ~ 31.25×10^{9}PPS/SEC^2
● Accelrating/Deccelrating speed 125 ~ 500×10^{6}PPS/SEC
● Drive speed 1 ~ 4×10^{6}PPS
● Output-pulse number 0 ~ 4,294,967,295(Fixed pulse drive)
or Unlimited(Continuous drive)
● Speed curve
Constant speed, symmetrical/non-symmetrical linear acceleration,
symmetrical/non-symmetrical parabola S-curve acceleration/deceleration drive
● Fixed Pulse Drive decceleration mode
Auto(non-symmetrical linear acceleration/deceleration is also allowed)/Manual
● Output-pulse numbers and drive speeds are changeable during the driving
● Prevention of triangle driving profile for fixed pulse trapezoidal/S-curve acceleration
● Independent 2-pulse system or 1-pulse 1-direction system is selectable.
● Logical levels of drive pulse is selectable.

■ **Encoder A/B/Z Quadrature Input**
● Input Circuit High-speed photo coupler input. Connectable with differential line-driver.
● 2-phase pulse style or Up/Down pulse style is selectable.
● Pulse of each single,double and quad count edge evaluation is selectable
(2-phase pulse style).

■ **Position Counter**
● Logic Position Counter(for output pulse)range -2,147,483,648 ~ +2,147,483,647
● Real Position Counter(for feedback pulse)range -2,147,483,648 ~ +2,147,483,647
To read / write data is always possible.

■ **Comparison Register**
● COMP+Register comparison range -2,147,483,648 ~ +2,147,483,647
● COMP-Register comparison range -2,147,483,648 ~ +2,147,483,647
● Status and signal outputs for the comparisons of position counters
● To work as Software limit

■ **Automatic home search**
●Automatic of execution of Step1(high-speed near home search)
→Step2(low-speed home search)→Step3(low-speed encouder Z-phase search)
→Step4(high-speed offset drive).
● Deviation counter clear output :
Clear pulse width within the range of 10μ~20msec and logical level is selectable.
Enable/Disable of each step and search direction is selectable.

■ **Interrupt** (Interpolation Excluded)
● The factors of occurring interrupt:
..one drive-pulse outputting
..start / finish of a constant-speed drive during
the acceleration / deceleration driving
..end of the driving
..transition to “position counter ≥ COMP-”
..transition to “position counter < COMP-”
..transition to “position counter ≥ COMP+”
..transition to “position counter < COMP+”
..terminating of automatic home search, synchronous action
Enable/disable for these factors is selectable.

■ **External Signal for Driving**
● EXPP and EXPM signals for +/- direction fixed pulse/continuous drive
● Input Circuit : Photo coupler and IC built-in integral filter

■ **External Deceleration / Instant Stop Signal**
● IN0 ~ 3 4 points for each axis (IN0:encoder Z-phase input)
● Input Circuit Photo coupler and IC built-in integral filter
(IN0: high-speed photo coupler input)
Enable/disable and logical levels is selectable

■ **Servo Motor Input Signal**
● ALARM (Alarm), INPOS (In Position Check)
● Input Circuit : Photo coupler and IC built-in integral filter
Enable/disable and logical levels is selectable

■ **General Output Signal**
● OUT4 ~ 7 4 points for each axis
(General output and drive status output can be switched)
● Output Circuit 74LS06 output(open collector output)

■ **Driving Status Signal Output**
● ASND(speed accelerating), DSND(speed decelerating),
CMPP(position≧COMP+), CMPM(position＜COMP-)
Drive status is readable by status registers.

■ **Limit Signals Input**
● 1 point, for each +/- direction.
● Input Circuit Photo coupler and IC built-in integral filter
Logical levels and decelerating/instant stop is selectable

■ **Emergency Stop Signal Input**
● EMGN 1 point for all axes.
Stop the drive pulse immediately for all axes and logical levels is selectable
by jumper on the board.
● Input Circuit : Photo coupler and IC built-in integral filter.

Software

■ **For Windows XP (32bit), Vista (32/64bit) and 7 (32/64bit)**
● Device driver for MC8000P
● VC++,VB and C# Sample program
● Evaluation tool program
Software and user's manual are not attached to MC8043P.
Please contact us or our distributor directly when you need.
You can also download it on our website.
http://www.novaelec.co.jp/eng/index_e.html

Other Characteristics

● Temperature Range for Driving 0 ~ + 45°C (No condensation)
● Power Voltage for Driving +5V ± 5 % (Consumption current 700mA max.)
● External Supply Voltage 24V
● Board Dimensions 174.6×106.7mm (Connectors and brackets excluded)
● I/O Connector Type FX2B-100PA-1.27DS (Hirose)
● Accessories FX2B-100SA-1.27R (Hirose) with 1.2m cable

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