NPM
Nippon Pulse
Your Partner in Motion Control

PCL61x4 Series
New Product
Pulse Control LSI

Our best-selling PCL61x3 Series of Pulse Control LSIs has been upgraded to the more advanced PCL61x4 Series.

The PCL6114 and PCL6144 chips are downward compatible, so they can be conveniently used by current PCL61x3 users.

Uses either 4-Wire Serial Bus or 8/16 bit Parallel Bus.

Features:

- New 4-wire SPI in addition to 8/16 bit Parallel Bus
  - When using the serial interface, the parallel data bus terminals are available to use as general purpose I/O or to extend connection to up to FOUR other LSIs as slaves
- Linear interpolation between any 2-4 axes
  - Also possible between LSIs
  - Built-in encoder input and servomotor interface
- Pre-registers for continuous operation
  - Write operation data during operation for smooth transition to the next operation without stopping.
- Maximum output frequency: 15 Mpps

- 32 bit Up-Down Counter: 2 per axis
- On-the-fly speed and target position override
- 32 bit Comparator: 4 per axis (2 for soft limit function only)
  - Using a comparator and a counter, the following operations are possible:
    - Interrupt output with external output of the comparison result
    - Ring Count Function
    - Start by Internal Synchronization Signal
    - Software Limit Function

Review the following to see how the PCL61x4 Series can meet your motion-control needs.

Request	PCL61x4 Solution
I want to use an inexpensive microprocessor with few pins.	Because the PCL61x4 Series now accommodates a 4-wire serial bus, you can connect it to a microprocessor that doesn't have a parallel bus.
I want to replace the PCL61x3 Series chips that I am currently using.	The PCL61x3 Series software is upwardly compatible. The PCL6114 and PCL6144 are also hardware compatible with their counterparts.
I need high-resolution positional accuracy because I use a microstepping driver, a long linear stroke, or move at a very high speed.	Because the maximum output frequency with a standard reference clock is 9.8 Mbps (15 Mbps with maximum reference clock), the the PCL61x4 can easily operate with currently available microstepping drivers. Additionally, the increased 32 bit counters and comparators make high-resolution positional accuracy with long stroke linear applications possible.
I need a longer acceleration and deceleration time.	The acceleration and deceleration registers were increased from 14 bit to 16 bit for increased range.
My system uses both stepper motors and servomotors, but I want to design similar control software for both kinds.	The PCL61x4 outputs pulse control signals for both stepper motors and servomotors. Additionally, it is available in 1- or 4-axis versions, which can be combined based on the number of motors in your system.
I want to do continuous linear interpolation.	The PCL61x4 Series is equipped with pre-registers that allow you to input the data for the next move during the current operation. As a result, linear interpolation can occur without stopping between moves to input the data for the next move.
To avoid shock, I need the load to decelerate before stopping when it encounters a sensor switch.	For each sensor input signal — including origin (ORG), limit (±EL), and alarm (ALM) — you can choose immediate or decelerated stop.
In my linear motion system, I want to set the operating range by software instead of with physical switches.	The PCL61x4 has a software limit function. This feature allows an immediate or decelerated stop when the load's position exceeds your designated range setting.
I want to use sensors or other inputs with 5V in my system.	Though the power supply voltage is 3.3V, many signal terminals are 5V tolerant, making a 5V I/O interface possible.

PCL61x4 Basic Specifications (compared to PCL61x3)

Series / Specification	PCL6144 PCL6114	PCL6143 PCL6123 PCL6113
Number of Axes	<PCL6144> 4 <PCL6114> 1	<PCL6143> 4 <PCL6123> 2 <PCL6113> 1
Reference Clock (Standard, Max.)	19.6608MHz (Max. 30MHz)	19.6608MHz (Max. 30MHz)
Maximum Output Freq. (Standard, Max.)[1]	9.8Mpps (Max. 15Mpps)	9.8Mpps (Max. 15Mpps)
Number of speed setting registers	2 (FL,FH)	2 (FL,FH)
Speed setting range	1~16,383 (14 bits)	1~16,383 (14 bits)
Speed magnification setting range	0.3~600 times	0.3~600 times
Acceleration rate setting range	1~65,535 (16 bits)	1~16,383 (14 bits)
Deceleration rate setting range	1~65,535 (16 bits)	1~16,383 (14 bits)
Position pulse setting range	-2,147,483,648~ +2,147,483,647 (32 bits)	-134,217,728~ +134,217,727 (28 bits)
CPU Interface	8/16 bit parallel bus 4-Wire serial bus	8/16 bit parallel bus
Ramping-down point setting range	0~16,777,215 (24 bit)	0~16,777,215 (24 bit)
Package number of pins P = terminal pitch (mm)	<PCL6144> 176pin QFP/P=0.5 <PCL6114> 80pin QFP/P=0.5	<PCL6143> 176pin QFP/P=0.5 <PCL6123> 128pin QFP/P=0.5 <PCL6113> 80pin QFP/P=0.5
Package Dimensions (Molding) (mm)	<PCL6144> 24×24 <PCL6114> 12×12	<PCL6143> 24×24 <PCL6123> 14×20 <PCL6113> 12×12
Power Supply Voltage	+3.0~+3.6V	+3.0~+3.6V
Storage Temperature	-40~+85°C	-40~+85°C

Contents in red text indicate additions/improvements made to the PCL61x3 Series.
[1] "Standard" values represent results from using the standard 19.6608 MHz reference clock; "Max" values represent results from using the maximum 30 MHz reference clock.
[2] Linear interpolation between LSIs is possible provided all LSIs are connected to the same reference clock.
[3] When using the 4-Wire serial interface, the remaining terminals of the parallel data bus can be used for general purpose I/O control.

PCL61x4 List of Functions (compared to PCL61x3)

Series / Function	PCL6144 PCL6114	PCL6143 PCL6123 PCL6113
S-curve acceleration/deceleration	Yes	Yes
S-curve Section Setting	Yes	Yes
Triangle Drive Suppression (FH Correction)	Yes	Yes
Built-in Homing Routines	Yes, 4 types	Yes, 4 types
Servomotor Interface	Yes	Yes
Encoder Input (up to 4x multiplication)	Yes, each axis	Yes, each axis
Homing with Encoder Z-phase	Yes, each axis	Yes, each axis
Automatic Setting of Ramping-down Point	Yes	Yes
Up/Down Counter (Current Position Counter)	Yes, each axis 32 bit x 2	Yes, each axis 28 bit x 2
Counter Latch with Hardware	Yes	Yes
Comparator	Yes, each axis 32 bit x 4 (2 for Soft Limit Function only)	Yes, each axis 28 bit x 2
Inputs for External Mechanical Signals	Yes, each axis	Yes, each axis
Interrupt Signal Output	Yes, 27 factors	Yes, 23 factors
Interrupt Factor Setting	Yes	Yes
Interrupt Status (Interrupt Factor Monitoring)	Yes	Yes
Status	Yes, 48 types	Yes, 46 types
Pre-buffer (Pre-register) for Next Operation	Yes, 1 stage	Yes, 1 stage
Automatic Start of Next Operation	Yes	Yes
Command Buffer Monitor	Yes	Yes
Selection of Output Pulse Logic	Yes	Yes
Selection of Output Pulse Mode	Yes	Yes
Monitor Signal Output Terminal	Yes, 6 for each axis	Yes, 6 for each axis
Pulser Input	Yes, for each axis	Yes, for each axis
Pulser Synchronous Positioning	Yes	Yes
Linear Interpolation	Yes [2]	Yes [2]
Continuous Interpolation	Yes	Yes
Overriding Target Position	Yes	Yes
Output Pulse Width Control	Yes	Yes
Simultaneous Start/Stop	Yes	Yes
External Start/Stop	Yes	Yes
I/O Ports (General Purpose Input/ Output Terminals)	Yes, 8 per axis [3]	Yes, 8 per axis
Operating Switch Input Terminal	Yes	Yes
Ring Count	Yes	Yes
Software Limits	Yes	No
Timer Operation	Yes	Yes
Synchronization Signal Output	Yes	Yes
Compatibility to 5V Interface	Yes	Yes