LSI3144A

4-axis Quadrature Encoder Counter Card

Features

- PCI plug and play function with card ID for 16 identical cards
- High noise immunity with magnetic / photo-coupler isolation
- 4 32-bit high speed counter for 16 MHz max. Quadrature input
- 2 32-bit timer (X, Z axis)
- Quadrature, pulse/direction and up/down counting mode
- Programmable multiple rate at x1, x2, x4
- Load preset value to counter by external or software trigger
- Latch counter value by external trigger
- Multiple counter reset (homing) modes with clear output
- Differential or single-end input signal
- Compare mode : single, auto increment and FIFO compare mode (X, Z axis)
- Compare output gated and segment mask off
- PWM FIFO (X, Z axis) output
- Programmable duration for Compare out and Clear out
- Interrupt on external trigger, compare equal, borrow, carry And counter clear
- Supports DIN rail mounted wiring board

Introduction

The LSI3144A is a 4-axis quadrature encoder and counter card based on PCI bus. 16 identical cards with different IDs can be hooked on PCI-bus.

Load preset position value to counter form software / external trigger and latch current position to buffer are standard functions.

Besides the normal compare function and auto increment compare function, the FIFO compare mode and FIFO programmable compare out PWM function are the highlights of the LSI3144A.

It is a high value-added combination with MPC series motion control cards in same system to achieve various of precision apparatus.

Dll is provided for WinXP, Win7 and later or LINUX platform and sample programs come with VB source code.

Encoder Interface

Each input includes a decoding circuit for incremental quadrature encoding and accepts either single-ended or differential signals. Quadrature input works with or without an index, allowing linear or rotary encoder feedback.

Counters and compare function

The LSI3144A has four independent 32-bit counters. The maximum quadrature input rate is 16 Mhz. You can individually configure each counter for quadrature decoding, pulse/direction counting or up/down counting.

External Gate and Segment Mask Off

The compare output can be gated by INn or CLR (for compare out). Except for external gate, the segment mask off function provides more flexible control. There are 3 programmable coordinate segments, any or all of the 3 segments can be configured exterior or interior to mask off the compare out signal without effecting the compare function of auto increment or FIFO.

FIFO PWM

FIFO PWM synchronize with position FIFO compare out to provide on the fly PWM change. It is convenient to use as Laser power control on different line segment.

Timer

A 32-bit timer based on 1MHz clock can work as a hardware periodic timer to trigger sampling event.

Digital Input

Total 16 isolated I/P, (3 specific in HOME, LATCH, CLEAR_COUNTER per axis, and 4 general in) and 8 isolated O/P (2 specific out COMPARE_OUT, CLEAR_OUT per axis) give you more convenience in control.

Each input point also combines with a polarity bit. However each exclusive input point also can be used for general purpose.

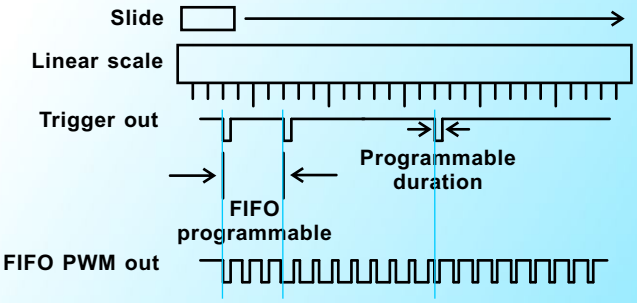
Besides, LSI3144A card allows each zero input mapping a ZERO TOGGLE FLAG, which is a toggle bit caused by each zero input edge trigger from high to low level transition..

Digital Output

Each axis has 2 specific output (COMPARE_OUT) and (CLEAR_OUT). When it is assigned to be compare-output point, it produces an active low signal (programmable one shot) on condition that counter value equals counter preset register value. CLEAR_OUT can work as PWM ouput or clear output, when it is assigned to be clear output point, it can be connected to driver's specific input in order to clear remainder pulses on the condition that hardware home happens. To work as PWM output, each compare point will trigger the FIFO PWM data to output. Besides, iboth of then can be configured as general output point. The output status also can be readback

Application Tips

- FIFO PWM output to control Laser beam power
- Using FIFO mode for continuous exposure or Image catching



※ Up to 1023 depth of FIFO (X, Z axis only)

Specifications (With Matched Wiring Board)

Counter / Timer

- Number Of Axes : 4, independent
- Counter Input : A,B,Z
- Input debounce : 512K,1M, 2M, 4M, 8M, 10M, 16M
- Input Pulse multiple Rate : x1, x2, x4 programmable (quadrature signal only)
- Maximum quadrature input frequency : 16MHz @x1, x2, x4
- Maximum input pulse frequency : 16MHz
- Encoder Type : Single-end or differential
- Counter Length : 32-bit
- Counter Modes : Quadrature, up/down, pulse/direction (Software select)
- Compare Mode : Single compare, Auto-Increment compare, FIFO compare with PWM FIFO
- Sample Clock Frequency : 198MHz
- Software Homing (Reset) Counter Method : 1 software trigger
- Hardware Homing (Reset) Counter Method : 5 H/W trigger
- Comparison FIFO Depth : 1023 (all axis)
- PWM FIFO Depth : 1023 (X, Z axis)
- Compare Out One Shot Duration : 1~16777215us
- Timer : 2 32-bit @1us time base

Digital Input

- Home : 1 per channel (Single-end or differential)
- Latch : 1 per channel (Single-end or differential)
- Clear Counter : 1 per channel (Single-end or differential)
- General Input : 1 per channel
- Debounce : 100, 200,1K, No debounce
- Polarity : non-inverting / inverting, all input signals are software programmable
- ON State : 2.8Vdc(max) 4.5mA(min)
- OFF State : 8Vdc(min) 3mA(max)
- Switching Speed : 2.2KHz max. (general input) 2MHz (specific digital input)

Digital Output

- Clear Output (General Output) : 1 per channel
- Compare Output (General Output) : 1 per channel
- Polarity : non-inverting / inverting, all output signals are software programmable
- Output Rating : 3A @250Vac, 30Vdc (Relay) 1A @120Vdc (NMOS)
- Switching Speed : 20KHz(max)(MOS out only)

Main Card General

- Card ID : 4-bit
- Photo-coupler Isolation : All digital I/O and counter Input
- Insulation Resistance : 100M Ohm (min) at 1000Vdc
- Isolation Voltage : 2500Vac 1Min
- Connector : One 68-pin SCSI-II female connector
- Operation Temperature : 0 °C ~ +70 °C
- Storage Temperature : -20 °C ~ +80 °C
- Operation Humidity : 5~95% RH, non-condensing
- Dimensions : 151(W)*110(H)mm, 6.0(W)*4.4(H)in

Applications

- PWM Laser power control on the fly
- Touch probe/non-touch probe Trigger to latch position
- Linear Scale / encoder F/B
- CCD Image Capture Trigger on the fly

Pin Assignments

JF1

A_CLR_OUT	68	34	Y_CLR_OUT
Z_CLR_OUT	67	33	X_CLR_OUT
A_CMP	66	32	Y_CMP
Z_CMP	65	31	X_CMP
A_IN3	64	30	Y_IN1
Z_IN2	63	29	X_IN0
A_CLR-	62	28	Y_CLR-
A_CLR+	61	27	Y_CLR+
A_LAH-	60	26	Y_LAH-
A_LAH+	59	25	Y_LAH+
A_H-	58	24	Y_H-
A_H+	57	23	Y_H+
A_C-	56	22	Y_C-
A_C+	55	21	Y_C+
A_B-	54	20	Y_B-
A_B+	53	19	Y_B+
A_A-	52	18	Y_A-
A_A+	51	17	Y_A+
Z_CLR-	50	16	X_CLR-
Z_CLR+	49	15	X_CLR+
Z_LAH-	48	14	X_LAH-
Z_LAH+	47	13	X_LAH+
Z_H-	46	12	X_H-
Z_H+	45	11	X_H+
Z_C-	44	10	X_C-
Z_C+	43	9	X_C+
Z_B-	42	8	X_B-
Z_B+	41	7	X_B+
Z_A-	40	6	X_A-
Z_A+	39	5	X_A+
EXTG	38	4	+5Vin
EXTG	37	3	+5Vin
EXTG	36	2	+24Vin
EXTG	35	1	+24Vin

JM1

	25	13	NC
NC	24	12	NC
NC	23	11	NC
EXTG	22	10	EXTG
EXTG	21	9	EXTG
ACLR_CNTRO-	20	8	ACLR_CNTRO+
ACMP-	19	7	ACMP+
ZCLR_CNTRO-	18	6	ZCLR_CNTRO+
ZCMP-	17	5	ZCMP+
YCLR_CNTRO-	16	4	YCLR_CNTRO+
YCMP-	15	3	YCMP+
XCLR_CNTRO-	14	2	XCLR_CNTRO+
XCMP-		1	XCMP+

Software Support

PC OS Support

WinXP, Win7 and later or Linux O.S. Embedded XP, Win CE (at request)

Library

DLLs, VI library

Develop Software

Visual C++, Visual Basic, Borland C/C++ Builder, LabVIEW etc

Example Source Code

Visual Basic

Ordering Information

- **LSI3144A :** 4-axis Quadrature Encoder Counter Card
- **ADP3144DIN(N) :** DIN rail mounted wiring board for LSI3144A, General output : 8 NMOS P.42
- **ADP3144DIN(R) :** DIN rail mounted wiring board for LSI3144A, General output : 8 Relays P.42
- **ADP3144ADIN :** DIN rail mounted wiring board for LSI3144A, General output : 8 open collector (5Vdc ~ 30Vdc) P.42
- **M2668681501 :** 68-pin SCSI II cable 1.5 M for JF1 I.18
- **M2668683001 :** 68-pin SCSI II cable 3.0 M for JF1 I.18
- **JS51050 :** DIN rail mounted dummy wiring board (D type 25P male to terminals) for JM1 I.12
- **M270325X4 :** D type 25P male-female cable 1.5M for DB25PF I.17
- **M270325X4S :** D type 25P male-female cable 1.5M, shielding for JM1 I.17
- **M270325X0 :** D type 25P male-female cable 3.0M for DB25PF I.17
- **M270325X0S :** D type 25P male-female cable 3.0M, shielding for JM1 I.17
- **SM23415 :** Extension kit for JM1 (bracket and flat cable for 25P female D type connector)