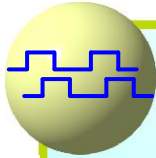




# Bridging the Gap between Real World and Computer



## LSI3181

### Single-axis Quadrature Encoder Counter Card



### Introduction

The LSI3181 is a one-axis high speed quadrature counter card, providing on the fly compare and counting function. Come with the hardware.

DLL is provided for WinXP, Win7 and later or Linux platform, sample source code in VB and Linux Qt are also available.

### Encoder Interface

The input signals are magnetic coupled and signal type of single end or differential can be set at wiring board. The software debounce time is programmable to filter the unwanted glitches.

### Counters and compare function

The signal input of the counter can configure as quadrature (multiple rate at 1, 2, 4), single pulse or dual pulse mode and the counter is 32-bit width sampled at 198MHz. Together with the counter, there are 7 Homing modes (Counter clear mode) to choose. The counter also provides 2 compare functions : FIFO (1023 data depth) compare and Auto-increment compare, all these mode can have programmable output pulse width and hardware gated output function. The compare FIFO can be managed by fill, clear, threshold setting. The status out of FIFO : full, near empty and empty can trigger the interrupt service routine.

### Segment Mask Off and External Gate

The compare output can be gated by IN00 (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.

### Position offset compare

The base compare data came from auto increment or FIFO can have 8 offset to modify the compare data to get the offset compare output. Each offset compare output has its own programmable pulse width control.

### Timer

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

### Features

- ▶ PCI plug and play function with card ID for 16 identical cards
- ▶ High noise immunity with magnetic/photo-coupler isolation
- ▶ Supports DIN rail mounted wiring board
- ▶ 32-bit timer based on 1us time base
- ▶ 8 photo isolated digital input
- ▶ 8 photo isolated digital output
- ▶ Software debounce for digital input
- ▶ Software programmable I/O polarity
- ▶ Interrupt from IN00~IN07
- ▶ 32-bit counter
- ▶ 16 MHz max. Quadrature input rate
- ▶ Quadrature, pulse/direction and up/down counting
- ▶ Programmable multiple rate at X1, X2, X4
- ▶ Software debounce for input signals
- ▶ Multiple counter reset (homing) modes
- ▶ Differential or single-end input signal
- ▶ Compare mode : Single, auto increment and FIFO compare mode
- ▶ Output gated and segment mask off
- ▶ Programmable duration for Compare output
- ▶ Interrupt on compare equal, FIFO near end
- ▶ 8 position offset comparator
- ▶ 8 offset compare equal output (differential out)
- ▶ Programmable duration for position offset compare output

### Digital I/O

8 photo-coupler isolated digital input and 8 photo-coupler isolated digital output of standard digital I/O interface can connect to any type of the ADP9201DIN wiring board. Need no extra digital I/O card, in small applications. There are digital filters for the digital input and programmable polarity to adjust the logic to convenient state and the input transition can generate the request of interrupt

### Applications

- ▶ Event counting
- ▶ Frequency counter
- ▶ Pulse signal receiver / display
- ▶ Linear Scale / encoder F/B
- ▶ CCD Image Capture Trigger on the fly



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## Specifications (With Matched Wiring Board)

### Counter

- ▶ Number of axes : 1
- ▶ Input : 5 magnetic isolation (A, B, Z, CLEAR, HOME input), TTL level
- ▶ Output : 1 magnetic isolation (compare out), TTL level  
8 differential position offset compare out
- ▶ Maximum quadrature input frequency : 16MHz @x1, x2, x4
- ▶ Encoder Type : Single-end or differential  
(with ADP3101 DIN wiring board)
- ▶ Input software debounce :  
512k, 1M, 2M, 4M, 8M, 10M, 16M (programmable)
- ▶ Input multiple rate : x1, x2, x4 programmable  
(quadrature signal only)
- ▶ Counter length : 32-bit
- ▶ Position offset : 16-bit
- ▶ Counter Mode : (QUADRATURE), (CLOCK/DIRECTION),  
(UP CLOCK/ DOWN CLOCK)
- ▶ Compare Mode : Single compare,  
Auto-Increment compare,  
FIFO compare
- ▶ Sample clock frequency : 198MHz
- ▶ FIFO depth : 1023
- ▶ Compare out one shot duration : 1~65535us

### Digital

- ▶ Input : 8 photo-coupler isolated
- ▶ ON state : 2.8Vdc(max) 4.5mA(min)
- ▶ OFF state : 8Vdc(min) 3mA(max)
- ▶ Switching speed : 10KHz max. (limit by photo coupler speed and debounce filter )
- ▶ Software debounce : 100Hz, 200Hz, 1KHz, No debounce (programmable)
- ▶ Interrupt at IN00 ~ IN07
- ▶ Output : 8 photo-coupleri isolated
- ▶ Output range : Open collector 0 ~ 45Vdc (on card)
- ▶ Output rating : (With ADP3101DIN wiring board)  
3A @250Vac, 30Vdc (Relay)  
1A @ 24Vdc (PMOS)  
2A @ 240Vac (SSR)
- ▶ Sink current : 500mA(peak) per channel (on card)
- ▶ Switching speed : 20KHz(max)(MOS out only)

### Timer

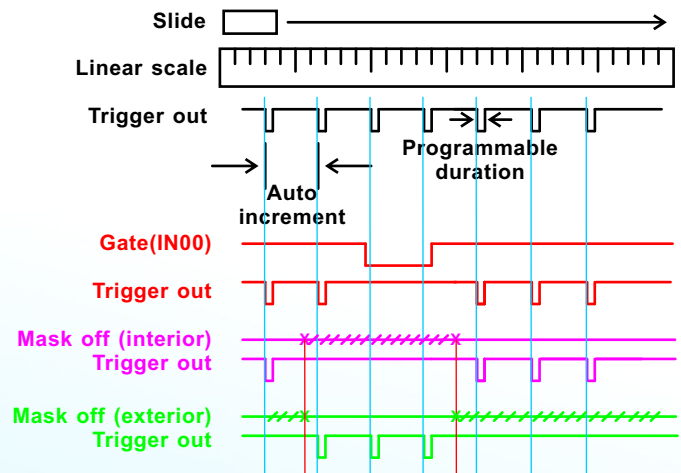
- ▶ Timer time base : 1us
- ▶ Timer/counter length : 32-bit

### Main Card General

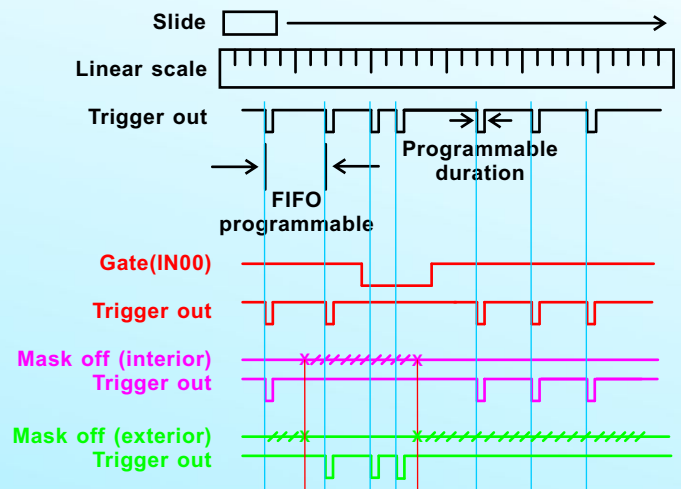
- ▶ Card ID : 4-bit, 16 position
- ▶ Insulation resistance : 1000Mohm (min) at 1000Vdc
- ▶ Isolation voltage : 2500Vac 1 min
- ▶ Connector : One 20 pin centronic female connector  
Two 20 pin flat cable connector
- ▶ Operation temperature : 0 °C ~ +70 °C
- ▶ Storage temperature : -20 °C ~ +80 °C
- ▶ Operation humidity : 5-95% RH, non-condensing
- ▶ Dimension : 130(W) \* 102(H)mm, 5.2(W) \* 4.1(H)in

## Application Tips

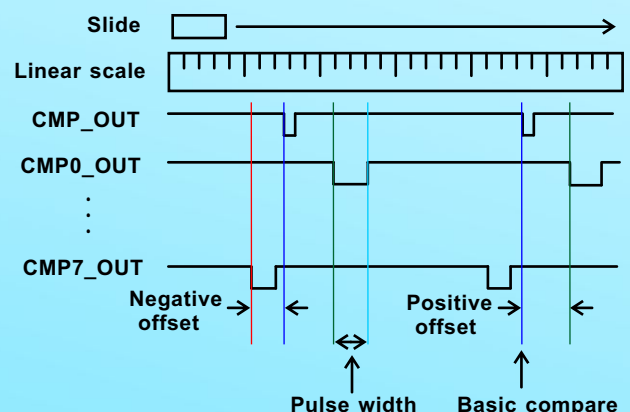
### Auto increment



### FIFO programmable



### FIFO/Auto increment offset compare





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## Pin Assignments

**JF1**

NC	20	10	NC
CMP_OUT	19	9	NC
NC	18	8	HOME
NC	17	7	NC
CLR_IN-	16	6	CLR_IN+
Z-	15	5	Z+
B-	14	4	B+
A-	13	3	A+
EXTG	12	2	+5Vin
EXTG	11	1	+5Vin

**ADP9201\_JM1**

EXT +24Vin	20	19	EXT +24Vin
EXTG	18	17	EXTG
EXT_OUT07	16	15	EXT_IN07
EXT_OUT06	14	13	EXT_IN06
EXT_OUT05	12	11	EXT_IN05
EXT_OUT04	10	9	EXT_IN04
EXT_OUT03	8	7	EXT_IN03
EXT_OUT02	6	5	EXT_IN02
EXT_OUT01	4	3	EXT_IN01
EXT_OUT00	2	1	IN00_EXT(compare out gate input)

**JM1**

NC	25	13	NC
NC	24	12	NC
EXTG	23	11	NC
EXTG	22	10	EXTG
CMP7_OUT-	21	9	EXTG
CMP6_OUT-	20	8	CMP7_OUT+
CMP5_OUT-	19	7	CMP6_OUT+
CMP4_OUT-	18	6	CMP5_OUT+
CMP3_OUT-	17	5	CMP4_OUT+
CMP2_OUT-	16	4	CMP3_OUT+
CMP1_OUT-	15	3	CMP2_OUT+
CMP0_OUT-	14	2	CMP1_OUT+
		1	CMP0_OUT+

## 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

- ▶ **LSI3181** : Single-axis Quadrature Encoder Counter Card(up to16MHz x 4 quadrature input)
- ▶ **ADP3101DIN** : DIN rail mounted wiring board for LSI3101 quadrature counter related function P.41
- ▶ **M262020150** : 20-pin SCSI II centronic cable 1.5 M for JF1 I.18
- ▶ **M262020300** : 20-pin SCSI II centronic cable 3.0 M for JF1 I.18
- ▶ **ADP9201DIN(R)** : DIN rail mounted wiring board with 16 I/O LED indicators and Relay output for 8 DI, 8DO (for ADP9201\_JM1) P.79
- ▶ **ADP9201DIN(P)** : DIN rail mounted wiring board with 16 I/O LED indicators and PMOS output for 8 DI, 8DO (for ADP9201\_JM1) P.79
- ▶ **ADP9201DIN(S)** : DIN rail mounted wiring board with 16 I/O LED indicators and SSR output for 8 DI, 8DO (for ADP9201\_JM1) P.79
- ▶ **JS51053** : DIN rail mounted dummy wiring board for general Digital I/O, Transistor out (for ADP9201\_JM1) I.12
- ▶ **M23207** : 20-pin flat cable 1.5 M for ADP9201\_JM1 I.17
- ▶ **M23209** : 20-pin flat cable 3.0 M for ADP9201\_JM1 I.17
- ▶ **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 JM1 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 JM1 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)

## Note