PISO-PS300

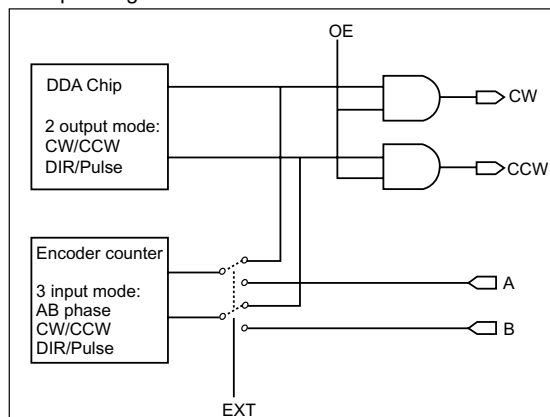## 3-axis high speed stepping/servo control board

Features

- 32-bit +5V PCI bus, Plug & Play
- 3-axis pulse output stepping/servo control board
- Maximum output pulse rate: 1MHz
- Encoder/pulse read back
- Programmable output mode: CW/CCW, Pulse/Direction
- 3-axis linear interpolation, 2-axis circular interpolation
- Programmable trapezoidal speed profile
- Programmable DDA period
- Programmable direction configuration
- Programmable home return speed, home preset, home direction
- Hardware emergency stop, software emergency stop
- Auto-protection for each limit switch
- 2500Vrms optical isolation
- 8 digital inputs, 7 digital outputs.
  Embedded CPU, totally 45-command set

Functional Description

PISO-PS300 is a 3-axis high speed, pulse-type stepping/ servo motor control board. The embedded CPU of PISO-PS300 performs the motion command transferred from host-PC by way of the 2K bytes FIFOs. It also sends the positions and status back to host-PC via another 2K bytes FIFOs. This buffer provides enough data, and males this card suitable for windows operating system. The motion profile is generated by microprocessor. This microprocessor also handles auto-protection functions. Each digital I/O supports 2500Vrms optical isolation. This board provides DOS, Windows and LabVIEW drivers.

Operating Mode

To developing your system easily, PISO-PS300 provides two operating mode: simulation mode/real mode.

The output pins CW and CCW can be set as output enable or disable by OE signal. The encoder counter source signal can be connected to outside (A/B) or internal DDA chip by EXT signal.

Simulation mode

In simulation mode, the PISO-PS300 will simulate the motion profile according to the motion command that received from host PC, and then the PISO-PS300 will send the 3-axis positions back to host PC. The PISO-PS300 will not output pulse to motor driver by set OE=0. The encoder counter counts the internal DDA output pulse by set EXT=0. Therefore, the positions which read from the encoder counter is really output pulse number. This mode is very useful and efficient in the design phase. The user can debug and develop the motion profile beforehand. And if the user has the daughter board DB-8R, it can also simulate the digital input/output.

Real mode

In real mode, the output mode of DDA chip can be set as CW/CCW or DIR/Pulse mode according to user's motor driver, and set OE=1 for output enable. Setting EXT=1, the source signal of encoder counter come from external input. The input mode of encoder counter could be three kind mode: AB phase, CW/CCW and DIR/Pulse.
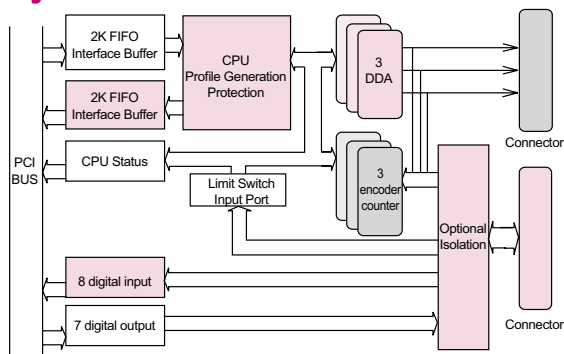
DDA Technology

The DDA chip of PISO-PS300 card will generate equal-space pulse train corresponding to the specific pulse number during a DDA period. This mechanism is very useful to execute pulse generation and interpolation function. The DDA period is determined by DDA cycle. When DDA cycle set to 1, the DDA period is equal to (1+1)x1.024ms=2.048ms. The output pulse number can be set to 0~2047, therefore the maximum output pulse rate will be 1Mpps. The minimum output pulse rate is 3.83pps when set DDA cycle=254 (DDA period=(254+1) x1.024ms =261.12ms) and pulse number=1.

PCI Motion Control

PISO-PS300

3-axis high speed stepping/servo control board

System Block

System block diagram of PISO-PS300

Specifications

Motion
- Number of axis: 3 axes
- Maximum pulse rate: 1MHz
- Bits up/down ounter for encoder feed-back signals
- Home, forward, backward limit switches per axis
- Programmable limit switch normal state: N.O. or N.C.

General Purpose I/O
- 8-channel isolation digital input
- Input voltage: 0~24V
- 7-channel open collector output
- 2500Vrms optical isolation

I/O connector
- Connector 1: D-sub 25-pin connector for encoder input
- Connector 2: D-sub 9-pin connector for X,Y pulse output and servo-on signal
- Connector 3: D-sub 9-pin connector for Z pulse output, limit switchs and server-on signal
- Connector 4: D-sub 25-pin connector for limit switches, digital input and digital output

General Specifications
- Power requirements: +5V @ 950 mA (typical)
- Operating temperature: 0 ~ 60°C
- Operating humidity: 0 ~ 90% non-condensing
- Storage temperature: -20 ~ 70°C
- Dimensions: 208 mm x 121 mm

Ordering Information

Standard

PISO-PS300: 3-axis high-speed stepping/servo control board

Optional

DB-8R: Motion interface I/O board
DN-25: DIN-rail mounting screw terminal board

Pin Assignment

CN 1

1A+	1	14	2C
1A-	2	15	-2C
1B+	3	16	+GND
1B-	4	17	5V
5V	5	18	2B-
GND	6	19	2B+
1C+	7	20	2A-
1C-	8	21	2A+
5V	9	22	GND
3A+	10	23	3A
3B+	11	24	-3A
3C+	12	25	+3C-
	13		

CN 2

CW_PULSEX	1	6	SONX
CCW_DIRX	2	7	FVCC
CW_PULSEY	3	8	SONY
CCW_DIRY	4	9	
FGND	5		

CN 3

CW_PULSEZ	1	6	/ZI
CCW_DIRZ	2	7	/ZLS+
SON3	3	8	/ZLS-
FVCC	4	9	VEXT
FGND	5		

CN 4

/XLS+	1	14	/IP7
/XLS-	2	15	/IP8
/YLS+	3	16	VEXT
/YLS-	4	17	/OP1
/X1	5	18	/OP2
/YI	6	19	/OP3
/ENG	7	20	/OP4
/IP1	8	21	/OP5
/IP2	9	22	/OP6
/IP3	10	23	/OP7
/IP4	11	24	
/IP5	12	25	/EXT_GND
/IP6	13		

PISO-ENCODER300/600

PCI bus 3/6-axis encoder input board

PISO-ENCODER300

PISO-ENCODER600

Features

- 32-bit +5V PCI bus, Plug & Play
- 3/6-axis encoder counter
- True 32-bit counter
- Maximum counting rate: 1MHz
- Third-order internal digital filter
- Counting mode: Quadrant, CW_CCW and PULSE_DIR
- A+, A-, B+, B-, C+, C- inputs
- Programmable register reset counter function
- Index (C channel) reset counter function
- Hardware reset (HR1~HR6) counter function
- 8 digital outputs
- 2500V optical isolation

Functional Description

The PISO-ENCODER300/600 has a 3/6-axis encoder input counter and each axis has a 32-bit true counter with maximum counting rate of 1MHz. The counting mode has 3 types of selections: QUADRANT mode, CW_CCW mode, PULSE_DIR mode. The PISO-ENCODER600 provides 3 kinds of counter reset mode: 1.register reset, 2.index reset, 3. hardware reset. In index reset mode, the Encoder counter will be reset by C+/C-channel input. In hardware reset mode, the Encoder counter will be reset by an external pin (HR1~HR6). The HR1~HR6 also can be used as a digital inputs. The PISO-ENCODER300 and PISO-ENCODER600 also provides 8-channel digital outputs.

Connection between Encoder and ICPDAS Motion Control Card

Connection between Open-Connector Encoder and ICPDAS Motion Control Card
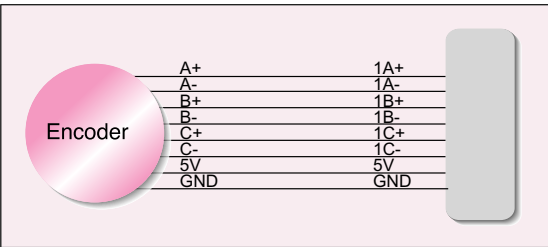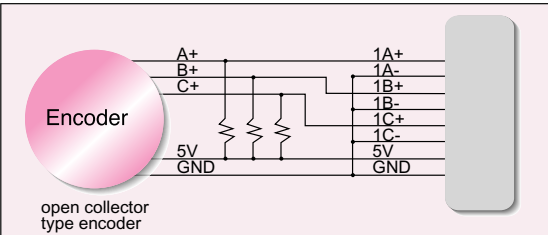
open collector type encoder

General Specifications

- I/O connector: one 68-pin SCSI-II female
- Power requirements: +5V @ 500 mA typical
- Operating temperature: 0 ~ 60°C
- Operating humidity: 0 ~ 90% non-condensing
- Storage temperature: -20 ~ 70°C
- Dimensions: 157 mm x 106 mm

Pin Assignment

EVCC	1		35	EGND
1A+	2		36	4A+
1A-	3		37	4A-
1B+	4		38	4B+
1B-	5		39	4B-
1C+	6		40	4C+
1C-	7		41	4C-
EVCC	8		42	EGND
2A+	9		43	5A+
2A-	10		44	5A-
2B+	11		45	5B+
2B-	12		46	5B-
2C+	13		47	5C+
2C-	14		48	5C-
EVCC	15		49	EGND
3A+	16		50	6A+
3A-	17		51	6A-
3B+	18		52	6B+
3B-	19		53	6B-
3C+	20		54	6C+
3C-	21		55	6C-
EXT_VCC	22		56	EXT_VCC
HR1	23		57	DO 1
HR2	24		58	DO 2
HR3	25		59	DO 3
HR4	26		60	DO 4
HR5	27		61	DO 5
HR6	28		62	DO 6
NC	29		63	DO 7
NC	30		64	DO 1
NC	31		65	NC
NC	32		66	NC
NC	33		67	NC
EXT_GND	34		68	EXT_GND

Ordering Information

Standard

PISO-ENCODER300: PCI 3-axis encoder input board
PISO-ENCODER600: PCI 6-axix encoder input board

Optional

DN-68: DIN-rail mounting screw terminal board
CA-SCSI15: SCSI II 68-pin & 68-pin female cable

SERVO-300
3-axis high speed servo motor control board

Features

- 3-axis V-command servo motor control board
- 2500 points per axis for pitch error compensation
- Provides simulation/open-loop/closed loop modes
- Programmable trapezoidal speed profile
- Programmable DDA cycle
- Programmable direction configuration
- Programmable home return speed, home preset, home direction
- Linear interpolation/circular interpolation
- Hardware failure detection
- Software/Hardware emergency stop
- 2500Vrms optical isolation
- Auto protection for each limit switch
- 8 digital inputs, 7 digital outputs.
- Embedded CPU, totally 45-command set

Functional Description

SERVO-300 is a 3-axis, command-type, servo control baord with quadrature encoder feedback. The embedded CPU of SERVO-300 performs the motion commands transferred from PC via a 2K bytes FIFOs. The CPU also send the information of position and status to the PC via another 2K bytes FIFOs. This buffer provides enough data males this card suitable for widows operating system. The SERVO-300 provides DOS and Windows drivers. It is low cost and easy to ues while still provides comprehensive motion capability with high performance and relibility.

Operating Mode

To developing your system easily, SERVO-300 board provides three operating mode: simulation mode/open-loop mode/close-loop mode.

Simulation mode

In simulation mode, the SERVO-300 control board will simulate the motion profile according to the motion commands received from host PC; and then the SERVO-300 will send the 3-axis positions back to host PC. The SERVO-300 control board will not output V-command to motor driver. The simulation mode can be operated with machine off. The user can debug and develop the motion program beforehand. And if the user has the daughter board DB-8R, it can also simulate the digital input/output like as a machine.

Open loop mode

In open loop mode, user can directly output a constant voltage to servo driver to let the motor rotate at constant speed. The constant value can be set by MSERVO3_CALV() command. This mode can be used to tune the velocity loop gain or to drive the inverter.

Closed-loop mode

In closed-loop mode, the SERVO-300 performs the PD controller. It also executes the following function.
1. Pitch error compensation
2. Limit switch auto-protection
3. Hardware failure detection

Software DDA

For precise control and adjustable speed, the software DDA will divide the command into several equal delta commands. The maximum command is 2040 pulse, so the maximum speed is $2040/(0.003*DDA) * 60/ENCODER$. For example, DDA=4, ENCODER=4000 pulse/rev. delta command=2040/4=508, pulse speed= $2040/(0.003*4)*60/4000$ =2550 rpm Therefore the maximum speed will be 2550 rpm while select DDA=4. In case of the user want to increase the maximum speed that the servo driver is available, the DDA value should be reduced. The maximum speed will be 5100 rpm if DDA=2. So, it is very important to select a proper DDA value for your system.
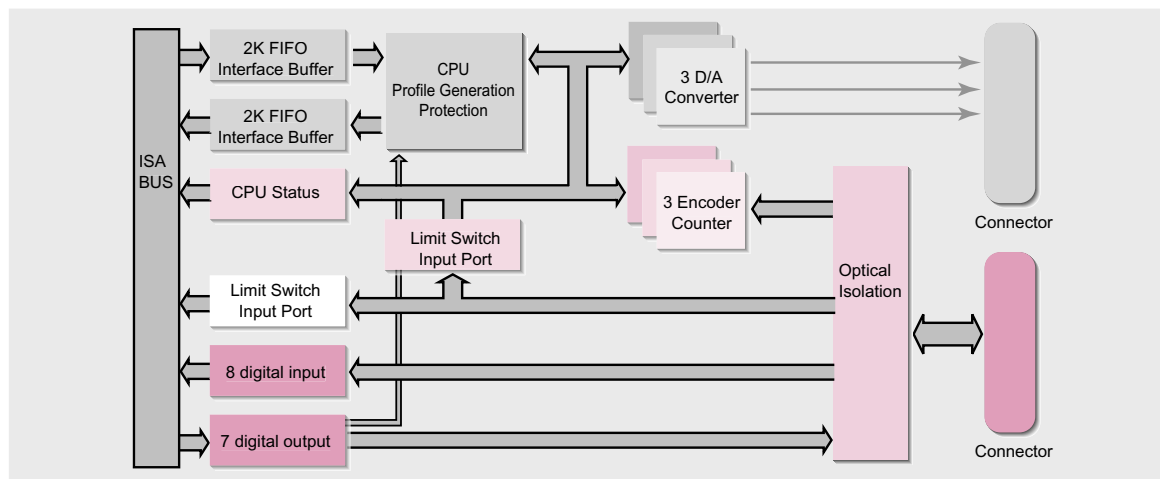
Specifications

Motion

- Number of axis: 3-axis
- Bits counter for encoder feed-back signal
- Position accuracy: ± 1 quadrature count
- Output Type: 12-bit analog output with $\pm 10V$
- Control algorithm: PD control
- Sampling rate: 2.2ms for 3-Axis control system
- Forward, backware, home, limit switch per axis
- Programmable limit switch state: N.O. or N.C.

SERVO-300

3-axis high speed servo motor control board

General Purpose I/O
- 8-channel isolation digital inputs
- Input voltage: 0~24V
- 7-channel open collector output
- 2500Vrms optical isolation

I/O connector:
- Connector 1: D-sub 25-pin connector for encoder input
- Connector 2: D-sub 9-pin connector for X,Y pulse output and servo-on signal
- Connector 3: D-sub 9-pin connector for Z pulse output, limit switches and servo-on signal
- Connector 4: D-sub 25-pin connector for limit switches, digital input and digital output

General Specifications
- Power requirements: +5V @ 500 mA typical
- Operating temperature: 0 ~ 60°C
- Operating humidity: 0 ~ 90% non-condensing
- Storage temperature: -20 ~ 70°C
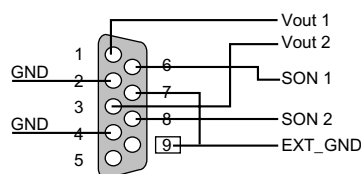- Dimensions: 208 mm x 121 mm

Ordering Information
Standard
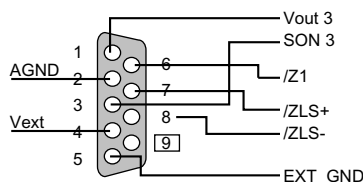**SERVO-300:** 3-axis servo motor control board

Optional
DB-200: Encoder interface I/O board
DB-8R: Motion interface I/O board
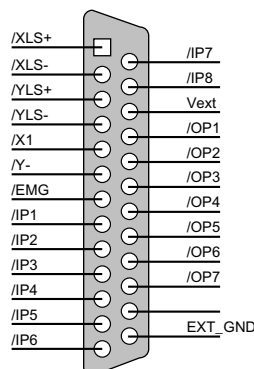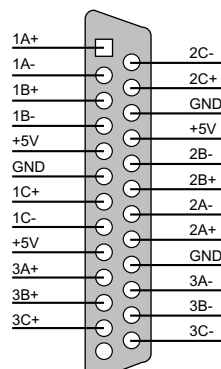**DN-25:** DIN-rail mounting screw terminal board

Pin Assignment

CN1

CN2

CN3   CN4

5 Motion Control

STEP-200

2-axis high speed stepper motor control board

Features

- 2-axis independent, simultaneous stepper motor control/servo motor control(pulse input type)
- Step rate: 1pps~250Kpps
- Max. step count: $2^{32}-1$ steps
- Embedded CPU
- Command type interface
- Linear, circular interpolation
- Automatic trapezoidal acceleration/deceleration
- Output pulse modes: CW/CCW or pulse/direction
- Output polarity can be programmable
- 2500Vrms optically isolated signal output

Functional Description

STEP-200 is a 2-axis command-type stepper motor controller board. It also can be used to control pulse-type servo motor. The embedded CPU of STEP-200 performs the motion commands transferred from PC to increase the system performance. A 2K bytes FIFOs is used as a command buffer. This buffer provides 1,360ms time buffer. Therefore, STEP-200 board is suitable for windows operation system. The STEP-200 board provides DOS and Windows drivers. The user can use our encoder-300 encoder interface board to work with STEP-200 to implement a closed-loop stepper-motor control system.

DDA Technology

The DDA chip is the heart of STEP-200 board will generate equal space pulse train corresponding to the specific pulse number during a DDA period. This mechanism is very useful to execute pulse generation and interpolation function. The DDA period is determined by DDA cycle. When DDA cycle set to 1, the DDA period is equal to 8.192ms. The output pulse number can be set to 0~2047, therefore the maximum output pulse rate will be 249.877 Kpps. The minimum output pulse rate is 0.96pps when set DDA cycle=254 (DDA period =1040.38ms and pulse number=1)

Specifications

- 5 isolated limit switch inputs per axis: home, forward end, reverse end, forward high speed, reverse high speed
- Output driving capability: 15 mA source current at 5V
  50 mA sink current at 0.4V
- Output polarity: Positive/Negative, Programmable
- Output pulse signal: two pulse (CW/CCW) mode or one pulse (pulse, direction) mode. Optically coupled with 330Ω pull-up resistor.

General Specifications

- I/O connector: one 25-pin D-Sub female
- Power requirements: +5V@500 mA (typical)
- Operating temperature: 0 ~ 60°C
- Operating humidity: 0 ~ 90% non-condensing
- Storage temperature: -20 ~ 70°C
- Dimensions: 167 mm x 108 mm

Pin Assignment

CN 1

Left	Pin		Pin	Right
+5V	1		14	+5V
CW_PULSE 1	2		15	CW_PULSE 2
CCW-DIR 1	3		16	CCW-DIR 2
HOLD 1	4		17	HOLD 2
GND	5		18	GND
EXT_VCC	6		19	EXT_VCC
/ORG 1	7		20	/ORG 2
/LS11	8		21	/LS21
/LS12	9		22	/LS22
/LS13	10		23	/LS23
/LS14	11		24	/LS24
/EMG	12		25	EXT_GND
EXT_GND	13			

Ordering Information

Standard
STEP-200: 2-axis stepper motor control board

Optional
DN-25: DIN-rail mounting screw terminal board

ENCODER-300
ISA bus 3-axis encoder input board

Features

- Support incremental or quadrature encoders
- 3 independent axis
- Encoder type: Single-ended or differential
- Logic levels: TTL- and CMOS-compatible
- Counts per encoder cycle: x1, x2, x4 (software selectable)
- Encoder input modes:
  Quadrature, up/down, pulse/direction
- 2500V optical isolation

Functional Description

This board is a 3-axis quadrature encoder interface board for the IBM PC/AT bus compatibles. For each encoder, phase 0, phase 90 and index pulse inputs are provided. Inputs may be single ended (A, B, C) or differential (A+, A-, B+, B-, C+, C-). Inputs are conditioned by a four-stage digital filters. The maximum input rate in quadrature decode mode is 1MHz. The conditioned inputs are applied to the 16-bit counters. The counter may be used for quadrature decoding, pulse and direction-input counting, or as a pulse input up/down counter

General Specifications

- I/O connector: one 25-pin D-Sub female
- Power requirements: +5V@500 mA typical
- Operating temperature: 0 ~ 60°C
- Operating humidity: 0 ~ 90% non-condensing
- Storage temperature: -20 ~ 70°C
- Dimensions: 159 mm x 108 mm

Pin Assignment

CN 1

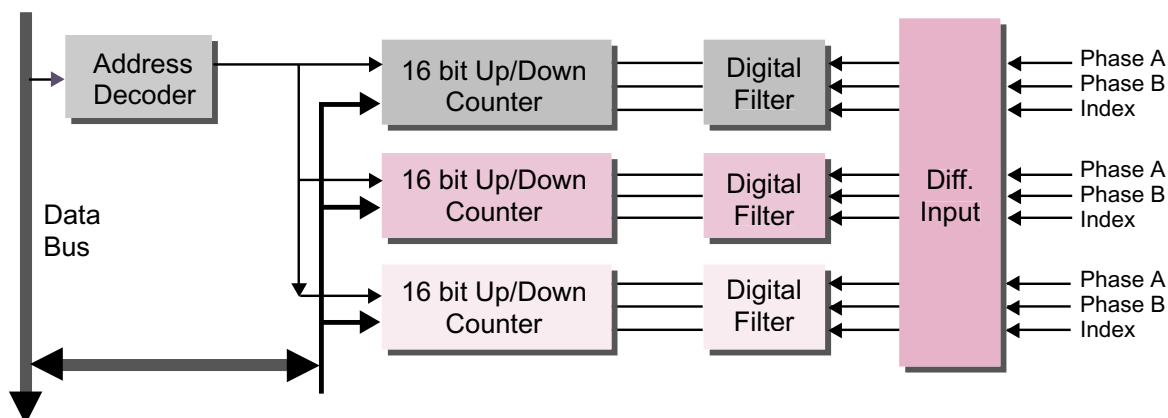|				
1A+	1		14	1A-
1B+	2		15	1B-
1C+	3		16	1C-
5V	4		17	GND
2A+	5		18	2A-
2B+	6		19	2B-
2C+	7		20	2C-
5V	8		21	GND
3A+	9		22	3A-
3B+	10		23	3B-
3C+	11		24	3C-
5V	12		25	GND
GND	13			

Ordering Information

Standard

Encoder-300: 3-axis encoder interface board

Optional

DN-25: DIN-rail mounting screw terminal board

Watchdog Boards

WDT-01 / WDT-02

Intelligent watchdog timer card

WDT-01

WDT-02

Features

■ Don't have to modify the original program

■ Can be used in ISA bus and print port interface

■ Harsh environment detection and warning before system crash

■ Cost effective solution

Functional Description

The WDT-01/WDT-02 are watchdog cards that provide watchdog timer, temperature monitor and power monitor functions.

They also provide many signals and mechanism such as relay control, reset signal, power-good signal that allow the user to control their system as soon as the errors are occurred. There are also many signals available, such as IRQ, I/O status RS-232, LED, Buzzer, to tell the user or operator that some errors are occurred. Once the WDT-01 has been power on, it will monitor the power and the temperature of PC automatically. After the software enable the watchdog timer, the WDT-01 will monitor the operations of software and hardware in the most inexpensive cost with the excellent protections. The WDT-02 is an economical version of WDT-01.

Applications

WDT-01/WDT-02 provide WDT utility software for Windows to monitor system status. When system is damaged, WDT-01/WDT-02 could alarm by digital output; and when system is frozen, WDT-01/WDT-02 could reset system automatically. WDT utility program executes when windows start and is resident in system tray. In NT system WDT utility event could logon into administrator account automatically when Windows NT is restarted. WDT utility takes very few system resources but could monitor most of the system information like voltage, temperature, fan speed and crash.

Specifications

Analog Input

● Watchdog timer: Software programmable from 0.01 second to 167772.15 seconds

● Computer power monitor: PC Power +5V, External Power +12V

● RS-232 output: speed: 9600, 4800, 2400 or 1200bps

● Printer-like I/O interface: LPT0(3bch), LPT1(378h), LPT(278h) or user-defined ports

● Terminal board has a power failure LED dispaly

● IRQ:3,4,5,6,7,9,10,11,12,14,15

● 4-bit TTL output:
  logic high: 2.4Vdc min,source 400 uA
  logic low: 0.5Vdc max,sink-10 mA

● Two Relay for watchdog or temperature failure:
  Contacts: FORM c.

● Max switched current: 1A 30V/dc

● Max switched voltage: 120VAC/60VDC

● Max carry current: 1.25AC/DC

Generail Specifications

● Power required:
  (a) External power: +12V, 3W or
  (b) Internal power: +12V, 3W

● Operating temperature: 0 ~ 60°C

● Dimensions: 170 mm x 110 mm

Output Signals:

Signal/Function	WDT Timeout	Over Temperature	Power Failure
Reset	Yes	No	No
IRQ	Yes	Yes	No
I/O status	Yes	Yes	Yes
RELAY	Yes	Yes	No
TTL	Yes	Yes	No
LED	Yes	Yes	Yes
RS-232	Yes	Yes	Yes
Buzzer	Yes	Yes	Yes

Ordering Information

Standard

WDT-01: Intelligent watchdog timer card with terminal board and 1 meter cable

WDT-02: Intelligent watchdog timer card without terminal board, cable, buzzer relay, LED, temerature sensor

Optional

CA-0205: 2-pin black & red cable, 0.5m

CA-2520: 25-pin Male-Male D-sub flat cable, 2m

WDT-03
Intelligent Watchdog Timer Card

Functional Description
The PC hardware and software may fail for some reasons. To prevent the failure, many different solutions are proposed. However, none of these solutions offer a 100% assurance. Since it is hard to prevent the failure, to detect the failure becomes more and more important. The WDT-03 is used to detect the failure of the software and hardware. It can be used to reduce the risk because of PC failure. The WDT-03 is useful even for those systems with built-in watchdog circuit.

Applications
WDT-03 provides software utility for Windows to monitor system status. When system is damaged WDT-03 could alarm by digital output; and when system is frozen, WDT-03 could reset system automatically. WDT-03 utility program executes when Windows start and is resident in system tray. In NT system WDT-03 utility event could logon into administrator account automatically when windows NT is restarted. WDT-03 utility takes very few system resources but could monitor most of the system information like voltage, temperature, fan speed and crash. The WDT-03 can control 3-channel of digital input terminal and 3-channel of signal relay output on its dughter board DB-3R.
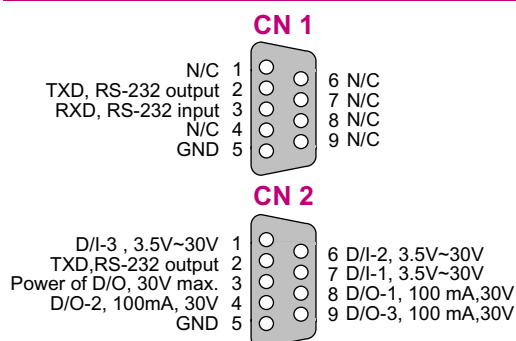
Specifications
- O.S./Bus/mounting independent
- OEM/ODM acceptable
- RS-232 output: speed:9600, 4800, 2400 or 1200bps
- Power required:
  1. External power: +12V,3W or
  2. Internal power: +12V,3W
- Bus Voltage monitoring: 3.3V, 5V, 12V, -5V, -12V
- Fan Speed monitoring: 3-channel
- Temperature monitoring: 3-channel
- Read/write cycles: 100,000 times

- Interface: RS-232 x 1 for local CPU
  RS232 x 1 for remote HOST(monitor the local CPU)
- Reset Mechanism:
  Power good signal for PC system
  Reset signal to simulate external reset-key pressed
- Mounting: ISA/PCI bus for PC

Generail Specifications
- Power consumption: 2W
- Operating temperature: 0 ~ 60°C
- Storage temperature: -20 ~ 70°C
- Dimensions: 140 mm x 70 mm

Pin Assignment

CN 1
Pin	
N/C 1	6 N/C
TXD, RS-232 output 2	7 N/C
RXD, RS-232 input 3	8 N/C
N/C 4	9 N/C
GND 5	

CN 2
Pin	
D/I-3 , 3.5V~30V 1	6 D/I-2, 3.5V~30V
TXD,RS-232 output 2	7 D/I-1, 3.5V~30V
Power of D/O, 30V max. 3	8 D/O-1, 100 mA,30V
D/O-2, 100mA, 30V 4	9 D/O-3, 100 mA,30V
GND 5	

Ordering Information
Standard
WDT-03: Intelligent Watchdog Timer card

Optional
DB-3R: Daughter Board for WDT-03
CA-0205: 2-pin Black & Red cable, 0.5m
CA-0910F: 9-pin Female-Female D-sub cable,1m