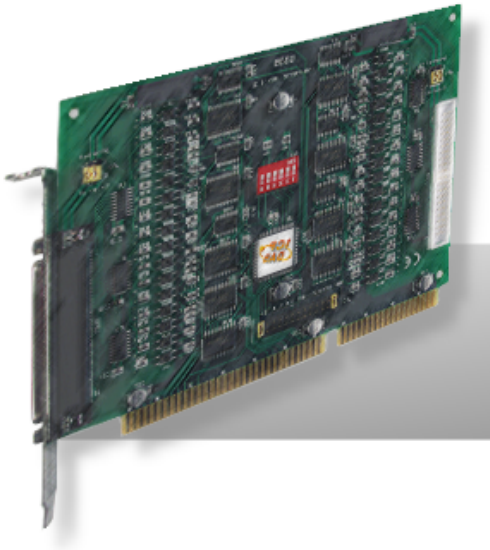

ISO-P32C32/P32S32W
ISO-P64/C64

User Manual

Version 1.9
Oct. 2011

Warranty

All products manufactured by ICP DAS are warranted against defective materials for a period of one year from the date of delivery to the original purchaser.

Warning

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1. Introduction

The ISO-P32C32/P32S32W consists of 32-channel isolated D/I and 32-channels isolated D/O. The ISO-P64 consists of 64-channel isolated D/I. The ISO-C64 consists of 64-channel isolated D/O. The D/I specifications of ISO-P32C32/P32S32W & ISO-P64 are the same. The D/O specifications of ISO-P32C32/P32S32W & ISO-C64 are the same.

1.1 Specifications

1.1.1 ISO-P32C32

Model Name	ISO-P32C32
Digital Input	
Isolation Voltage	3750 Vrms (Using external power) 3000 Vrms (Using internal power)
Channels	32
Compatibility	Photo isolated current
Input Voltage	Logic 0: DC 0 ~ 1 V Logic 1: DC 9 ~ 24 V
Input Impedance	3 KΩ, 0.5 W
Response Speed	4 kHz (Typical)
Digital Output	
Isolation Voltage	3750 Vrms (Using external power)
Channels	32
Compatibility	Sink, Open Collector
External Voltage	5 ~ 30 V_{DC} (max.)
Output Capability	100 mA for one channel @ 100% duty 100 mA for all channels @ 100% duty
Response Speed	4 kHz (Typical)
General	
Bus Type	ISA
Data Bus	8-bit
I/O Connector	Female DB37 x 1 ; 40-pin box header x 1
Dimensions (L x W x D)	163 mm x 115 mm x 22 mm
Power Consumption	600 mA @ +5 V
Operating Temperature	0 ~ 60 °C
Storage Temperature	-20 ~ 70 °C
Humidity	5 ~ 85% RH, non-condensing

1.1.2 ISO-P32S32W

Model Name	ISO-P32S32W
Digital Input	
Isolation Voltage	3750 Vrms (Using external power)
Channels	32
Compatibility	Photo isolated current
Input Voltage	Logic 0: DC 0 ~ 1 V Logic 1: DC 5 ~ 24 V
Input Impedance	3 KΩ, 0.5 W
Response Speed	4 kHz (Typical)
Digital Output	
Isolation Voltage	3750 Vrms (Using external power)
Channels	32
Compatibility	Sink, Open Collector
External Voltage	5 ~ 30 V_{DC} (max.)
Output Capability	500 mA for one high driving channel @ 100% duty 500 mA for all high driving channels @ 100% duty (The GND pins all must be connected with GND of External Power)
	100 mA for one low driving channel @ 100% duty 100 mA for all low driving channels @ 100% duty (The GND pins all must be connected with GND of External Power)
Response Speed	4 kHz (Typical)
General	
Bus Type	ISA
Data Bus	8-bit
I/O Connector	Female DB37 x 1 40-pin Box header x 1
Dimensions (L x W x D)	163 mm x 115 mm x 22 mm
Power Consumption	600 mA @ +5 V
Operating Temperature	0 ~ 60 °C
Storage Temperature	-20 ~ 70 °C
Humidity	5 ~ 85% RH, non-condensing

1.1.3 ISO-P64

Model Name	ISO-P64
Digital Input	
Isolation Voltage	3750 Vrms (Using external power) 3000 Vrms (Using internal power)
Channels	64
Compatibility	Photo Coupler Isolated
Input Voltage	Logic 0: DC 0 ~ 1 V Logic 1: DC 9 ~ 24 V
Response Speed	4 kHz (Typical)
General	
Bus Type	ISA
Data Bus	8-bit
I/O Connector	Female DB37 x 1 ; 40-pin Box header x 1
Dimensions (L x W x D)	175 mm x 115 mm x 22 mm
Power Consumption	400 mA @ +5 V
Operating Temperature	0 ~ 60 °C
Storage Temperature	-20 ~ 70 °C
Humidity	5 ~ 85% RH, non-condensing

1.1.4 ISO-C64

Model Name	ISO-C64
Digital Output	
Isolation Voltage	3750 Vrms (Using external power)
Channels	64
Compatibility	Sink, Open Collector
External Voltage	5 ~ 30 V_{DC} (max.)
Output Capability	100 mA for one low driving channel @ 100% duty 100 mA for all low driving channels @ 60% duty
Response Speed	4 kHz (Typical)
General	
Bus Type	ISA
Data Bus	8-bit
I/O Connector	Female DB37 x 1 ; 40-pin Box header x 1
Dimensions (L x W x D)	178 mm x 115 mm x 22mm
Power Consumption	500 mA @ +5 V
Operating Temperature	0 ~ 60 °C
Storage Temperature	-20 ~ 70 °C
Humidity	5 ~ 85% RH, non-condensing

I/O channels				
	D/I channels	D/O channels		
		Low Drive	High Drive	Type
ISO-P32S32W	32	24	8	Current Sink, NPN
ISO-P32C32	32	32	-	Current Sink, NPN
ISO-P64	64	-	-	-
ISO-C64	-	64	-	Current Sink, NPN

1.2 Order Description

- ISO-P32C32/P32S32W: ISA bus D/I of 32-bit, D/O of 32-bit.
- ISO-P64: ISA bus D/I of 64-bit.
- ISO-C64: ISA bus D/O of 64-bit.

1.3 Options

- ADP-37/PCI: extender, 50-pin OPTO-22 header to DB-37 for PCI Bus I/O boards
- ADP-50/PCI: extender, 50-pin OPTO-22 header to 50-pin header, for PCI Bus I/O boards
- DB32R: 32-channel relay output board (RoHS) Include : CA-3710D Male-Male D-sub Cable 1.0 M
- DB16P16R: 16-channel input terminal and 16-channel relay output board Include : CA-3710D Male- Male D-sub Cable 1.0 M

1.4 Product Check List

The shipping package includes the following items:

- One ISO-P32C32, ISO-P32S32W, ISO-P64 or ISO-C64 card
- One software utility ISA CD.
- One Quick Start Guide

It is recommended that you read the Quick Start Guide first. All the necessary and essential information is given in the Quick Start Guide, including:

- Where to get the software driver, demo programs and other resources.
- How to install the software.
- How to test the card.

Attention!

If any of these items is missing or damaged, contact the dealer from whom you purchased the product. Please save the shipping materials and carton in case you need to ship or store the product in the future.

2. Hardware configuration

2.1 ISO-P32C32 Board Layout

The board layout of ISO-P32C32 is given as follows:

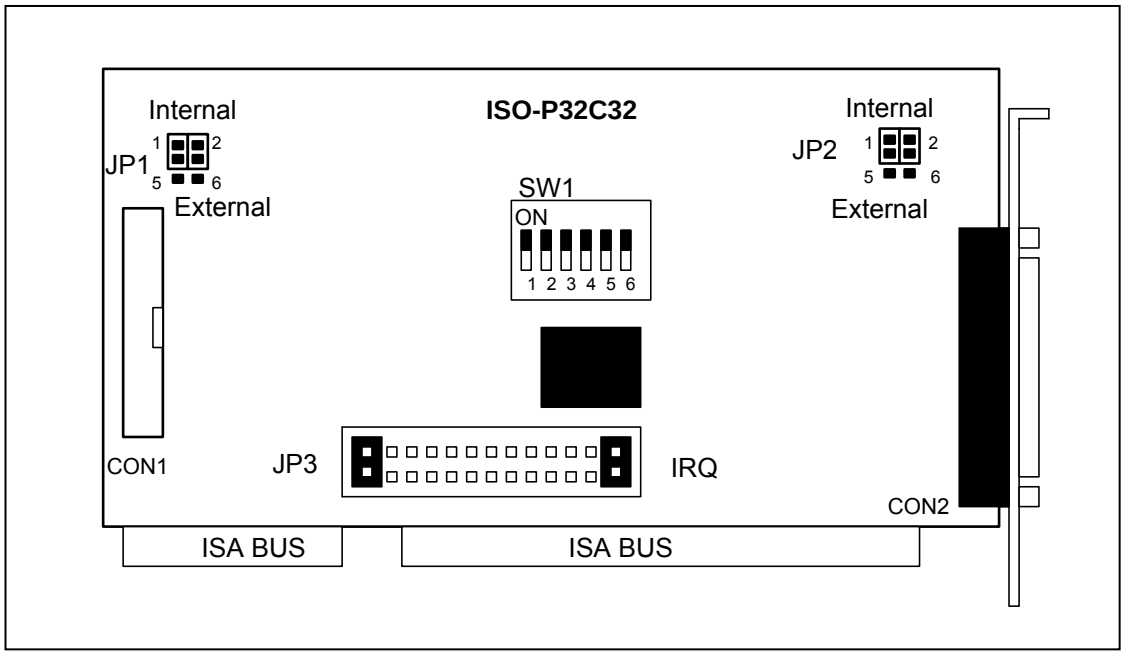


Figure 2-1: Board layout of ISO-P32C32

- CON1: 40-PIN connector for D/I/O channel 16~31
- CON2: 37-PIN D-sub connector for D/I/O channel 0~15
- JP1: CON1 select internal/external power
- JP2: CON2 select internal/external power
- JP3: Interrupt levels selection (ISO-P32C32 provides IRQ9, 10,11,12,14 and 15)
- SW1: I/O Address selection
- DI/O Channel

	DO Channel	Power	Ground
Isolation Bank 1	DI_0~15	(CON1, Pin18)	(CON1, Pin19)
Isolation Bank 2	DO_0~15	(CON1, Pin37)	(CON1, Pin1 & 20)
Isolation Bank 3	DI_16~31	(CON2, Pin18)	(CON2, Pin19)
Isolation Bank 4	DO_16~31	(CON2, Pin37)	(CON2, Pin1 & 20)

2.2 ISO-P32S32W Board Layout

The board layout of ISO-P32S32W is given as follow:

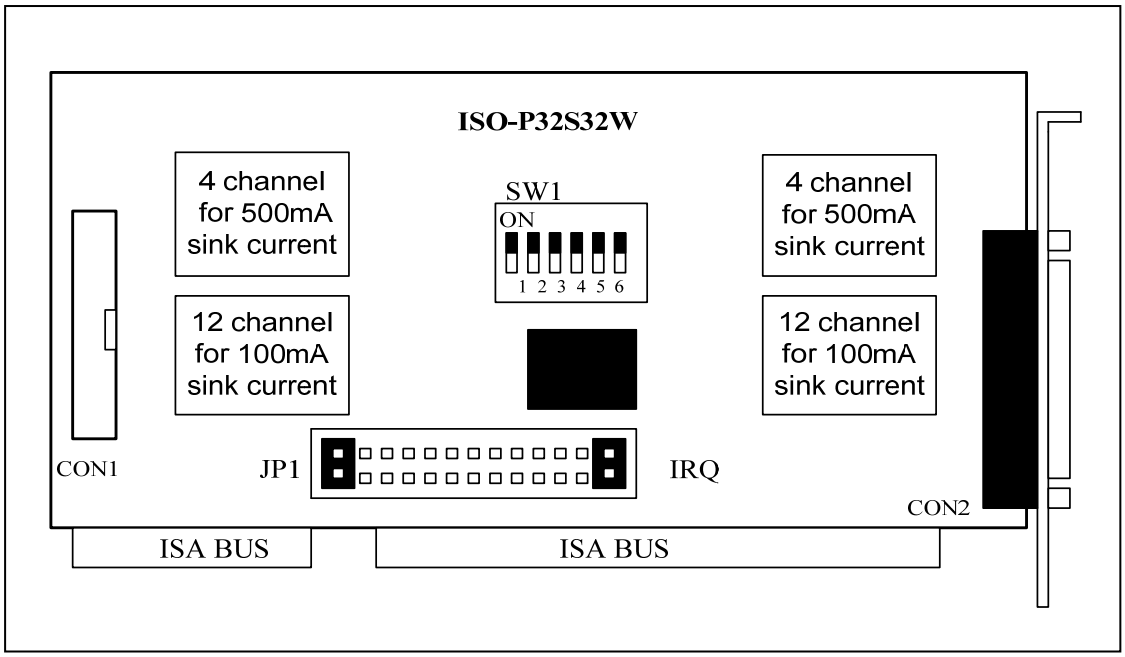


Figure 2-4. Board layout of ISO-P32S32W

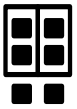
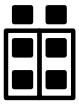
- CON1: 40-PIN connector for D/I/O channel 16~31
- CON2: 37-PIN D-sub connector for D/I/O channel 0~15
- JP1: Interrupt levels selection (ISO-P32S32W provides IRQ9,10,11,12,14 and 15)
- SW1: I/O Address selection
- DI/O Channel

	DI/DO Channel	Power	Ground
Isolation Bank 1	DI_0~15	(CON1,Pin37)	(CON1,Pin1)
Isolation Bank 2	DO_0~3 (High drive for 500 mA sink current, NPN)		(CON1,Pin18 & Pin19)
	DO_4~15(Low drive for 100 mA sink current, NPN)		(CON1,Pin1 & Pin20)
Isolation Bank 3	DI_16 ~ DI_31	(CON2,Pin37)	(CON2,Pin1)
Isolation Bank 4	DO_16~19(High drive for 500 mA sink current, NPN)		(CON2,Pin18 & Pin19)
	DO_20~31(Low drive for 100 mA sink current, NPN)		(CON2,Pin1 & Pin20)

Attention: To prevent the board damaged forever by overload, the GND pins (CON1: pin 1/ 18/ 19/ 20, CON2: pin 1/ 18/ 19/ 20) all must be connected with GND of External Power.

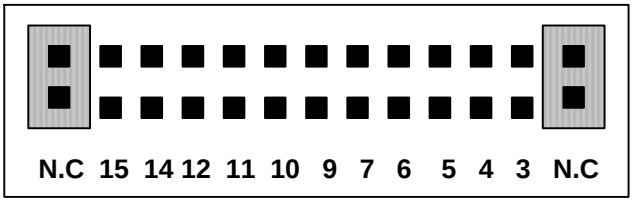
2.2.1 Jumper Setting

JP1/JP2 Jumper setting (for **ISO-P32C32**):

	**Internal Power**	**Default Setting**
	**External Power**	

- JP1: CON1 Internal power/External selection.
- JP2: CON2 Internal power/External selection.

IRQ selection : JP3 for **ISO-P32C32**
JP1 for **ISO-P32S32W**



Default IRQ: N.C (Not use IRQ)

- **Select IRQ one of the 3/4/5/6/7 for D/I channel 16 of CON1.**
- **Select IRQ one of the 9/10/11/12/14/15 for D/I channel 0 of CON2.**

- **Usage:**
  Step 1: Select IRQ 3/4/5/6/7 for channel 16.
  Step 2: Select IRQ 9/10/11/12/14/15 for channel 0.
  Step 3: Input interrupt signals by way of channel 0/16 of CON2/CON1.
  Step 4: Run P32Cint.EXE used interrupt function for ISO-P32C32/ P32S32W card.
  Step 5: Select I/O Base address of ISO-P32C32/P32S32W card.
  Step 6: Input IRQ number (Refer to JP3 setting of P32C32 board, JP1 setting of P32S32W board).

2.2.2 IRQ Circuit diagram

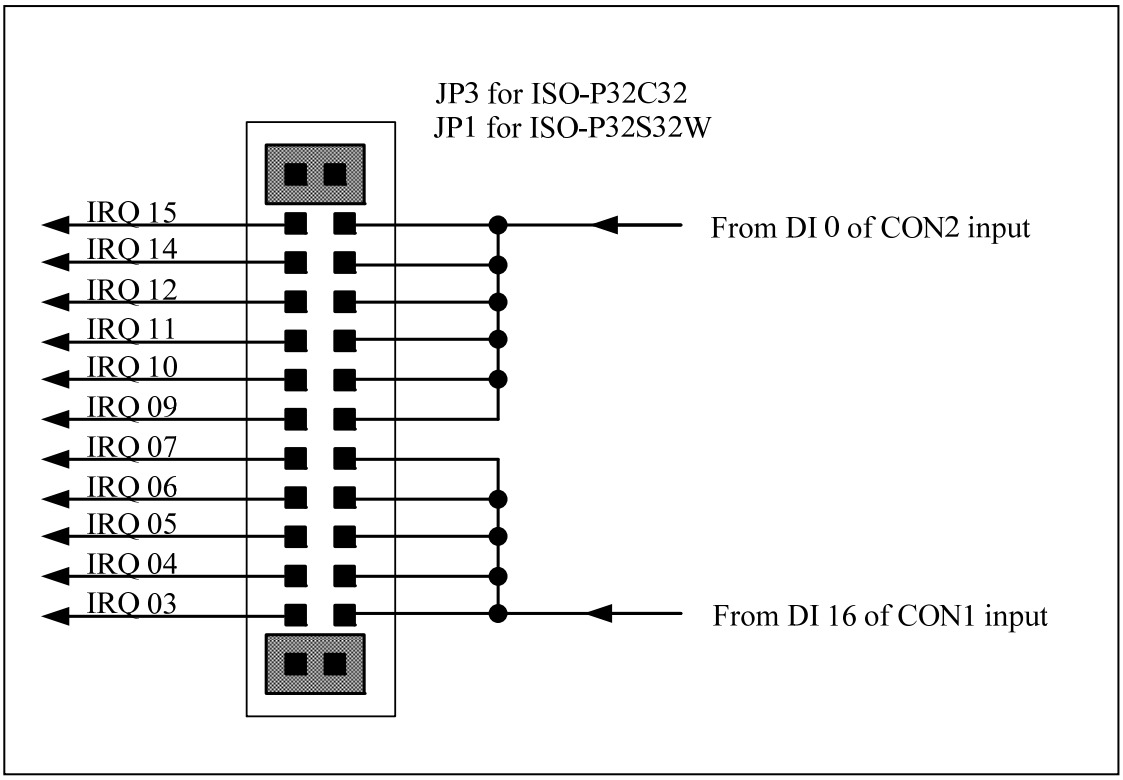


Figure 2-2: Select circuit diagram of IRQ for ISO-P32C32/P32S32W board.

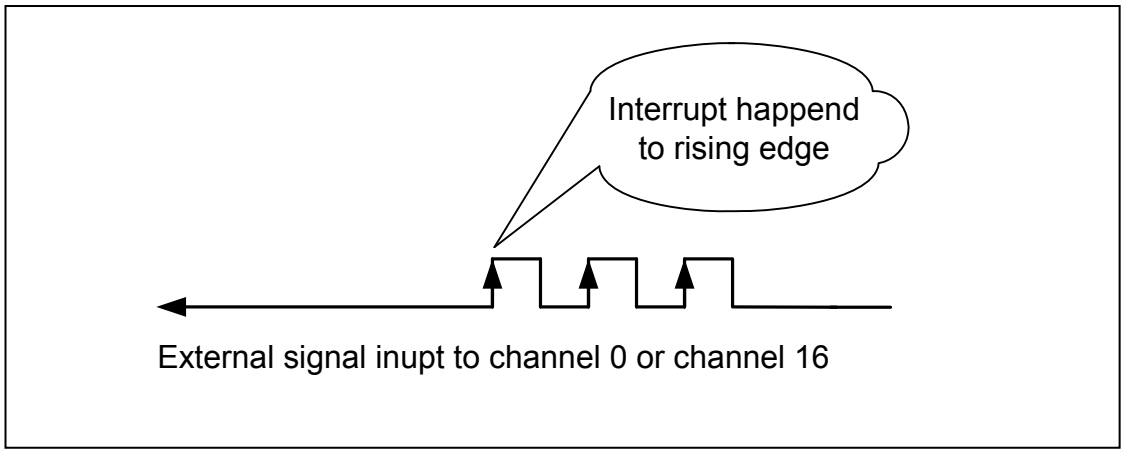
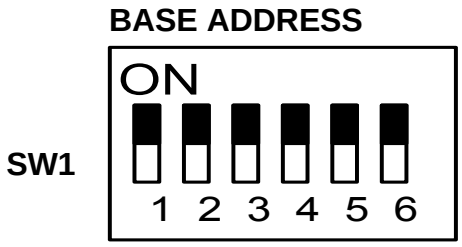


Figure 2-3: Interrupt happened to rising edge.

2.2.3 I/O Base Address Setting

The ISO-P32C32/P32S32W occupies 8 consecutive in I/O address space. The base address is set by DIP switch SW1.



Default Base Address 200 Hex

For Example

How to select 2 0 0 (Hex)

OFF → 1
ON → 0

2		0				0
1	ON	ON	ON	ON	ON	ON
	→ 0	0	0	0	0	0
	1 A8	2 A7	3 A6	4 A5	5 A4	6 A3

The detail SW1 base addresses setting. Please refer to **ISO-P32C32/P32S32W Base Address Table**.

ISO-P32C32/P32S32W Base Address Table:

(*): Default setting

S1 Dip Switch Address (Hex)	1 A8	2 A7	3 A6	4 A5	5 A4	6 A3
200 (*)	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**
208	ON	ON	ON	ON	ON	OFF
210	ON	ON	ON	ON	OFF	ON
218	ON	ON	ON	ON	OFF	OFF
220	ON	ON	ON	OFF	ON	ON
228	ON	ON	ON	OFF	ON	OFF
230	ON	ON	ON	OFF	OFF	ON
238	ON	ON	ON	OFF	OFF	OFF
240	ON	ON	OFF	ON	ON	ON
248	ON	ON	OFF	ON	ON	OFF
250	ON	ON	OFF	ON	OFF	ON
258	ON	ON	OFF	ON	OFF	OFF
260	ON	ON	OFF	OFF	ON	ON
268	ON	ON	OFF	OFF	ON	OFF
270	ON	ON	OFF	OFF	OFF	ON
278	ON	ON	OFF	OFF	OFF	OFF
280	ON	OFF	ON	ON	ON	ON
288	ON	OFF	ON	ON	ON	OFF
290	ON	OFF	ON	ON	OFF	ON
298	ON	OFF	ON	ON	OFF	OFF
2A0	ON	OFF	ON	OFF	ON	ON
2A8	ON	OFF	ON	OFF	ON	OFF
2B0	ON	OFF	ON	OFF	OFF	ON
2B8	ON	OFF	ON	OFF	OFF	OFF
2C0	ON	OFF	OFF	ON	ON	ON
2C8	ON	OFF	OFF	ON	ON	OFF
2D0	ON	OFF	OFF	ON	OFF	ON
2D8	ON	OFF	OFF	ON	OFF	OFF
2E0	ON	OFF	OFF	OFF	ON	ON
2E8	ON	OFF	OFF	OFF	ON	OFF
2F0	ON	OFF	OFF	OFF	OFF	ON
2F8	ON	OFF	OFF	OFF	OFF	OFF
300	OFF	ON	ON	ON	ON	ON
308	OFF	ON	ON	ON	ON	OFF
310	OFF	ON	ON	ON	OFF	ON

318	OFF	ON	ON	ON	OFF	OFF
320	OFF	ON	ON	OFF	ON	ON
328	OFF	ON	ON	OFF	ON	OFF
330	OFF	ON	ON	OFF	OFF	ON
338	OFF	ON	ON	OFF	OFF	OFF
340	OFF	ON	OFF	ON	ON	ON
348	OFF	ON	OFF	ON	ON	OFF
350	OFF	ON	OFF	ON	OFF	ON
358	OFF	ON	OFF	ON	OFF	OFF
360	OFF	ON	OFF	OFF	ON	ON
368	OFF	ON	OFF	OFF	ON	OFF
370	OFF	ON	OFF	OFF	OFF	ON
378	OFF	ON	OFF	OFF	OFF	OFF
380	OFF	OFF	ON	ON	ON	ON
388	OFF	OFF	ON	ON	ON	OFF
390	OFF	OFF	ON	ON	OFF	ON
398	OFF	OFF	ON	ON	OFF	OFF
3A0	OFF	OFF	ON	OFF	ON	ON
3A8	OFF	OFF	ON	OFF	ON	OFF
3B0	OFF	OFF	ON	OFF	OFF	ON
3B8	OFF	OFF	ON	OFF	OFF	OFF
3C0	OFF	OFF	OFF	ON	ON	ON
3C8	OFF	OFF	OFF	ON	ON	OFF
3D0	OFF	OFF	OFF	ON	OFF	ON
3D8	OFF	OFF	OFF	ON	OFF	OFF
3E0	OFF	OFF	OFF	OFF	ON	ON
3E8	OFF	OFF	OFF	OFF	ON	OFF
3F0	OFF	OFF	OFF	OFF	OFF	ON
3F8	OFF	OFF	OFF	OFF	OFF	OFF

2.2.4 I/O Register Address

The ISO-P32C32/P32S32W card occupies 8 consecutive PC I/O addresses. The following table lists the registers and their locations.

D/I: digital input data format.
D/O: digital output data format.

ISO-P32C32/P32S32W I/O Register Address

Address	Read	Write	ISO-P32C32/P32S32W
Base+0	D/I Channel 0~7	D/O Channel 0~7	CON 2
Base+1	D/I Channel 8~15	D/O Channel 8~15	CON 2
Base+2	D/I Channel 16~23	D/O Channel 16~23	CON 1
Base+3	D/I Channel 14~31	D/O Channel 14~31	CON 1

Read/Write Base+0

Bit	7	6	5	4	3	2	1	0
Channel	7	6	5	4	3	2	1	0

Read/Write Base+1

Bit	7	6	5	4	3	2	1	0
Channel	15	14	13	12	11	10	9	8

Read/Write Base+2

Bit	7	6	5	4	3	2	1	0
Channel	23	22	21	20	19	18	17	16

Read/Write Base+3

Bit	7	6	5	4	3	2	1	0
Channel	31	30	29	28	27	26	25	24

2.3 ISO-P64 Board Layout

The board layout of ISO-P64 is given as follows:

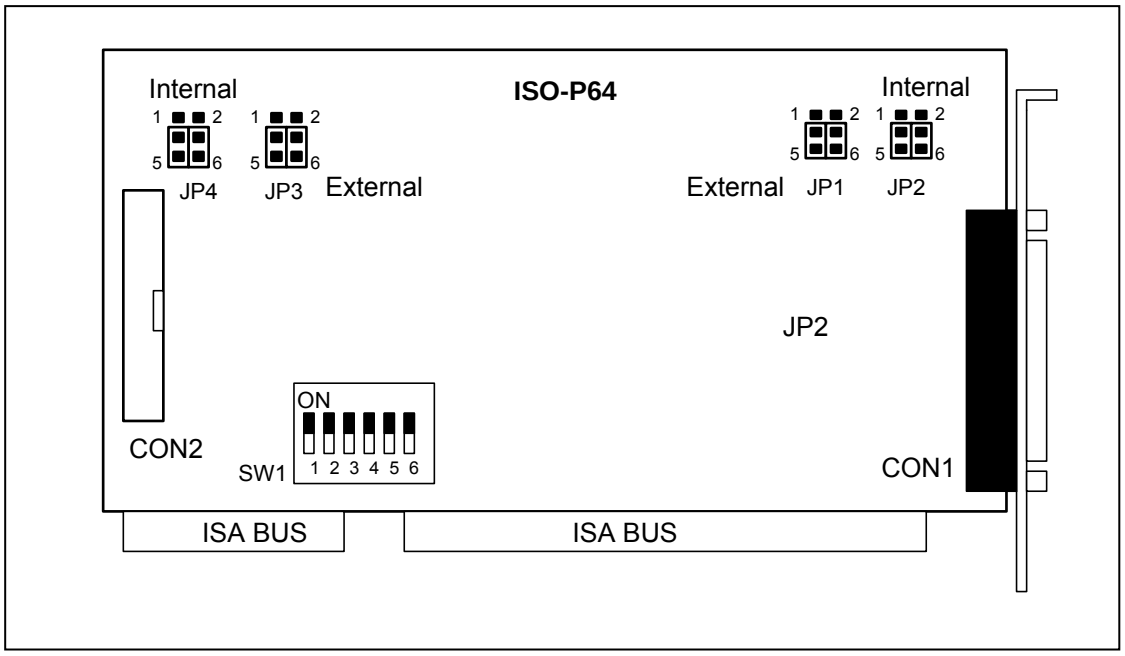


Figure 2-5: Board layout of ISO-P64

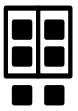
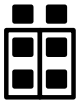
JP1: select internal/external power for DI_0 ~ DI_15 (3000 V isolation)
JP2: select internal/external power for DI_16 ~ DI_31 (3000 V isolation)
JP3: select internal/external power for DI_47 ~ DI_32 (3000 V isolation)
JP4: select internal/external power for DI_63 ~ DI_48 (3000 V isolation)

Isolation bank 1: DI_0 ~ DI_15, Power=CON1_18, Ground=CON1_1
Isolation bank 2: DI_16 ~ DI_31, Power=CON1_37, Ground=CON1_20
Isolation bank 3: DI_32 ~ DI_47, Power=CON2_18, Ground=CON2_1
Isolation bank 4: DI_48 ~ DI_63, Power=CON2_37, Ground=CON2_20
All these four banks are fully isolated from each other.

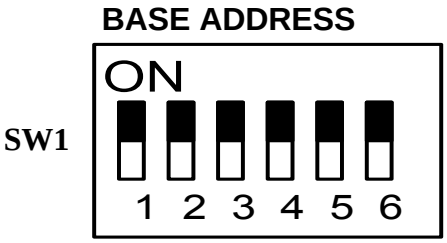
The DC/DC1 is used to provide the internal power supply for bank1 & bank2.
The DC/DC2 is used to provide the internal power supply for bank3 & bank4.

2.3.1 Jumper setting

JP1/JP2/JP3/JP4 jumper setting:

	**Internal Power**	
	**External Power**	**Default Setting**

2.3.2 I/O Base Address Setting



Default Base Address 200 Hex

For Example: How to select 2 0 0 (Hex)

OFF → 1
ON → 0

2		0				0
1	ON	ON	ON	ON	ON	ON
	→ 0	0	0	0	0	0
	1 A8	2 A7	3 A6	4 A5	5 A4	6 A3

The detail SW1 base addresses setting. Please refer to **ISO-P64 Base Address Table**.

ISO-P64 Base Address Table:

(*): Default setting

S1 Dip Switch Address (Hex)	1 A8	2 A7	3 A6	4 A5	5 A4	6 A3
200 (*)	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**
208	ON	ON	ON	ON	ON	OFF
210	ON	ON	ON	ON	OFF	ON
218	ON	ON	ON	ON	OFF	OFF
220	ON	ON	ON	OFF	ON	ON
228	ON	ON	ON	OFF	ON	OFF
230	ON	ON	ON	OFF	OFF	ON
238	ON	ON	ON	OFF	OFF	OFF
240	ON	ON	OFF	ON	ON	ON
248	ON	ON	OFF	ON	ON	OFF
250	ON	ON	OFF	ON	OFF	ON
258	ON	ON	OFF	ON	OFF	OFF
260	ON	ON	OFF	OFF	ON	ON
268	ON	ON	OFF	OFF	ON	OFF
270	ON	ON	OFF	OFF	OFF	ON
278	ON	ON	OFF	OFF	OFF	OFF
280	ON	OFF	ON	ON	ON	ON
288	ON	OFF	ON	ON	ON	OFF
290	ON	OFF	ON	ON	OFF	ON
298	ON	OFF	ON	ON	OFF	OFF
2A0	ON	OFF	ON	OFF	ON	ON
2A8	ON	OFF	ON	OFF	ON	OFF
2B0	ON	OFF	ON	OFF	OFF	ON
2B8	ON	OFF	ON	OFF	OFF	OFF
2C0	ON	OFF	OFF	ON	ON	ON
2C8	ON	OFF	OFF	ON	ON	OFF
2D0	ON	OFF	OFF	ON	OFF	ON
2D8	ON	OFF	OFF	ON	OFF	OFF
2E0	ON	OFF	OFF	OFF	ON	ON
2E8	ON	OFF	OFF	OFF	ON	OFF
2F0	ON	OFF	OFF	OFF	OFF	ON
2F8	ON	OFF	OFF	OFF	OFF	OFF
300	OFF	ON	ON	ON	ON	ON
308	OFF	ON	ON	ON	ON	OFF
310	OFF	ON	ON	ON	OFF	ON
318	OFF	ON	ON	ON	OFF	OFF

320	OFF	ON	ON	OFF	ON	ON
328	OFF	ON	ON	OFF	ON	OFF
330	OFF	ON	ON	OFF	OFF	ON
338	OFF	ON	ON	OFF	OFF	OFF
340	OFF	ON	OFF	ON	ON	ON
348	OFF	ON	OFF	ON	ON	OFF
350	OFF	ON	OFF	ON	OFF	ON
358	OFF	ON	OFF	ON	OFF	OFF
360	OFF	ON	OFF	OFF	ON	ON
368	OFF	ON	OFF	OFF	ON	OFF
370	OFF	ON	OFF	OFF	OFF	ON
378	OFF	ON	OFF	OFF	OFF	OFF
380	OFF	OFF	ON	ON	ON	ON
388	OFF	OFF	ON	ON	ON	OFF
390	OFF	OFF	ON	ON	OFF	ON
398	OFF	OFF	ON	ON	OFF	OFF
3A0	OFF	OFF	ON	OFF	ON	ON
3A8	OFF	OFF	ON	OFF	ON	OFF
3B0	OFF	OFF	ON	OFF	OFF	ON
3B8	OFF	OFF	ON	OFF	OFF	OFF
3C0	OFF	OFF	OFF	ON	ON	ON
3C8	OFF	OFF	OFF	ON	ON	OFF
3D0	OFF	OFF	OFF	ON	OFF	ON
3D8	OFF	OFF	OFF	ON	OFF	OFF
3E0	OFF	OFF	OFF	OFF	ON	ON
3E8	OFF	OFF	OFF	OFF	ON	OFF
3F0	OFF	OFF	OFF	OFF	OFF	ON
3F8	OFF	OFF	OFF	OFF	OFF	OFF

2.3.3 I/O Register Address

The ISO-P64 card occupies 8 consecutive PC I/O address. The following table lists the registers and their locations.

ISO-P64 I/O Register Address

Address	D/I Channel	ISO-P64
Base+0	Channel 0~7	Read Only
Base+1	Channel 8~15	Read Only
Base+2	Channel 16~23	Read Only
Base+3	Channel 24~31	Read Only
Base+4	Channel 32~39	Read Only
Base+5	Channel 40~47	Read Only
Base+6	Channel 48~55	Read Only
Base+7	Channel 56~63	Read Only

Read

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Base+0	7	6	5	4	3	2	1	0
Base+1	15	14	13	12	11	10	9	8
Base+2	23	22	21	20	19	18	17	16
Base+3	31	30	29	28	27	26	25	24
Base+4	39	38	37	36	35	34	33	32
Base+5	47	46	45	44	43	42	41	40
Base+6	55	54	53	52	51	50	49	48
Base+7	63	62	61	60	59	58	57	56

2.4 ISO-C64 Board Layout

The board layout of ISO-C64 is given as follows:

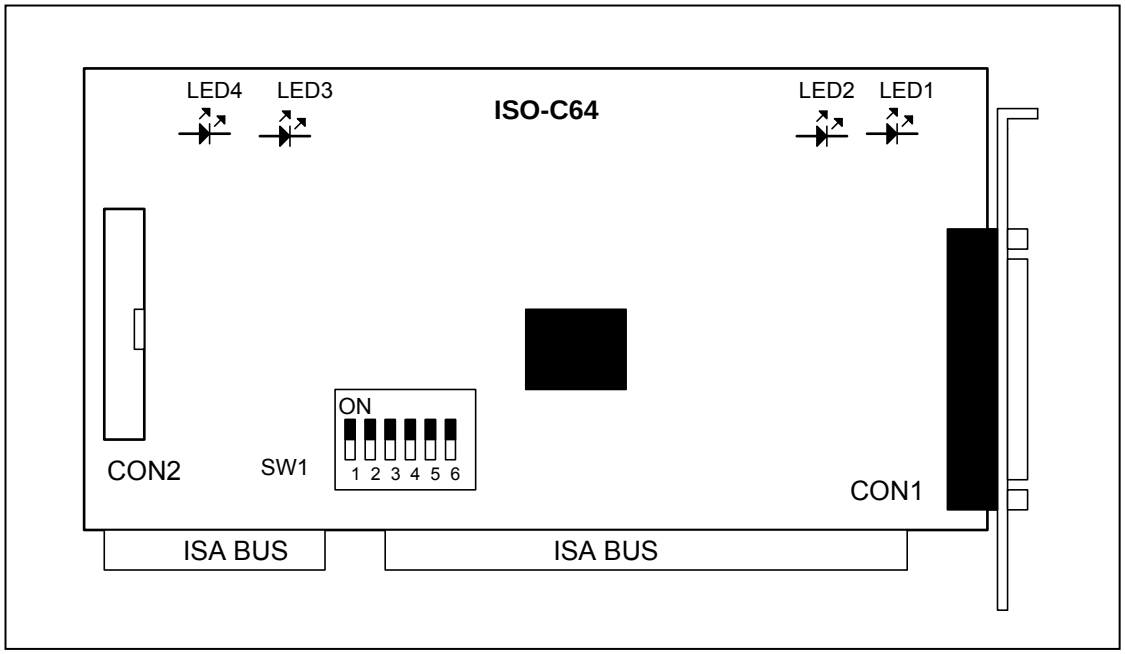


Figure 2-6: Board layout of ISO-C64

LED 1: power indicator for DO_0 ~ DO_15
LED 2: power indicator for DO_31 ~ DO_16
LED 3: power indicator for DO_47 ~ DO_32
LED 4: power indicator for DO_63 ~ DO_48

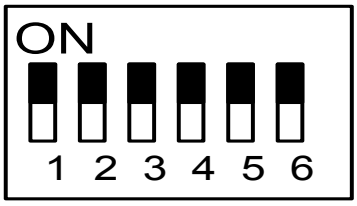
Isolation bank 1: DO_0 ~ DO_15, Power=CON1_18, Ground=CON1_1
Isolation bank 2: DO_16 ~ DO_31, Power=CON1_37, Ground=CON1_20
Isolation bank 3: DO_32 ~ DO_47, Power=CON2_18, Ground=CON2_1
Isolation bank 4: DO_48 ~ DO_63, Power=CON2_37, Ground=CON2_20

All these four banks are fully isolated from each other.

2.4.1 I/O Base Address Setting

BASE ADDRESS

SW1



Default base Address 200 Hex

For Example

How to select 2 0 0 (Hex)

OFF → 1
ON → 0

2		0				0
1	ON	ON	ON	ON	ON	ON
	→ 0	0	0	0	0	0
	1 A8	2 A7	3 A6	4 A5	5 A4	6 A3

The detail SW1 base addresses setting. Please refer to **ISO-C64 Base Address Table**.

ISO-C64 Base Address Table:

(*): Default setting

S1 Dip Switch Address (Hex)	1 A8	2 A7	3 A6	4 A5	5 A4	6 A3
200 (*)	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**
208	ON	ON	ON	ON	ON	OFF
210	ON	ON	ON	ON	OFF	ON
218	ON	ON	ON	ON	OFF	OFF
220	ON	ON	ON	OFF	ON	ON
228	ON	ON	ON	OFF	ON	OFF
230	ON	ON	ON	OFF	OFF	ON
238	ON	ON	ON	OFF	OFF	OFF
240	ON	ON	OFF	ON	ON	ON
248	ON	ON	OFF	ON	ON	OFF
250	ON	ON	OFF	ON	OFF	ON
258	ON	ON	OFF	ON	OFF	OFF
260	ON	ON	OFF	OFF	ON	ON
268	ON	ON	OFF	OFF	ON	OFF
270	ON	ON	OFF	OFF	OFF	ON
278	ON	ON	OFF	OFF	OFF	OFF
280	ON	OFF	ON	ON	ON	ON
288	ON	OFF	ON	ON	ON	OFF
290	ON	OFF	ON	ON	OFF	ON
298	ON	OFF	ON	ON	OFF	OFF
2A0	ON	OFF	ON	OFF	ON	ON
2A8	ON	OFF	ON	OFF	ON	OFF
2B0	ON	OFF	ON	OFF	OFF	ON
2B8	ON	OFF	ON	OFF	OFF	OFF
2C0	ON	OFF	OFF	ON	ON	ON
2C8	ON	OFF	OFF	ON	ON	OFF
2D0	ON	OFF	OFF	ON	OFF	ON
2D8	ON	OFF	OFF	ON	OFF	OFF
2E0	ON	OFF	OFF	OFF	ON	ON
2E8	ON	OFF	OFF	OFF	ON	OFF
2F0	ON	OFF	OFF	OFF	OFF	ON
2F8	ON	OFF	OFF	OFF	OFF	OFF
300	OFF	ON	ON	ON	ON	ON
308	OFF	ON	ON	ON	ON	OFF
310	OFF	ON	ON	ON	OFF	ON
318	OFF	ON	ON	ON	OFF	OFF
320	OFF	ON	ON	OFF	ON	ON

328	OFF	ON	ON	OFF	ON	OFF
330	OFF	ON	ON	OFF	OFF	ON
338	OFF	ON	ON	OFF	OFF	OFF
340	OFF	ON	OFF	ON	ON	ON
348	OFF	ON	OFF	ON	ON	OFF
350	OFF	ON	OFF	ON	OFF	ON
358	OFF	ON	OFF	ON	OFF	OFF
360	OFF	ON	OFF	OFF	ON	ON
368	OFF	ON	OFF	OFF	ON	OFF
370	OFF	ON	OFF	OFF	OFF	ON
378	OFF	ON	OFF	OFF	OFF	OFF
380	OFF	OFF	ON	ON	ON	ON
388	OFF	OFF	ON	ON	ON	OFF
390	OFF	OFF	ON	ON	OFF	ON
398	OFF	OFF	ON	ON	OFF	OFF
3A0	OFF	OFF	ON	OFF	ON	ON
3A8	OFF	OFF	ON	OFF	ON	OFF
3B0	OFF	OFF	ON	OFF	OFF	ON
3B8	OFF	OFF	ON	OFF	OFF	OFF
3C0	OFF	OFF	OFF	ON	ON	ON
3C8	OFF	OFF	OFF	ON	ON	OFF
3D0	OFF	OFF	OFF	ON	OFF	ON
3D8	OFF	OFF	OFF	ON	OFF	OFF
3E0	OFF	OFF	OFF	OFF	ON	ON
3E8	OFF	OFF	OFF	OFF	ON	OFF
3F0	OFF	OFF	OFF	OFF	OFF	ON
3F8	OFF	OFF	OFF	OFF	OFF	OFF

2.4.2 I/O Register Address

The ISO-C64 card occupies 8 consecutive PC I/O address. The following table lists the registers and their locations.

ISO-C64 I/O Register Address

Address	D/O Channel	ISO-C64
Base+0	Channel 0~7	Write Only
Base+1	Channel 8~15	Write Only
Base+2	Channel 16~23	Write Only
Base+3	Channel 24~31	Write Only
Base+4	Channel 32~39	Write Only
Base+5	Channel 40~47	Write Only
Base+6	Channel 48~55	Write Only
Base+7	Channel 56~63	Write Only

Write

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Base+0	7	6	5	4	3	2	1	0
Base+1	15	14	13	12	11	10	9	8
Base+2	23	22	21	20	19	18	17	16
Base+3	31	30	29	28	27	26	25	24
Base+4	39	38	37	36	35	34	33	32
Base+5	47	46	45	44	43	42	41	40
Base+6	55	54	53	52	51	50	49	48
Base+7	63	62	61	60	59	58	57	56

2.5 Isolated D/I Architecture

The D/I architecture of ISO-P32C32 & ISO-P64 are the same. The User can select internal power or external power to supply photo-couple digital input power. The ISO-P32S32W only used external Power. The block diagram of D/I are given as follows:

Configure 1: Internal power supply (Default Setting)

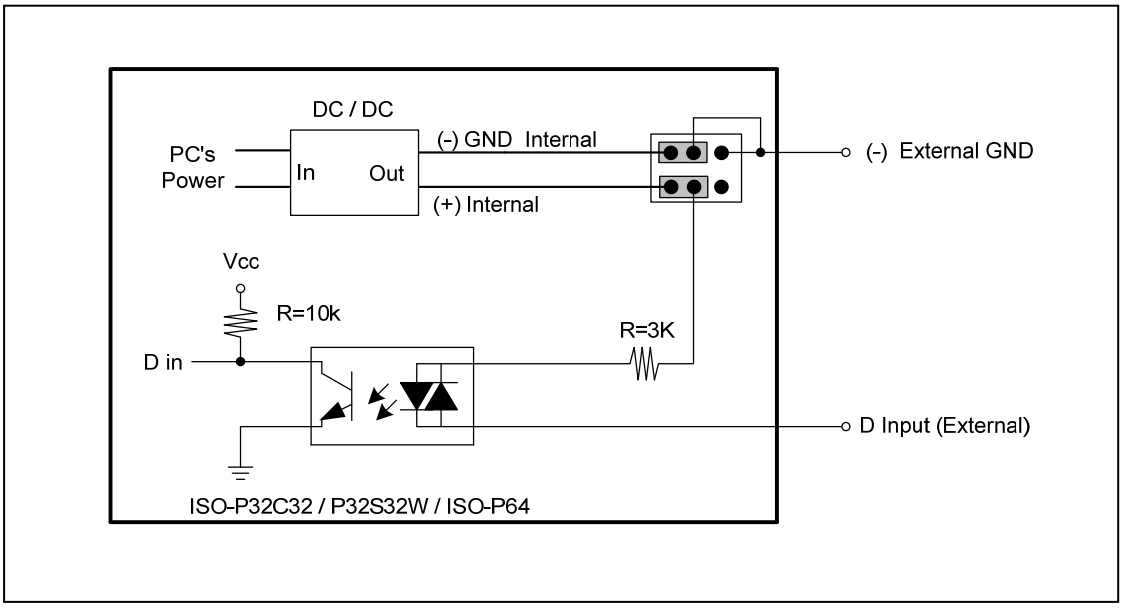


Figure 2-6: Isolated D/I Architecture with internal power supply

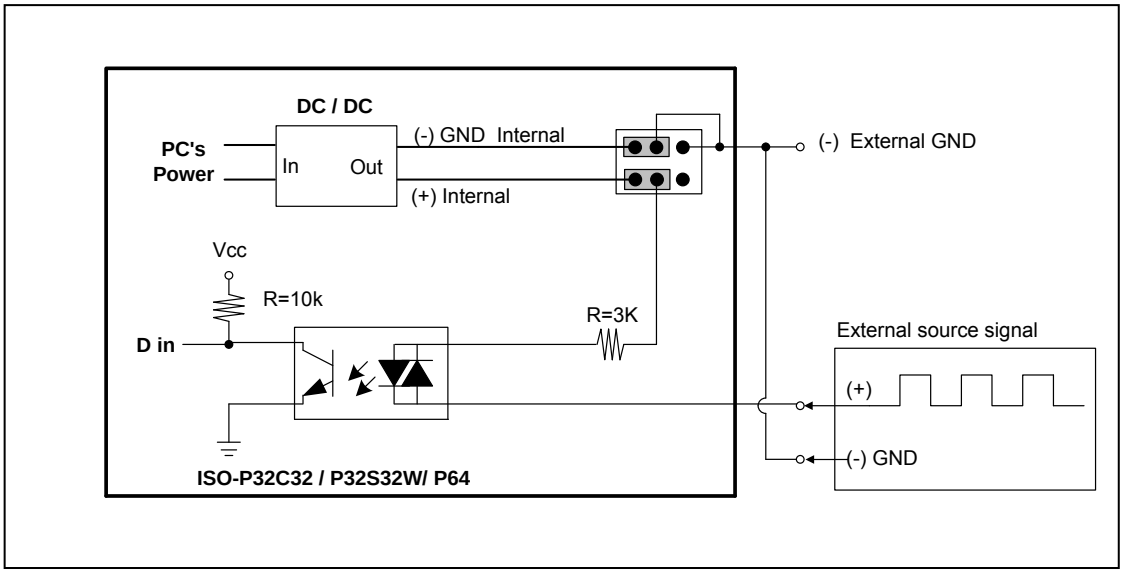


Figure 2-7: Typical Applications of D/I with internal power supply.

Configure 2: External power supply

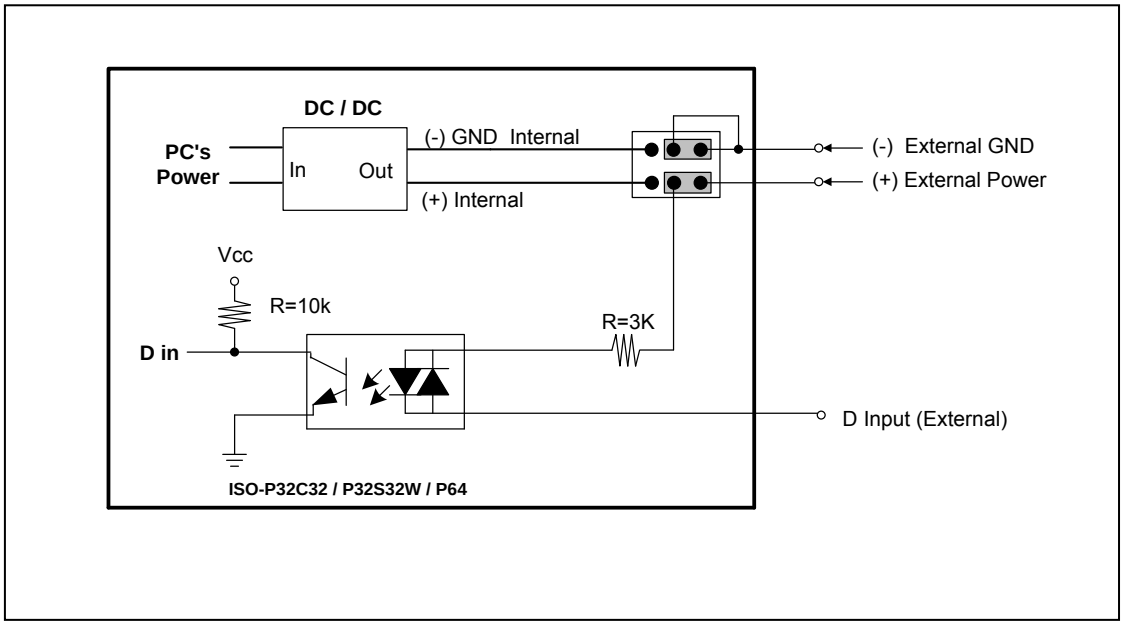


Figure 2-8: Isolated D/I Architecture with external power supply

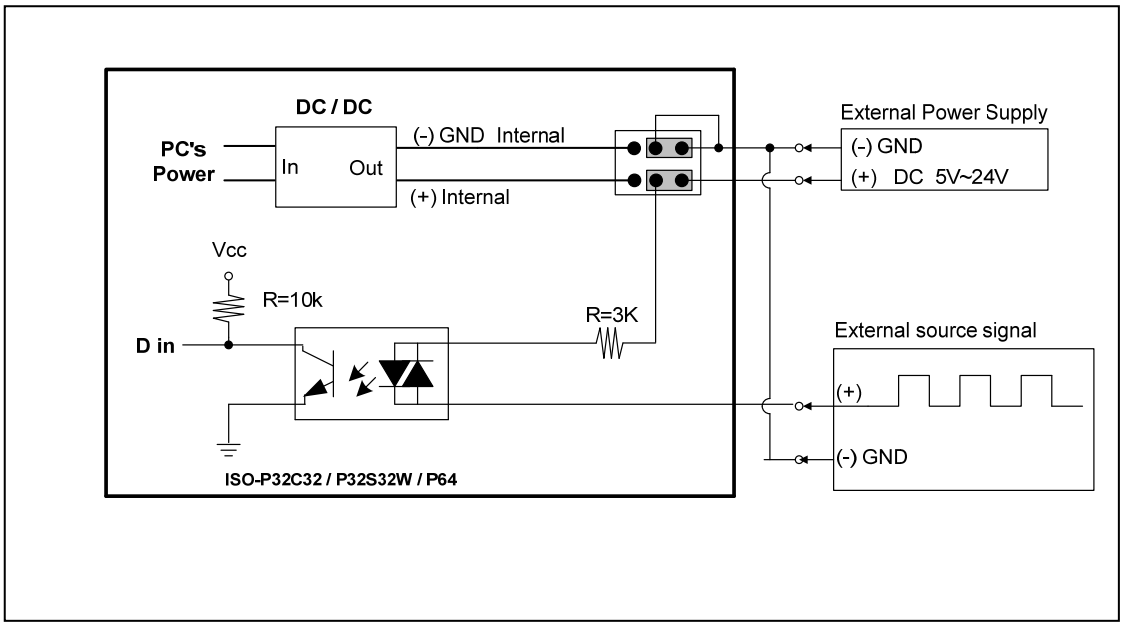
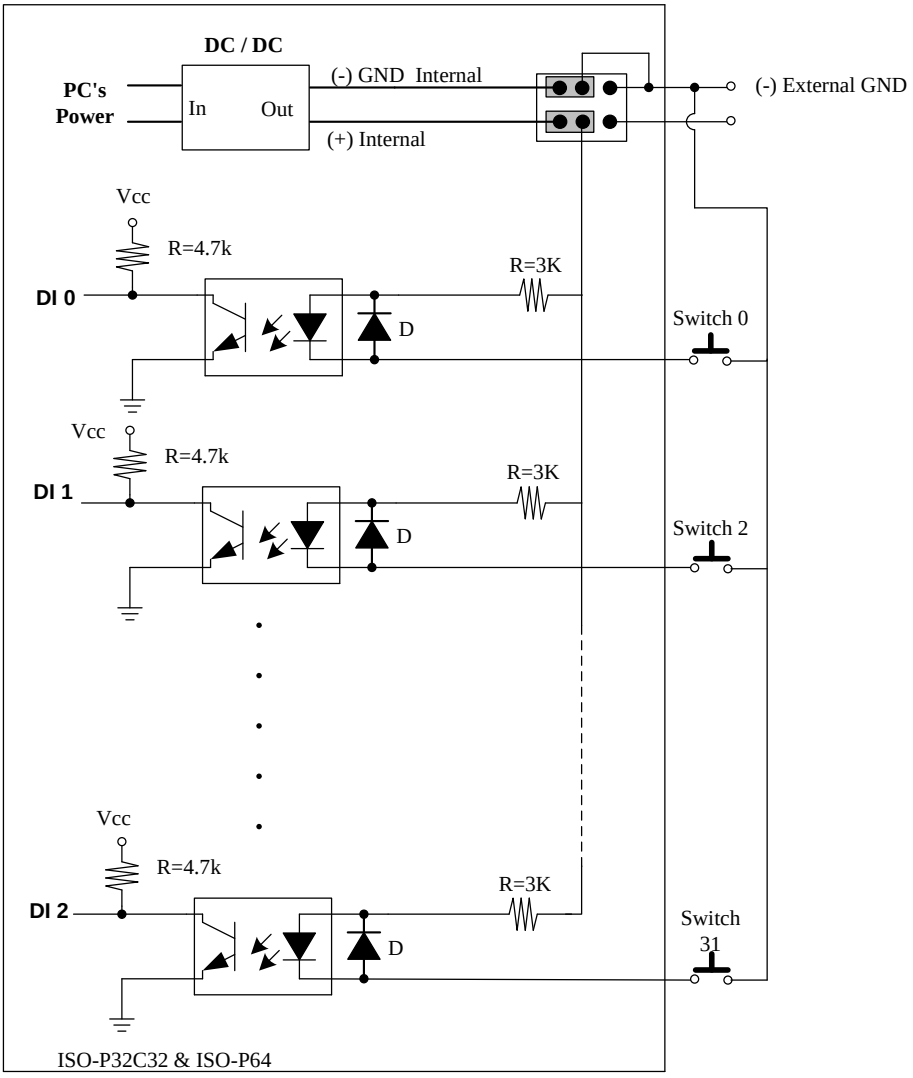
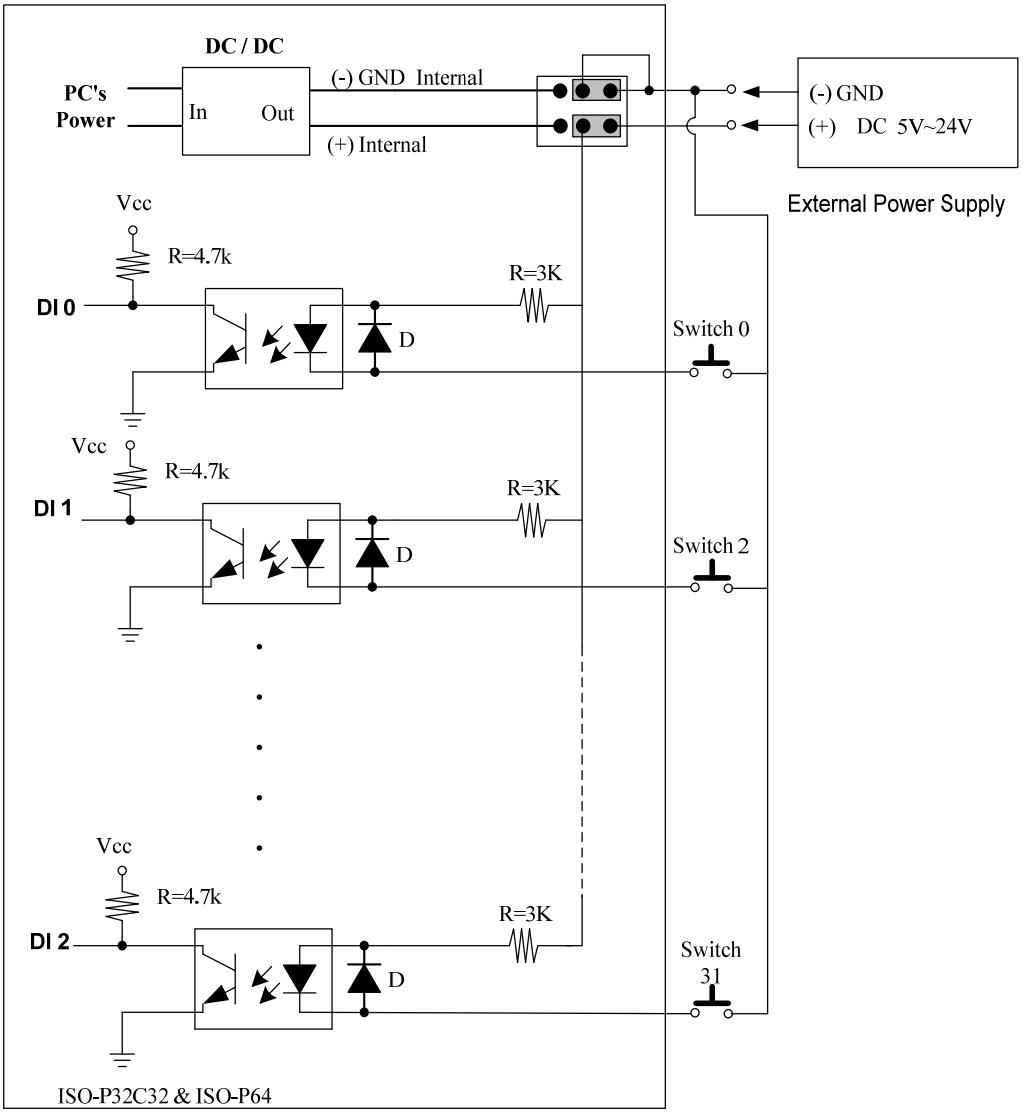


Figure 2-9: Typical Applications of D/I with external power supply.

2.5.1 Sample D/I Architecture for Internal Power



2.5.2 Sample D/I Architecture for External Power



2.6 Isolated D/O Architecture

The D/O architecture of ISO-P32C32/P32S32W & ISO-C64 are the same. The block diagrams of D/O are given as follows:

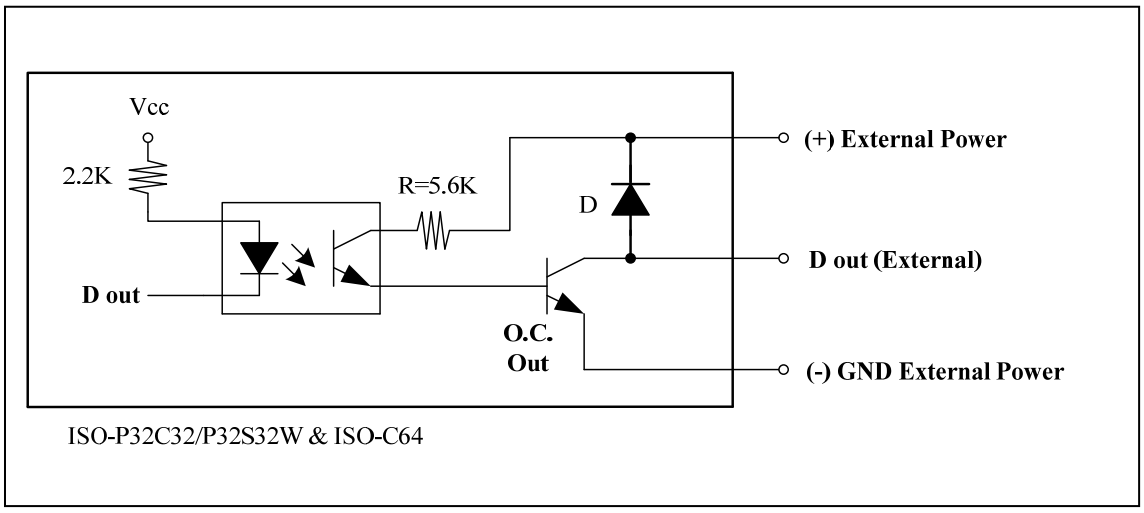


Figure 2-10: Isolated D/O Architecture

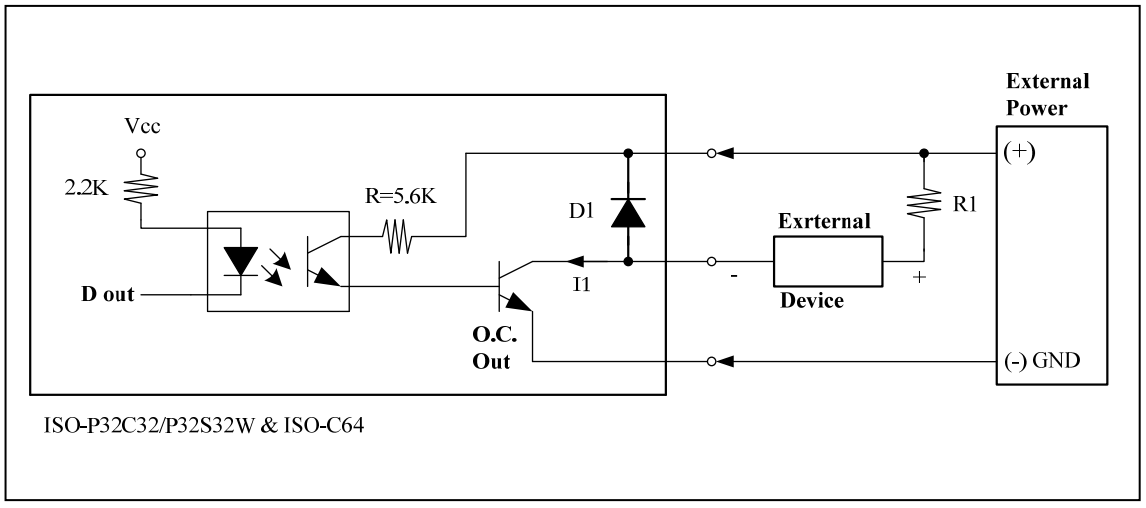
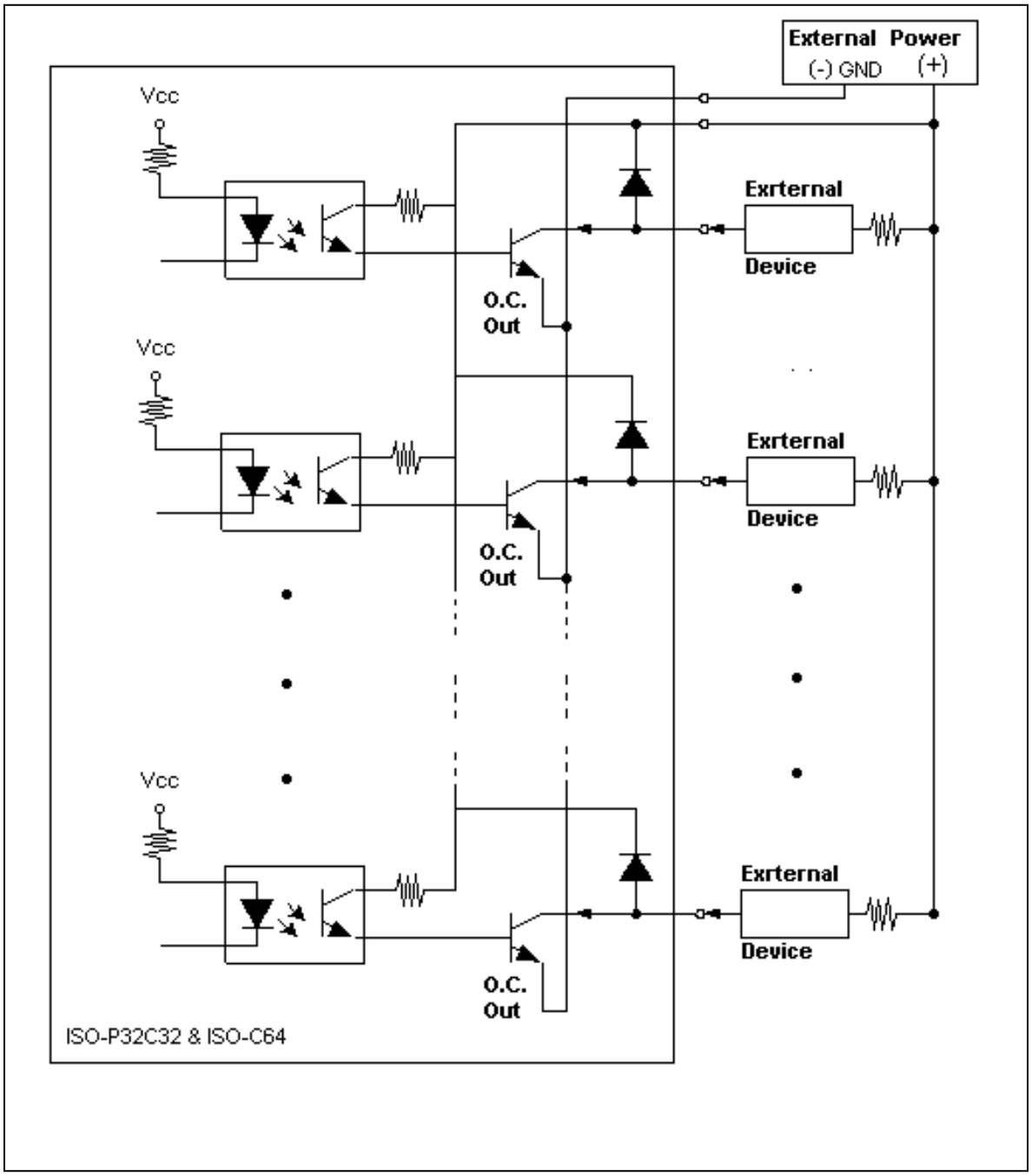


Figure 2-11: Typical Applications of D/O

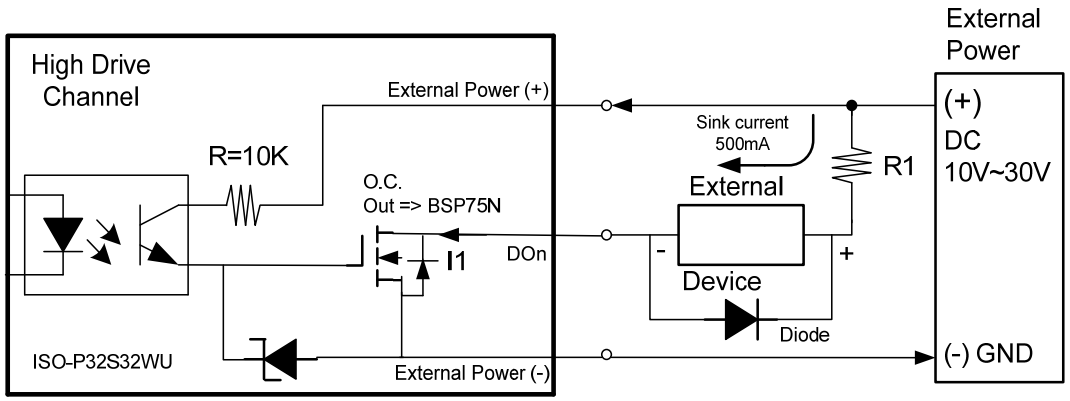
NOTE:

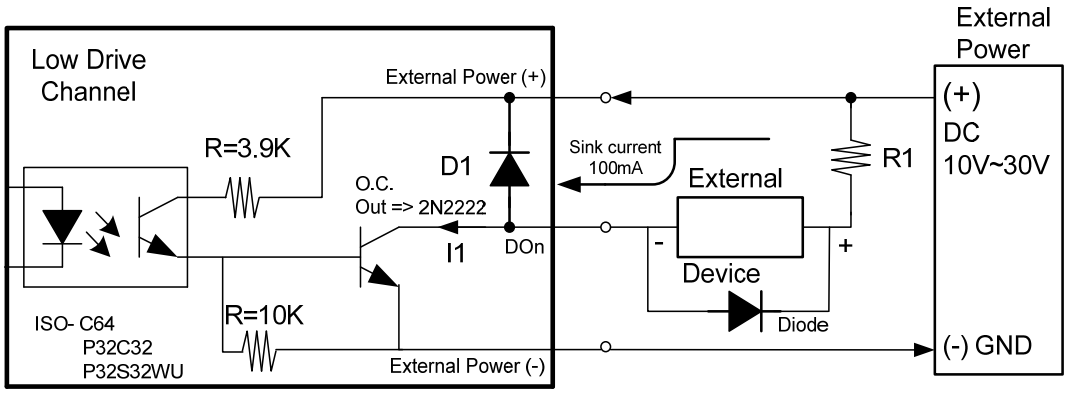
1. The ISO-P32C32/C64, I1, I2, … & I32 must be < 100 mA . The ISO-P32S32W ,
   I1~I4 & I17~I20 must be ≦500 mA , The other must be < 100 mA .
2. The R1, R2, ... & R32 are current-limit resistors. They must be designed to let I1, I2, ... & I32 <100 mA for ISO-P32C32/C64. I1~4 & I17~20 ≦500 mA for ISO-P32S32W.
3. If the internal resistance of external device is large enough, the R can be omitted.
4. The D1, D2, ... & D31 are common-cathode diodes for switching inductive lords. They can be used as relay driver, hammer driver, lamp driver, display driver, line driver & logic buffers.

2.6.1 Sample D/O Architecture



Open-Collector wiring Notice





Open Collector Output Type & Notice

High Drive channel : Open collector N-channel Power FET (BPS75N) . Max. Sink Current Is 500 mA for Each Cannel .

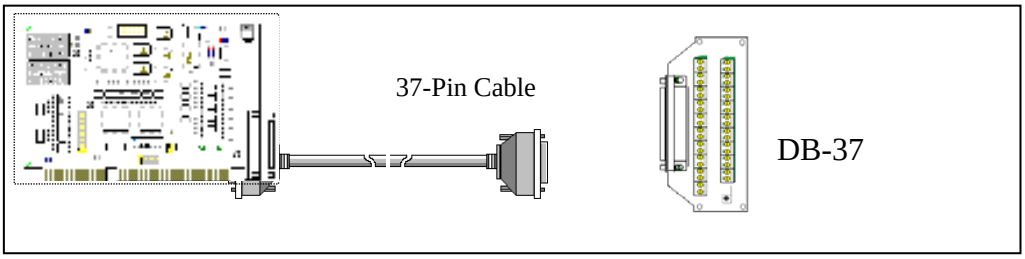
Low Drive channel : Open collector NPN/PNP Transistor . Max. Sink Current Is 100 mA for Each Channel .

(Recommend : It Is necessary to connect a diode In the External Device end as means of preventing damage form the counter emf . If your External Device Is inductive Load , Ex. Relay ⋯)

2.7 Daughter Boards

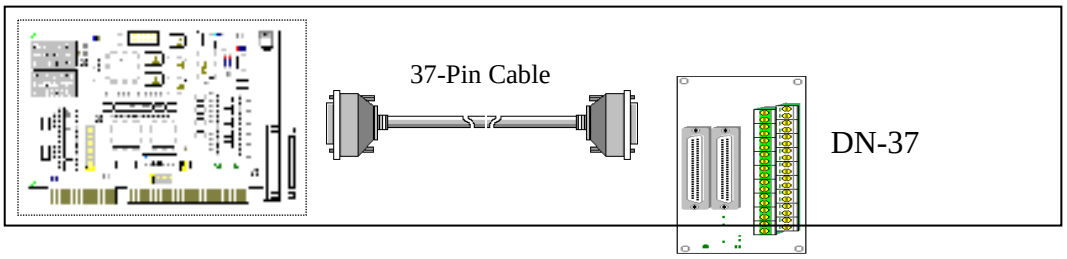
2.7.1 DB-37

The DB-37 is a general purpose daughter board for D-sub 37 pins. It is designed for easy wire connection.



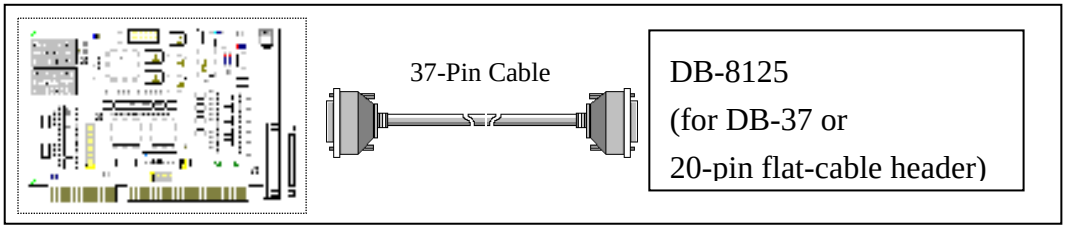
2.7.2 DN-37

The DN-37 is a general purpose daughter board for DB-37 with DIN-Rail Mounting. It is designed for easy wire connection.

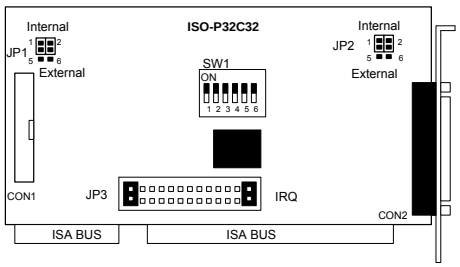


2.7.3 DB-8125

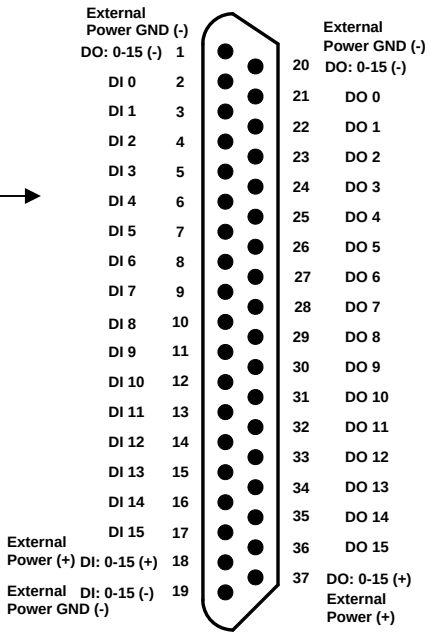
The DB-8125 is a general purpose screw terminal board. It is designed for easy wire connection. There are one DB-37 & two 20-pin flat-cable headers in the DB-8125.



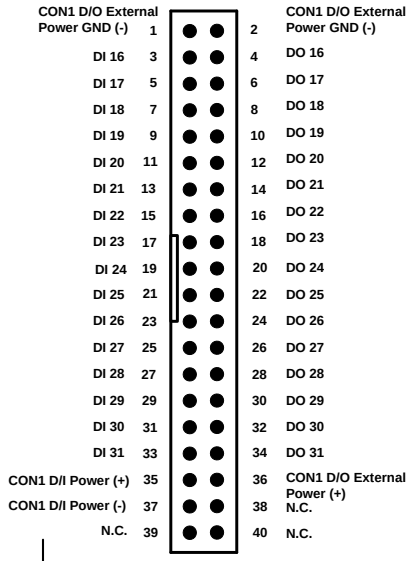
2.8 Pin Assignment of ISO-P32C32

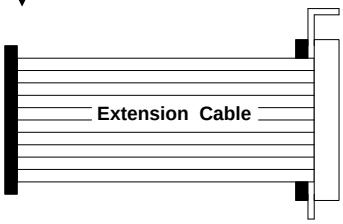


CON2: Pin assignment



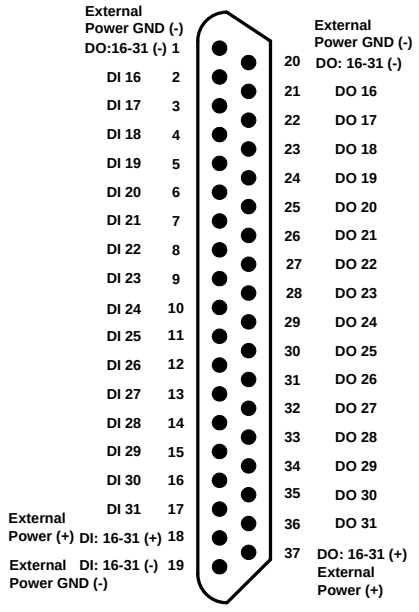
CON1: Pin assignment





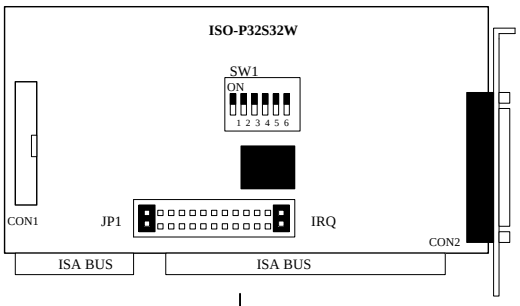
DB-40-Pin conversion DB-37-Pin

CON1: Pin assignment



Pin assignment of CON1 via extension cable

2.9 Pin Assignment of ISO-P32S32W

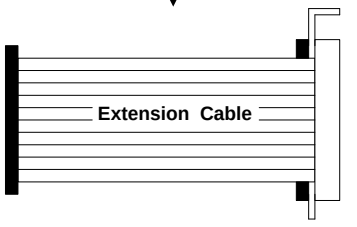


CON2: Pin assignment

External Power GND (-)	1	20	External Power GND (-)
DI 0	2	21	DO 0 for High drive
DI 1	3	22	DO 1 for High drive
DI 2	4	23	DO 2 for High drive
DI 3	5	24	DO 3 for High drive
DI 4	6	25	DO 4
DI 5	7	26	DO 5
DI 6	8	27	DO 6
DI 7	9	28	DO 7
DI 8	10	29	DO 8
DI 9	11	30	DO 9
DI 10	12	31	DO 10
DI 11	13	32	DO 11
DI 12	14	33	DO 12
DI 13	15	34	DO 13
DI 14	16	35	DO 14
DI 15	17	36	DO 15
GND for High Drive	18	37	External Power (+)
GND for High Drive	19		

CON1: Pin assignment

CON1 D/O External Power GND (-)	1	2	CON1 D/O External Power GND (-)
DI 16	3	4	DO 16 for High drive
DI 17	5	6	DO 17 for High drive
DI 18	7	8	DO 18 for High drive
DI 19	9	10	DO 19 for High drive
DI 20	11	12	DO 20
DI 21	13	14	DO 21
DI 22	15	16	DO 22
DI 23	17	18	DO 23
DI 24	19	20	DO 24
DI 25	21	22	DO 25
DI 26	23	24	DO 26
DI 27	25	26	DO 27
DI 28	27	28	DO 28
DI 29	29	30	DO 29
DI 30	31	32	DO 30
DI 31	33	34	DO 31
GND for High Drive	35	36	CON1 D/O External Power (+)
GND for High Drive	37	38	N.C.
N.C.	39	40	N.C.



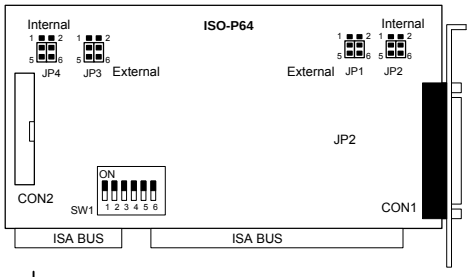
CON1: Pin assignment

External Power GND (-)	1	20	External Power GND (-)
DI 16	2	21	DO 16 for High drive
DI 17	3	22	DO 17 for High drive
DI 18	4	23	DO 18 for High drive
DI 19	5	24	DO 19 for High drive
DI 20	6	25	DO 20
DI 21	7	26	DO 21
DI 22	8	27	DO 22
DI 23	9	28	DO 23
DI 24	10	29	DO 24
DI 25	11	30	DO 25
DI 26	12	31	DO 26
DI 27	13	32	DO 27
DI 28	14	33	DO 28
DI 29	15	34	DO 29
DI 30	16	35	DO 30
DI 31	17	36	DO 31
GND for High Drive	18	37	DO 16 for High drive
GND for High Drive	19		

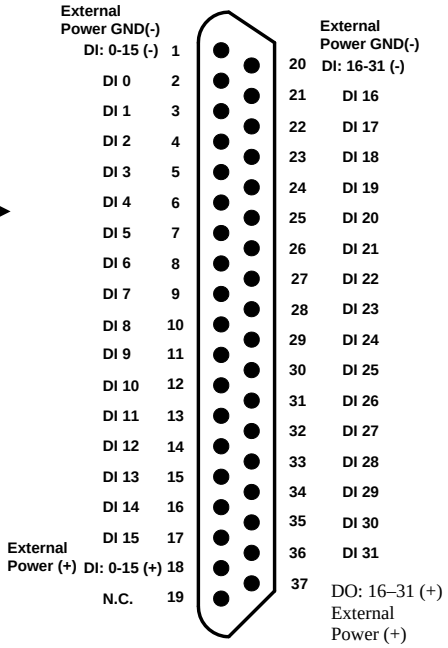
DB-40-Pin conversion DB-37-Pin

Pin assignment of CON1 via extension cable

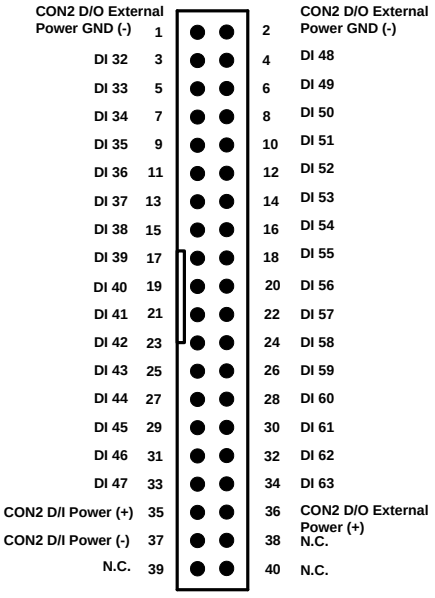
2.10 Pin Assignment of ISO-P64

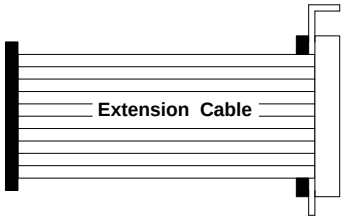


CON1 Pin assignment

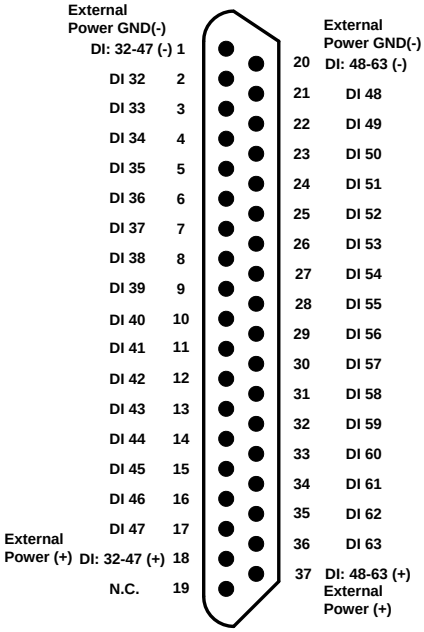


CON2 Pin assignment





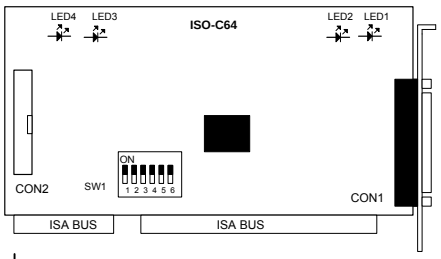
CON2 Pin assignment



Pin assignment of CON2 via extension cable

DB-40-Pin conversion DB-37-Pin

2.11 Pin Assignment of ISO-C64

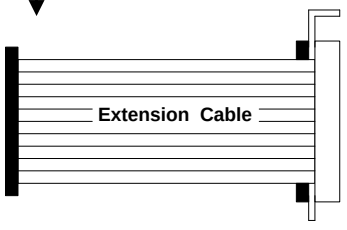


CON1 Pin assignment

External Power GND (-)	1	20	External Power GND (-)
DO: 0-15 (-)	2	21	DO: 16-31 (-)
DO 0	3	22	DO 16
DO 1	4	23	DO 17
DO 2	5	24	DO 18
DO 3	6	25	DO 19
DO 4	7	26	DO 20
DO 5	8	27	DO 21
DO 6	9	28	DO 22
DO 7	10	29	DO 23
DO 8	11	30	DO 24
DO 9	12	31	DO 25
DO 10	13	32	DO 26
DO 11	14	33	DO 27
DO 12	15	34	DO 28
DO 13	16	35	DO 29
DO 14	17	36	DO 30
DO 15	18	37	DO 31
External Power (+) DO: 0-15 (+)	19		DO: 16-31 (+) External Power (+)
N.C.			

CON2 Pin assignment

CON2 D/O External Power GND (-)	1	2	CON2 D/O External Power GND (-)
DO 32	3	4	DO 48
DO 33	5	6	DO 49
DO 34	7	8	DO 50
DO 35	9	10	DO 51
DO 36	11	12	DO 52
DO 37	13	14	DO 53
DO 38	15	16	DO 54
DO 39	17	18	DO 55
DO 40	19	20	DO 56
DO 41	21	22	DO 57
DO 42	23	24	DO 58
DO 43	25	26	DO 59
DO 44	27	28	DO 60
DO 45	29	30	DO 61
DO 46	31	32	DO 62
DO 47	33	34	DO 63
CON2 D/I Power (+)	35	36	CON2 D/O External Power (+)
CON2 D/I Power (-)	37	38	N.C.
N.C.	39	40	N.C.



DB-40-Pin conversion DB-37-Pin

CON2 Pin assignment

External Power GND (-)	1	20	External Power GND (-)
DO: 32-47(-)	2	21	DO: 48-63(-)
DO 32	3	22	DO 48
DO 33	4	23	DO 49
DO 34	5	24	DO 50
DO 35	6	25	DO 51
DO 36	7	26	DO 52
DO 37	8	27	DO 53
DO 38	9	28	DO 54
DO 39	10	29	DO 55
DO 40	11	30	DO 56
DO 41	12	31	DO 57
DO 42	13	32	DO 58
DO 43	14	33	DO 59
DO 44	15	34	DO 60
DO 45	16	35	DO 61
DO 46	17	36	DO 62
DO 47	18	37	DO 63
External Power (+) DO: 32-47 (+)	19		DO: 48-63 (+) External Power (+)
N.C.			

Pin assignment of CON2 via extension cable

3. The applications of Digital I/O

3.1 The example of ISO-P32C32

The circuit diagram of D/O of ISO-P32C32 is given as follows:

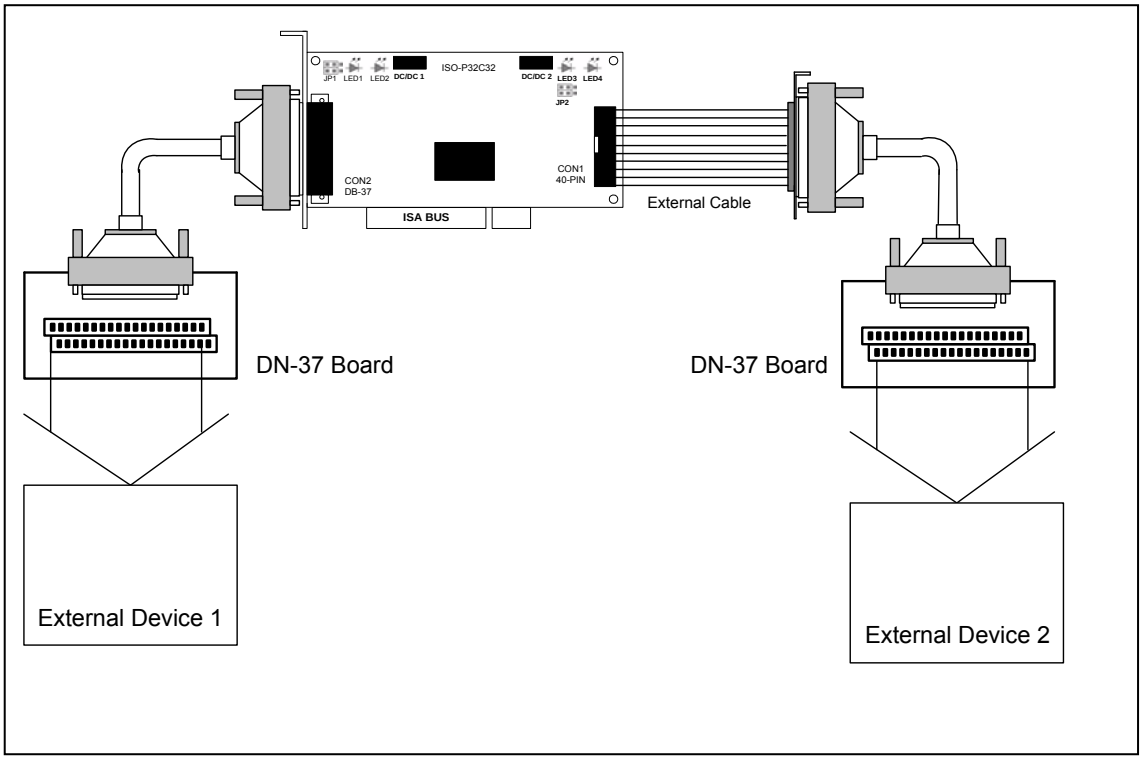


Figure 3-1: The example of digital inputs/outputs for ISO-P32C32

- The circuit diagram of external device 1: Refer to Figure 11.
- The circuit diagram of external device 2: Refer to Figure 12.

- **The test circuit diagram of D/I/O of ISO-P32C32 is given as follows:**

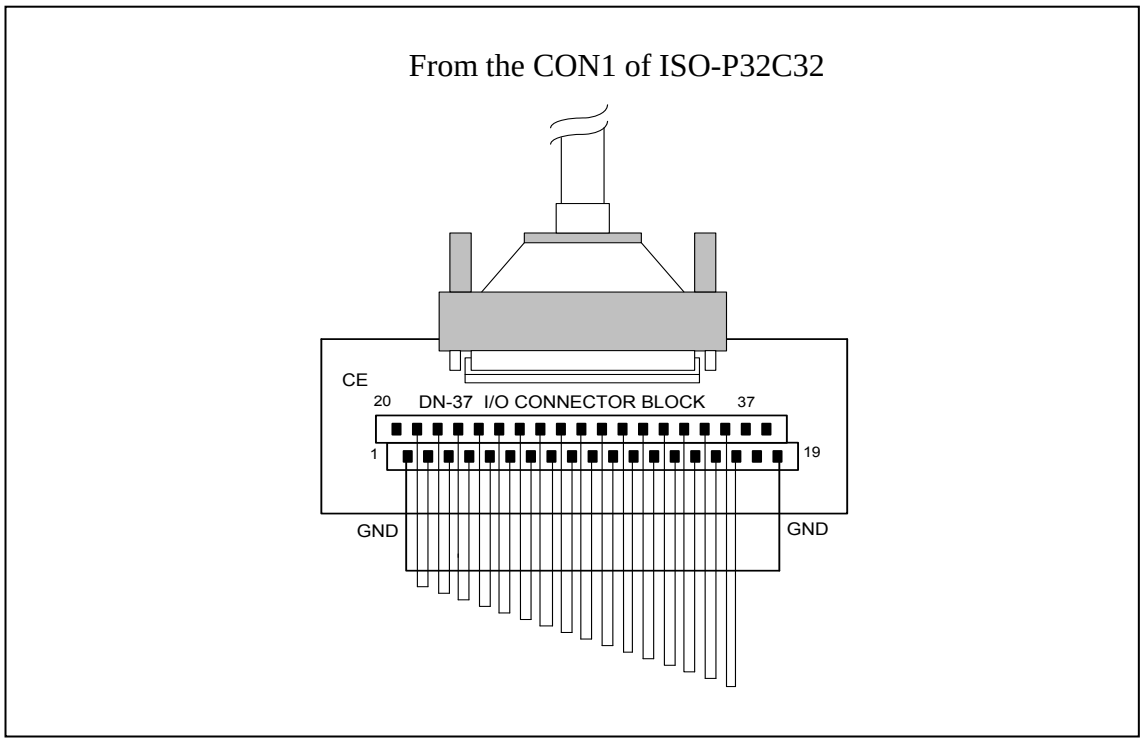


Figure 3-2: The D/I/O of CON1 of ISO-P32C32

- The D/I of CON2 of ISO-P32C32 for internal power.

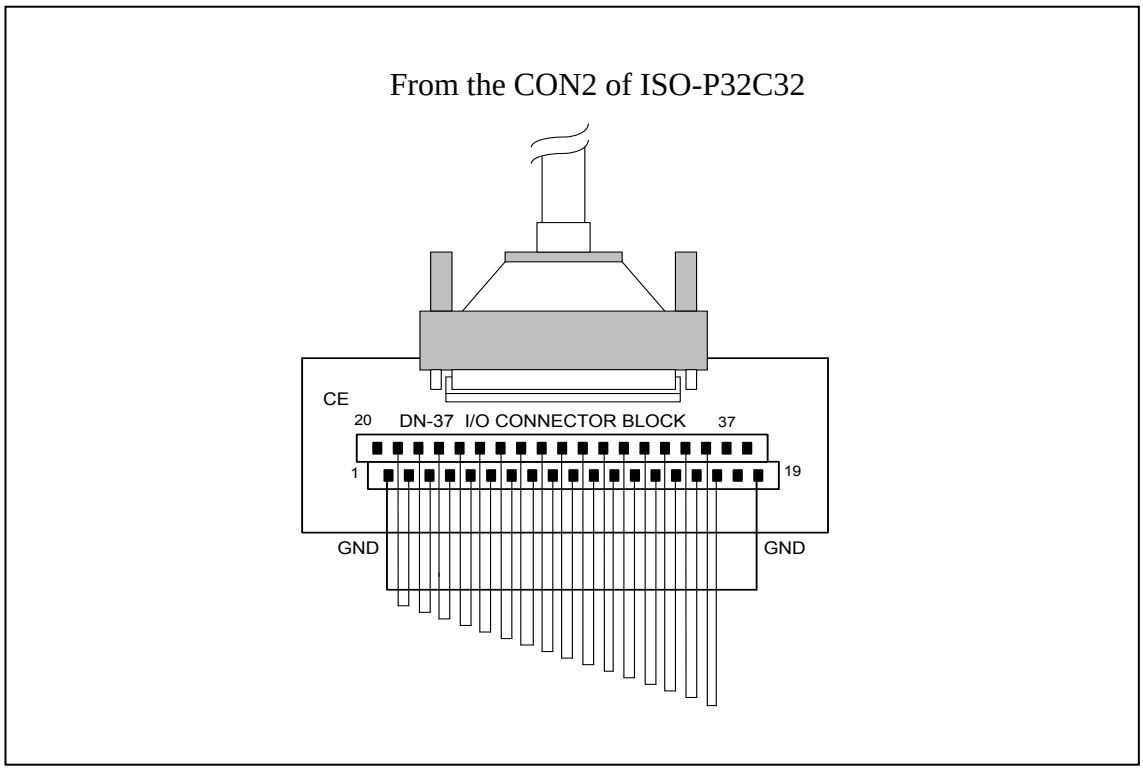


Figure 3-3: The D I/O of CON2 of ISO-P32C32

- The D/I of CON2 of ISO-P32C32 for internal power.

- **The interrupt input of circuit diagram (1) of ISO-P32C32 is given as follows:**

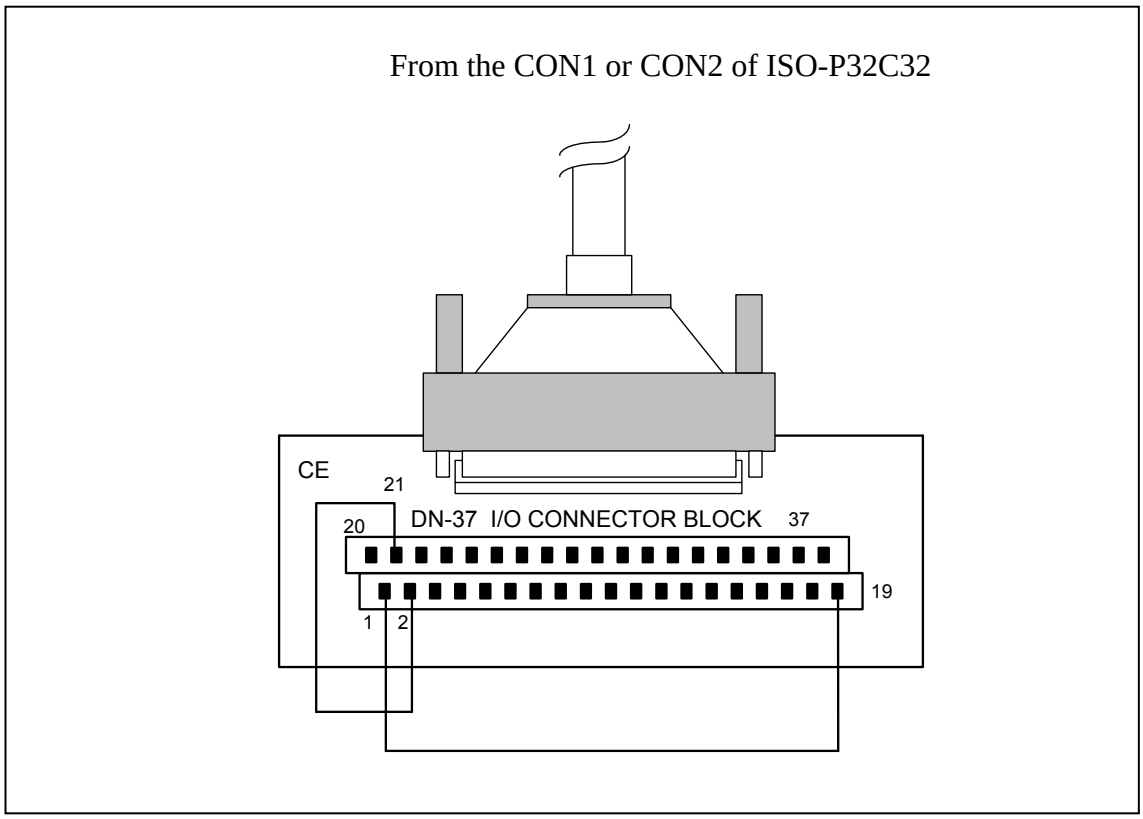


Figure 3-4: The interrupt input for ISO-P32C32

- **The interrupt input of circuit diagram(2) of ISO-P32C32 is given as follows:**

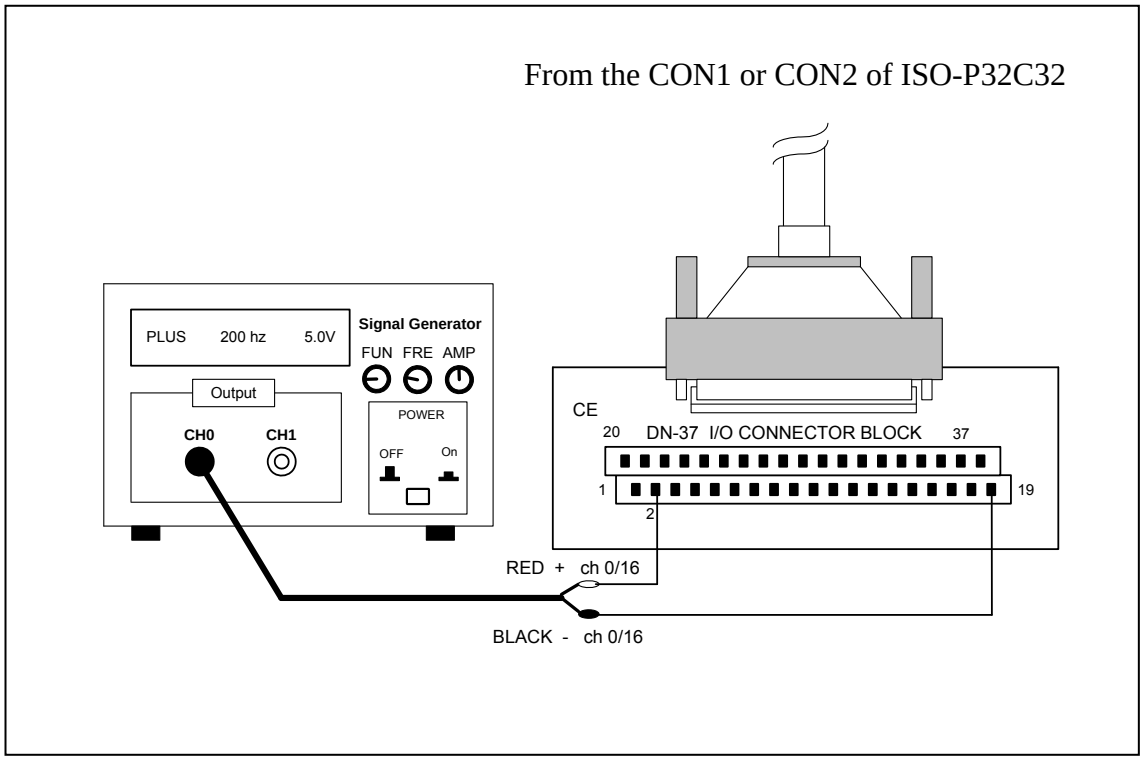


Figure 3-5: The interrupt input for ISO-P32C32

3.2 The example of ISO-P64

■ **The circuit diagram of D/I for ISO-P64 is given as follows:**

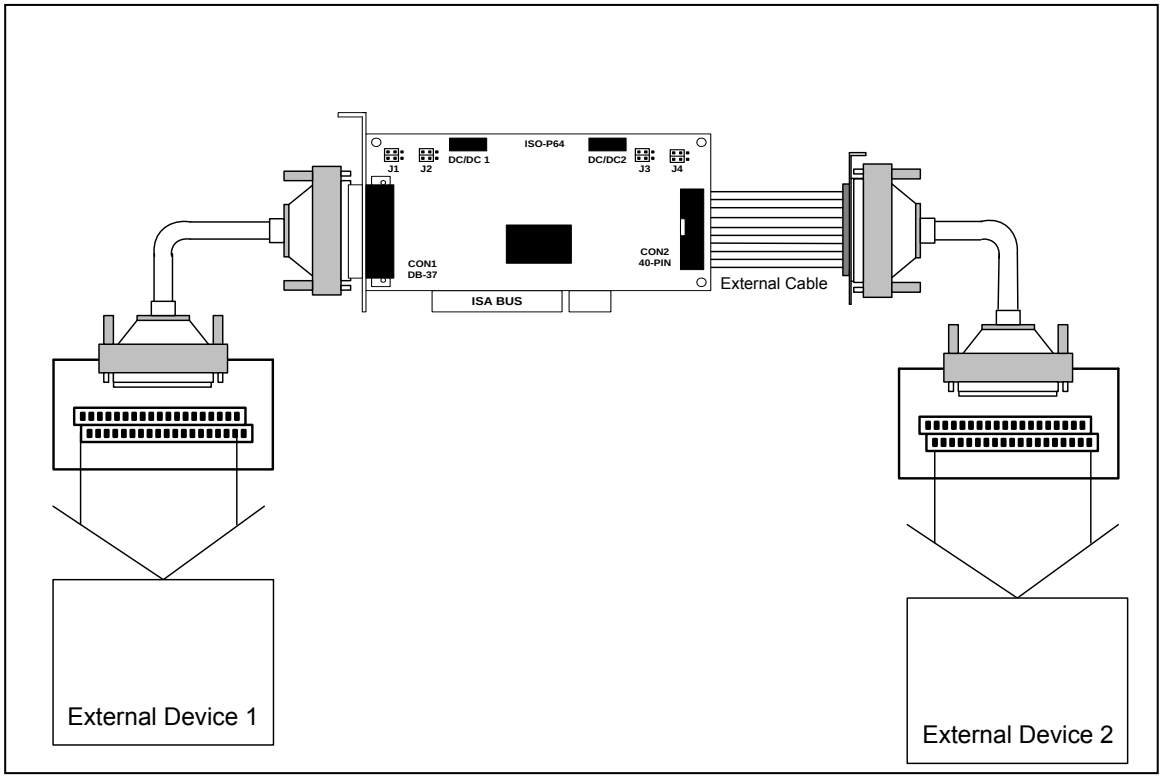
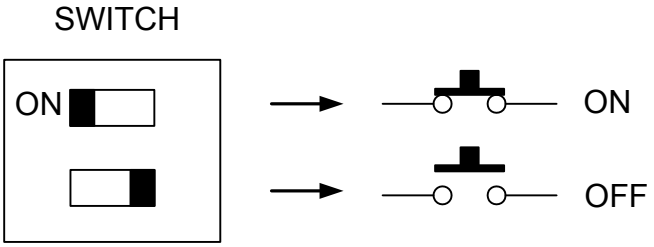


Figure 3-6: The example of digital inputs for ISO-P64

- The circuit diagram of external device 1: Refer to Figure 14.
- The circuit diagram of external device 2: Refer to Figure 15.



The circuit diagram of external device 1 is given as follows:

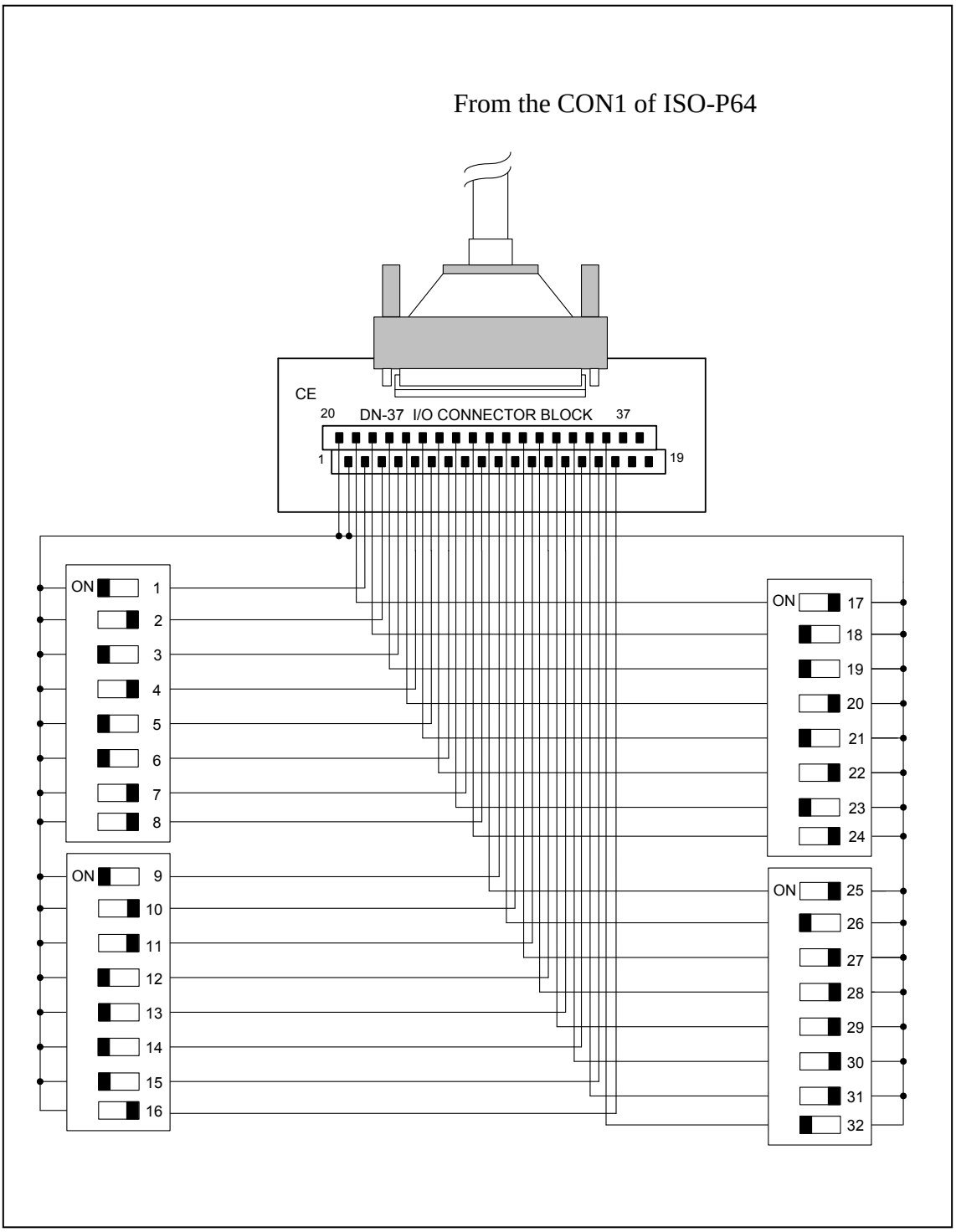


Figure 3-7: The circuit diagram of external device 2 for the digital inputs of ISO-P64

- The D/I of CON1 of ISO-P64 select internal power.

■ **The circuit diagram of external device 2 is given as follows:**

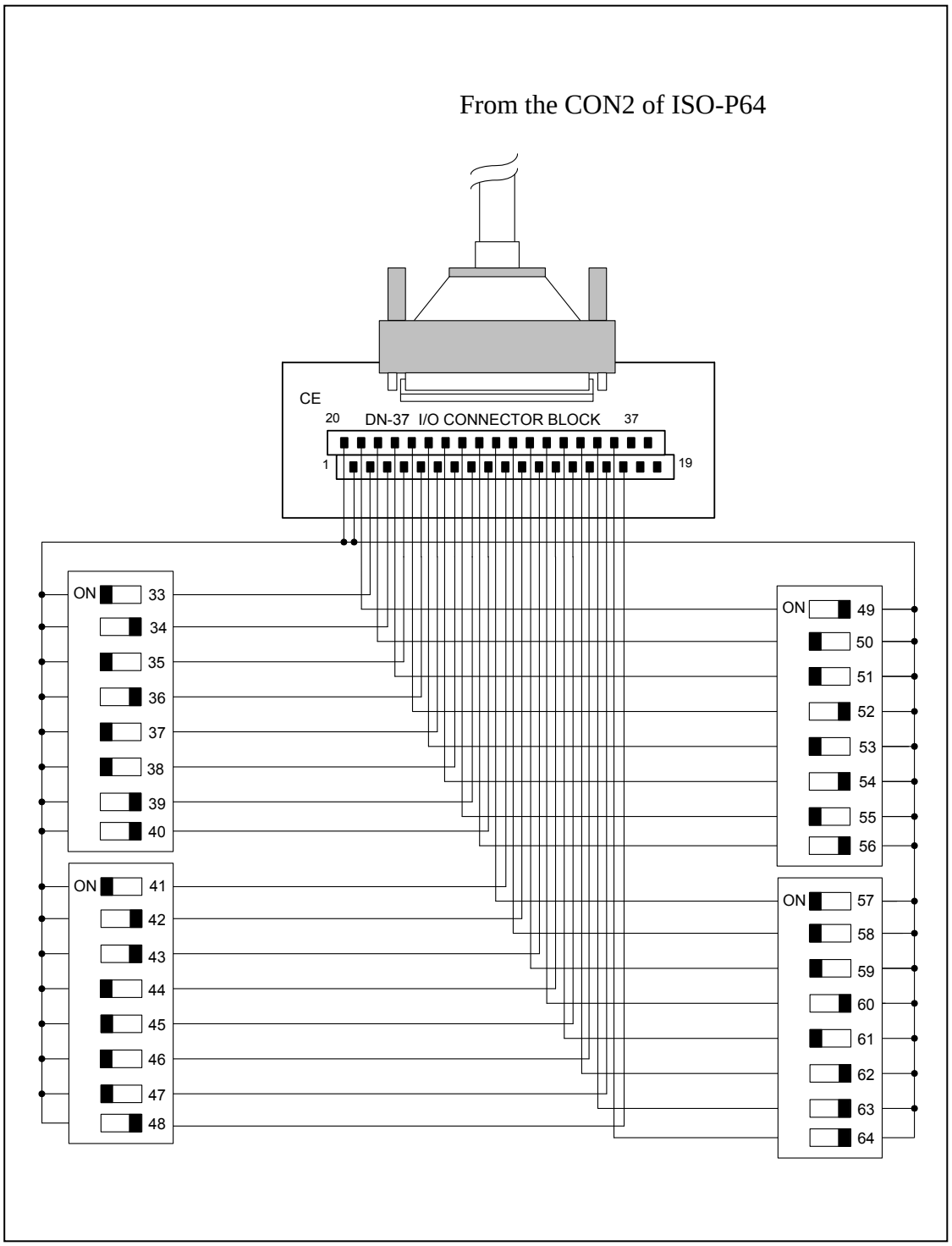


Figure 3-8: The circuit diagram of external device 2 for the digital inputs of ISO-P64

■ The D/I of CON2 of ISO-P64 select internal power.

3.3 The example of ISO-C64

- **The circuit diagram of D/O for ISO-P32C32 is given as follows:**

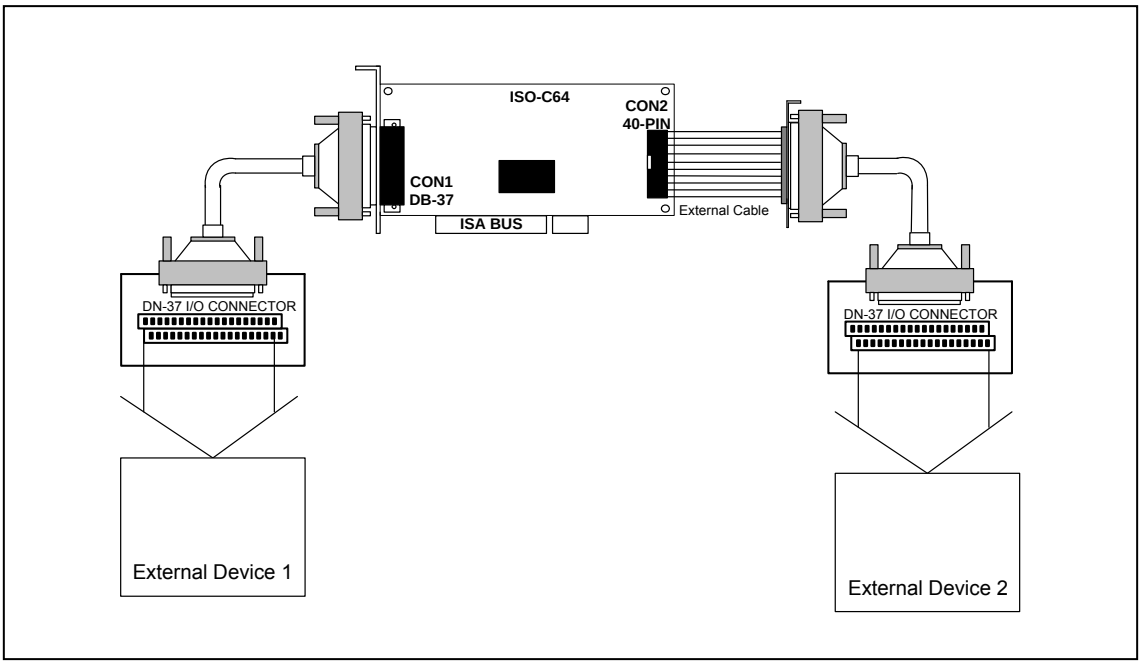


Figure 3-9: The example of digital outputs for ISO-C64

- The circuit diagram of external device 1: Refer to Figure 17.
- The circuit diagram of external device 2: Refer to Figure 18.

- **The circuit diagram of external device 1 is given as follows:**

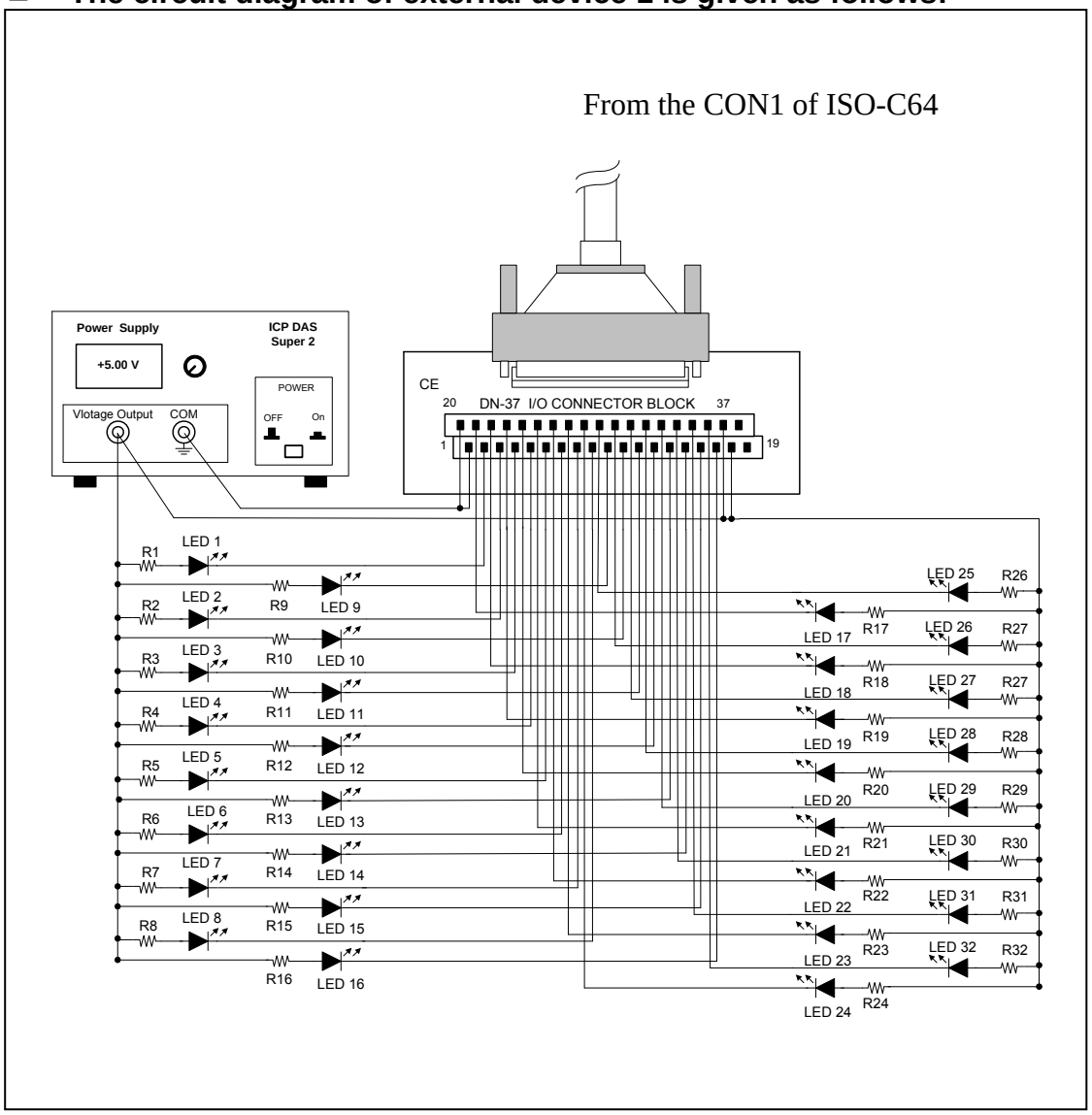


Figure 3-10: The circuit diagram of external device 1 for the digital outputs of ISO-C64

- The resistor of R1~R32 are 330 Ohm.
- The LED 1~LED 32 are light emitting diode.
- The pin-1/20 are the GND signal of DO_0~DO_15 / DO_16~DO_31.
- The pin-18/37 are the voltage (+) signal of DO_0~DO_15 / DO_16~DO_31 (Input 5 V_{DC}~24 V_{DC}).

- **The circuit diagram of external device 2 is given as follows:**

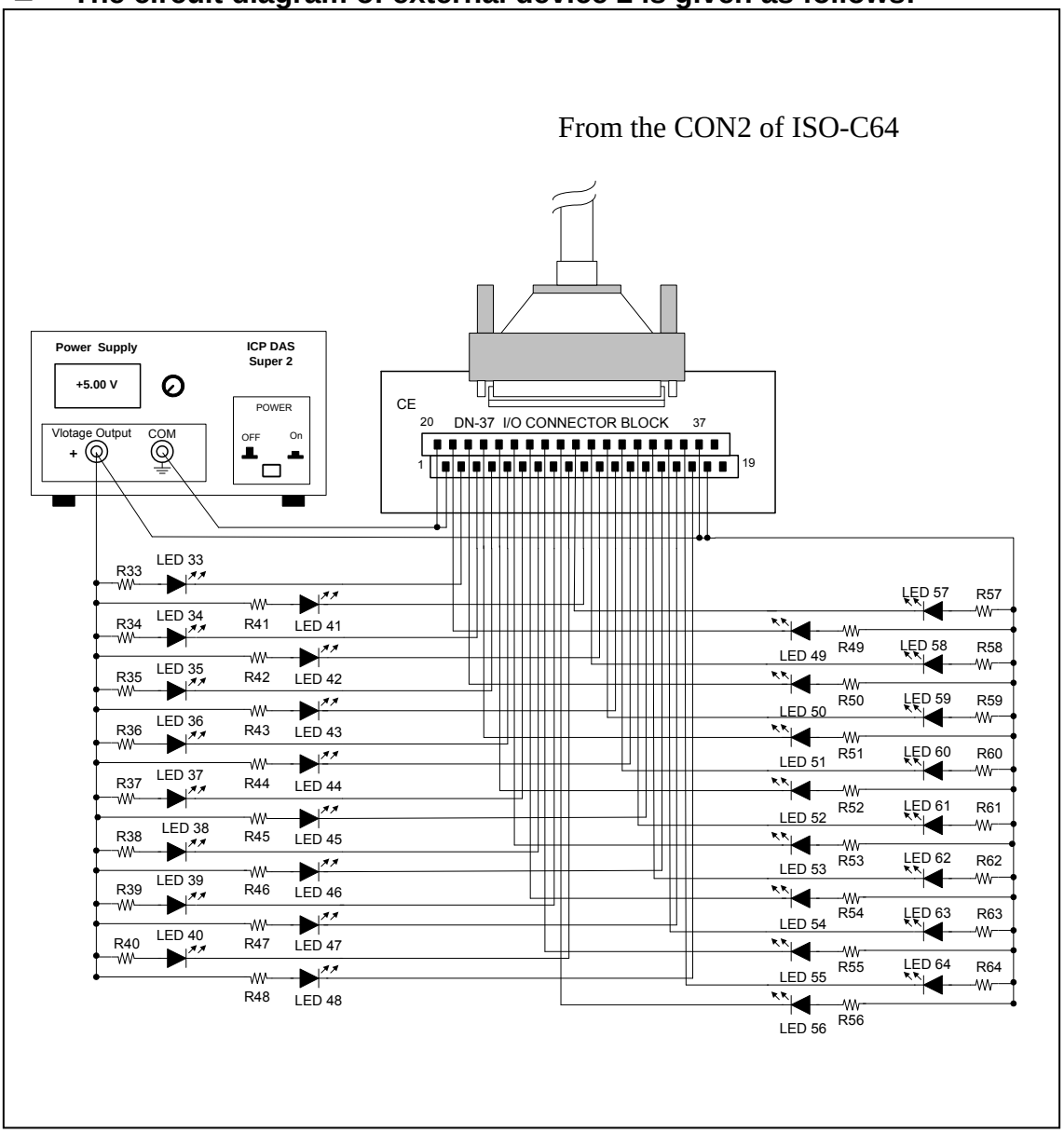


Figure 3-11: The circuit diagram of external device 2 for the digital outputs of ISO-C64

- The resistor of R33~R64 are 330 Ohm.
- The LED 33~LED 64 are light emitting diode.
- The pin-1/20 are the GND signal of DO_32~DO_47 / DO_48~DO_63.
- The pin-18/37 are the voltage(+) signal of DO_32~DO_47 / DO_32~DO_63 (Input 5 V_{DC}~24 V_{DC}).

4. Demo Program

There are many demo programs given in the company floppy disk or CD-ROM. After the software installation, the driver will be installed into disk as following:

4.1 DEMO1 D/O for ISO-P32C32/P32S32W

```
/* ------------------------------------------------------------ */
/* Demo 1: Digital Output of ISO_P32C32                         */
/* Step 1: The circuit diagram of hardware: refer to Sec 3.1    */
/* Step 1: run demo1.EXE under DOS                              */
/* ------------------------------------------------------------ */

#include <dos.h>
#define  wBase    0x200

void main()
{
char c;
unsigned char i;

clrscr();

/* initial value  */
outp(wBase+0,0x00);
outp(wBase+1,0x00);
outp(wBase+2,0x00);
outp(wBase+3,0x00);

while(1)
{
printf("\n\n --------- Digital output of ISO-P32C32  ------------");
for (i=1;i<=0x80;i=i<<1)
   {
    outp(wBase+0,i);       /* DO_07 to DO_00 of CON2 */
    outp(wBase+1,i);       /* DO_15 to DO_08 of CON2 */
    outp(wBase+2,i);       /* DO_23 to DO_16 of CON1 */
    outp(wBase+3,i);       /* DO_31 to DO_24 of CON1 */
    sleep(1);
    printf("\nD 31-0 Output Value = %02x,%02x,%02x,%02x",i,i,i,i);

 if(i==0x80)  { i=0x01; break; }

   if (kbhit()!=0)
      {
      c=getch();
      if ((c=='q') || (c=='Q') ||  c==27 )
      return;
      }
   delay(1);
   }  /* end of while   */
  }   /* end of for loop*/
}
```

4.2 DEMO2 D/I for ISO-P32C32/P32S32W

```
/*---------------------------------------------------------------*/
/* Demo 2: Digital input of ISO-P32C32                           */
/* Step 1: The circuit diagram of hardware: refer to Sec 3.1     */
/* Step 1: run demo2.EXE  under DOS                              */
/* --------------------------------------------------------------*/

#define wBase    0x200
#include <dos.h>

void main()
{
unsigned char j1,j2,j3,j4;
char c;

clrscr();

/* step 1: digital input from DI_0 to DI_31                      */
while(1)
{

for ( ; ; )
   {
  printf("\n\n --------- Digital input of ISO-P32C32 ------------");
    j1=inp(wBase+0)^0xff;   /* DI_07 to DI_00 of CON2 */
    j2=inp(wBase+1)^0xff;   /* DI_15 to DI_08 of CON2 */
    j3=inp(wBase+2)^0xff;   /* DI_23 to DI_16 of CON1 */
    j4=inp(wBase+3)^0xff;   /* DI_31 to DI_24 OF CON1 */

 printf("\nD 31-0 Input  Value = %02x,%02x,%02x,%02x",j4,j3,j2,j1);
     sleep(1);

   if (kbhit()!=0)
     {
     c=getch();
     if ((c=='q') || (c=='Q') ||  c==27 )
     return;
     }
   delay(1);
   }  /* end of while */
  } /* end of for */

}
```

4.3 DEMO3 D/I/O for ISO-P32C32/P32S32W

```
/* ------------------------------------------------------------*/
/* Demo 3: Digital I/O test by itself for ISO-P32C32           */
/* Step 1: The circuit diagram of hardware: refer to Sec 3.1   */
/* Step 2: run demo3.EXE  under DOS                            */
/* ------------------------------------------------------------ */

#define  wBase    0x200
#include <dos.h>

void main()
{

unsigned char i,j1,j2,j3,j4;
char c;

clrscr();

/* step 1: read from DI_0 to DI_31 of CON2 and CON1 */
while(1)
{
printf("\n --------- ISO-P32C32 test by itself ------------");
for (i=1;i<=0x80;i=i<<1)
   {

    outp(wBase+0,i);       /* DO_07 to DO_00 of CON2 */
    outp(wBase+1,i);       /* DO_15 to DO_08 of CON2 */
    outp(wBase+2,i);       /* DO_23 to DO_16 of CON1 */
    outp(wBase+3,i);       /* DO_31 to DO_24 of CON1 */
    sleep(1);
    j1=inp(wBase+0)^0xff;  /* DI_07 to DI_00 of CON2 */
    j2=inp(wBase+1)^0xff;  /* DI_15 to DI_08 of CON2 */
    j3=inp(wBase+2)^0xff;  /* DI_23 to DI_16 of CON1 */
    j4=inp(wBase+3)^0xff;  /* DI_31 to DI_24 of CON1 */


 printf("\nD 31-0 Output Value = %02x,%02x,%02x,%02x",i,i,i,i);
 printf("\nD 31-0 Input  Value = %02x,%02x,%02x,%02x\n",j4,j3,j2,j1);

 if( i != j1 )
   {
    printf("\nDO_7-DO_0 error in here!\n");
    putch(0x07);  putch(0x07);  putch(0x07);
   }
    if( i != j2 )
       {
        printf("\nDO_15-DO_8  error in here!\n");
        putch(0x07);  putch(0x07);  putch(0x07);
       }
     if( i != j3 )
       {
        printf("\nDO_24-DO_16 error in here!\n");
        putch(0x07);  putch(0x07);  putch(0x07);
       }
      if( i != j4 )
       {
        printf("\nDO_31-DO_25 error in here!\n");
        putch(0x07);  putch(0x07);  putch(0x07);
       }
```

```
 if(i==j1 & i==j2 & i==j3 & i==j4)
  {
   printf("The Digital I/O test of PISO-P32C32 by itself OK!\n");
  }

 if(i==0x80)  { i=0x01; break; }

    if (kbhit()!=0)
       {
       c=getch();
       if ((c=='q') || (c=='Q') ||  c==27 )
       return;
       }
    delay(3);
    }  /* end of while   */
  }
}
```

4.4 P32Cint.exe Interrupt input for ISO-P32C32/P32S32W

```
/*---------------------------------------------------------------*/
/* P32Cint.exe: Win32 Console-Mode program used Interrupt function */
/* P32Cint.cpp used Visual C++ compiler                          */
/* Step 1: The circuit diagram of hardware: refer to Sec 3.1     */
/* Step 2: Run P32Cint.exe under Win95/98                        */
/*---------------------------------------------------------------*/
#include <windows.h>
#include <iostream.h>
#include <stdio.h>
#include "dio.h"

WORD    wBase = 0x200;
WORD    nIRQ  = 5;
WORD    wApcCount=0;

/******************* Function Registered To Vxd *********************/
DWORD  WINAPI   RegisterApcFunction(PVOID param)
{
   //--------- Do you action in this function ------------
   wApcCount++;
   return 0;
}

int MyErr(char* s)
{
     cout << s << endl ;
     cout << "Press <Enter> key to exit." << endl;
   getchar();
     return 1;
}

int main(void)
{
cout<< "Demo program for Interrupt of ISO-P32C32"<< endl;
cout<<"*****************************************" << endl;
cout<<"Wire connection....." << endl;
cout<<"Setting JP1, JP2 to Internal Power" << endl;
cout<<"Connect DO0   with DI0 => CON2.Pin21 with CON2.Pin2"<< endl;
cout<<"Connect DO16  with DI16 => CON1.Pin21 with CON1.Pin2"<< endl;
cout<<"Connect DI GND with DO GND =>CON2.Pin1 with CON2.Pin19"<<endl;
cout<<"Connect DI GND with DO GND =>CON1.Pin1 with CON1.Pin19"<<endl;
cout<< "*****************************************" << endl << endl ;

cout << "Please input the Base-Address of I/O port(i.e 0x200): ";
cin  >> wBase ;
cout << endl << "Please input the IRQ number(i.e 5) : ";
cin  >> nIRQ ;

   char buffer[20];
  _itoa( wBase, buffer, 16 );
cout<<endl<< "The Base-Address of I/O port is: 0x" << buffer << endl;
cout << "The IRQ number is: " << nIRQ << endl;

cout<<endl<< "Press <Enter> key to test the interrupt, "    << endl;
cout<<"or press <Ctrl> + <c> key to exit program."         << endl;
   getchar();
```

```
wApcCount = 0 ;
   if( DIO_DriverInit() != 0 )
         return MyErr( "Driver Initialize Error!!" );
     else
         cout << "Driver Initialize OK!!" << endl;

   if( DIO_RegisterApc(RegisterApcFunction) != 0 )
      return MyErr( "Register APC  Error!!" );
   else
      cout << "Register APC OK!!" << endl;

     if ( DIO_InstallIrq(wBase,static_cast<WORD>( nIRQ ) ) != 0 )
         return MyErr( "Interrupt Install Error!!" );
     else
         cout << "Interrupt Install OK!!" << endl;

   DIO_ResetIntCount();

     for (int i=0;i<10;i++)
     {

//
*****************************************************************
// The user could replace the internal trigger by external trigger.
//
*****************************************************************
         cout << "    Trigger interrupt" << endl;
// Make the DO16 to high then low to generate the interrupt signal
// for IRQ3,4,5,6,7 Connect the DO16 with DI16(Interrupt Source) to
// enable Interrupt
      DIO_OutputByte( (wBase + 2), 1);
      Sleep( 100 );
      DIO_OutputByte( (wBase + 2), 0);
      Sleep( 100 );

// Make the Output-Channel-0 to high then low to generate the
// interrupt signal for IRQ9,10,11,12,14,15 Connect the DO0 with
// DI0(Interrupt Source) to enable Interrupt
      DIO_OutputByte( wBase, 1 );
      Sleep( 100 );
      DIO_OutputByte( wBase, 0 );
      Sleep( 100 );

cout << "Waiting for an asynchronous procedure call(APC) is queued to
       the thread." << endl;
      SleepEx(INFINITE ,TRUE);
         cout << "    Got the APC!!" << endl << endl;
         //***** Do some thing in here ****
         //   :
     }

   WORD   dwIntCount;
     //*** How many times the interrupt occur ***
     if( DIO_GetIntCount(&dwIntCount) != 0 )
         return MyErr( " Get Interrupt Counter Error !!!" );
     else
         cout << "Interrupt Counter: " << dwIntCount << endl;

     DIO_DriverClose();
     cout << "Driver Close" << endl;

     return (1 - MyErr( "" ));
 }
```

4.5 DEMO1 D/I for ISO-P64

```
/* ------------------------------------------------------------ */
/* Demo 1: Digital Input of ISO-P64                             */
/* Step 1: The circuit diagram of hardware: refer to Sec 3.2    */
/* Step 2: run demo1.EXE                                        */
/* ------------------------------------------------------------ */

#define  wBase   0x200
#include <dos.h>

void main()
{
char c;
unsigned char i,r1,r2,r3,r4,r5,r6,r7,r8;

clrscr();

/* Digital input from DI_0 to DI_63 */
while(1)
{

for ( ; ;)
   {
    printf("\n--------- Digital input of ISO-P64  ------------");
    r1 =inp(wBase+0);      /* DI_07 to DI_0  */
    r2 =inp(wBase+1);      /* DI_15 to DI_08 */
    r3 =inp(wBase+2);      /* DI_23 to DI_16 */
    r4 =inp(wBase+3);      /* DI_31 to DI_24 */

    r5 =inp(wBase+4);      /* DI_39 to DI_32 */
    r6 =inp(wBase+5);      /* DI_47 to DI_40 */
    r7 =inp(wBase+6);      /* DI_55 to DI_48 */
    r8 =inp(wBase+7);      /* DI_63 to DI_56 */

     printf("\nThe CON1 of ISO-P64 ...");
     printf("\nD31- 0 Input Value = %02x,%02x,%02x,%02x\n",r4,r3,r2,r1);

     printf("\nThe CON2 of ISO-P64 ...");
     printf("\nD63-32 Input Value = %02x,%02x,%02x,%02x\n",r8,r7,r6,r5);
     sleep(1);

   if (kbhit()!=0)
     {
     c=getch();
     if ((c=='q') || (c=='Q') ||  c==27 )
     return;
     }
   delay(1);
   }  /* end of while    */
  }   /* end of for loop */
}
```

4.6 DEMO1 D/O for ISO-C64

```
/* ------------------------------------------------------------ */
/* Demo 1: Digital Output of ISO-C64                            */
/* Step 1: The circuit diagram of hardware: refer to Sec 3.3    */
/* Step 2: run demo1.EXE                                        */
/* ------------------------------------------------------------ */
#define  wBase   0x200
#include <dos.h>

void main()
{
char c;
unsigned char i;

clrscr();

/* Digital output from DO_0 to DO_63 */
while(1)
{
printf("\n\n --------- Digital output of ISO-C64  ------------");
for (i=1;i<=0x80;i=i<<1)
   {
     outp(wBase+0,i);       /* DO_07 to DO_00 */
     outp(wBase+1,i);       /* DO_15 to DO_08 */
     outp(wBase+2,i);       /* DO_23 to DO_16 */
     outp(wBase+3,i);       /* DO_31 to DO_24 */
     outp(wBase+4,i);       /* DO_39 to DO_32 */
     outp(wBase+5,i);       /* DO_47 to DO_40 */
     outp(wBase+6,i);       /* DO_55 to DO_48 */
     outp(wBase+7,i);       /* DO_63 to DO_56 */

     printf("\nThe CON1 of ISO-C64 ...");
     printf("\nD31- 0 Output Value = %02x,%02x,%02x,%02x\n",i,i,i,i);

     printf("\nThe CON2 of ISO-C64 ...");
     printf("\nD63-32 Output Value = %02x,%02x,%02x,%02x\n",i,i,i,i);
     sleep(1);

 if(i==0x80)  { i=0x01; break; }

   if (kbhit()!=0)
      {
      c=getch();
      if ((c=='q') || (c=='Q') ||  c==27 )
      return;
      }
   delay(1);
   }  /* end of while    */
  }   /* end of for loop */
}
```