PPCI7443, PPCIe-8443 function comparative data

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1. Overview

This document compares the functions of PCI-bus 4-axis control board, PPCI7443, and PCI Express-bus 4-axis control board, PPCIe-8443.

Refer to the user's manuals for more information. Please use the actual device to check the operation if necessary.

In this document, PPCI7443 is abbreviated as 7443 and PPCIe-8443 as 8443.

2. Function comparison list

Item	Contents of change
Bus	PCI → PCI Express x1
LSI used	PCL6045B → PCL6046 (Upper compatible replacement model of PCL6045B) Accordingly, command pulse counter and feedback pulse counter lengths have been changed from 28 bits to 32 bits. In addition, the positioning control range has been expanded as follows. -134,217,728 to +134,217,727(7443) -2,147,483,648 to +2,147,483,647(8443)
Axis control signal	Equipped in CN2. Pin assignment, no I/F change
Emergency stop signal	Added to CN1
Manual pulser input	Equipped with P1. Specification is changed.
Simultaneous start/Stop	Equipped with K1/K2. Pin assignment is changed
General-purpose input/output	Equipped with CN5. General-purpose inputs are added. Enhanced to 16 inputs and 16 outputs.
Board ID identification	SW1 is added for board ID.　SW for board ID enable/disable function is added.
Library (DLL)	Function names are changed from _7443_xxx() to _8443_xxx(). Specifications of function are not changed. Helical interpolation function is added.
Environmental response	RoHS、CE

3. Comparison on signal connection

3-1. Emergency stop signal connector (CN1)

[Outline of change]

(1) Connector usage Changed

7443: External 24V power input connector → 8443: Emergency stop signal connector

Equipped with emergency stop signal in 8443, which was not equipped in 7443

Emergency stop signal is enabled or disabled by SW3 in 8443

(2) Pin assignment Changed

PPCI7443

Pin	7443	Function (7443)
1	EXGND	External power supply GND (24 V and 5 V common)
2	EX+24V	External power supply 24V input

PPCIe-8443

Pin	8443	Function (8443)
1	EGND	External power supply GND
2	EMG	Emergency stop input

(3) Interface circuit

The circuit of 8443 is as shown in the figure below by changing the application:

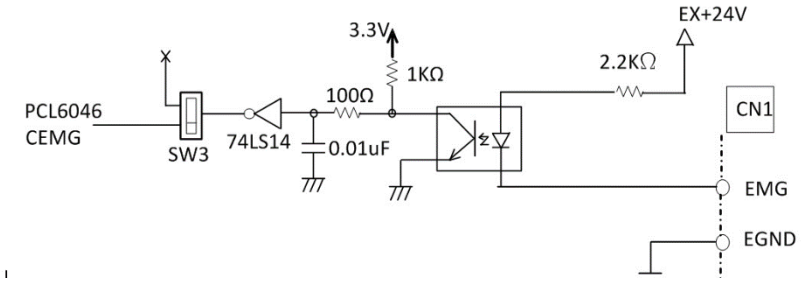

Figure 1. 8443 EMG circuit

(4) Connector model

No change (Equivalent is used)

[Precautions for replacement]

(1) If 24V for external signal is supplied from only CN1, the wiring should be changed so that 24V is supplied from CN2-Pin99, 100. (For CN2-Pin99, 100, both 7443 and 8443 are supplied with an external power supply of 24V.)

(2) Same connector is used for CN1 in both 7443 and 8443.

Make sure to wire CN1 correctly. In 8443, CN1-Pin2 (EMG) is connected to the cathode side of photo coupler for emergency input, so there is a slight possibility that 8443 board and power may break down if the cable for external 24V, which was used in 7443, is connected.

On the other hand, if the cable prepared for an emergency input in 8443 is used in 7443, a short circuit occurs. Do not connect it.

3-2. Axis control connector (CN2)

[Outline of change]

(1) Connector : No change (equivalent is used)

(2) Pin assignment: No change (axis number in the function column is indicated from 0 in accordance with 8443 User's Manual.)

Pin	7443	8443	Function	Pin	7443	8443	Function
1	VPP	VDD	+ 5V power supply (Note 1)	51	VPP	VDD	+ 5V power supply output (Note 1)
2	GND	EGND	External power supply GND	52	GND	EGND	External power supply GND
3	OUT1+	OUT0+	0-axis pulse signal + output	53	OUT3+	OUT2+	2-axis pulse signal + output
4	OUT1	OUT0-	0-axis pulse signal - output	54	OUT3	OUT2-	2-axis pulse signal-output
5	DIR1+	DIR0+	0-axis direction signal + output	55	DIR3+	DIR2+	2-axis Direction signal + output
6	DIR1	DIR0-	0-axis direction signal - output	56	DIR3	DIR2-	2-axis Direction signal - output
7	SVON1	SVON0	0-axis SVON output (Note 2)	57	SVON3	SVON2	2-axis SVON output (Note 2)
8	ERC1	ERC0	0-axis deviation clear output (Note 2)	58	ERC3	ERC2	2-axis deviation clearing output (Note 2)
9	ALM1	ALM0	0-axis Alarm input	59	ALM3	ALM2	2-axis Alarm input
10	INP1	INP0	0-axis In-position input	60	INP3	INP2	2-axis In-position input
11	RDY1	RDY0	0-axis Ready input	61	RDY3	RDY2	2-axis Ready input
12	GND	EGND	External power supply GND	62	GND	EGND	External power supply GND
13	EA1+	EA0+	0-axis encoder A-phase + input	63	EA3+	EA2+	2-axis encoder A-phase + Input
14	EA1	EA0-	0-axis encoder A-phase - Input	64	EA3	EA2-	2-axis encoder A-phase - Input
15	EB1+	EB0+	0-axis encoder B-phase + input	65	EB3+	EB2+	2-axis encoder B-phase + Input
16	EB1	EB0-	0-axis encoder B-phase - Input	66	EB3	EB2-	2-axis encoder B-phase - Input
17	EZ1+	EZ0+	0-axis encoder Z-phase + input	67	EZ3+	EZ2+	2-axis encoder Z-phase + input
18	EZ1	EZ0-	0-axis encoder Z-phase - input	68	EZ3	EZ2-	2-axis encoder Z-phase - input
19	VPP	VDD	+ 5V power supply output (Note 1)	69	VPP	VDD	+ 5V power supply output (Note 1)
20	GND	EGND	External power supply GND	70	GND	EGND	External power supply GND
21	OUT2+	OUT1+	1-axis pulse signal + output	71	OUT4+	OUT3+	3-axis pulse signal + output
22	OUT2	OUT1-	1-axis pulse signal - output	72	OUT4	OUT3-	3-axis pulse signal - output
23	DIR2+	DIR1+	1-axis direction signal + output	73	DIR4+	DIR3+	3-axis direction signal + output
24	DIR2	DIR1-	1-axis direction signal - output	74	DIR4	DIR3-	3-axis direction signal -output
25	SVON2	SVON1	1-axis SVON output (Note 2)	75	SVON4	SVON3	3-axis SVON output (Note 2)
26	ERC2	ERC1	1-axis deviation clearing output (Note 2)	76	ERC4	ERC3	3-axis deviation clear output (Note 2)
27	ALM2	ALM1	1-axis Alarm input	77	ALM4	ALM3	3-axis Alarm input
28	INP2	INP1	1-axis In-position input	78	INP4	INP3	3-axis In-position input
29	RDY2	RDY1	1-axis Ready input	79	RDY4	RDY3	3-axis Ready input
30	GND	EGND	External power supply GND	80	GND	EGND	External power supply GND
31	EA2+	EA1+	1-axis encoder A-phase + Input	81	EA4+	EA3+	3-axis encoder A-phase + Input

Pin	7443	8443	Function	Pin	7443	8443	Function
32	EA2	EA1-	1-axis encoder A-phase - Input	82	EA4	EA3-	3-axis encoder B-phase - Input
33	EB2+	EB1+	1-axis encoder B-phase + Input	83	EB4+	EB3+	3-axis encoder B-phase + Input
34	EB2	EB1-	1-axis encoder B-phase - Input	84	EB4	EB3-	3-axis encoder B-phase - Input
35	EZ2+	EZ1+	1-axis encoder Z-phase + input	85	EZ4+	EZ3+	3-axis encoder Z-phase + input
36	EZ2	EZ1-	1-axis encoder Z-phase - input	86	EZ4	EZ3-	3-axis encoder Z-phase-input
37	+EL1	PEL0	0-axis +EL input	87	+EL3	PEL2	2-axis +EL input
38	- EL1	MEL0	0-axis - EL input	88	- EL3	MEL2	2-axis -EL input
39	CMP1	CMP0	0-axis comparator output	89	LTC3	LTC2	2-axis latch output
40	SD/PCS1	PCS/SD0	0-axis PCS/ SD signal entry	90	SD/PCS3	PCS/SD2	2-axis PCS/ SD signal input
41	ORG1	ORG0	0-axis ORG signal input	91	ORG3	ORG2	2-axis ORG signal input
42	GND	EGND	external power supply GND	92	GND	EGND	External power supply GND
43	+EL2	PEL1	1-axis +EL input	93	+EL4	PEL3	3-axis +EL input
44	- EL2	MEL1	1-axis -EL input	94	- EL4	MEL3	3-axis -EL input
45	CMP2	CMP1	1-axis comparator output	95	LTC4	LTC3	3-axis latch input
46	SD/PCS2	PCS/SD1	1-axis PCS/ SD signal input	96	SD/PCS4	PCS/SD3	3-axis PCS/ SD signal input
47	ORG2	ORG1	1-axis ORG signal input	97	ORG4	ORG3	3-axis ORG signal input
48	GND	EGND	External power supply GND	98	GND	EGND	External power supply GND
49	GND	EGND	External power supply GND	99	E_24V	E_24V	External power supply 24V input
50	GND	EGND	External power supply GND	100	E_24V	E_24V	External power supply 24V input

(Note 1) +5V power supply output: both 7443 and 8443 are isolated from bus power supply and generated from external power supply 24V input

(Note 2) SVON and ERC output specifications are changed as follows:

7443: Photocoupler output 35V, 50mA(max) → 8443: Photocoupler output 35V, 15mA(min)

(3) Interface circuit : No change

(4) Signal name: Changed

Although the function of each signal is not changed, some signal names are changed as follows:

- In 8443, the signal names with axis numbers start from 0 (e.g. ORG1 → ORG0).
- In 7443, '+' was added only to the positive signal name for differential signals such as command pulse and encoder signals. In 8443, '+' and '-' are added to all signals.

[Precautions for replacement]

The equivalent parts are used, and they share the same interface circuit. However, there can be slight differences in max. & min. current values and in the signal change timings due to the difference of used parts specifications. Please check the operations in the actual system as needed.

3-3. Manual pulser input connector (P1)… (Connector No : CN3 in 7443)

[Outline of change]

(1) Function specifications Changed

7443 provides a pulser input for four axes. On the other hand, 8443 provides a pulser input for single axis and the target axis can be selected by DLL functions. This function enables to control four axes with one pulser by switching the target axis.

(2) Connector model and number of pins

7443: (manufactured by Neitron) 2317F[illegible] Changed

8443: (manufactured by JIH) 23N6960-10S10B-01G-V10-G, 9 pins

(3) Pin assignment Changed

PPCI7443

Pin	7443	Function (7443)
1	GND	Bus power supply GND
2	PB4	4-axis pulser B-phase input
3	PA4	4 axis pulser A-phase input
4	PB3	3 axis pulser B-phase input
5	PA3	3 axis pulser A-phase input
6	+5V	Bus power supply + 5V
7	GND	Bus power supply GND
8	PB2	2-axis pulser B-phase input
9	PA2	2-axis pulser A-phase input
10	PB1	1-axis pulser B-phase input
11	PA1	1-axis pulser A-phase input
12	+ 5V	Bus power supply + 5V

PPCIe-8443

Pin	8443	Function (8443)
1	+ 5V	External connection + 5V (Note 1)
2	PA+	Pulser A-phase differential + input
3	PA-	Pulser A-phase differential - input
4	PB+	Pulser B-phase differential + input
5	PB-	Pulser B-phase differential - Input
6	EGND	External connection GND
7	Not Available	Not used
8	Not Available	Not used
9	Not Available	Not used

(Note 1) + 5V for external connection is isolated from bus power supply and generated from external power supply 24V input

(4) Interface circuit Changed

In 7443, PA and PB input signals of PCL6045B were pulled up and provided directly to the connector. In 8443, however, they are isolated by photo coupler and the interface is changed to correspond to the differential inputs of PA and PB.

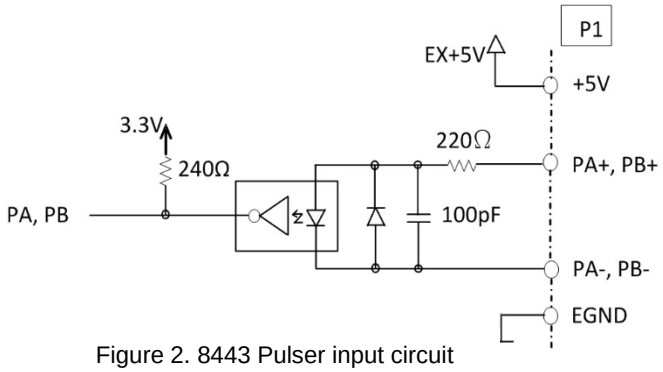

Figure 2. 8443 Pulser input circuit

(5) Connector No.

7443: CN3 → 8443: P1 Changed

[Precautions for replacement]

(1) Pulser input cannot be used for several axes simultaneously in 8443 due to the functional change.

(2) In 8443, PA and PB are changed to differential inputs compatible. Change the wirings as necessary.

3-4. Simultaneous start/simultaneous stop signal connectors (K1/K2). (Connector number of 7443: CN4)

[Outline of change]

(1) Connector model, the number of pins Changed

7443: (Neitron) 2317RJ-6, 6 pins → 8443: (Neitron) 2317RJ-6, 4 pin x 2

In 8443, the configuration of two connectors, K1 and K2, are changed as the following assignment:

By separating the connectors connecting the boards, wiring work has been easier.

(2) Pin assignment Changed

PPCI7443

Pin	7443	Function (7443)
1	GND	Bus power supply GND
2	STP	Simultaneous stop input/output
3	STA	Simultaneous start input/output
4	STP	Simultaneous stop input/output
5	STA	Simultaneous start input/output
6	+5V	Bus power +5 V

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Pin	8443	Function (8443) Both K1 and K2
1	Not Available	Not used
2	STA	Simultaneous start input/output
3	STP	Simultaneous stop input/output
4	GND	GND (Note 1)

(Note 1) GND: common with bus power GND

(3) Connector No. Changed

7443: CN4 → 8443: K1, K2

(4) Interface circuit: No change

[Precautions for replacement]

(1) There is no change in interface, however, there are changes in the number of connector pins and pin assignments.
Be sure to change the wiring connection.

3-5. General-purpose I/O connector (CN5)

[Outline of change]

(1) Function specifications Changed

7443 provided only six outputs. 8443 is enhanced to 16 inputs and 16 outputs.

(2) Connector model and number of pins Changed

7443: 10 pins (9 pins) → 8443: (JVE) 23N6850-44M10B-01G-7.6-C, 44 pins

(3) Pin assignment Changed

PPCI7443

Pin	Signal	Function	Pin	Signal	Function
1	DGND	Bus power supply GND	6	ED3	General-purpose output 3
2	DGND	Bus power supply GND	7	ED4	General-purpose output 4
3	ED0	General-purpose output 0	8	ED5	General-purpose output 5
4	ED1	General-purpose output 1	9	VCC	Bus power 5V
5	ED2	General-purpose output 2	10	N.C.	Not used

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Pin	Signal	Function	Pin	Signal	Function	Pin	Signal	Function
1	GND	GND (Note 1)	16	EDI11	General-purpose input 11	31	EDO6	General-purpose output 6
2	GND	GND (Note 1)	17	GND	GND (Note 1)	32	EDO7	General-purpose output 7
3	EDI0	General-purpose input 0	18	GND	GND (Note 1)	33	EDO8	General-purpose output 8
4	EDI1	General-purpose input 1	19	EDI12	General-purpose input 12	34	EDO9	General-purpose output 9
5	EDI2	General-purpose input 2	20	EDI13	General-purpose input 13	35	GND	GND (Note 1)
6	EDI3	General-purpose input 3	21	EDI14	General-purpose input 14	36	VCC	+3.3 V power output
7	EDI4	General-purpose input 4	22	EDI15	General-purpose input 15	37	EDO10	General-purpose output 10
8	EDI5	General-purpose input 5	23	EDO0	General-purpose output 0	38	EDO11	General-purpose output 11
9	VCC	+3.3V power supply output	24	EDO1	General-purpose output 1	39	EDO12	General purpose output 12
10	GND	GND (Note 1)	25	EDO2	General-purpose output 2	40	EDO13	General-purpose output 13
11	EDI6	General-purpose input 6	26	EDO3	General-purpose output 3	41	EDO14	General-purpose output 14
12	EDI7	General-purpose input 7	27	GND	GND (Note 1)	42	EDO15	General purpose output 15
13	EDI8	General-purpose input 8	28	GND	GND (Note 1)	43	GND	GND (Note 1)
14	EDI9	General-purpose input 9	29	EDO4	General-purpose output 4	44	GND	GND (Note 1)
15	EDI10	General-purpose input 10	30	EDO5	General-purpose output 5			

(Note 1) GND: Common GND with bus power GND.

(4) Interface circuit: Changed

・ In 7443, the signal voltage is 5 V. In 8443, it is changed to 3.3 V.

[Precautions for replacement]

(1) Note that the signal voltage is changed.

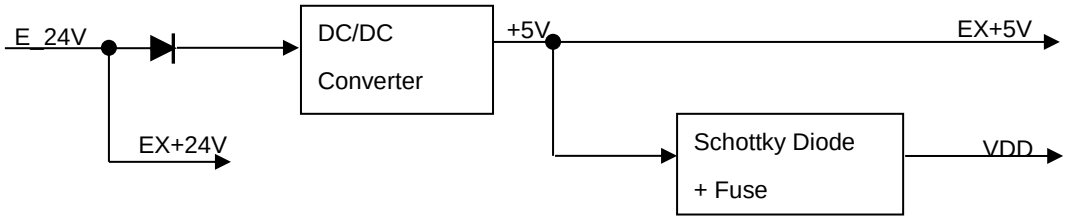
(2) Note that the input signal added in 8443 is pulled down inside the board and is turned ON at level H signal.

4. Hardware Reference

Power-related signals for 8443 are summarized as follows:

Signal name	Function	Description
E_24V	24V external power supply input	24V power supply supplied externally. Input voltage: +24 VDC ± 5%, Required power capacity: 500 mA Max. Isolated from bus power supply.
EX+24V	24V internal power supply	24V power supply for external signal input supplied from external power supply 24V input. Isolated from bus power supply.
VDD	+ 5V power supply output	Externally usable 5V generated from an external 24V power source. Output Voltage: + 5V DC ±5%, Output Capacitance: 500mA Max in sum of VDD and EX+5V Isolated from bus power supply. An overcurrent and reverse voltage protection circuit is built-in.
EX+5V	+ 5V power supply output	Externally usable 5V generated from an external 24V power source. Output Voltage: + 5V DC ±5%, Output capacitance: 500mA Max in sum of VDD and EX+5V Isolated from bus power supply. The protection circuit is not installed.
EGND	External power supply GND	GND of externally supplied +24V power supply and 5V generated there. Isolated from bus power supply.
VCC	+3.3 V bus power supply	3.3 V for board internal control supplied from the bus. Used for extended general-purpose I/O, CN5.
B12V	+12 V bus power supply	12 V for board internal control supplied from the bus. Power capacity: 250 mA Max It is not output to the outside.
GND	Bus power supply GND	GND for board internal control supplied from the bus. Used for extended general-purpose I/O, CN5 and simultaneous start/stop, K1/K2.

Note 1: Both VDD and EX+5V are 5V that are made from an external power supply of 24V and can be used externally. However, overcurrent and reverse-voltage suppressors are built-in only for VDD.



Note 2: When connecting an external device (drivers or external encoders) to 5V power supply, pay attention to the power supply capacitance.

Note 3: When using a bus power supply, pay special attention to noise inflow and power supply capacity caused by wiring.

5. Library (DLL)

[Outline of change]

(1) Function specifications: No change

Function specifications, such as function functions and argument formats, remain unchanged.

(2) Function name: Changed

The function name has been changed from _7443_xxxx() to _8443_xxxx().

(3) DLL related file Changed

There is no change in the specifications, but the file name has been changed in 8443.

(4) Additional function Changed

The Existing functions in 7443 remain, and the following functions are added. Refer to manual in details.

- Functions for helical interpolation
- Board ID enable/disable setting function
- General-purpose I/O operation functions (general-purpose input functions, etc. have been added)

[Precautions for replacement]

(1) When you reuse the program for 7443, replace the function name description in the program since the function name has been changed. Then replace the header, Lib, and other related files, and rebuild the program.