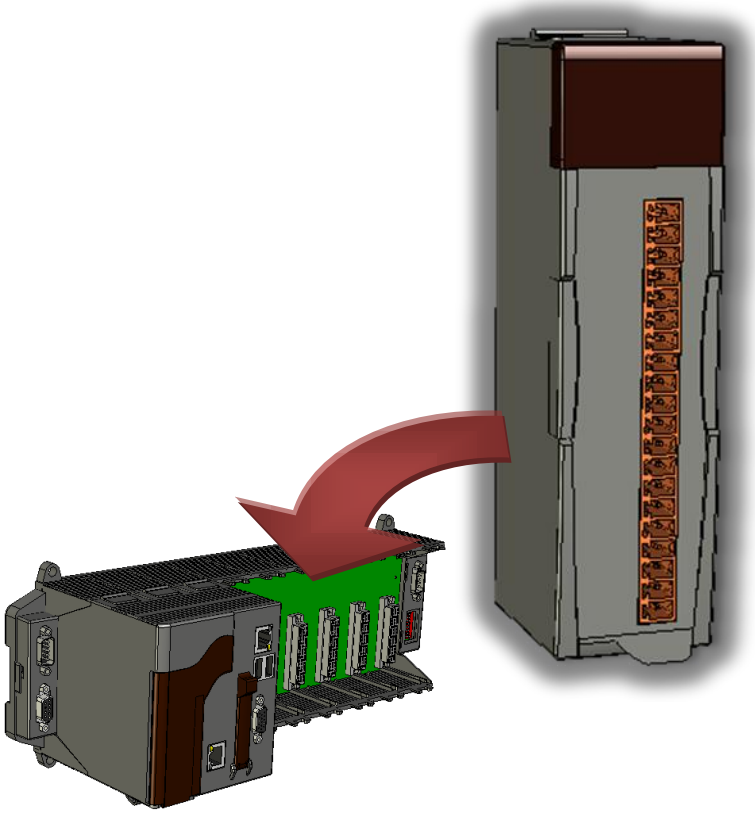
I-8024W
User and API Manual
Version 2.02, Sep 2016

API functuion for ICPDAS all series PAC



Written by Hans

Edited by Anna Huang

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Table of Contents

Preface

The I-8024W is a 4-channel 14-bit analog output module

The I-8024W is a 14-bit source type analog output module, which offer 4 single-ended analog output channels. Every channel can be programmed to an individual output range of, ±10 V or 0 ~ +20 mA.

Options for configuring power-on and safe values are also included. The I-8024W provide RF immunity level matching that defined by IEC 61000-4-3 standard, together with 4 kV ESD protection as well as 3000 VDC intra-module isolation.

The information contained in this manual is divided into the following topics:

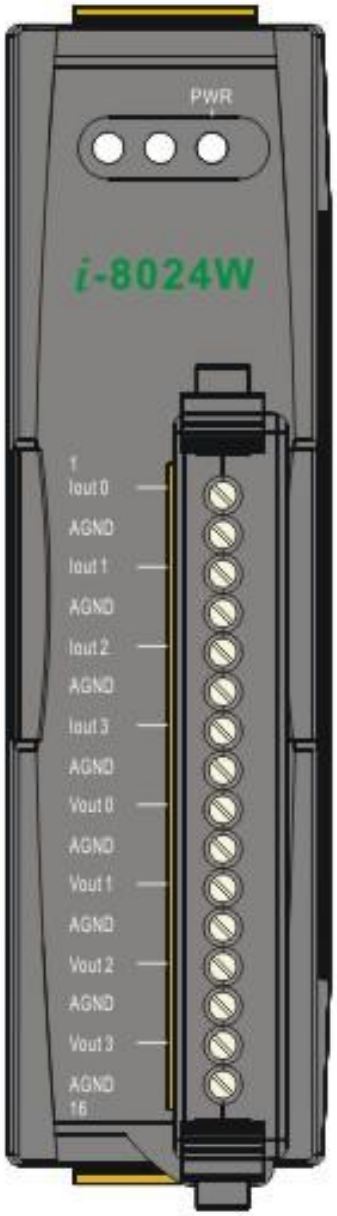
- Chapter 1, “Hardware” – This chapter provides information related to the hardware, such as the specifications, the jumper settings details and wiring information.
- Chapter 2, “API” – This chapter describes the functions provided in the I-8024W library together with an explanation of the differences in the naming rules used for the MiniOS7 and Windows platforms.

Chapter 1. Hardware

1.1. Specifications

Analog Output	
Output Channels	4
Output Type	+/- 10 V, 0 ~ +20 mA
Resolution	14-bit
Accuracy	+/- 0.1% of FSR for voltage output ; +/- 0.2% of FSR for current output
Readback Accuracy	+/-1% of FSR
Zero Drift	Voltage: +/-30 µV/ °C Current: +/-0.2 µA/ °C
Span Drift	+/- 20ppm/°C
Voltage Output Capability	10 V @ 20 mA
Max Current Load Resistance	External +24V : 1050 Ohms
Power-Up and SafeValue	Yes
4KV ESD Protection	Yes, Contact for each terminal.
Intra-module Isolation, Field to Logic	3000 VDC
LED Display	
1 LED as Power	
Power	
Power Consumption	0.4 A @ 5 VDC = 2W ,+/- 5%
Environment	
Operating Temperature	-25 ~ 75 °C
Storage Temperature	-30 ~ 75 °C
Humidity	5 ~ 95%, Non-condensing
Dimensions	
30 mm x 102 mm x 115 mm (W x L x H) Detail	

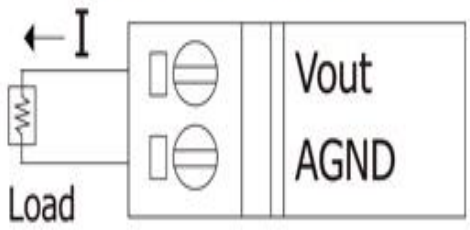
1.2. Pin Assignments



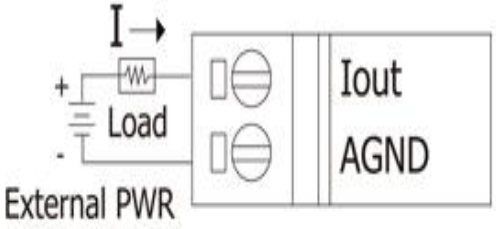
Terminal No.	Pin Assignment
01	Iout 0
02	AGND
03	Iout 1
04	AGND
05	Iout 2
06	AGND
07	Iout 3
08	AGND
09	Vout 0
10	AGND
11	Vout 1
12	AGND
13	Vout 2
14	AGND
15	Vout 3
16	AGND

1.3. Wire Connections

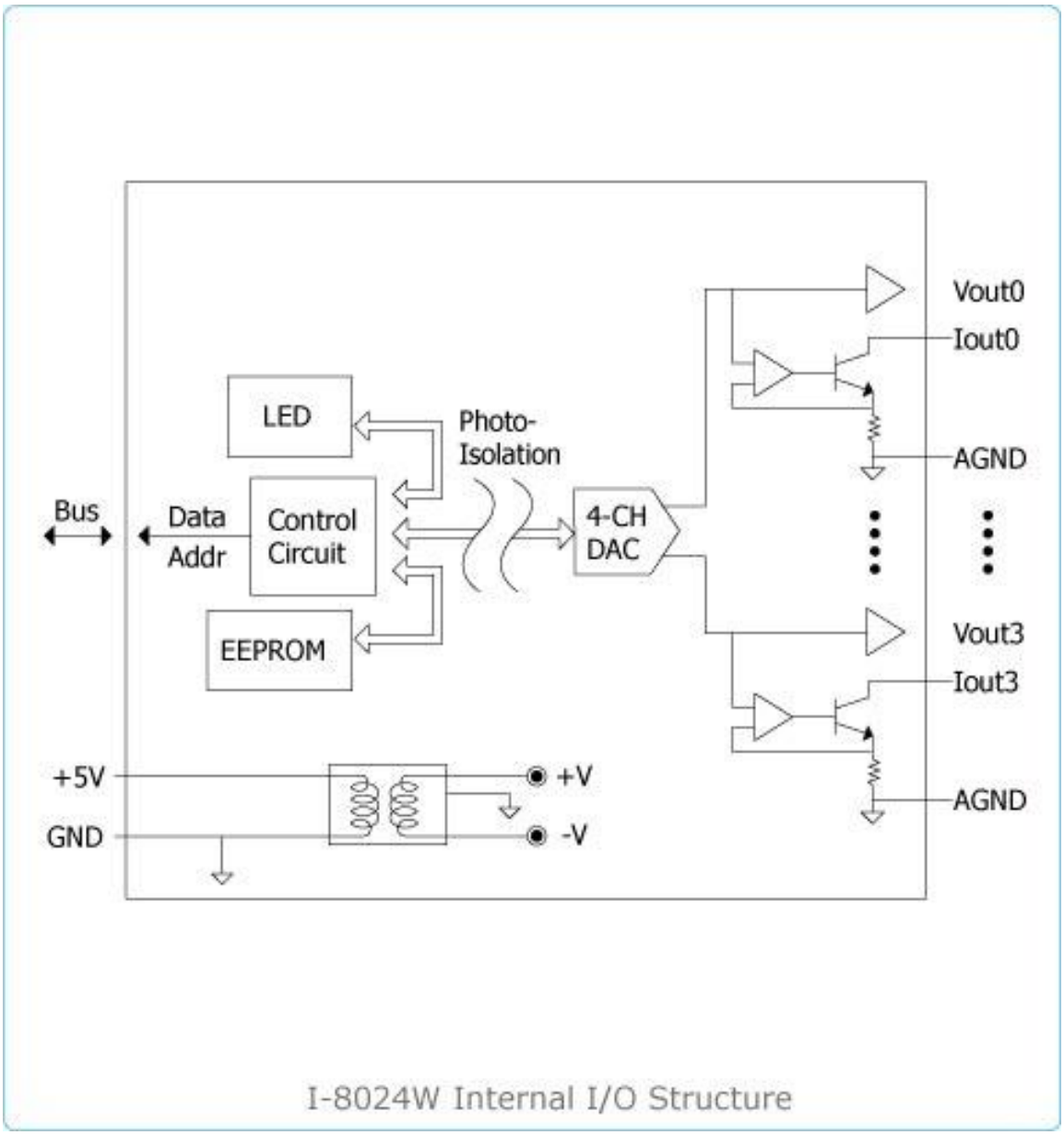
I-8024W Voltage Output Wiring



I-8024W Current Output Wiring



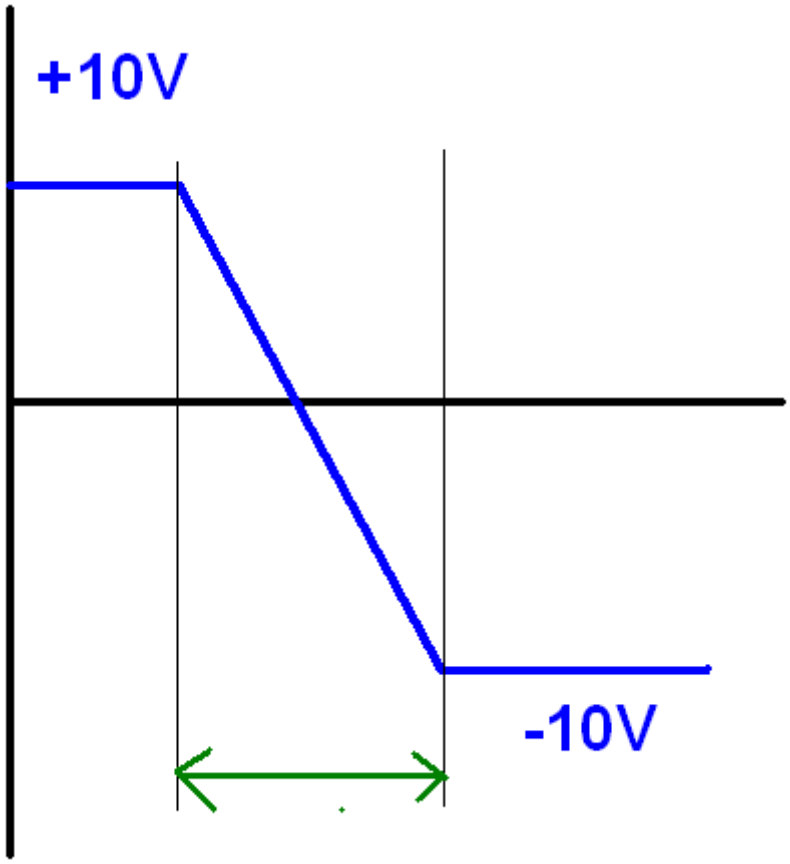
1.4. Block Diagram



I-8024W Internal I/O Structure

1.5. Slew rate

The Slew rate of I-8024W module is about 16 us (62.5 K Hz) from +10 V to -10V as below picture.



1.6. Location of the Demo Programs

ICP DAS provides a range of demo programs for different platforms that can be used to verify the functions of the I-8024W. The source code contained in these programs can also be reused in your own custom programs if needed. The following is a list of the locations where both the demo programs and associated libraries can be found on either the ICP DAS web site or the enclosed CD.

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For example:

I-8024W demo for I-8000 is located at

http://ftp.icpdas.com/pub/cd/8000cd/napdos/8000/841x881x/demo/io_in_slot/8024w/

Platform	Location
For I-8000 on Web	
Library	http://ftp.icpdas.com/pub/cd/8000cd/napdos/8000/841x881x/demo/lib/
Demo	http://ftp.icpdas.com/pub/cd/8000cd/napdos/8000/841x881x/demo/io_in_slot/
For I-8000 on CD	
Library	CD:\Napdos\8000\841x881x\demo\Lib
Demo	CD:\Napdos\8000\841x881x\demo\IO_in_Slot
For iPAC-8000 on Web	
Library	http://ftp.icpdas.com/pub/cd/8000cd/napdos/ipac8000/demo/basic/ip-84x1_ip-88x1/lib/
Demo	http://ftp.icpdas.com/pub/cd/8000cd/napdos/ipac8000/demo/basic/ip-84x1_ip-88x1/io_in_slot/
For iPAC-8000 on CD	
Library	CD:\Napdos\iPAC8000\Demo\Basic\iP-84x1_iP-88x1\Lib
Demo	CD:\Napdos\iPAC8000\Demo\Basic\iP-84x1_iP-88x1\IO_in_Slot
For Windows CE5 on Web	
Library	http://ftp.icpdas.com/pub/cd/winpac/napdos/wp-8x4x_ce50/sdk/io_m

	odules/
Demo	http://ftp.icpdas.com/pub/cd/winpac/napdos/wp-8x4x_ce50/demo/winpac/evc/pac_io/local/ (eVC demo) http://ftp.icpdas.com/pub/cd/winpac/napdos/wp-8x4x_ce50/demo/winpac/dotnet/c%23.net/pac_io/local/ (C# demo)

Platform	Location
For the Windows CE5 Platform on the CD	
Library	CD:\napdos\wp-8x4x_ce50\sdk\IO_Modules
Demo (eVC & C#)	CD:\napdos\wp-8x4x_ce50\Demo\WinPAC\eVC\PAC_IO\Local CD:\napdos\wp-8x4x_ce50\Demo\WinPAC\DOTNET\C#.NET\PAC_IO\Local
For the Windows CE6 Platform on the Web	
XP-8000-CE6	http://ftp.icpdas.com/pub/cd/xp-8000-ce6/sdk/special_io/ http://ftp.icpdas.com/pub/cd/xp-8000-ce6/demo/xpac/vc2008/io/local/ http://ftp.icpdas.com/pub/cd/xp-8000-ce6/demo/xpac/c%23/io/local/
XP-8000-Atom-CE6	http://ftp.icpdas.com/pub/cd/xpac-atom-ce6/sdk/special_io/ http://ftp.icpdas.com/pub/cd/xpac-atom-ce6/demo/xpac/vc2008/io/local/ http://ftp.icpdas.com/pub/cd/xpac-atom-ce6/demo/xpac/c%23/io/local/
For the Windows CE6 Platform on the CD	
XP-8000-CE6	CD:\SDK\Special_IO CD:\Demo\XPAC\VC2008\IO\Local CD:\Demo\XPAC\C#\IO\Local
XP-8000-Atom-CE6	CD:\SDK\Special_IO CD:\Demo\XPAC\VC2008\IO\Local CD:\Demo\XPAC\C#\IO\Local
For Windows CE7 on Web	
Library	http://ftp.icpdas.com/pub/cd/winpac_am335x/vp-x231/sdk/io_modules/
Demo	http://ftp.icpdas.com/pub/cd/winpac_am335x/vp-x231/demo/pac/vc2008/io/local/ http://ftp.icpdas.com/pub/cd/winpac_am335x/vp-x231/demo/pac/c%2

	3/io/local/ (C# demo)
For the Windows CE7 Platform on the CD	
Library	CD:\napdos\WinPAC_AM335x\VP-x231\Sdk\IO_Modules\
Demo (VC & C#)	CD:\napdos\WinPAC_AM335x\VP-x231\demo\Pac\Vc2008\IO\Local CD:\napdos\WinPAC_AM335x\VP-x231\demo\Pac\C#\IO\Local
For the Windows Embedded Standard (WES) Platform on the Web	
XP-8000	http://ftp.icpdas.com/pub/cd/xp-8000/sdk/io/ http://ftp.icpdas.com/pub/cd/xp-8000/demo/specialized_io/
XP-8000-Atom	http://ftp.icpdas.com/pub/cd/xpac-atom/sdk/io/ http://ftp.icpdas.com/pub/cd/xpac-atom/demo/specialized_io/
For the Windows Embedded Standard (WES) Platform on the CD	
XP-8000	CD:\SDK\IO CD:\Demo\Specialized_IO
XP-8000-Atom	CD:\SDK\IO CD:\Demo\Specialized_IO

Chapter 2. API References

ICP DAS provides APIs, libraries and demo programs, including the source code, for easy integration of the I-8024W into the platforms indicated in the table below. The APIs and programming procedures are similar on both the MiniOS7 and Windows platforms, with the only difference being the prefix characters added to the name of the functions in the library (APIs). For the MiniOS7 and Linux platforms, “I8024W_” is prefixed to the function name, and for the Windows platform, “pac_i8024W_” is prefixed to the function name.

In this document, the function name relevant to the MiniOS7 platform is used in the examples and as the title of the section for each function.

The following table gives an overview of the relationship between the platforms and the product series, together with the respective prefix for the function name.

Platform	Product included	API Prefix
Windows CE5 Windows CE6 Windows CE7	WP-8000 series VP-2000 series XP-8000-CE6 series	“pac_i8024W_ “+ function name
Windows Embedded Standard (WES)	XP-8000 series iPPC series	“pac_i8024W_ “+ function name
MiniOS7	I-8000 series iPAC-8000 series VP-2000 series	“I8024W_” + function name
Linux	LinPAC-8000 series	“I8024W_” + function name

2.1. Function List

The following is a list of the functions provided in the 8024W.lib for the MiniOS7 platform.

Function	Description
錯誤! 書籤的自我參照不正確。	This function initializes the module I-8024W in the specified slot.
I8024_VoltageOut	This function makes I-8024W modules to output the voltage of specified floating-point value in the specified channel and slot
I8024_CurrentOut	This function makes I-8024W modules to output the current of specified floating-point value in the specified channel and slot
I8024_VoltageOut_Hex	This function makes I-8024W modules to output the specified voltage value in HEX format in the specified channel and slot
I8024_CurrentOut_Hex	This function makes I-8024W modules to output the specified current value in HEX format in the specified channel and slot.

2.1.1. i802W_ Initial

This function initializes the module I-8024W in the specified slot. You must implement this function once before you try to use the other I-8024W functions.

Syntax

```
short i8024W_Initial (
      int slot
);
```

Parameter

slot [in]:
Specifies the slot of WinPAC-8000 in which the I-8024 plugged (Range: 1 to 7).

Return Values

None

Examples

[C++]

```
int slot = 1;
i8024W_Initial (slot);
//The I-8024W is initialized in the slot 1.
//Please plugs the I-8024W card into the slot 1 before initialization.
```

[C#]

```
int slot = 1;
i8024W_Initial (slot);
```

2.1.2. i8024W_VoltageOut

This function makes I-8024W modules to output the voltage of specified floating-point value in the specified channel and slot.

Syntax

```
void i8024W_VoltageOut (
    int slot,
    int ch,
    float data
);
```

Parameter

slot [in]
Specifies the slot of WinPAC-8000 in which the I-8024W plugged (Range: 1 to 7).

ch [in]
Specifies the channel from which I-8024W outputs (Range: 0 to 3).

data [in]
Specifies the analog output value (Voltage range: -10 ~ +10V).

Return Values

None

Examples

[C++]

```
int slot = 1, ch = 0;
float data = 3.0f;
i8024W_VoltageOut (slot, ch, data);
//The I-8024W module outputs 3.0V voltage from the channel 0.
```

[C#]

```
int slot = 1, ch = 0;
float data = 3.0f;
i8024W_VoltageOut (slot, ch, data);
```

2.1.3. i8024W_CurrentOut

This function makes I-8024W modules to output the current of specified floating-point value in the specified channel and slot.

Syntax

```
void i8024W_CurrentOut (
        int slot,
        int ch,
        float data
);
```

Parameter

slot [in]
Specifies the slot of WinPAC-8000 in which the I-8024 plugged (Range: 1 to 7).

ch [in]
Specifies the channel from which I-8024W outputs (Range: 0 to 3).

data [in]
Specifies the analog output value (Current range: 0 ~ + 20 mA).

Return Values

None

Examples

[C++]

```
int slot = 1, ch = 0;
float data= 10.0f;
i8024W_CurrentOut (slot, ch, data);
//Output 10.0mA current from the channel 0 of I-8024W module.
```

[C#]

```
int slot = 1, ch = 0;
float data = 10.0f;
i8024W_CurrentOut (slot, ch, data);
```

2.1.4. i8024W_VoltageOut_Hex

This function makes I-8024W modules to output the specified voltage value in HEX format in the specified channel and slot.

Syntax

```
void i8024W_VoltageOut_Hex (
        int slot,
        int ch,
        int data
);
```

Parameter

slot [in]
Specifies the slot of WinPAC-8000 in which the I-8024 plugged (Range: 1 to 7).

ch [in]
Specifies the channel from which I-8024W outputs (Range: 0 to 3).

data [in]
Specifies analog output data with hexadecimal value(Voltage range: 8000h ~ 7FFFh, that is -32768 ~ +32767, linearly maps to the range of voltage output: -10 ~ +10 V).

Return Values

None

Examples

[C++]

```
int slot = 1, ch = 0, data = 0x3FFF;
i8024W_VoltageOut_Hex (slot, ch, data);
//The I-8024W module outputs the 5.0V voltage from the channel 0.
```

[C#]

```
int slot = 1, ch = 0; data = 0x3FFF;
i8024W_VoltageOut_Hex (slot, ch, data);
```

2.1.5. i8024W_CurrentOut_Hex

This function makes I-8024W modules to output the specified current value in HEX format in the specified channel and slot.

Syntax

```
void i8024W_CurrentOut_Hex (
    int slot,
    int ch,
    int data
);
```

Parameter

slot [in]
Specifies the slot of WinPAC-8000 in which the I-8024 plugged (Range: 1 to 7).

ch [in]
Specifies the channel from which I-8024W outputs (Range: 0 to 3).

data [in]
Specifies analog output data with hexadecimal value (Current range: 0h ~ 7FFFh, that is 0 ~ +32767, linearly maps to the range of current output: 0. ~ +20.mA).

Return Values

None

Examples

[C++]

```
int slot = 1, ch = 0; data = 0x3FFF;
i8024W_CurrentOut_Hex (slot, ch, data);
//Output the 10.0mA current from the channel 0 of I-8024W
module.
```

[C#]

```
int slot = 1, ch = 0; data = 0x3FFF;
i8024W_CurrentOut_Hex (slot, ch, data);
```