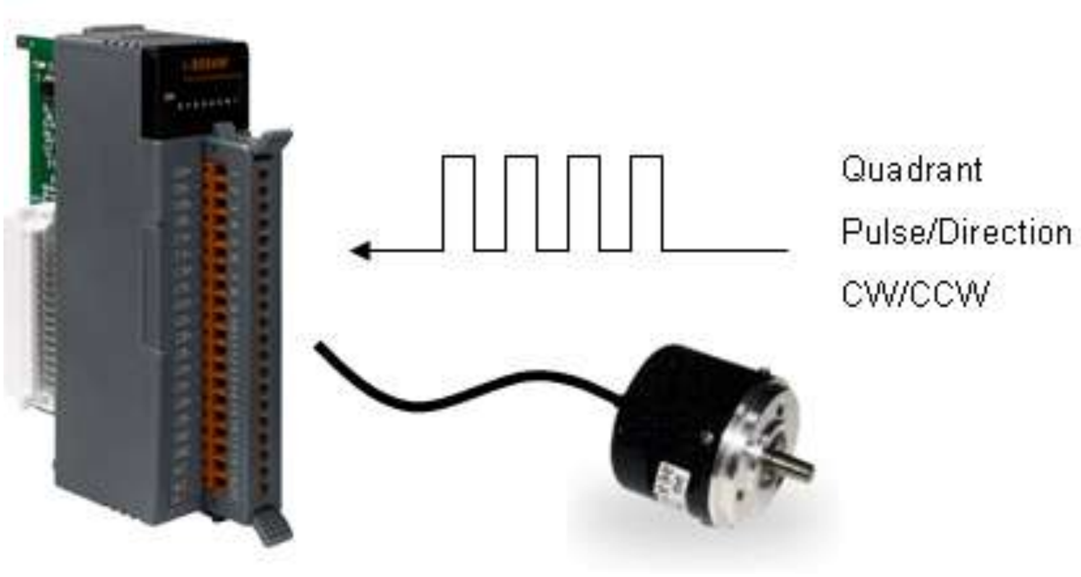
I-8088W

API Reference Manual

Version 1.0.1, June 2013

Service and usage information for Linux Platform



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Edited by Anna Huang

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1. Introduction

PWM (Pulse width modulation) is a powerful technique for controlling analog circuits. It uses digital outputs to generate a waveform with variant duty cycle and frequency to control analog circuits. I-8088W has 8 PWM output channels and 8 digital inputs. It can be used to develop powerful and cost effective analog control system.

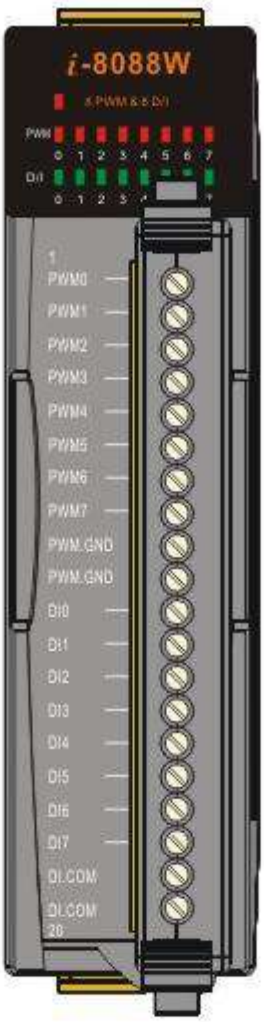
Features:

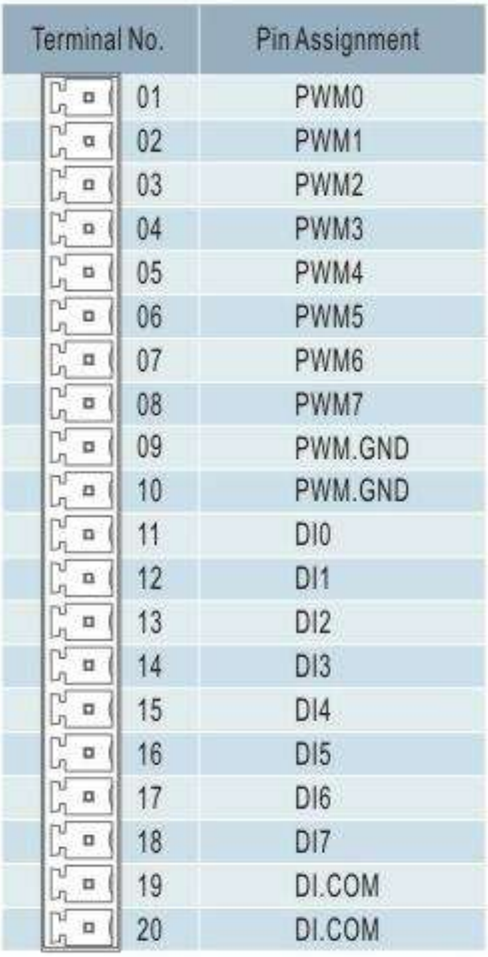
- Automatic generation of PWM outputs by hardware, without software intervention.
- 10 Hz ~ 500 kHz (non-continuous) PWM output frequency with 0.1% ~ 99.9% duty cycle
- Software and hardware trigger mode for PWM output
- Individual and synchronous PWM output Using software trigger mode, you can set configuration for all PWM channels then trigger them one by one or all of them at the same time.
- Burst mode PWM operation for standby
- DI channel can be configured as simple digital input channel or hardware trigger source of the PWM output.

1.1. Specification

PWM Output	
Channels	8
Scaling Resolution	16-bit (1 - 128 µs for each step)
Frequency Range	10 Hz - 500 kHz (non-continuous)
Duty Cycle	0.1 % - 99.9 %
PWM Mode	Burst counting, Continuous mode
Burst Counter	1 - 65535
Hardware Trigger Mode	Trigger Start and Trigger Stop
Output Type	Source
Max. Load Current	1 mA
Intra-module Isolation, Field to Logic	3,750 Vrms
ESD Protection	4 kV Contact for each channel
Digital Input	
Input Channels	8 (Sink/Source)
Input Type	One common for all digital input
On Voltage Level	+5 V - +30 V
Off Voltage Level	< 0.8 V
Input Impedance	4.7 kΩ, 1/4 W
Intra-module Isolation, Field to Logic	3,750 Vrms
ESD Protection	4 kV Contact for each channel
LED Display	
1 LED as Power Indicator/16 LED as PWM and Digital Input Indicator	
Power	
Power Consumption	40 mA @ 5 V, 2 W ± 5 %
Environment	
Operating Temperature	-25 ˚C - +75 ˚C
Storage Temperature	-30 ˚C - +85 ˚C
Humidity	5 % - 95 % RH, non-condensing
Dimensions	
30 mm x 102 mm x 115 mm (W x L x H)	

1.2. Pin Assignment

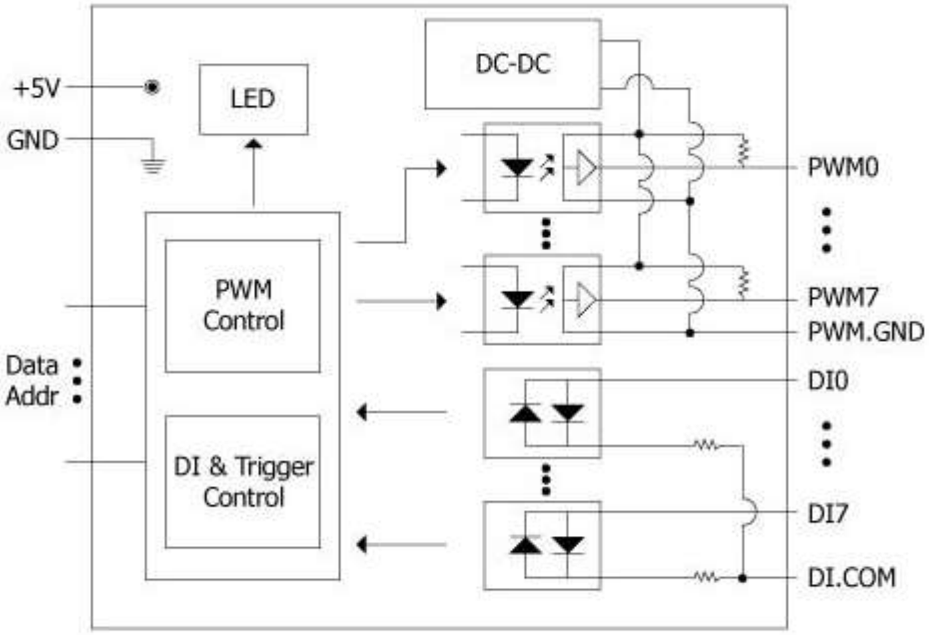




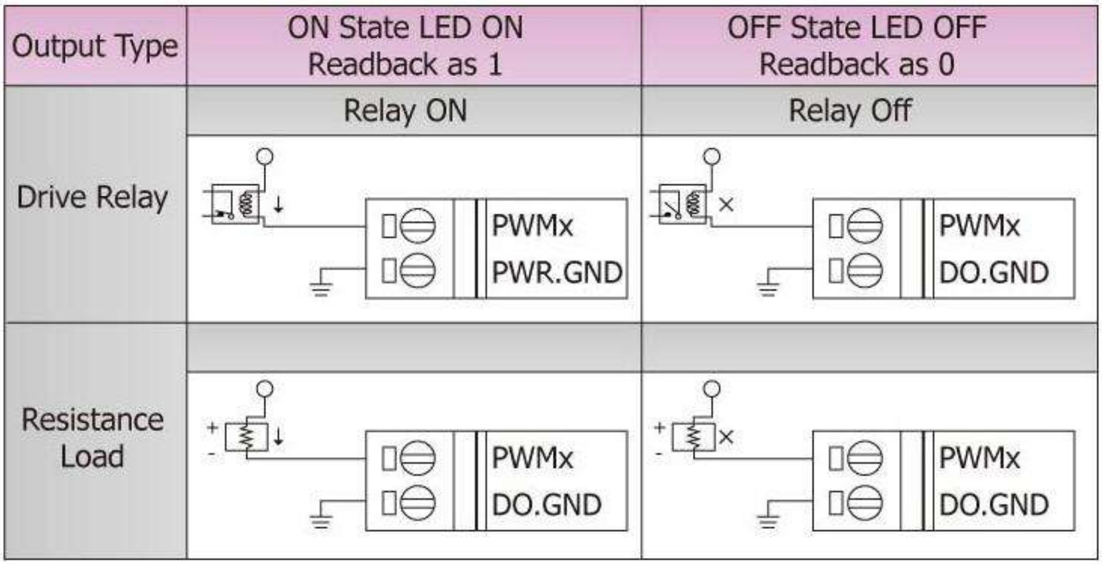
Terminal No.	Pin Assignment
01	PWM0
02	PWM1
03	PWM2
04	PWM3
05	PWM4
06	PWM5
07	PWM6
08	PWM7
09	PWM.GND
10	PWM.GND
11	DI0
12	DI1
13	DI2
14	DI3
15	DI4
16	DI5
17	DI6
18	DI7
19	DI.COM
20	DI.COM

- Pin 1 ~ 8: PWM0 ~ PWM7, are designed for PWM output
- Pin 9 ~ 10: PWM.GND is isolated ground.
- Pin 11 ~ 18: DI0 ~ DI7 are designed for digital input that also capable of setting as an external trigger signal to start or stop its PWM pulse.
- Pin 19 ~ 20: DI.COM is isolated ground.

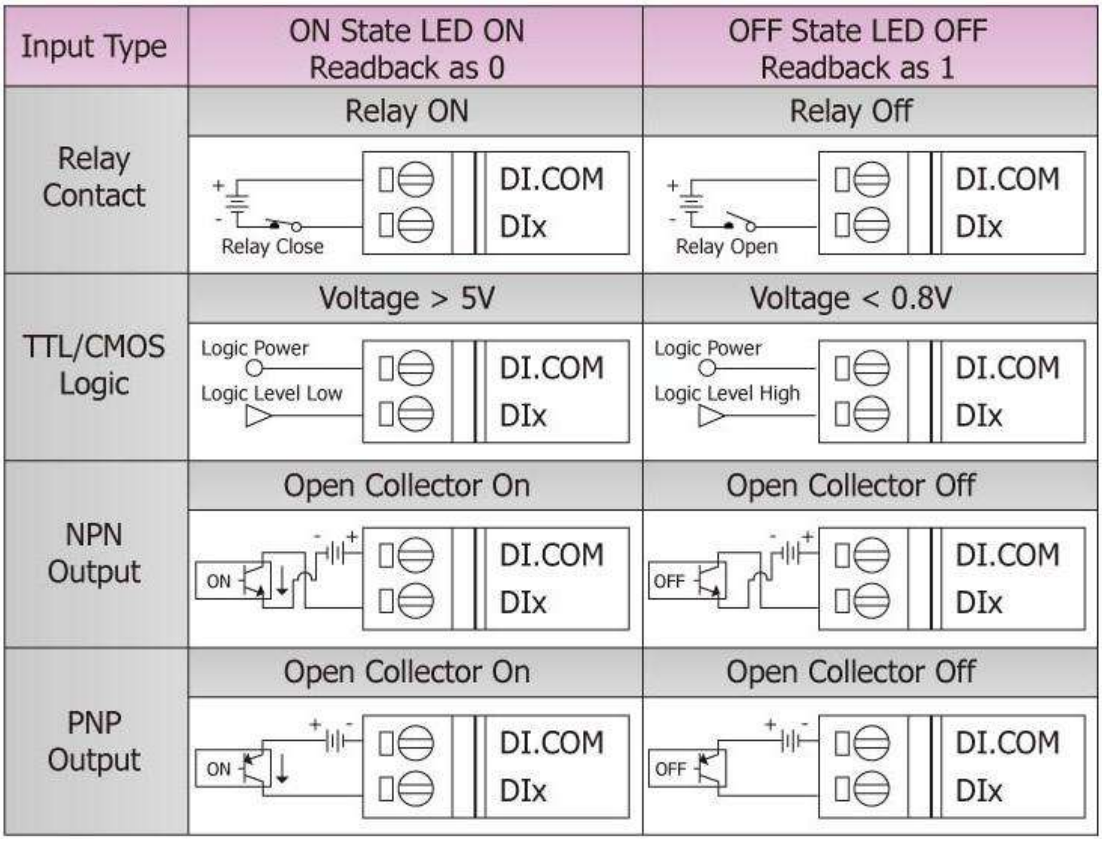
1.3. Block Diagram



1.4. Wire Connection



Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0
Drive Relay	Relay ON	Relay Off
	PWMx PWR.GND	PWMx DO.GND
Resistance Load		
	PWMx DO.GND	PWMx DO.GND



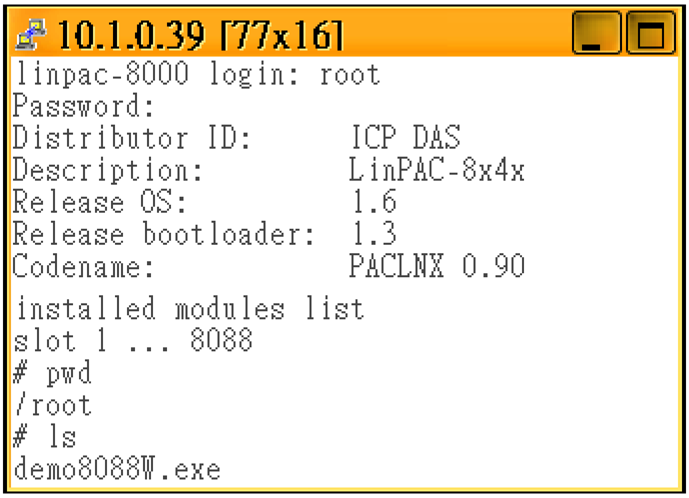
Input Type	ON State LED ON Readback as 0	OFF State LED OFF Readback as 1
Relay Contact	Relay ON	Relay Off
	Relay Close DI.COM DIx	Relay Open DI.COM DIx
TTL/CMOS Logic	Voltage > 5V	Voltage < 0.8V
	Logic Power Logic Level Low DI.COM DIx	Logic Power Logic Level High DI.COM DIx
NPN Output	Open Collector On	Open Collector Off
	ON DI.COM DIx	OFF DI.COM DIx
PNP Output	Open Collector On	Open Collector Off
	ON DI.COM DIx	OFF DI.COM DIx

2. Software and Getting Started

2.1. Software

In this section, we will introduce you one simple program (demo 8080W.exe) which have three setup modes – Normal, Hardware Trigger and Synchronize. We need to check the following steps before running the program.

1. First, user need to download LinPAC SDK, which is includes GNU toolchain, Libraries, header, examples files, etc.
2. Check the power cable, Ethernet cable, VGA monitor, the communication cable between controller and PC has been connected well, and then check the i-8088W has been plugged in the controller.
3. Next, check the communication between controller and PC is fine, and download the demo program files to the controller.

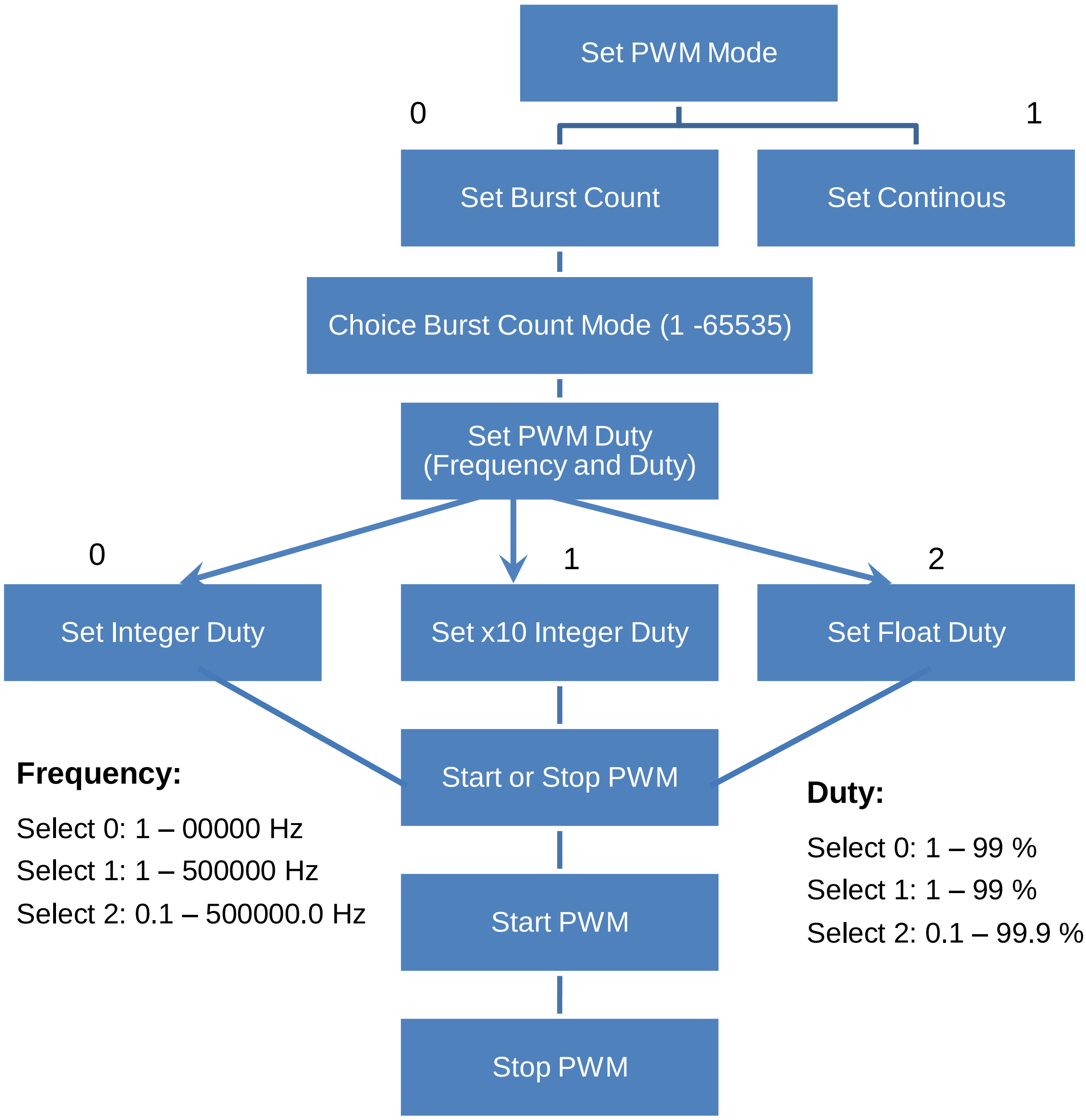


```
linpac-8000 login: root
Password:
Distributor ID:       ICP DAS
Description:          LinPAC-8x4x
Release OS:           1.6
Release bootloader:   1.3
Codename:             PACLNX 0.90
installed modules list
slot 1 ... 8088
# pwd
/root
# ls
demo8088W.exe
```

4. User can find the related files in the product CD or below website: http://www.icpdas.com/root/product/solutions/pac/linpac/linpac-8000_download.html

2.2. Simple PWM Operation

2.2.1. Flow Chart



Frequency:

Select 0: 1 – 00000 Hz
Select 1: 1 – 500000 Hz
Select 2: 0.1 – 500000.0 Hz

Duty:

Select 0: 1 – 99 %
Select 1: 1 – 99 %
Select 2: 0.1 – 99.9 %

Note: Each time you change the settings of “PWM Duty", you have to re-send the “Start PWM” command to ensure the operation properly.

2.2.2. How to Setup the Standard PWM

Please make sure you have completed the steps in section 2.1 before operating the following steps.

Description of the demo:

In this example, we will use the demo to set I-8088W as “Continuous” mode and its frequency is 10 Hz, PWM duty is 50%. When we send the “Start Normal PWM” commend, the DI0 will blinking per 0.5s.

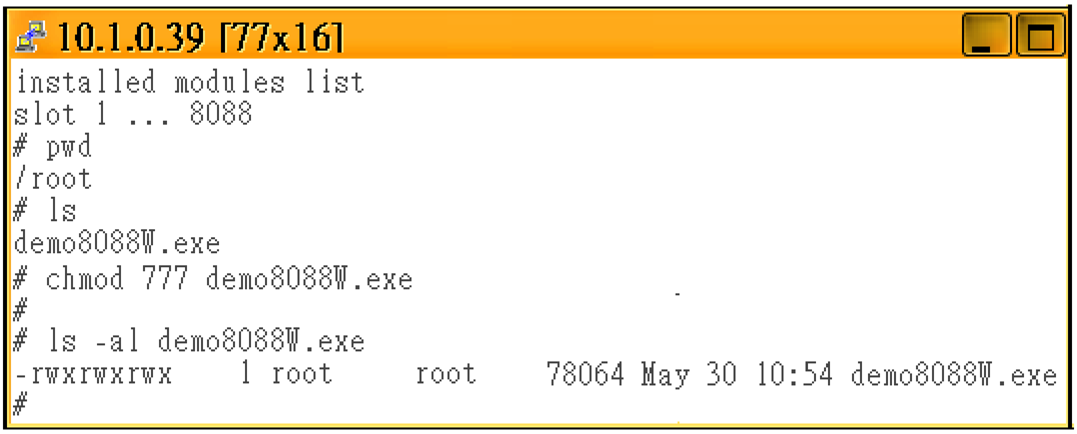
Wire connection of I-8088W:

To do this, you need to wire PW0 to DI0, DI.COM to External 5V, PWM.GND to External GND. (Please refer to section 1.2 Pin Assignment)

Now, follow the steps to configure the related parameter:

Step 1: Change the authority of “demo8088W.exe”

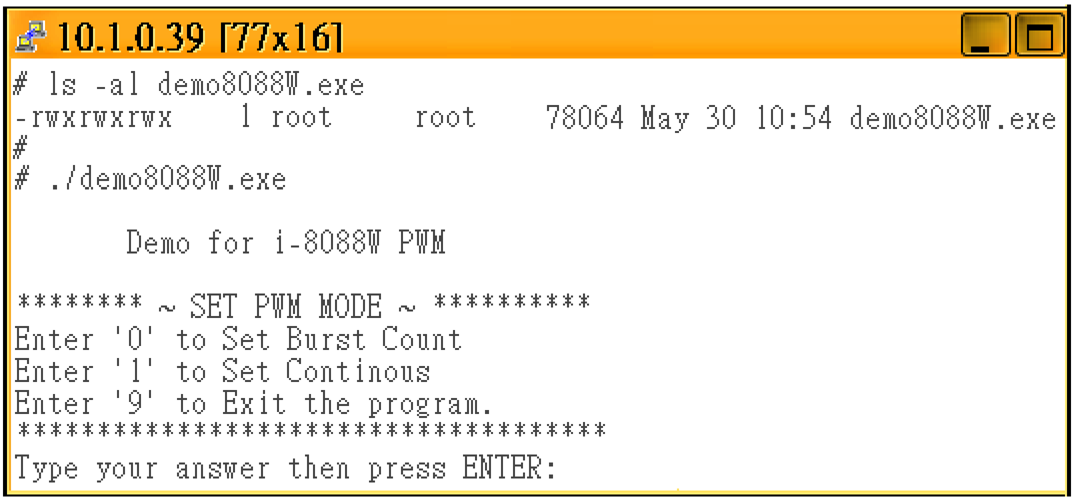
For example, my LP-8x4x’s IP address is 10.1.0.39, and telnet to the LP-8x4x by pietty.exe as below:



```
installed modules list
slot 1 ... 8088
# pwd
/root
# ls
demo8088W.exe
# chmod 777 demo8088W.exe
#
# ls -al demo8088W.exe
-rwxrwxrwx    1 root     root     78064 May 30 10:54 demo8088W.exe
#
```

Step 2: Change the authority of “demo8088W.exe”

When you run the program, it will initialize the i-8088W module and obtain the related information as shown below.

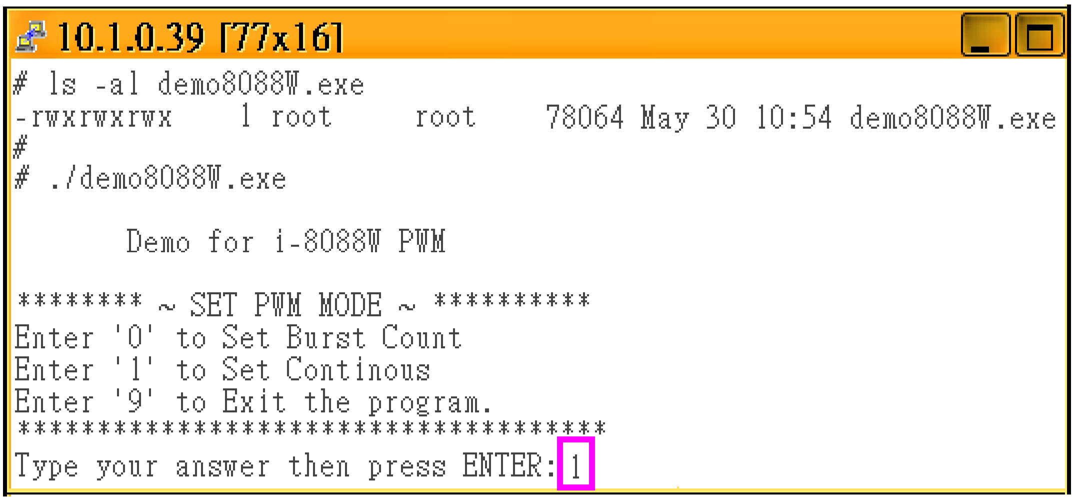


10.1.0.39 [77x16]

```
# ls -al demo8088W.exe
-rwxrwxrwx    1 root     root     78064 May 30 10:54 demo8088W.exe
#
# ./demo8088W.exe

       Demo for i-8088W PWM

******** ~ SET PWM MODE ~ **********
Enter '0' to Set Burst Count
Enter '1' to Set Continous
Enter '9' to Exit the program.
*************************************
Type your answer then press ENTER:
```

Step3: Set PWM Mode

This setting includes two modes – “Burst Count Mode” and “Continuous Mode”.
“Burst Count Mode” means it can output multiple fixed pulse in a period time and then stop output. “Continuous Mode” means it can output one fixed pulse in a period time and continue output.
In this example, we enter "1" to set it as "Continuous mode".



10.1.0.39 [77x16]

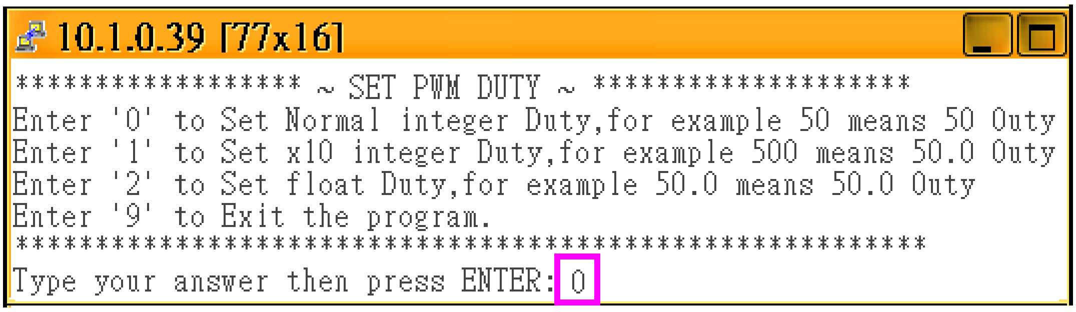
```
# ls -al demo8088W.exe
-rwxrwxrwx    1 root     root     78064 May 30 10:54 demo8088W.exe
#
# ./demo8088W.exe

       Demo for i-8088W PWM

******** ~ SET PWM MODE ~ **********
Enter '0' to Set Burst Count
Enter '1' to Set Continous
Enter '9' to Exit the program.
*************************************
Type your answer then press ENTER:1
```

Step 4: Set PWM Duty

There are three options in this setting, if you choose:

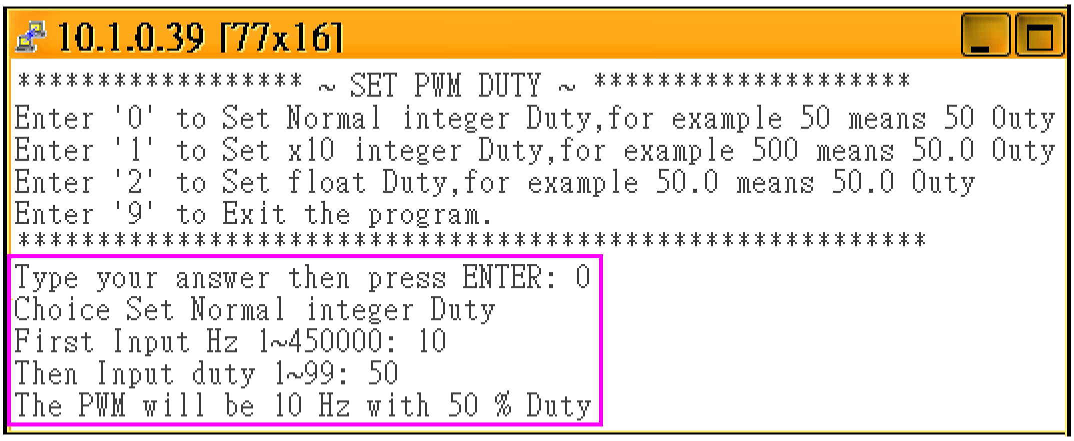
- "0" means you can enter an integer value (ex. input 50 to set it as 50 %)
- "1" means you can enter an integer value to set it as one decimal place value. (ex. input 999 to set it as 99.9 %)
- "2" means you can enter a one decimal place value. (ex. input 99.9 to set it as 99.9 %)

In this example, please enter "0" to set it as “Normal integer Duty”



```
****************** ~ SET PWM DUTY ~ ********************
Enter '0' to Set Normal integer Duty,for example 50 means 50 0uty
Enter '1' to Set x10 integer Duty,for example 500 means 50.0 0uty
Enter '2' to Set float Duty,for example 50.0 means 50.0 0uty
Enter '9' to Exit the program.
*********************************************************
Type your answer then press ENTER: 0
```

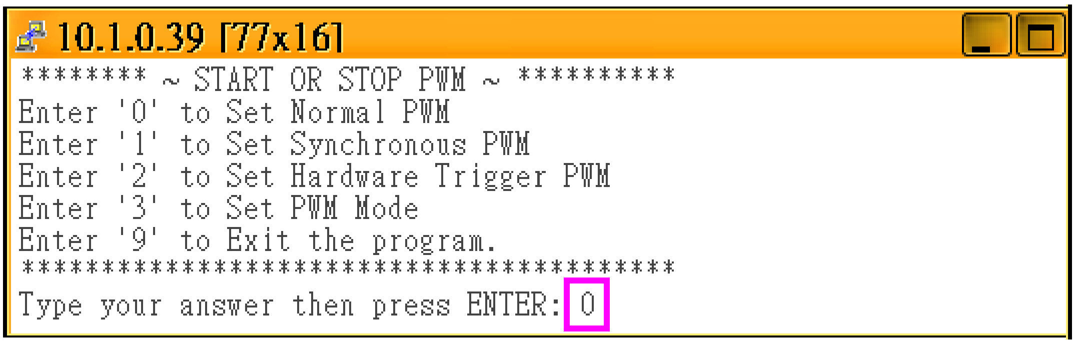
Then, we will set its frequency as 10 Hz, PWM duty as 50 %.



```
****************** ~ SET PWM DUTY ~ ********************
Enter '0' to Set Normal integer Duty,for example 50 means 50 0uty
Enter '1' to Set x10 integer Duty,for example 500 means 50.0 0uty
Enter '2' to Set float Duty,for example 50.0 means 50.0 0uty
Enter '9' to Exit the program.
*********************************************************
Type your answer then press ENTER: 0
Choice Set Normal integer Duty
First Input Hz 1~450000: 10
Then Input duty 1~99: 50
The PWM will be 10 Hz with 50 % Duty
```

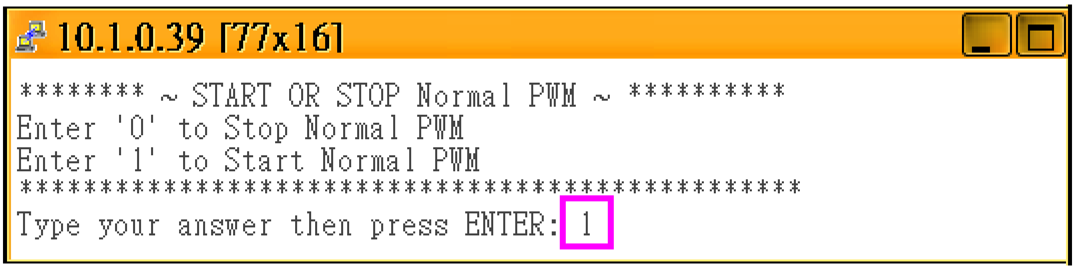
Step 5: Start PWM

You will see three modes in below picture, please enter “0” to set it as “Normal PWM”



```
******** ~ START OR STOP PWM ~ **********
Enter '0' to Set Normal PWM
Enter '1' to Set Synchronous PWM
Enter '2' to Set Hardware Trigger PWM
Enter '3' to Set PWM Mode
Enter '9' to Exit the program.
****************************************
Type your answer then press ENTER: 0
```

Then enter “0” to start the PWM.

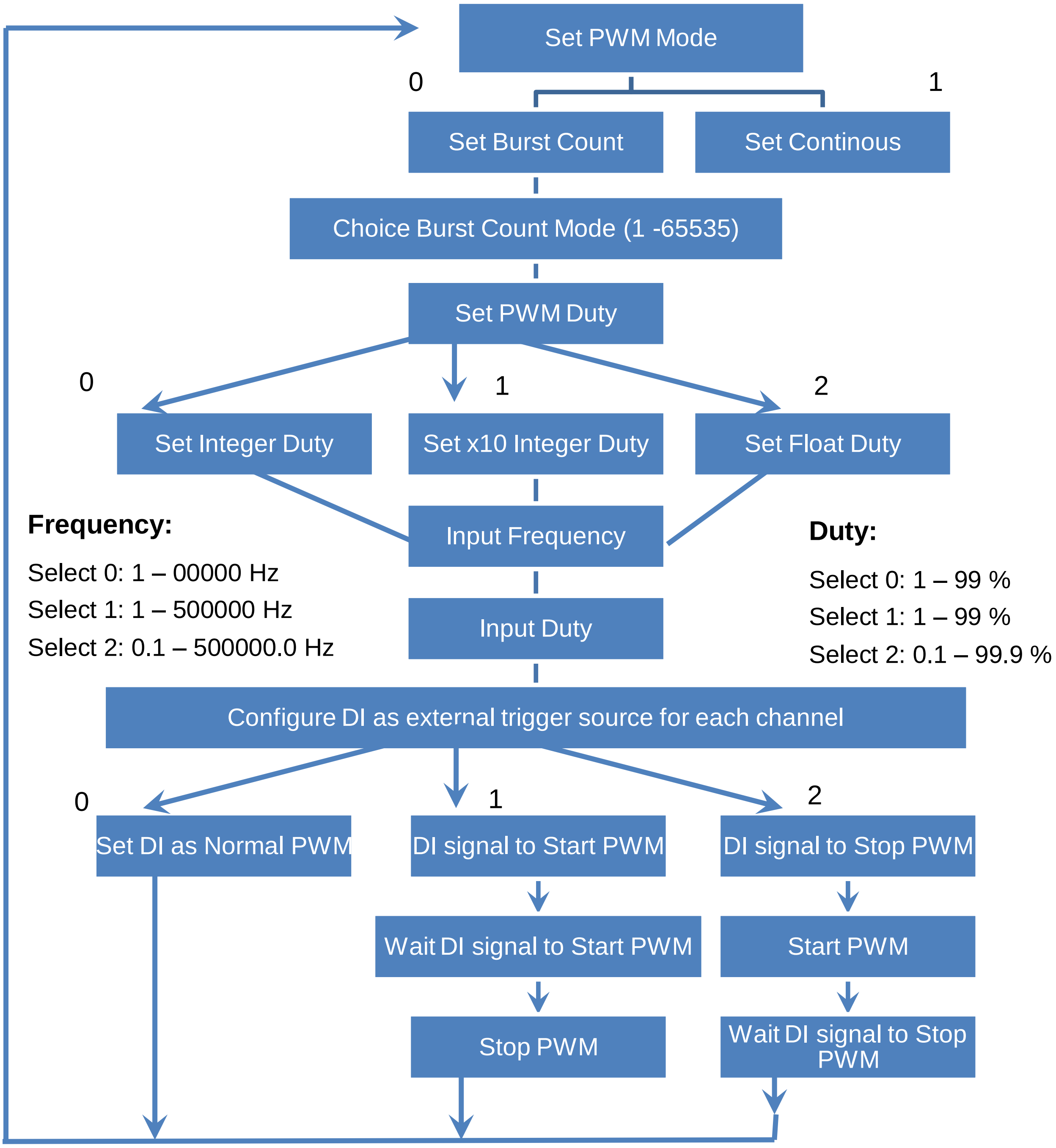


```
******** ~ START OR STOP Normal PWM ~ **********
Enter '0' to Stop Normal PWM
Enter '1' to Start Normal PWM
***********************************************
Type your answer then press ENTER: 1
```

If you have completed the correct setup, you will see below picture. In this example, it will send the “start PWM“ command to channel 0 ~ 7, the condition is 10 Hz with 50% duty, and we has connected the PWM0 to DI0, so the DI0 will blink per 0.5 seconds.

2.3. Using DI to Trigger PWM

2.3.1. Flow Chart



Frequency:

Select 0: 1 – 00000 Hz
Select 1: 1 – 500000 Hz
Select 2: 0.1 – 500000.0 Hz

Duty:

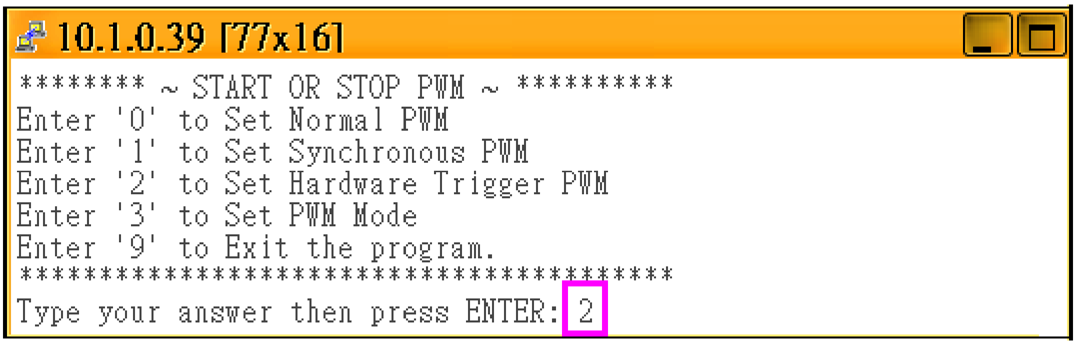
Select 0: 1 – 99 %
Select 1: 1 – 99 %
Select 2: 0.1 – 99.9 %

2.3.2. How to Setup the Trigger PWM

There are 8 DI pins on I-8088W, normally these DI pin just acts as digital input channels. We can also configure them as external trigger signal pins to start or stop the PWM output.

Step 1: Follow the same way in section 2.2.2 to configure PWM output mode and set PWM duty and frequency.

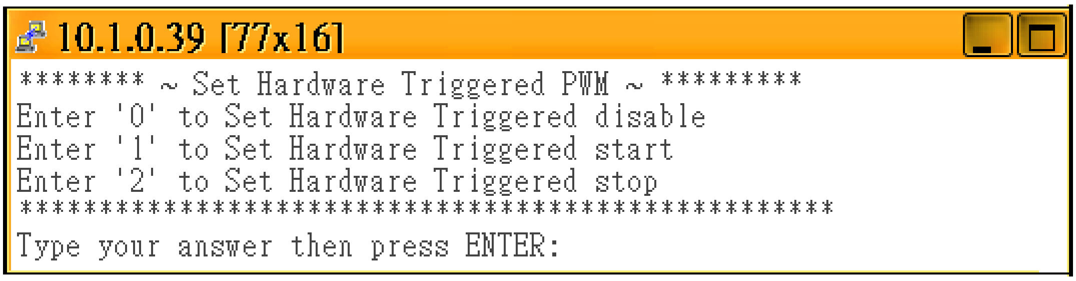
Step 2: Enter "1" to set "Hardware Trigger PWM"



```
******** ~ START OR STOP PWM ~ **********
Enter '0' to Set Normal PWM
Enter '1' to Set Synchronous PWM
Enter '2' to Set Hardware Trigger PWM
Enter '3' to Set PWM Mode
Enter '9' to Exit the program.
****************************************
Type your answer then press ENTER: 2
```

There are three options to set the DI channels as PWM trigger signal:

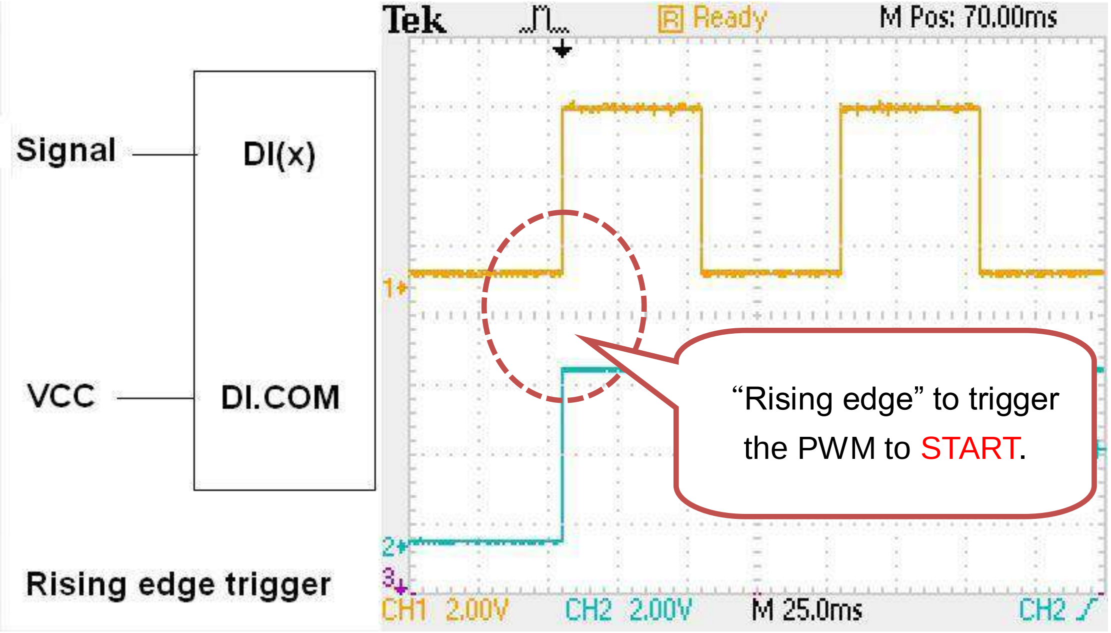
- "0": Normal DI. If you set it as "Normal DI" mode, it will be unrelated to the PWM function.
- "1": Accept DI signal to start the PWM output.
- "2": Accept DI signal to stop the PWM output.



```
******** ~ Set Hardware Triggered PWM ~ *********
Enter '0' to Set Hardware Triggered disable
Enter '1' to Set Hardware Triggered start
Enter '2' to Set Hardware Triggered stop
**************************************************
Type your answer then press ENTER:
```

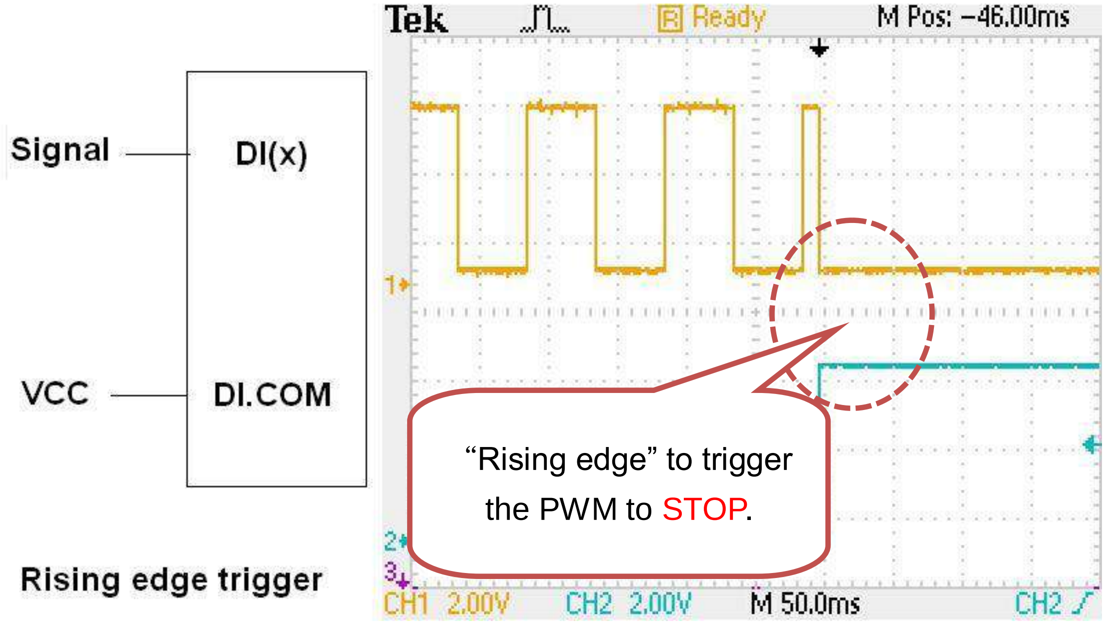
There are two ways to configure the DI signal to start or stop the PWM output. One is rising edge to trigger the PWM to start or stop, the wiring like below two pictures.

Rising edge to Start PWM



"Rising edge" to trigger the PWM to START.

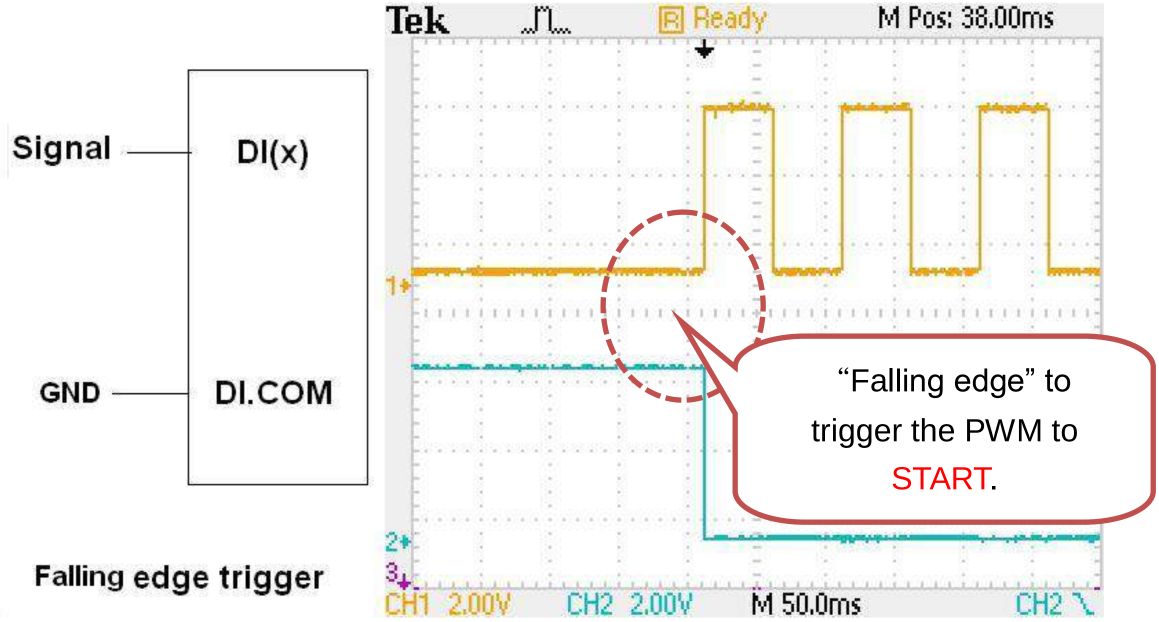
Rising edge to Stop PWM



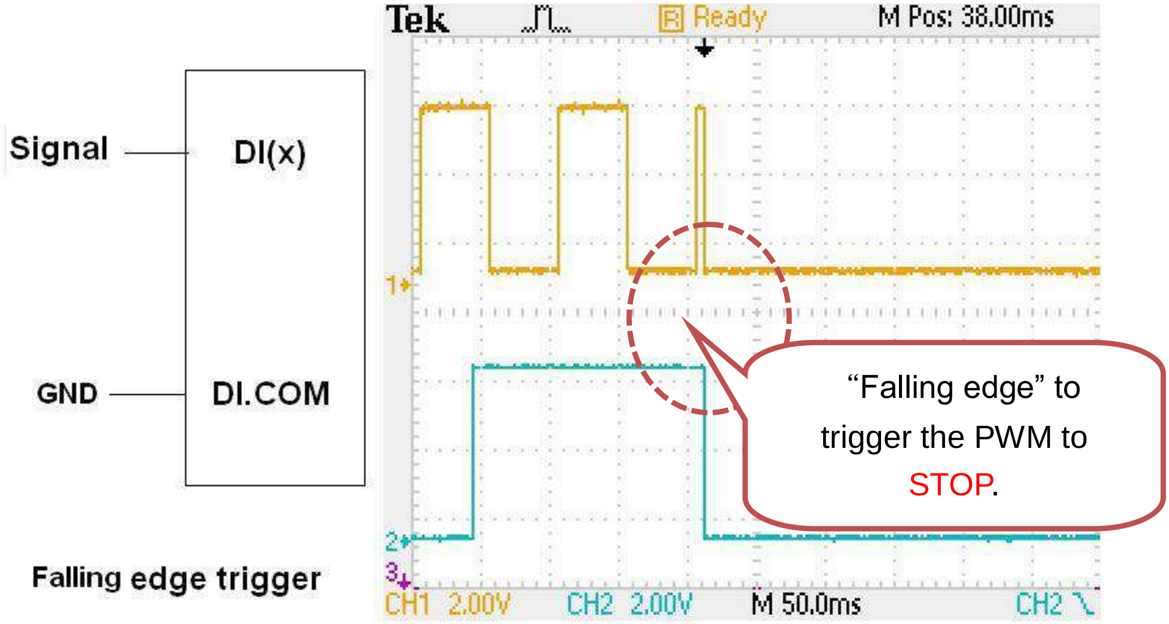
"Rising edge" to trigger the PWM to STOP.

The other is falling edge to trigger the PWM to start or stop, the wiring like below two pictures.

Falling edge to Start PWM

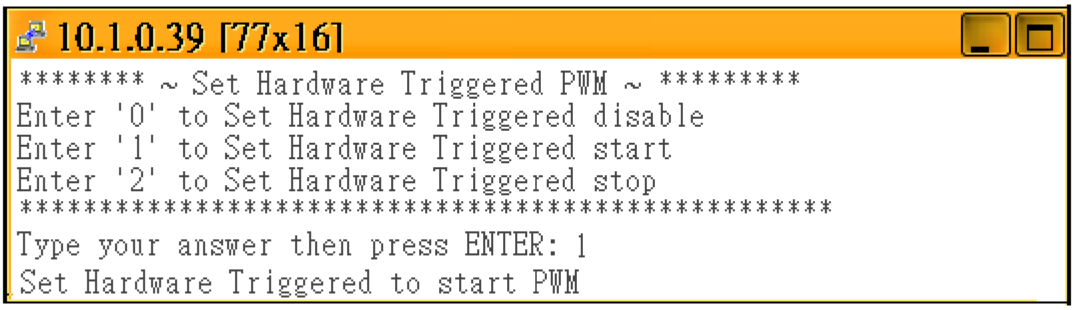


Falling edge to Stop PWM



Step 3: Start the PWM

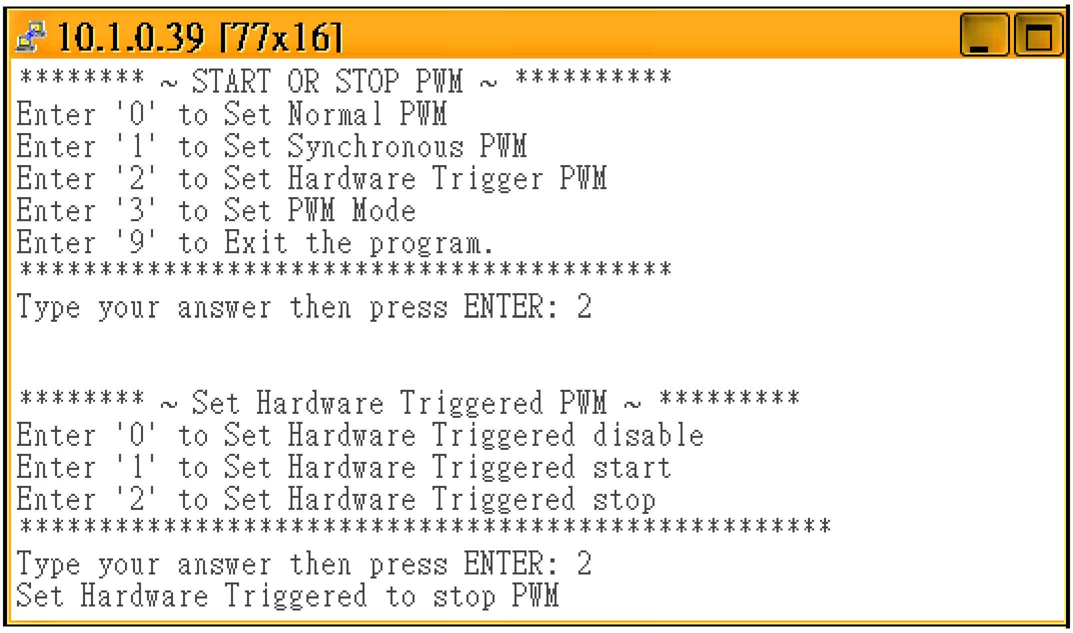
You can enter “1” to start the PWM output. It will start PWM when received an external trigger signal.



```
******** ~ Set Hardware Triggered PWM ~ *********
Enter '0' to Set Hardware Triggered disable
Enter '1' to Set Hardware Triggered start
Enter '2' to Set Hardware Triggered stop
***************************************************
Type your answer then press ENTER: 1
Set Hardware Triggered to start PWM
```

Step 4: Stop the PWM:

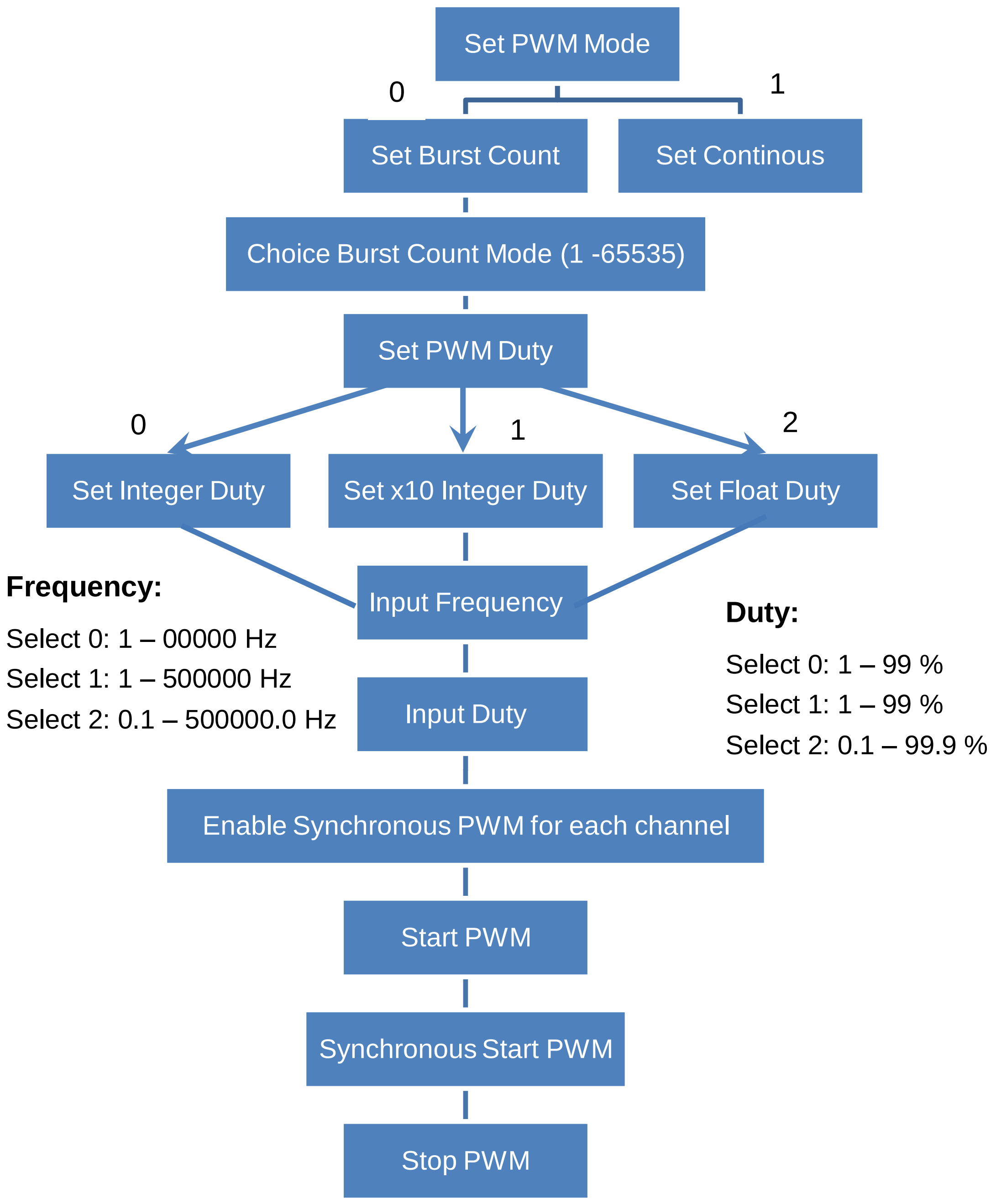
In Normal PWM mode, the signal will continue transfer until you go back to enter “2” to stop the PWM output.



```
******** ~ START OR STOP PWM ~ **********
Enter '0' to Set Normal PWM
Enter '1' to Set Synchronous PWM
Enter '2' to Set Hardware Trigger PWM
Enter '3' to Set PWM Mode
Enter '9' to Exit the program.
*****************************************
Type your answer then press ENTER: 2


******** ~ Set Hardware Triggered PWM ~ *********
Enter '0' to Set Hardware Triggered disable
Enter '1' to Set Hardware Triggered start
Enter '2' to Set Hardware Triggered stop
***************************************************
Type your answer then press ENTER: 2
Set Hardware Triggered to stop PWM
```

2.4. Synchronize PWM

2.4.1. Flow Chart



Frequency:

Select 0: 1 – 00000 Hz

Select 1: 1 – 500000 Hz

Select 2: 0.1 – 500000.0 Hz

Duty:

Select 0: 1 – 99 %

Select 1: 1 – 99 %

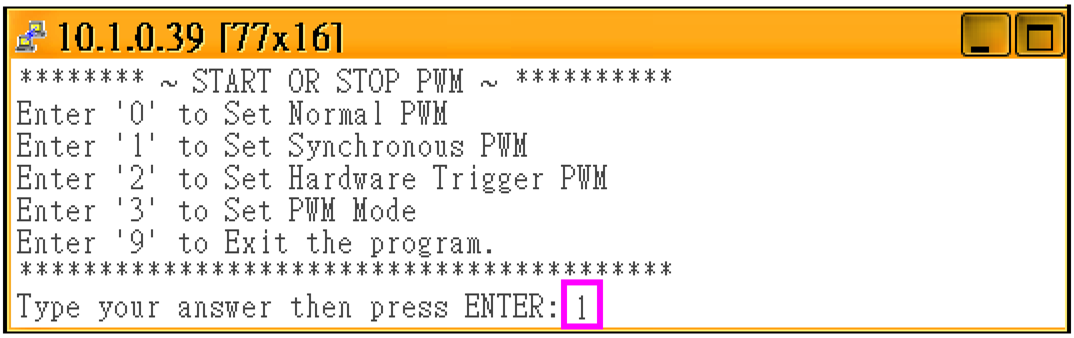
Select 2: 0.1 – 99.9 %

2.4.2. How to Setup the Standard PWM

I-8088W can configure each PWM output channel as synchronous mode.

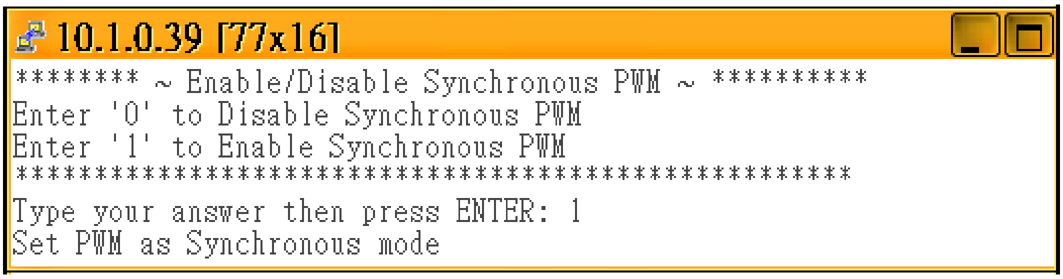
Step 1: Follow the same way in section 2.2.2 to configure PWM output mode and set PWM duty and frequency.

Step 2: Enter “2” to set “Synchronous PWM”



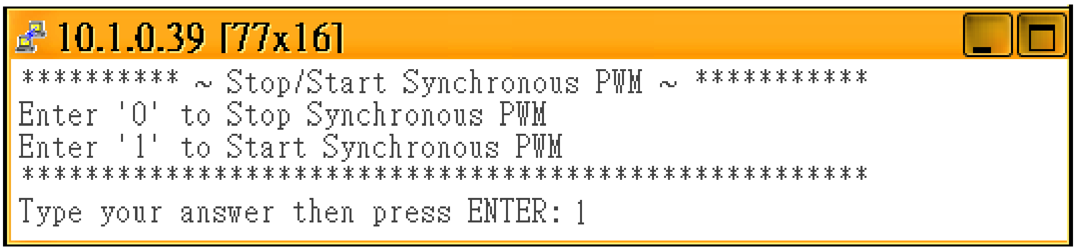
```
******** ~ START OR STOP PWM ~ **********
Enter '0' to Set Normal PWM
Enter '1' to Set Synchronous PWM
Enter '2' to Set Hardware Trigger PWM
Enter '3' to Set PWM Mode
Enter '9' to Exit the program.
****************************************
Type your answer then press ENTER: 1
```

Step 3: Enter“1” to enable



```
******** ~ Enable/Disable Synchronous PWM ~ **********
Enter '0' to Disable Synchronous PWM
Enter '1' to Enable Synchronous PWM
***************************************************
Type your answer then press ENTER: 1
Set PWM as Synchronous mode
```

Step 4: Enter“1” to start Synchronous PWM.

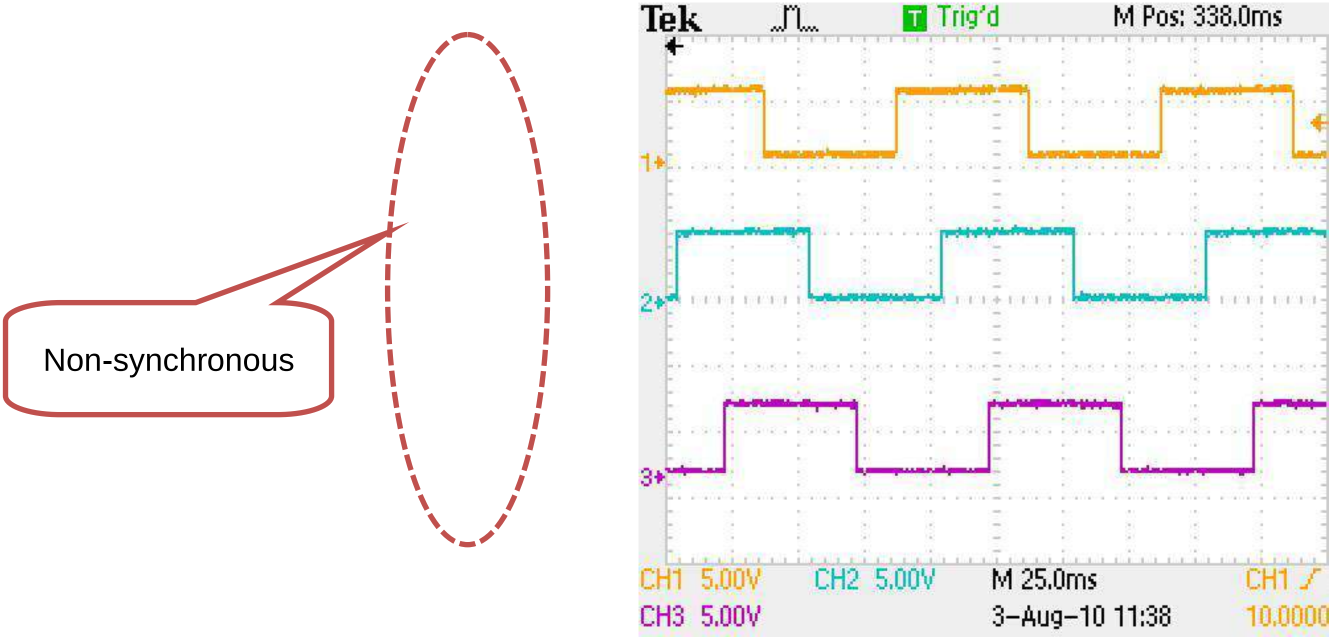


```
********** ~ Stop/Start Synchronous PWM ~ ***********
Enter '0' to Stop Synchronous PWM
Enter '1' to Start Synchronous PWM
***************************************************
Type your answer then press ENTER: 1
```

You will see the different between following two pictures.

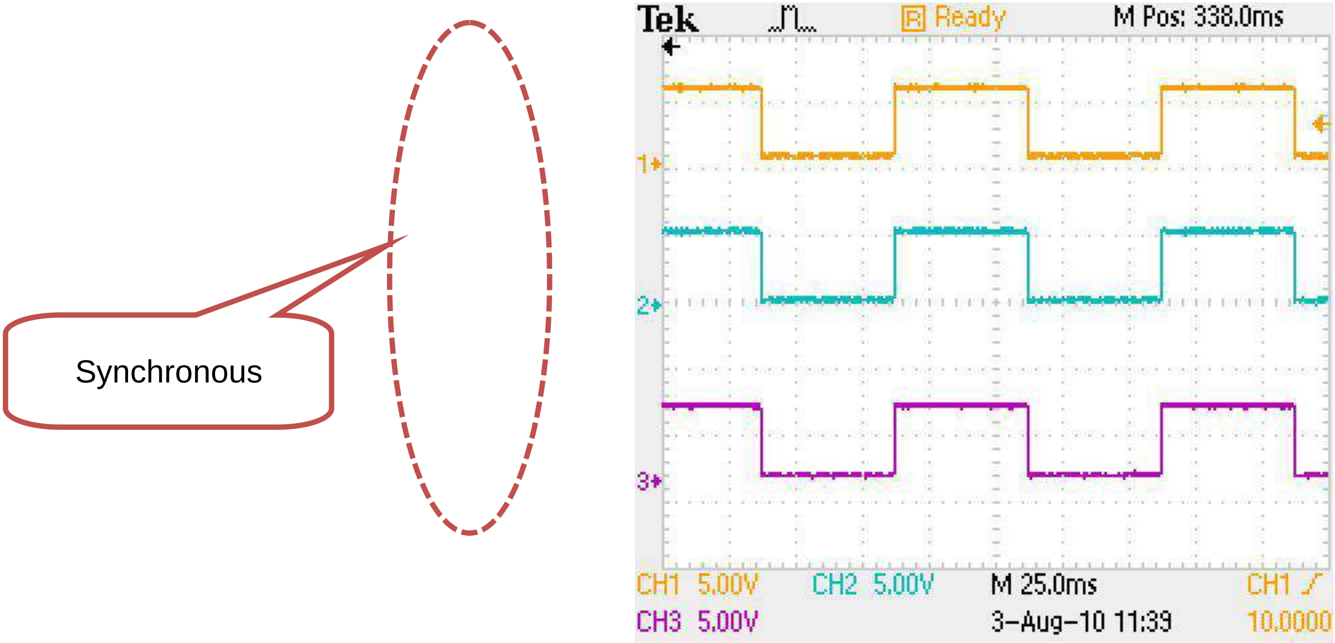
Start PWM:

In previous sections, we can start PWM by software command or DI trigger signal, but you can see the signal is non-synchronous in below picture.



Start Synchronous PWM:

So, we can call i8088W_Sync_Start or pac_i8088W_Sync_Start to start the PWM output and synchronize the rising edge for each synchronous PWM pulse.



3. API for Linux PAC

3.1.1. i8088W_Init

The function can initialize the I-8088W and then check the hardware ID for each slot. If the return value is “0” that means there is an I-8088W module in that slot. If return “-1” that means there is no I-8088W module.

Syntax

```
short i8088W_Init(int slot);
```

Parameters

slot: 1 ~ 8

Return Value

Please refer to Error Code Table.

Example

[C]

```
int slotIndex, err;
err=i8088W_Init(slotIndex);
Open_Slot(slotIndex);
if(err==0)
{
        printf("There is an I-8088W at slot %d\n",slotIndex);
}
else
{
        printf("There is no I-8088W at slot %d\n",slotIndex);
}
```

3.1.2. i8088W_GetFirmwareVersion

The function is used to get the firmware version of I-8088W.

Syntax

```
short i8088W_GetFirmwareVersion(int slot);
```

Parameters

slot: 1 ~ 8

Return Value

The firmware version of I-8088W hardware.

Example

[C]

```
short firmware_version;
Open_Slot(slot);
firmware_version = i8088W_GetFirmwareVersion(int slot);
```

3.1.3. i8088W_GetLibVersion

The function is used to get the version of library file.

Syntax

```
short i8088W_GetLibVersion(void);
```

Parameters

None

Return Value

The versions of library file.

Example

[C]

```
short version;
Open_Slot(slot);
version = i8088W_GetLibVersion();
```

3.1.4. i8088W_SetPWMDuty

The function is used to set the related PWM parameters.

Syntax

```
short i8088W_SetPWMDuty(int slot,int ch,unsigned long hz,unsigned int duty);
```

Parameters

slot: 1 ~ 8

ch: 0 ~ 7

hz: 0 ~ 450K

duty High part: 0 ~ 99

Low part: 100 - High part

Return Value

Please refer to Error Code Table.

Example

[C]

```
int slot,ch;
slot = 1;
Open_Slot(slot);

for(ch=0;ch<8;ch++)
{
    i8088W_ SetPWMDuty (slot, ch, 50);
}
```

3.1.5. i8088W_SetPWMDuty_Deci

The function is used to set the PWM parameters precisely.

Syntax

```
short i8088W_SetPWMDuty_Deci (int slot,int ch,unsigned long deci_Hz,unsigned
int deci_duty);
```

Note

i8088W_SetPWMDuty_Deci is the same as i8088W_SetPWMDuty_float in usage, but the i8088W_SetPWMDuty_Deci will run faster than i8088W_SetPWMDuty_floa for the floating calculation reason

Parameters

slot: 1 ~ 8

ch: 0 ~ 7

deci_Hz example: 10 deci_Hz = 10 Hz

deci_duty 0~999, for example: 503 deci_duty = 50.3% High Part

Low Part=1000 - 503= 497 => 49.7% Low Duty cycle

Return Value

Please refer to Error Code Table.

Example

[C]

```
int slot,ch;
slot = 1;
Open_Slot(slot);

for(ch=0;ch<8;ch++)
{
    i8088W_ SetPWMDuty_Deci(slot,ch,50.3);
}
```

3.1.6. i8088W_SetPWMDuty_float

The function is used to set the PWM parameters precisely

Syntax

```
short i8088W_SetPWMDuty_Float(int slot,int ch,float f_Hz,float f_Duty);
```

Note

i8088W_SetPWMDuty_Deci is the same as i8088W_SetPWMDuty_float in usage, but the i8088W_SetPWMDuty_Deci will run faster than i8088W_SetPWMDuty_floa for the floating calculation reason

Parameters

slot: 1 ~ 8

ch: 0 ~ 7

f_Hz 100 means f_Hz = 10 Hz

f_Duty 0.0~99.9, for example: 50.3 means 50.3% High Part

Low Part =100.0- f_Duty = 49.7 means = 49.7%

Return Value

Please refer to Error Code Table.

Example

[C]

```
int slot,ch;
slot = 1;
Open_Slot(slot);

for(ch=0;ch<8;ch++)
{
    i8088W_ SetPWMDuty_Float (slot,ch,50.3);
}
```

3.1.7. i8088W_GetRealPWMDuty_Deci

The function will get real frequency and duty that can be produced by 8088W.

Syntax

```
short i8088W_GetRealPWMDuty_Deci (int slot,int ch,unsigned long*
deci_hz,unsigned int* deci_duty);
```

Note

The duty and frequency of 8088W PWM is discrete not continuous,when we use i8088W_SetPWMDuty to configure the duty and frequency, we have to use this function to check the real duty and frequency which can be produced by 8088W normally, at low frequency 10K, the configued frequency will be closer to real frequcncy can be generated.

Parameters

slot: 1 ~ 8

ch: 0 ~ 7

deci_hz: the real frequency produced by 8088W unit (x10Hz)

deci_duty: the real duty produced by 8088W (x10 %)

Return Value

Please refer to Error Code Table.

Example

[C]

```
unsigned long deci_hz;
unsigned int deci_duty
slot = 1;
Open_Slot(slot);

for(ch=0;ch<8;ch++)
{
  i8088W_GetRealPWMDuty_Deci(slot,ch,& deci_hz, & deci_duty);
  Printf(“CH[%d] PWM Hz = %lu ; Duty = %u\n”, ch, deci_hz, deci_duty);
}
```

3.1.8. i8088W_SetPWMCountMode

The function is used to set the count mode of I-8088W.

Syntax

```
short i8088W_SetPWMCountMode(int slot,int ch,unsigned char countMode);
```

Parameters

slot: 1 ~ 8

ch: 0 ~ 7

count Mode

1: Continuos

0: Burst count

Return Value

Please refer to Error Code Table.

Example

[C]

```
int slot,ch;
slot = 1;
mode=0; //burst mode
Open_Slot(slot);

for(ch=0;ch<8;ch++)
{
     i8088W_ SetPWMCountMode(slot,ch,mode);
}
```

3.1.9. i8088W_SetBurstCount

The function is used to set the BurstCount of I-8088W.

Syntax

```
short i8088W_SetBurstCount(int slot,int ch,unsigned int burstCount);
```

Parameters

slot: 1 ~ 8

ch: 0 ~ 7

burstCount: 0~65536

Return Value

Please refer to Error Code Table.

Example

[C]

```
int slot=1, ch, burstCount;
Open_Slot(slot);
burstCount=10000; for(ch=0;ch<8;ch++)
{
    i8088W_ SetBurstCount (slot, ch, burstCount);
}
```

3.1.10. i8088W_PWM_Start

The function is used to start the PWM pulse.

Syntax

```
short i8088W_PWM_Start(int slot,int ch);
```

Parameters

slot: 1 ~ 8

ch: 0 ~ 7

Return Value

Please refer to Error Code Table.

Example

[C]

```
int slot,ch;
slot = 1;
Open_Slot(slot);
for(ch=0;ch<8;ch++)
{
    i8088W_PWM_Start (slot,ch);
}
```

3.1.11. i8088W_PWM_Stop

The function is used to stop the PWM pulse.

Syntax

```
short i8088W_PWM_Stop(int slot,int ch);
```

Parameters

slot: 1 ~ 8

ch: 0 ~ 7

Return Value

Please refer to Error Code Table.

Example

[C]

```
int slot=1, ch;
Open_Slot(slot);
for(ch=0;ch<8;ch++)
{
    i8088W_PWM_Stop(slot, ch);
}
```

3.1.12. i8088W_SetSyncChannel

The function is used to set the specific channel as synchronous.

Syntax

```
short i8088W_SetSyncChannel(int slot,int ch,int enBit);
```

Parameters

slot: 1 ~ 8

ch: 0 ~ 7

enBit

1: define channel as synchronous mode,

0: not synchronous mode

Return Value

Please refer to Error Code Table.

Example

[C]

```
int slot, ch, enBit;
slot = 1;
enBit=1;
Open_Slot(slot);

for(ch=0;ch<8;ch++)
{
  i8088W_ SetSyncChannel(slot, ch, enBit);
}
```

3.1.13. i8088W_GetSyncChannel

The function is used to get the synchronous channel by using array.

Syntax

```
short i8088W_GetSyncChannel(int slot,int syncArr[]);
```

Parameters

slot: 1 ~ 8

syncArr[] is an 8 bit array

syncArr[i]=1 means channel[i] is set as synchronous1: define

Return Value

Please refer to Error Code Table.

Example

[C]

```
int slot, syncArr[];
slot = 1;
Open_Slot(slot);

i8088W_ GetSyncChannel (slot, syncArr);
```

3.1.14. i8088W_Sync_Start

The function is used to start the synchronization of PWM pulse.

Syntax

```
short i8088W_Sync_Start(int slot);
```

Parameters

slot: 1 ~ 8

Return Value

Please refer to Error Code Table.

Example

[C]

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

i8088W_Sync_Start (slot);
```

3.1.15. i8088W_Sync_Stop

The function is used to stop the synchronization of PWM pulse.

Syntax

```
short i8088W_Sync_Stop(int slot);
```

Parameters

slot 1 ~ 8

Return Value

Please refer to Error Code Table.

Example

[C]

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

i8088W_Sync_Stop (slot);
```

3.1.16. i8088W_SetHardwareTrigChannel

The "DI" pin of I-8088W can be set as hardware trigger pin or simply DI pin. The user can call this function to specify the status of channels.

Syntax

```
short i8088W_SetHardwareTrigChannel(int slot,int ch,int triggerState);
```

Parameters

slot: 1 ~ 8

ch: 0 ~ 7

triggerState

0, disabled hardware trigger (Normal DI pin)

1, means this DI has been configured as external trigger signal for I-8088W to startup its PWM pulse.

2, this DI has been configured as external trigger signal for I-8088W to stop its PWM pulse.

Return Value

Please refer to Error Code Table.

Example

[C]

```
int slot,ch, triggerState;
slot = 1;
Open_Slot(slot);

triggerState=0;
for(ch=0;ch<8;ch++)
{
  i8088W_ SetHardwareTrigChannel (slot,ch, triggerState);
}
```

3.1.17. i8088W_GetHardwareTrigChannel

The "DI" pin of I-8088W can be set as hardware trigger pin or simply DI pin. The user can call this function to know the status of channels.

Syntax

```
short i8088W_GetHardwareTrigChannel(int slot,int ch,int* triggerState);
```

Parameters

slot: 1 ~ 8

ch: 0 ~ 7

triggerState

0, disabled hardware trigger (Normal DI pin)

1, means this DI has been configured as external trigger signal for I-8088W to startup its PWM pulse.

2, this DI has been configured as external trigger signal for I-8088W to stop its PWM pulse.

Return Value

Please refer to Error Code Table.

Example

[C]

```
int slot,ch, triggerState;
slot = 1;
Open_Slot(slot);
triggerState=0;
for(ch=0;ch<8;ch++)
{
  i8088W_ GetHardwareTrigChannel(slot,ch,& triggerState);
}
```

3.1.18. i8088W_GetPWMActiveState

The function is used to get PWM status.

Syntax

```
short i8088W_GetPWMActiveState(int slot,unsigned int *State,int ActiveArr[]);
```

Parameters

slot: 1 ~ 8

*State: the PWM output status of i-8088 value 0~0xff

ActiveArr[]: the *State value will be parse into Bit Array

When PWM generate pulse output, the state will be 1, we can know which PWM channel is sending PWM output. If we configure PWM as Burst Count mode, the PWM output will be stop when it sends confgured count of PWM pulse (for example 1000 pulse) by using this function, we can know the actural PWM output state.

Return Value

Please refer to Error Code Table.

Example

[C]

```
int slot=1,ch,activatedBit[8];
unsigned int activatedState=0;
Open_Slot(slot);

i8088W_GetPWMActiveState (slot,& activatedState, activatedBit);
for(ch=0;ch<8;ch++)
{
   if(activatedBit[ch])
   printf(“PWM CH[%d] is activated\n”,ch);
}
```

3.1.19. i8088W_GetDI

The function is used to get DI status. The user can view which channels have received the signals.

Syntax

```
short i8088W_GetDI(int slot,unsigned int *diVal,int diArr[]);
```

Parameters

slot: 1 ~ 8

diVal: the DI status of i-8088 value 0~0xff

diArr[]: the *DI value will be parse into Bit Array

Return Value

Please refer to Error Code Table.

Example

[C]

```
int slot;
ch,enBit[8];
Slot=1;
unsigned int dival=0;
Open_Slot(slot);

i8088W_GetDI(slot, &diVal,enBit);
printf ("DI Vaule = %02X\n",diVal);

for (ch=0; ch< 8; ch++)
{
  printf ("DI[%d]= %d\n",ch, enBit[ch]);
}
```

Appendix. Error Codes

0	OK
-1	ID_ERROR
-2	SLOT_OUT_RANGE
-3	CHANNEL_OUT_RANGE
-4	SELECT_CHANNEL_ERROR
-5	HI_DUTY_OUT_RANGE
-6	LO_DUTY_OUT_RANGE