

# PXI1117

## User's Manual

 **Beijing ART Technology Development Co., Ltd.**

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# Chapter 1 Overview

ART PXI1117 module is designed for data acquisition applications with 16-bit resolution analog output.

It can be directly inserted into a slot of PXI chassis to constitute the laboratory, product quality testing center and systems for different areas of data acquisition, waveform analysis and processing. It may also constitute the monitoring system for industrial production process.

## Unpacking Checklist

Check the shipping carton for any damage. If the shipping carton and contents are damaged, notify the local dealer or sales for a replacement. Retain the shipping carton and packing material for inspection by the dealer.

Check for the following items in the package. If there are any missing items, contact your local dealer or sales.

- PXI1117
- ART Disk
  - a) user's manual (pdf)
  - b) drive
  - c) catalog
- Warranty Card

## FEATURES

### Analog Output

- Converter Type: AD7945BRS
- Output Range: 0~10V,  $\pm 5V$ ,  $\pm 10V$
- 12-bit resolution
- Update Rate: 153Hz~1MHz
- Output channels: 2 differential outputs
- Memory Size: 128K word RAM
- Trigger Mode: software and hardware trigger (external trigger)
- Trigger Type: level trigger , edge trigger
- Trigger Direction: negative, positive, either positive or negative trigger
- Clock Source: internal clock and external clock (software configuration)
- Synchronization Clock Direction: synchronization clock input, synchronization clock output
- Synchronization Clock Source: synchronization clock io3V\_TRIG4, 3V\_TRIG5, 3V\_TRIG6, 3V\_TRIG7  
Note: only one channel can output each time.
- Trigger Source: ATR (analog trigger signal)
- Trigger Level: 0~10V
- Set-up Time: 600ns
- Non-linear error:  $\pm 0.5LSB(max)$
- Operating Temperature: 0 ~ 55°C
- Storage Temperature: -20 ~ 70°C

**Board Clock Oscillation:** 40MHz

# Chapter 2 Component Layout Diagram and a Brief Description

## 2.1 The Main Component Layout Diagram

## 2.2 The Function Description for the Main Component

### 2.2.1 Signal Output Connector

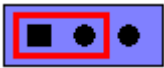
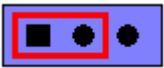
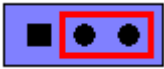
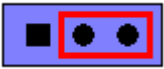
- CN1: analog output connector
- CN6 (IN): AO1 output synchronization clock port
- CN3 (OUT1), CN4 (OUT2), and CN5 (OUT3): AO0 output synchronization clock port

### 2.2.2 Potentiometer

- RP1: trigger level adjustment potentiometer
- RP2: AO1 full-scale adjustment potentiometer
- RP3: AO0 full-scale adjustment potentiometer
- RP4: AO1 zero-point adjustment potentiometer
- RP5: AO0 zero-point adjustment potentiometer

### 2.2.3 Jumper

JP1, JP2: power supply setting

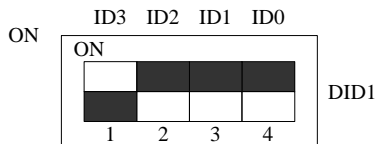
JP1	JP2	Power Supply Setting
		PXI Bus+15V(JP1), -15V(JP2)
		External 30V power, +30V(JP1), -30V(JP2)

### 2.2.4 Physical ID of DIP Switch

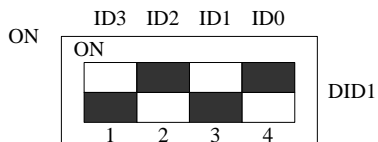
DID1: Set physical ID number. When the PC is installed more than one PXI1117 , you can use the DIP switch to set a physical ID number for each board, which makes it very convenient for users to distinguish and visit each board in the progress of the hardware configuration and software programming. The following four-bit numbers are expressed by the binary system: When DIP switch points to "ON", that means "1", and when it points to the other side, that means "0." As they are shown in the following diagrams: "ID3" is the high bit."ID0" is the low bit, and the black part in the diagram represents the location of the switch. (Test software of the company often uses the logic ID management equipments and at this moment the physical ID DIP switch is invalid. If you want to use more than one device that is the same type in the same system at the same time, please use the physical ID as much as possible.).



The above chart shows "1111", so it means that the physical ID is 15.



The above chart shows "0111", so it means that the physical ID is 7.



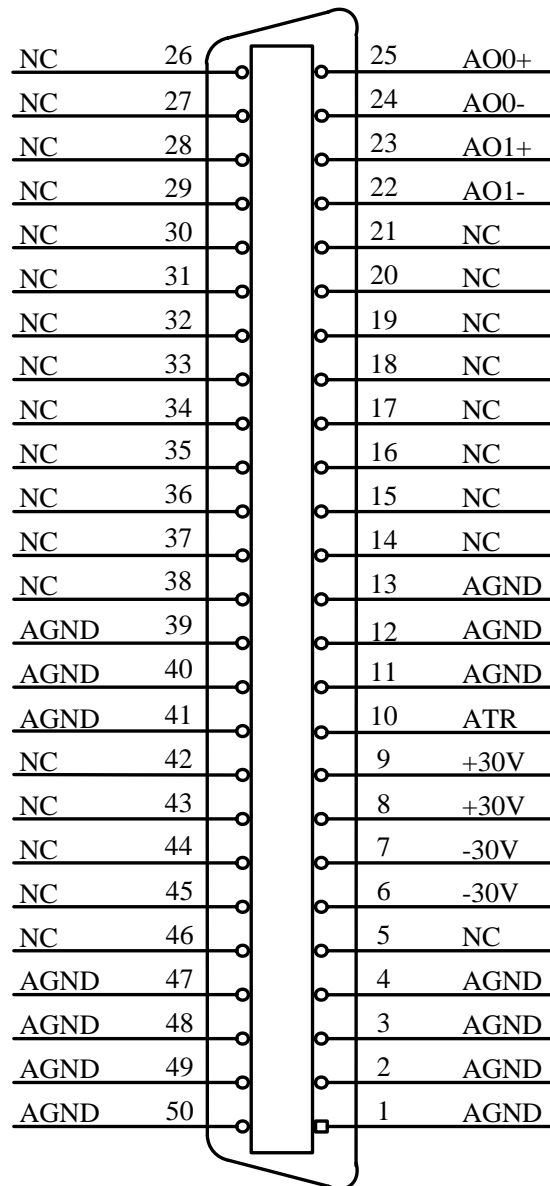
The above chart shows "0101", so it means that the physical ID is 5.

ID3	ID2	ID1	ID0	Physical ID (Hex)	Physical ID (Dec)
OFF (0)	OFF (0)	OFF (0)	OFF (0)	0	0
OFF (0)	OFF (0)	OFF (0)	ON (1)	1	1
OFF (0)	OFF (0)	ON (1)	OFF (0)	2	2
OFF (0)	OFF (0)	ON (1)	ON (1)	3	3
OFF (0)	ON (1)	OFF (0)	OFF (0)	4	4
OFF (0)	ON (1)	OFF (0)	ON (1)	5	5
OFF (0)	ON (1)	ON (1)	OFF (0)	6	6
OFF (0)	ON (1)	ON (1)	ON (1)	7	7
ON (1)	OFF (0)	OFF (0)	OFF (0)	8	8
ON (1)	OFF (0)	OFF (0)	ON (1)	9	9
ON (1)	OFF (0)	ON (1)	OFF (0)	A	10
ON (1)	OFF (0)	ON (1)	ON (1)	B	11
ON (1)	ON (1)	OFF (0)	OFF (0)	C	12
ON (1)	ON (1)	OFF (0)	ON (1)	D	13
ON (1)	ON (1)	ON (1)	OFF (0)	E	14
ON (1)	ON (1)	ON (1)	ON (1)	F	15

# Chapter 3 Signal Connector and Connection of Signal

## 3.1 Signal Connector

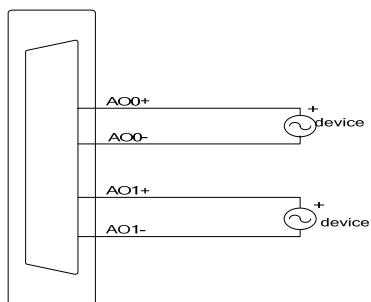
CN1: 50-pin SCSI definition



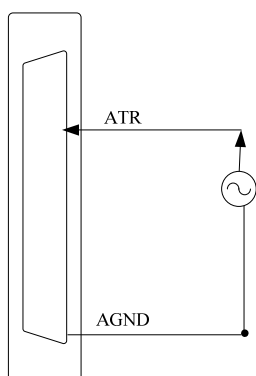
Pin definition

Pin Name	Feature	Function
AO0+~AO1+	Output	Analog output positive terminal.
AO0-~AO1-	Output	Analog output negative terminal.
AGND	GND	Ground.
+30V	Input	+30V input port
-30V	Input	-30V output port
ATR	Input	Analog trigger signal.
NC		NC

### 3.1 Analog Output



### 3.2 Trigger Signal Connection



## Chapter 4 Methods of Using Trigger Function

### 4.1 Analog Output Wave

DA can output the following waves: line, sine wave, pyramidal wave, square wave, and random wave.

### 4.2 Trigger Function of DA

#### 4.2.1 Internal Trigger Function

When DA is in the initialization, if the hardware parameter `DAPara.TriggerMode = PXI1117_TRIGMODE_SOFT`, we can achieve the internal trigger acquisition. In this function, when calling the `EnableDeviceDA` function, DA immediately access to the conversion process and not wait for the conditions of any other external hardware. It also can be interpreted as the software trigger.

As for the specific process, please see the figure below, the cycle of the DA work pulse is decided by the sampling frequency.

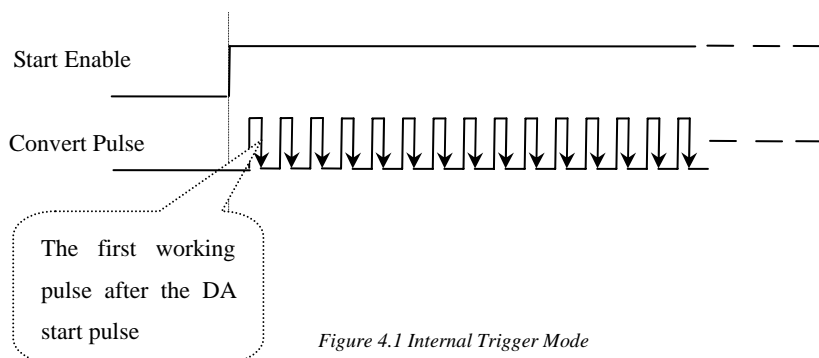


Figure 4.1 Internal Trigger Mode

#### 4.2.2 External Trigger Function

When DA is in the initialization, if the hardware parameter `DAPara.TriggerMode = PXI1117_TRIGMODE_POST`, we can achieve the external trigger acquisition. In this function, when calling the `EnableDeviceDA` function, DA will not immediately access to the conversion process but wait for the external trigger source signals accord with the condition, then start converting the data. It also can be interpreted as the hardware trigger. Trigger source is ATR.

The trigger modes include the edge trigger and level trigger.

##### Edge Trigger Function

Edge trigger is to capture the characteristics of the changes between the trigger source signal and the trigger level signal to trigger DA conversion. When `TriggerType= PXI1117_TRIGTYPE_EDGE`, it is the edge trigger type.



When `DAPara.TriggerDir = PXI1117_TRIGDIR_NEGATIVE`, choose the trigger mode as the falling edge trigger. That is, when the ATR trigger signal is on the falling edge, DA will immediately access to the conversion process, and its follow-up changes have no effect on DA output.

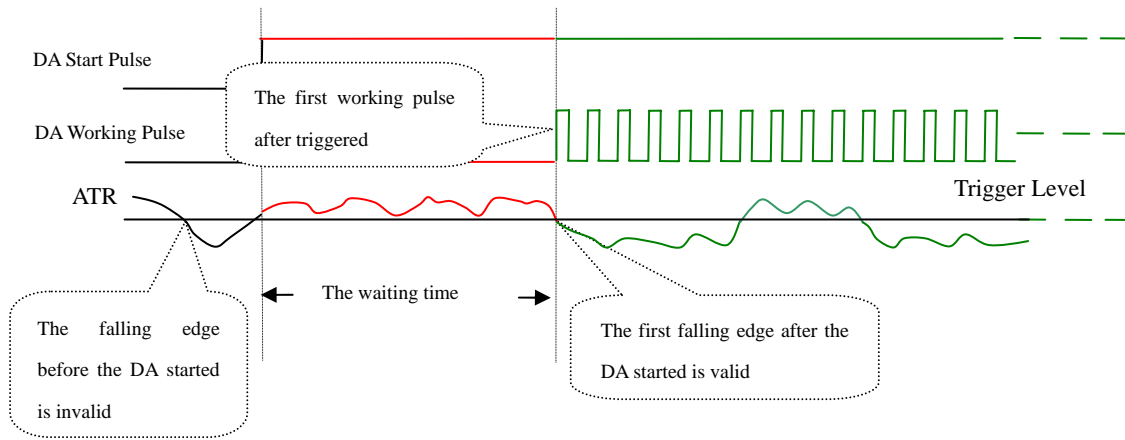


Figure 5.2 Falling edge Trigger

When `DAPara.TriggerDir = PXI1117_TRIGDIR_POSITIVE`, choose the trigger mode as rising edge trigger. That is, when the ATR trigger signal is on the rising edge, DA will immediately access to the conversion process, and its follow-up changes have no effect on DA output.

When `DAPara.TriggerDir = PXI1117_TRIGDIR_POSIT_NEGAT`, choose the trigger mode as rising or falling edge trigger. That is, when the ATR trigger signal is on the rising or falling edge, DA will immediately access to the conversion process, and its follow-up changes have no effect on DA output. This function can be used in the case that the acquisition will occur if the exoteric signal changes.

### Triggering Level Function

Level trigger is to capture the condition that trigger signal is higher or lower than the trigger level to trigger AD conversion. When `DAPara.TriggerType = PXI1117_TRIGTYPE_PULSE`, it is level trigger type.

When `DAPara.TriggerDir = PXI1117_TRIGDIR_NEGATIVE`, DA is in the conversion process if the ATR is lower than the trigger level. And DA output will automatically stop if the ATR is higher than the trigger level. DA's work status changes with changes of ATR.

When `DAPara.TriggerDir = PXI1117_TRIGDIR_POSITIVE`, DA is in the conversion process if the ATR is higher than the trigger level. And DA conversion will automatically stop if the ATR is lower than the trigger level. DA's work status changes with changes of ATR.

When `DAPara.TriggerDir = PXI1117_TRIGDIR_POSIT_NEGAT`, it means the trigger level is low. The effect is the same as the internal software trigger.

# Chapter 5 Notes, Calibration and Warranty Policy

## 5.1 Notes:

In product's pack, user can find this user manual, PXI1117 module and quality guarantee card. Users must save quality guarantee card carefully, if the products have some problems and need for repair, please send products together with quality guarantee card to ART, we will make very good after-sale service and solve the problem as quickly as we can.

When using PXI1117, in order to prevent the IC(chip) from electrostatic harm, please do not touch IC (chip) in the front panel of PXI1117 module.

## 5.2 Analog Output Calibration

The default range is  $\pm 10V$ , take it for example, others are similar.

- 1) Zero adjustment: Select AO0 for example, set the output value to 0. Adjust RP5 until the actual output value of AO0 is 0V. RP4 correspond to AO1.
- 2) Full-scale adjustment: Select AO0 for example; set its output value to 4095. Adjust RP3 until the actual output value 9995.11mV. RP2 correspond to AO1.
- 3) Repeat steps above until meet the requirement.

## 5.3 Warranty Policy

Thank you for choosing ART. To understand your rights and enjoy all the after-sales services we offer, please read the following carefully.

1. Before using ART's products please read the user manual and follow the instructions exactly. When sending in damaged products for repair, please attach an RMA application form which can be downloaded from: [www.art-control.com](http://www.art-control.com).
2. All ART products come with a limited two-year warranty:
  - The warranty period starts on the day the product is shipped from ART's factory
  - For products containing storage devices (hard drives, flash cards, etc.), please back up your data before sending them for repair. ART is not responsible for any loss of data.
  - Please ensure the use of properly licensed software with our systems. ART does not condone the use of pirated software and will not service systems using such software. ART will not be held legally responsible for products shipped with unlicensed software installed by the user.
3. Our repair service is not covered by ART's guarantee in the following situations:
  - Damage caused by not following instructions in the User's Manual.
  - Damage caused by carelessness on the user's part during product transportation.
  - Damage caused by unsuitable storage environments (i.e. high temperatures, high humidity, or volatile chemicals).
  - Damage from improper repair by unauthorized ART technicians.
  - Products with altered and/or damaged serial numbers are not entitled to our service.
4. Customers are responsible for shipping costs to transport damaged products to our company or sales office.
5. To ensure the speed and quality of product repair, please download an RMA application form from our company website.