

Product:

PCI-1712

Abstract:

Testing the 1MHz Sampling Rate of the PCI-1712

Description:

This document provides a simple way to test the 1MHz sampling rate of PCI-1712 and information about the maximum sampling rate.

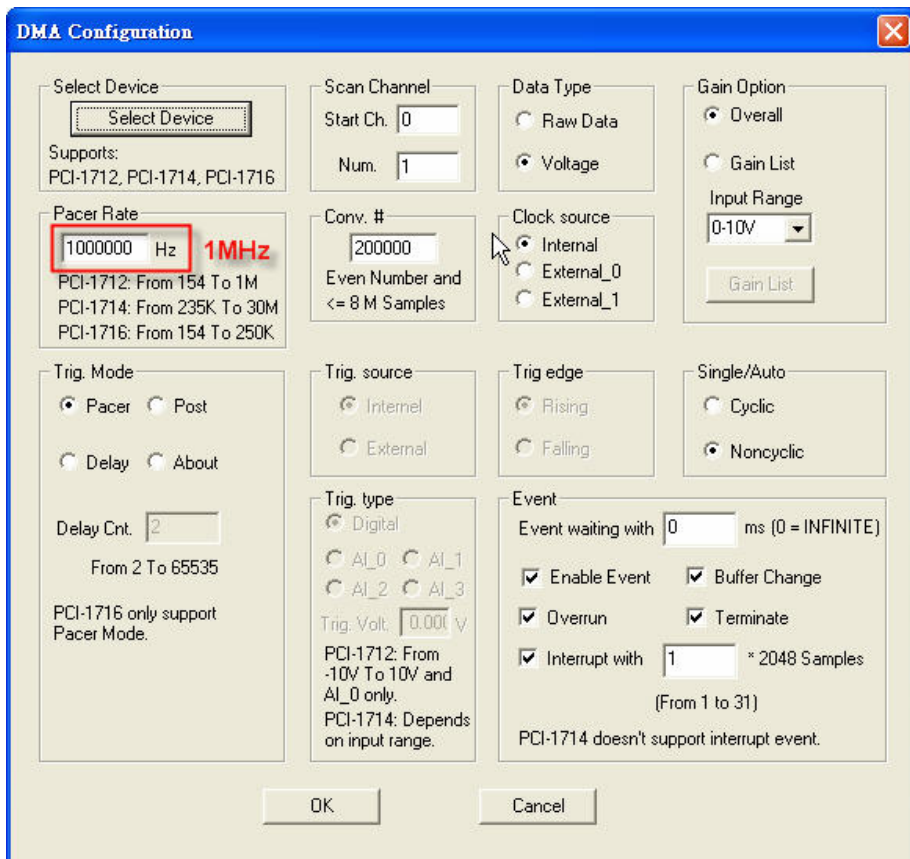
Solution:

To measure the sampling speed of the PCI-1712, a reliable instrument or signal source, like a function generator, is needed to provide a signal with fixed frequency for measurement.

Using the method "DMA-BM" will be necessary to have 1MHz AI sampling.

Please follow the steps below to finish the test.

1. Find VC AD-DMA-BM example in folder:
C:\Program Files\ADVANTECH\ADSAPI\Examples\VC\AD_DMA_BM.
2. Use an instrument to produce 100kHz 0~5V pulse signal to AI channel 0 (pin68+, pin60-).
3. Set parameters in the example setting page as shown below:



DMA Configuration

Select Device:
Supports: PCI-1712, PCI-1714, PCI-1716

Scan Channel: Start Ch. Num.

Data Type: ☐ Raw Data ☒ Voltage

Gain Option: ☒ Overall ☐ Gain List
Input Range:

Pacer Rate: Hz **1MHz**
PCI-1712: From 154 To 1M
PCI-1714: From 235K To 30M
PCI-1716: From 154 To 250K

Conv. #:
Even Number and <= 8 M Samples

Clock source: ☒ Internal ☐ External_0 ☐ External_1

Trig. Mode: ☒ Pacer ☐ Post
☐ Delay ☐ About
Delay Cnt.
From 2 To 65535
PCI-1716 only support Pacer Mode.

Trig. source: ☒ Internal ☐ External

Trig. edge: ☒ Rising ☐ Falling

Single/Auto: ☐ Cyclic ☒ Noncyclic

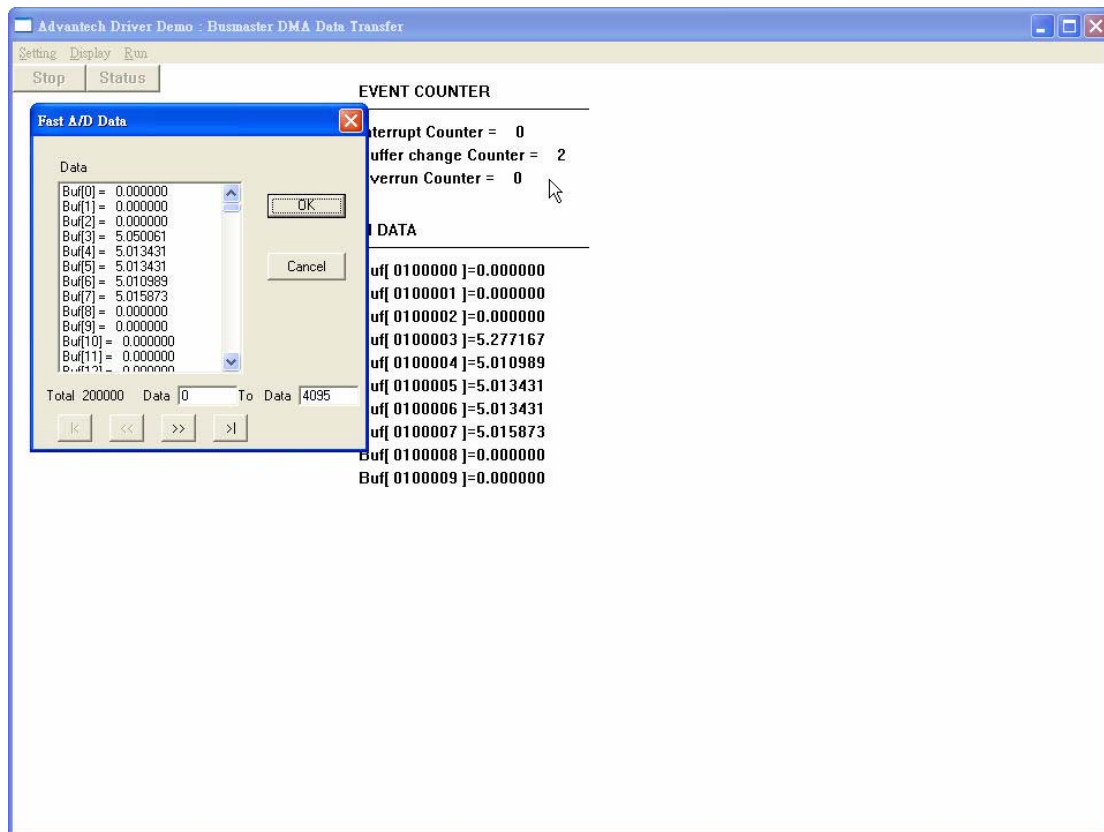
Trig. type: ☒ Digital ☐ AI_0 ☐ AI_1 ☐ AI_2 ☐ AI_3
Trig. Volt. V
PCI-1712: From -10V To 10V and AI_0 only.
PCI-1714: Depends on input range.

Event: Event waiting with ms (0 = INFINITE)
☒ Enable Event ☒ Buffer Change
☒ Overrun ☒ Terminate
☒ Interrupt with * 2048 Samples
(From 1 to 31)
PCI-1714 doesn't support interrupt event.

4. See the result of sampling in the Run page.

Since the sampling rate is 10X faster than the measured signal, there should be 10 data streams being sampled per period.

And you can see from the following picture, the sampling is correct with expected 10 data streams per period.



So it should be an easy way to verify if your PCI-1712 can sample with the sampling speed of 1MHz.

By just installing the example and having a function generator, it can be done.

One thing you have to notice is that the sampling rate is shared by channels. This is because there's only one AD converter for all AI channels, and a multiplex is switching each measured channel to AD converter. For instance, if the customer wants to sample 4 channels, the maximum sampling rate for each channel becomes $1M/4=250k(Hz)$.

The sampled data will be in the order below (if the start channel is ch. 0):

Buf [0] : ... => ch. 0

Buf [1] : ... => ch. 1

Buf [2] : ... => ch. 2

Buf [3] : ... => ch. 3

Buf [4] : ... => ch. 0

Buf [5] : ... => ch. 1

Buf [6] : ... => ch. 2

Buf [7] : ... => ch. 3

Buf [8] : ... => ch. 0

The time interval between each buffer is still $1/1\text{Mhz}=1\mu\text{s}$.

But for each channel, it would be $1\mu\text{s}\times 4=4\mu\text{s}$, resulting in 250kHz sampling rate.