

Lacroy HD4034 控制

一般而言示波器與電腦推薦連接方式:

1. Ethernet

2. 真 USB

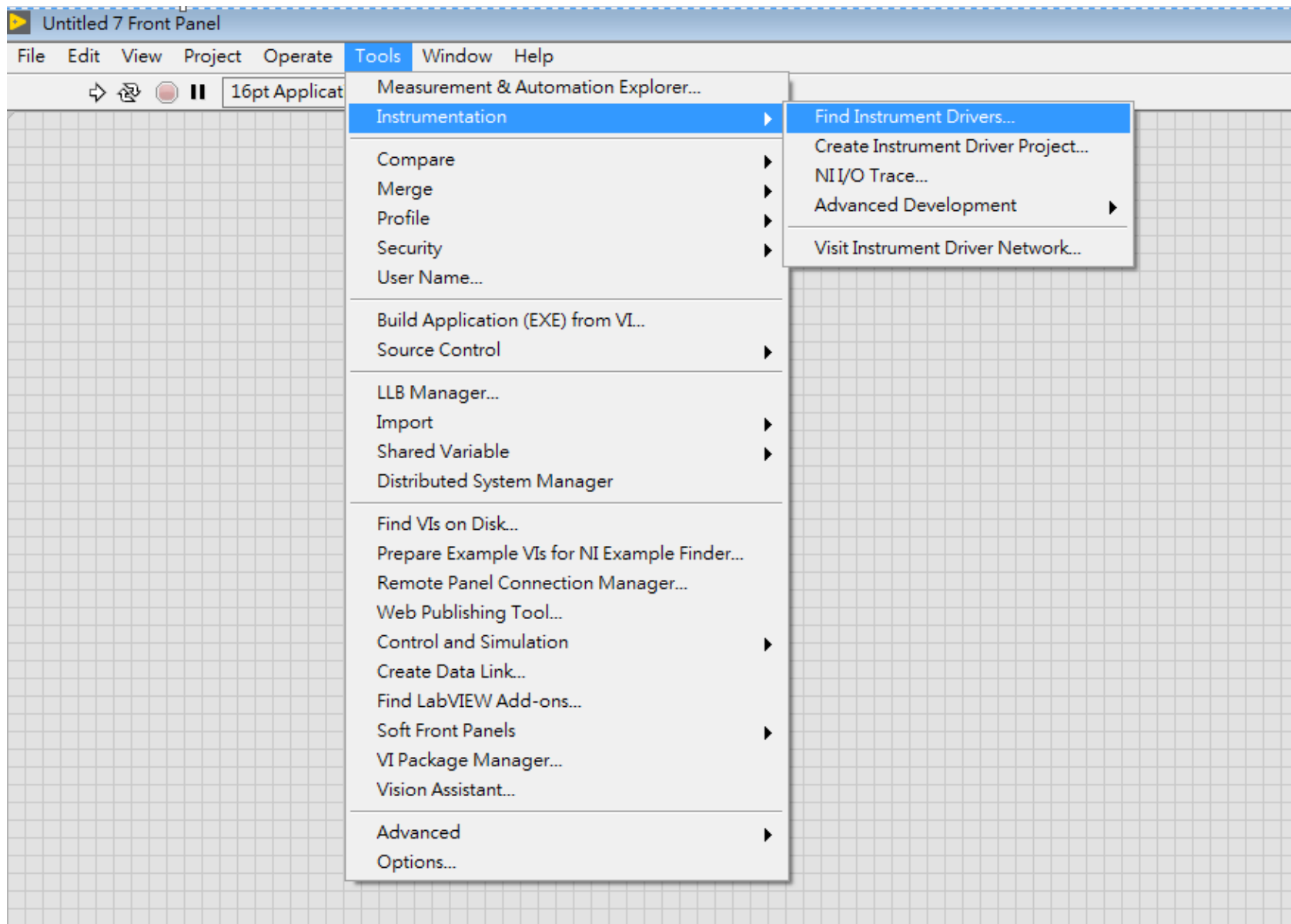
3. GPIB

4. 偽 USB, RS232 serial (Tek 牌常見)

Lecroy HDO: Utilities->Utilities Setup -> Remote  
可以看到 VISA address

Ex. USB0::0x05ff::0x1023::3511N17479::INSTR

# 先透過 NI Tool 找看看有沒有現成的 VI 可以用



NI Instrument Driver Finder - Configure Search

- Connected Instruments
- Installed Instrument Drivers
  - Agilent 34401
  - niDMM
  - niModInst

You are not logged in.

Instrument Driver downloads are available free of charge to registered ni.com users.

You will be prompted to create a new profile or login after you have selected a driver to install.

Login

Scan for Instruments

Manufacturer

LeCroy

Additional Keywords

HDO

NI Certified Drivers Only

\*Configure your search manually using these controls.

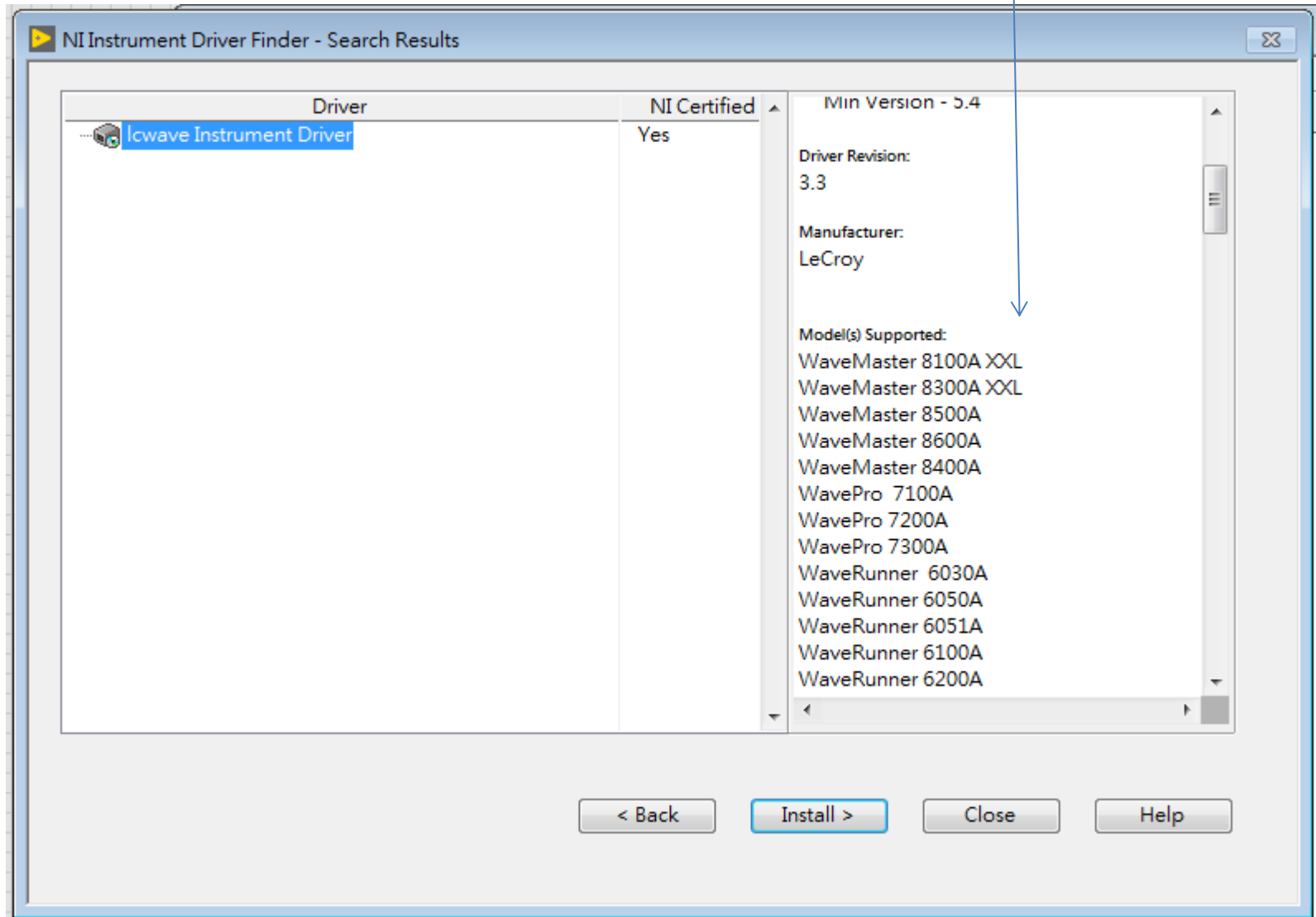
< Back

Search >

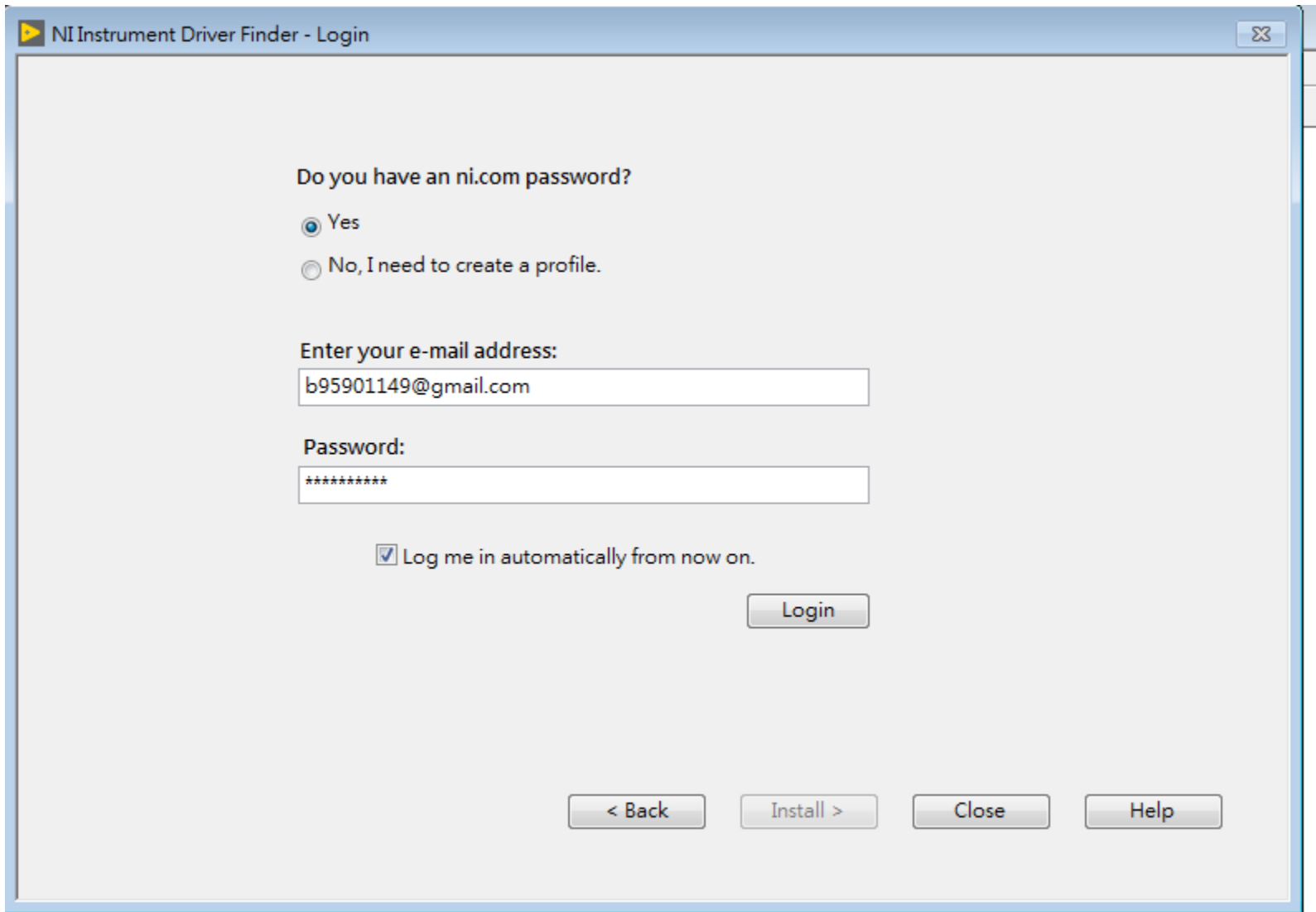
Close

Help

檢查看看自己的儀器有沒有出現在列表



# 輸入 NI 帳號(免費申請) 可以下載



NI Instrument Driver Finder - Login

Do you have an ni.com password?

Yes

No, I need to create a profile.

Enter your e-mail address:

b95901149@gmail.com

Password:

\*\*\*\*\*

Log me in automatically from now on.

Login

< Back   Install >   Close   Help

# 也可以透過網頁直接搜尋儀器 driver



創新 產品選購 支援 社群

我的帳號 登入

首頁 > 支援 > 下載 > 驅動程式 > 其他廠商儀器驅動程式

搜尋完整網站

搜尋範圍

Instrument Drivers

縮小依據

製造商

- A (1990)
- B-C (1057)
- D-E (160)
- F-H (388)
- I-K (1606)

[查看完整清單](#)

## 儀器驅動程式資料庫 (IDNet)

尋找、下載或提交驅動程式以溝通第三方儀器。如果您正在尋找 NI 產品的驅動程式，請前往 [NI 驅動程式](#)。

Instrument Drivers | 輸入關鍵字

### 常用驅動程式

Tektronix TDS 200 1000 2000 Series	Agilent E363XA 系列
Agilent 34970A	Agilent 3458Tektronix TDS 3000 系列
Agilent 34401	Tektronix MDO MSO DPO 2000 3000 4000 系列
Keithley 2400 Series	Ocean Optics 2000 4000 系列
Agilent 33XXX Series	Agilent MXA 系列

### 提交驅動程式

儀器驅動程式認證

分享自己的驅動程式

## Instrument Driver Network

### LeCroy HDO4034

#### Model Specifications

<b>Manufacturer(s):</b>	LeCroy
<b>Instrument Model:</b>	HDO4034
<b>Description:</b>	High Definition Oscilloscopes
<b>Instrument Type(s):</b>	Oscilloscope
<b>Application Area(s):</b>	Test and Measurement

#### Drivers Available For This Instrument Model

ADE	Driver Type	Interface(s)	Options	NI Certified	Rating	
LabVIEW	Plug and Play (project-style)	IEEE 488.2 (GPIB), Ethernet	None	Yes	3.86	<a href="#">Go To Driver Page</a>

#### Where's my Application Development Environment (ADE)?

If you cannot find an instrument driver that supports your Application Development Environment (ADE), use an instrument driver converter:

- The [LabVIEW Instrument Driver Import Wizard](#) allows you to convert an instrument driver from LabWindows/CVI (C source) to a LabVIEW wrapper (DLL).


#### Next Steps

- [Browse All Drivers](#)
- [Submit New Driver](#)
- [Request New Driver](#)
- [Request Support](#)

#### Learn More

- [Learn about instrument drivers](#)
- [Development Resources](#)
- [Instrument Control Tutorials](#)
- [Instrument Control Discussion Forum](#)
- [IDNet License Agreement](#)




Driver	NI Certified	Min Version - 5.4
 lwave Instrument Driver	Yes	Driver Revision: 3.3  Manufacturer: LeCroy
		WaveRunner 6100A WaveRunner 6200A

**Instrument Driver Installation** ✕

Installation successful. The driver is located in the directory listed below.

C:\Program Files (x86)\National Instruments\LabVIEW 2018\instr.lib\LeCroy Wave Series



< Back

Install >

Close

Help



### Start Using Instrument Driver



Open Project



Open Palette

### Examples (double-click to open)

- LeCroy Wave Series Acquire and Read MyMeasurements.vi
- LeCroy Wave Series Acquire Multiple Waveforms.vi
- LeCroy Wave Series Acquire Timed Sequence.vi
- LeCroy Wave Series Acquire Waveform In Loop.vi
- LeCroy Wave Series Acquire Waveform With Preview.vi
- LeCroy Wave Series Acquire Waveform.vi
- LeCroy Wave Series Edge Triggered Acquisition.vi
- LeCroy Wave Series Sequence Acquisition.vi
- LeCroy Wave Series Transfer Selected Waveform.vi

### Instrument Driver Location

C:\Program Files (x86)\National Instruments\LabVIEW 2018\instr.lib\LeCroy Wave Series

Explore...

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Close

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# 隨便點開一個範例程式

## VISA resource name 填入在示波器上看到的 VISA address

LeCroy Wave Series Acquire Waveform In Loop.vi Front Panel \*

File Edit View Project Operate Tools Window Help

16pt Application Font

VISA resource name (c) 2008 - 2012 NATIONAL INSTRUMENTS. ALL RIGHTS RESERVED.

USB0::0x05FF::0x1023::3511N17479::INSTR

STOP

Source (0: Channel 1)  
Channel 1 0

Timeout (10000 ms)  
10000

Reset? Perform Auto Setup?

Directions:

1. Setup the scope to be able to successfully single trigger on a signal applied to the channel selected in the "Source" control, or set Perform Auto Setup? to True to perform an autoseup.
2. On this front panel, enter the VISA Resource name for your scope. (e.g. VICP::123.45.67.8 for TCP/IP, GPIB::5::INSTR for GPIB). Modify the timeout if necessary.
3. For an initial test, set the Reset? and Perform Auto Setup? controls to True, and then run the VI to find the signal. Leave both set to False for subsequent runs. The scope's AUX OUT or Cal Out is a good test signal to use.

Waveform Data

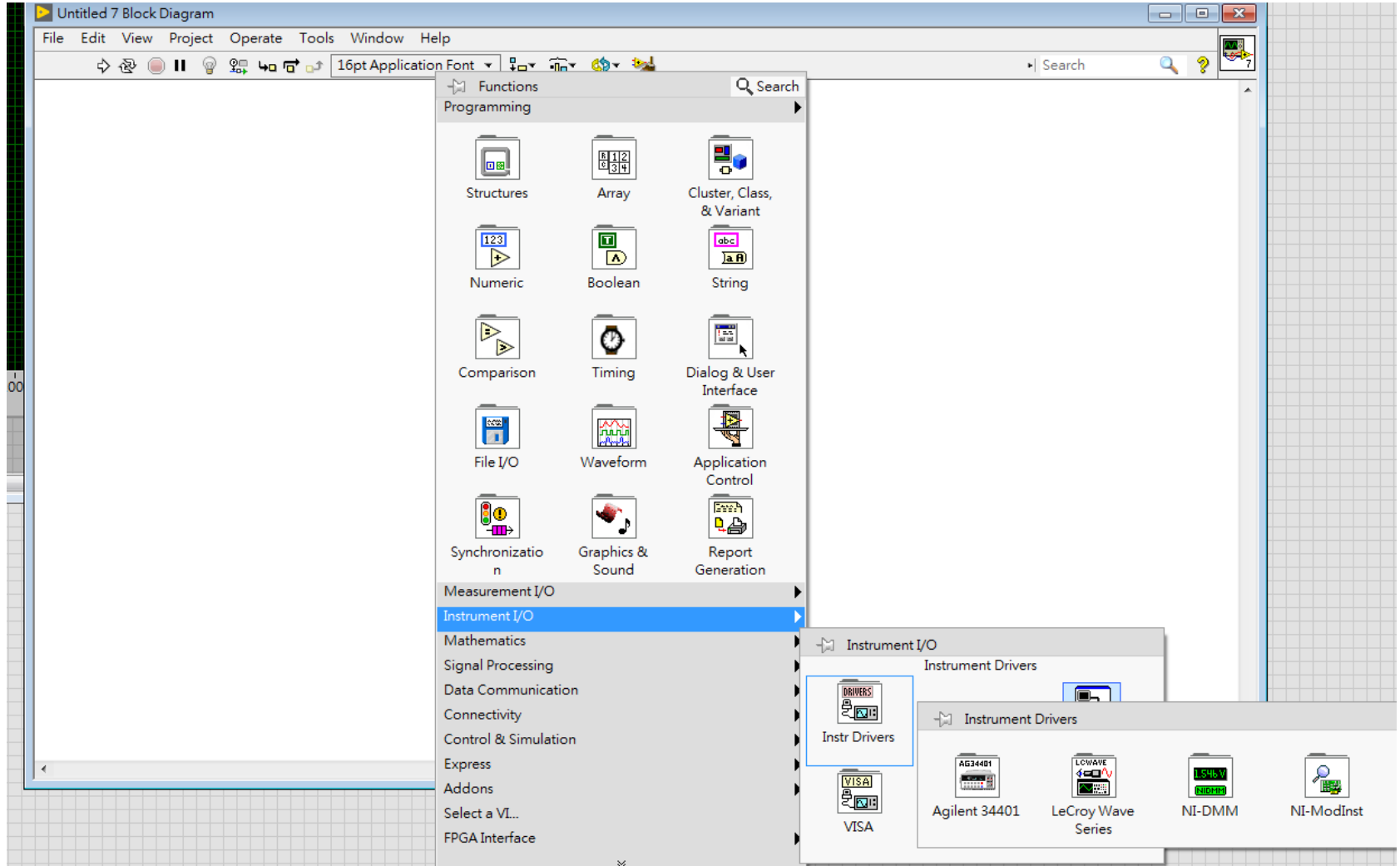
Plot 0

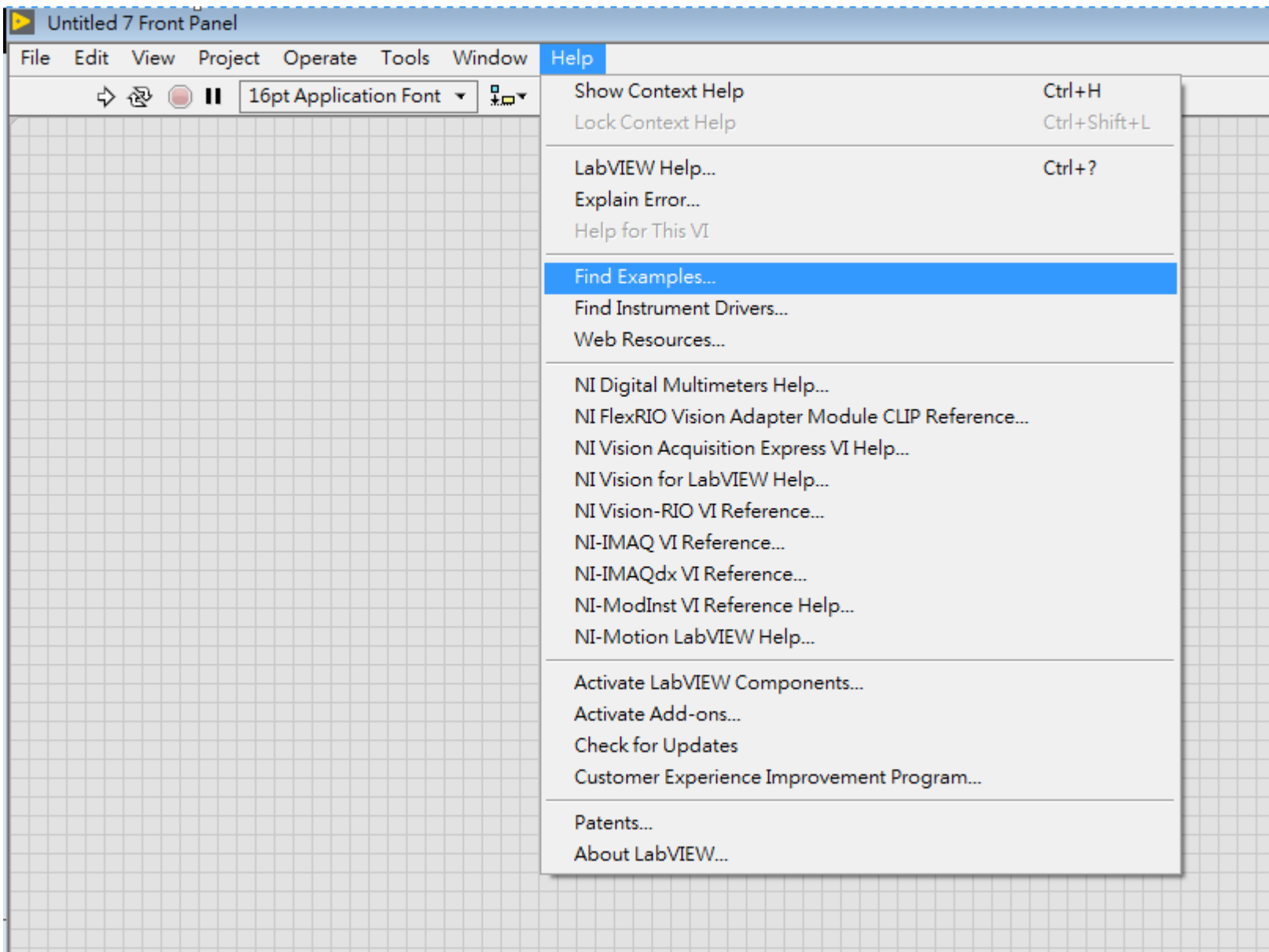
Amplitude

Time

Time (s)	Amplitude
0.0000	0.00
0.0002	0.10
0.0004	0.00
0.0006	0.10
0.0008	0.00
0.0010	0.10
0.0012	0.00
0.0014	0.10
0.0016	0.00
0.0018	0.10
0.0020	0.00
0.0022	0.10
0.0024	0.00
0.0026	0.10
0.0028	0.00
0.0030	0.10
0.0032	0.00
0.0034	0.10
0.0036	0.00
0.0038	0.10
0.0040	0.00
0.0042	0.10
0.0044	0.00
0.0046	0.10
0.0048	0.00
0.0050	0.00

# 儀器 function 通常會被裝在 Instr. IO/Instr Drivers





Untitled 7 Front Panel

File Edit View Project Operate Tools Window Help

16pt Application Font

Show Context Help Ctrl+H

Lock Context Help Ctrl+Shift+L

LabVIEW Help... Ctrl+?

Explain Error...

Help for This VI

Find Examples...

Find Instrument Drivers...

Web Resources...

NI Digital Multimeters Help...

NI FlexRIO Vision Adapter Module CLIP Reference...

NI Vision Acquisition Express VI Help...

NI Vision for LabVIEW Help...

NI Vision-RIO VI Reference...

NI-IMAQ VI Reference...

NI-IMAQdx VI Reference...

NI-ModInst VI Reference Help...

NI-Motion LabVIEW Help...

Activate LabVIEW Components...

Activate Add-ons...

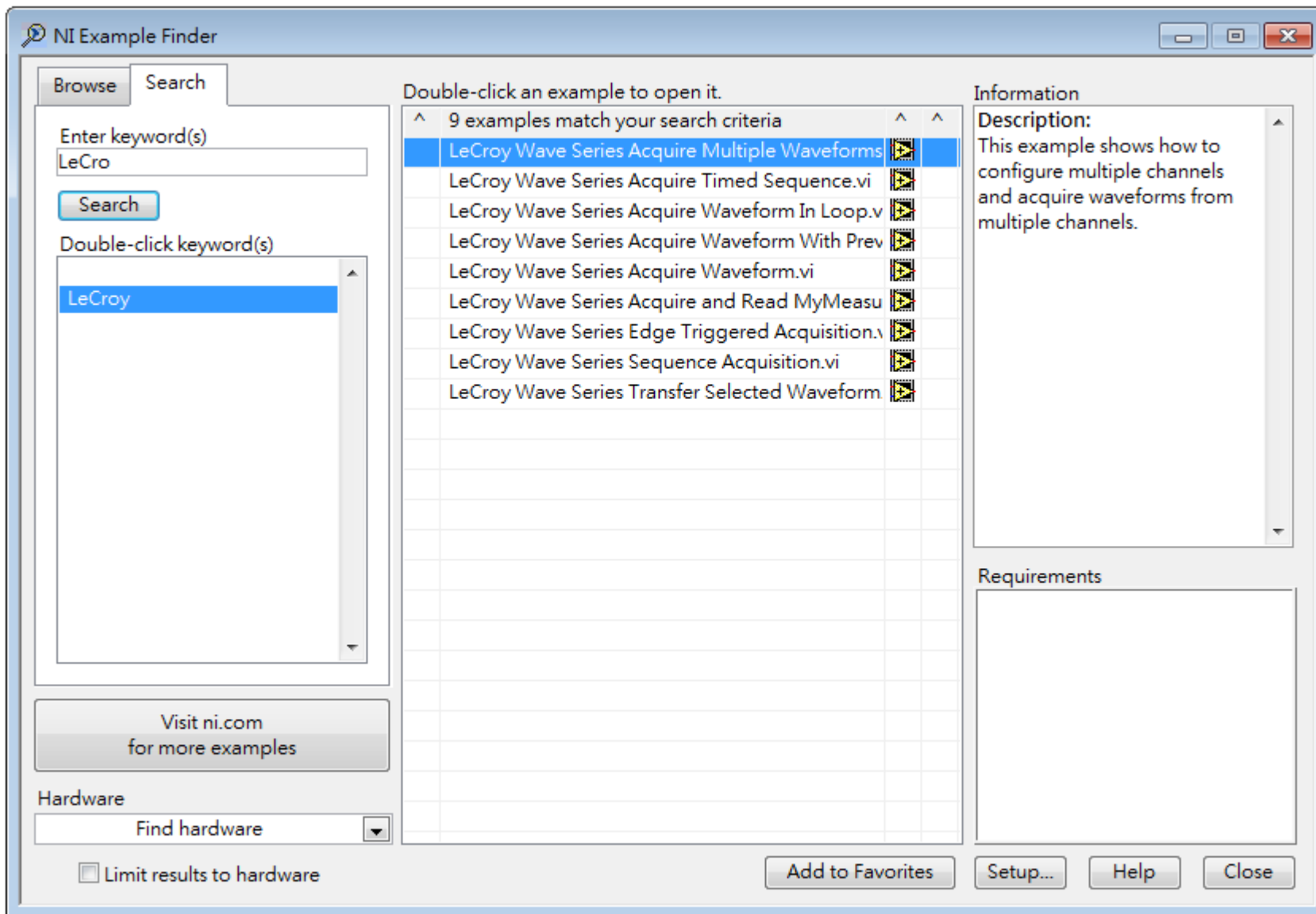
Check for Updates

Customer Experience Improvement Program...

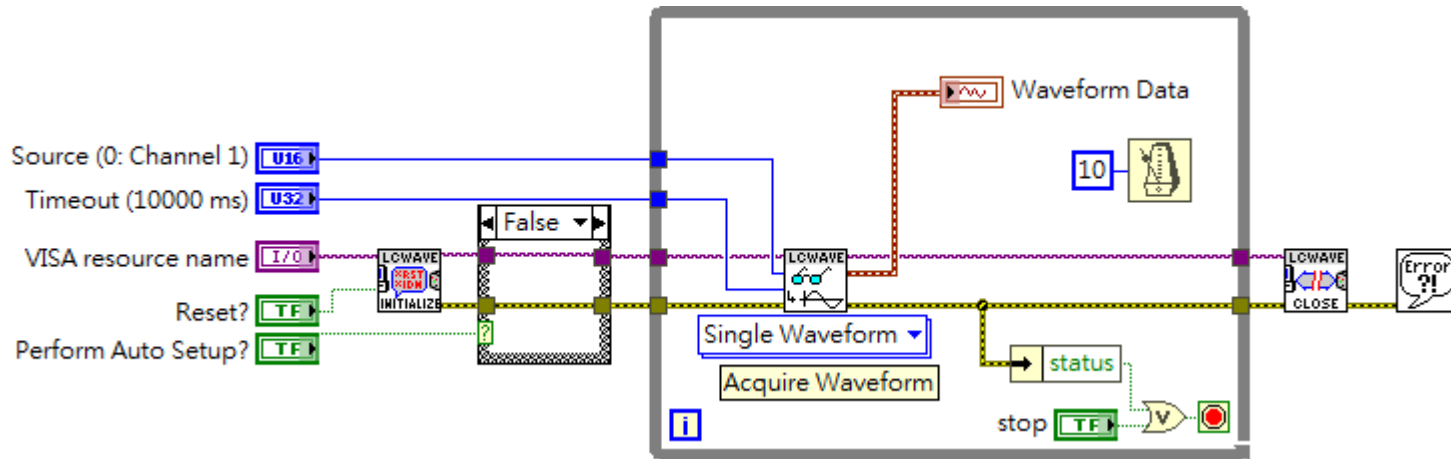
Patents...

About LabVIEW...

# 範例一樣會被裝在 NI example 中



# Acquire Waveform in Loop

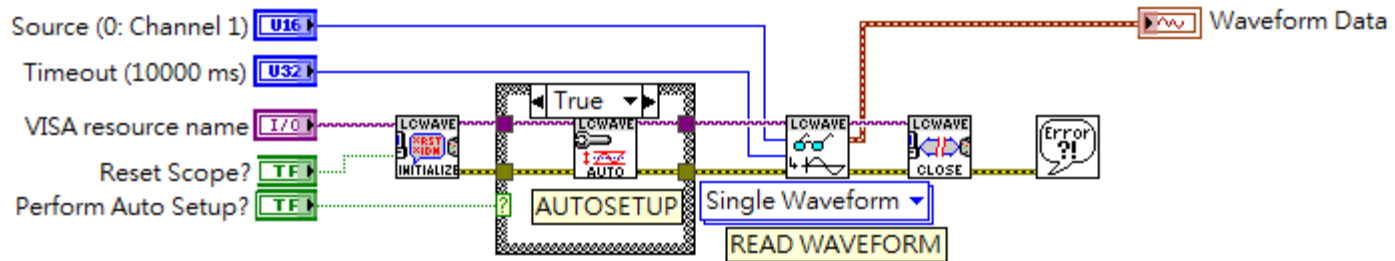


最普通的使用方式, 把示波器上的正在擷取的資料 buffer 傳到螢幕上

九成九的 DAQ 裝置資料擷取格式都如同上圖

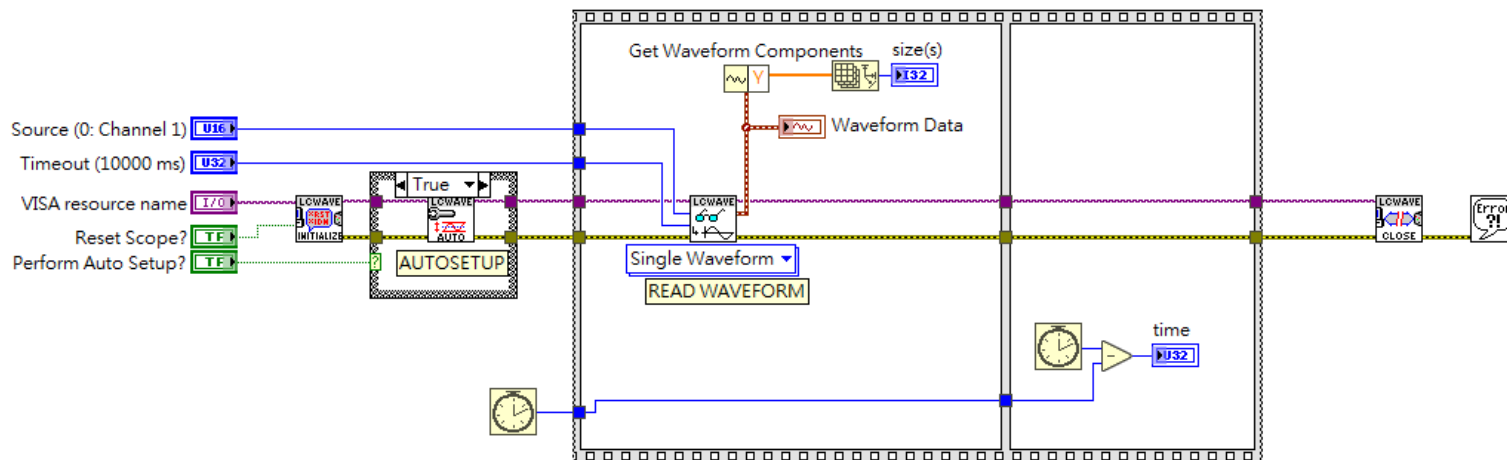
初始化 -> 設定 trigger/clock -> 迴圈下讀取指令 -> 關閉 VISA 通道

# Acquire Waveform





Timebase 設定 5M points, 計算得知約需 1.1~1.2 sec  
取樣時間大概2ms, 但是傳遞資料時間需要超過 1秒  
HD4034的 USB 介面算是真 USB, 傳輸速度 >  $5M * 12bit \sim 60Mb/sec$



如果把取樣點數改到 500 samples

傳輸時間大約 60ms

這個值差不多可以看做最小延遲, 代表透過 USB 通道下指令到儀器回應的最小延遲

受限於這個延遲, 想要透過電腦端擷取 waveform (wfm) 資料的最高速度差不多是  $1/60\text{ms} \sim 16\text{wfm/sec}$

只要 trigger 大於 16 Hz 你就會發現無論如何程式取資料的方式跟不上資料生產的速度, 一般而言 10-20Hz 以下 pump probe 實驗比較不會有問題, KHz 以上的就會面臨困擾

高訊噪比 -> 更多穩定取樣數去做平均

## 解決方法:

1. 改用 ethernet 獲取更低的延遲(不過新的機種 USB 的速度已經跟 100M ethernet 差不多)
2. 改用 PCI 或 PXI 介面的 digitalizer (NI, Spectrum Instr.) , FIFO 配合 PCI/PCIe 介面 >1Gb/sec 頻寬
3. 想辦法讓示波器利用本身的 ASIC 完成需要的運算 (measurements), PC 端只擷取運算後少量的特徵資料 (ex. FWHM, 積分值, peak 值 , FFT 頻譜 等等), 或是已經 average 過的資料
4. Lecroy 有一種特殊介面 LSIB 可以提供接近 PCI 的傳輸頻寬 (不過應該還是輸 NI or Spectrum)

# LSIB Serial Interface Bus

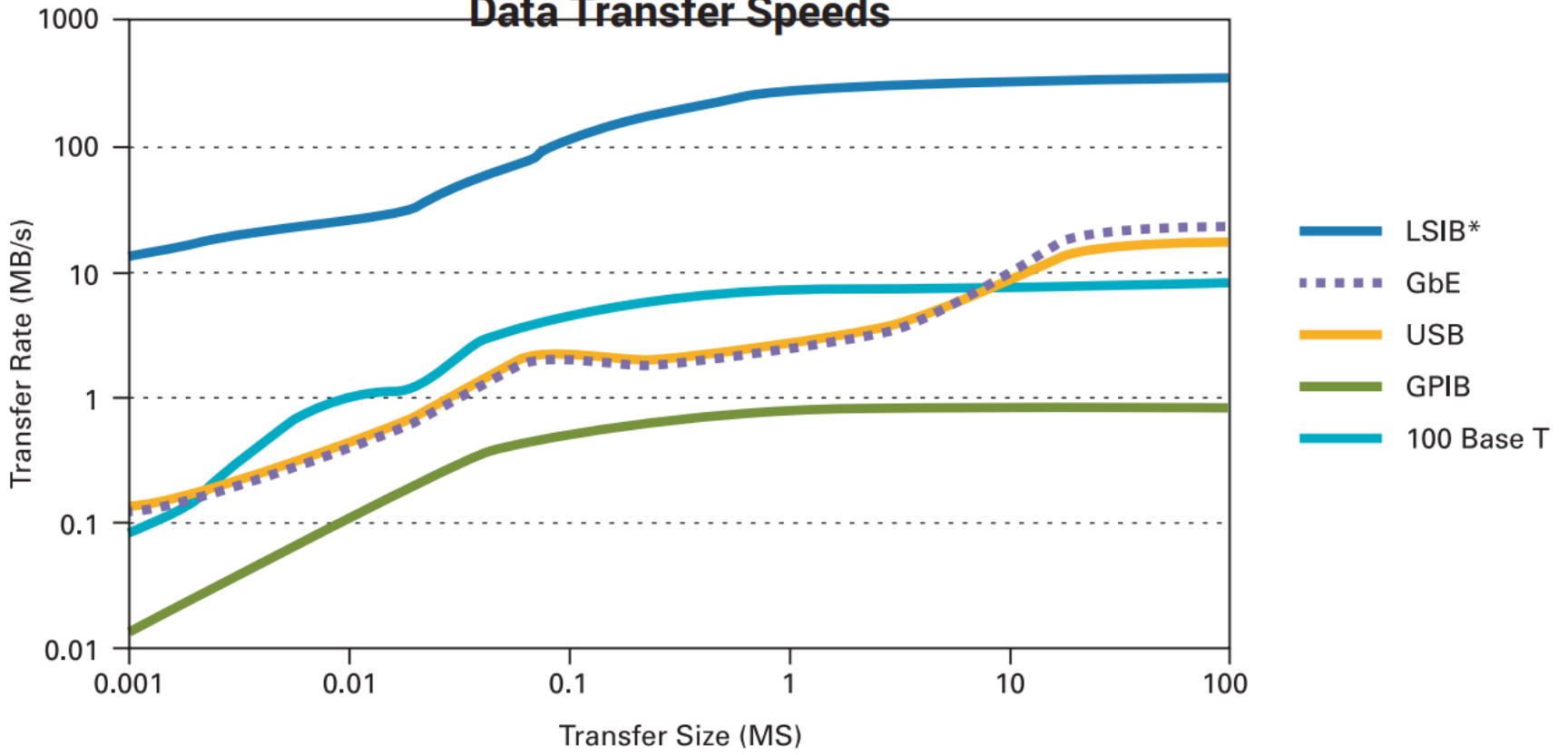
## Key Features

- Up to 325 MB/s transfer rate
- Standard x4 PCI Express® connection
- Connection options for both Desktop and Laptop computers
- 3M and 7M cable lengths to adapt to various test setups



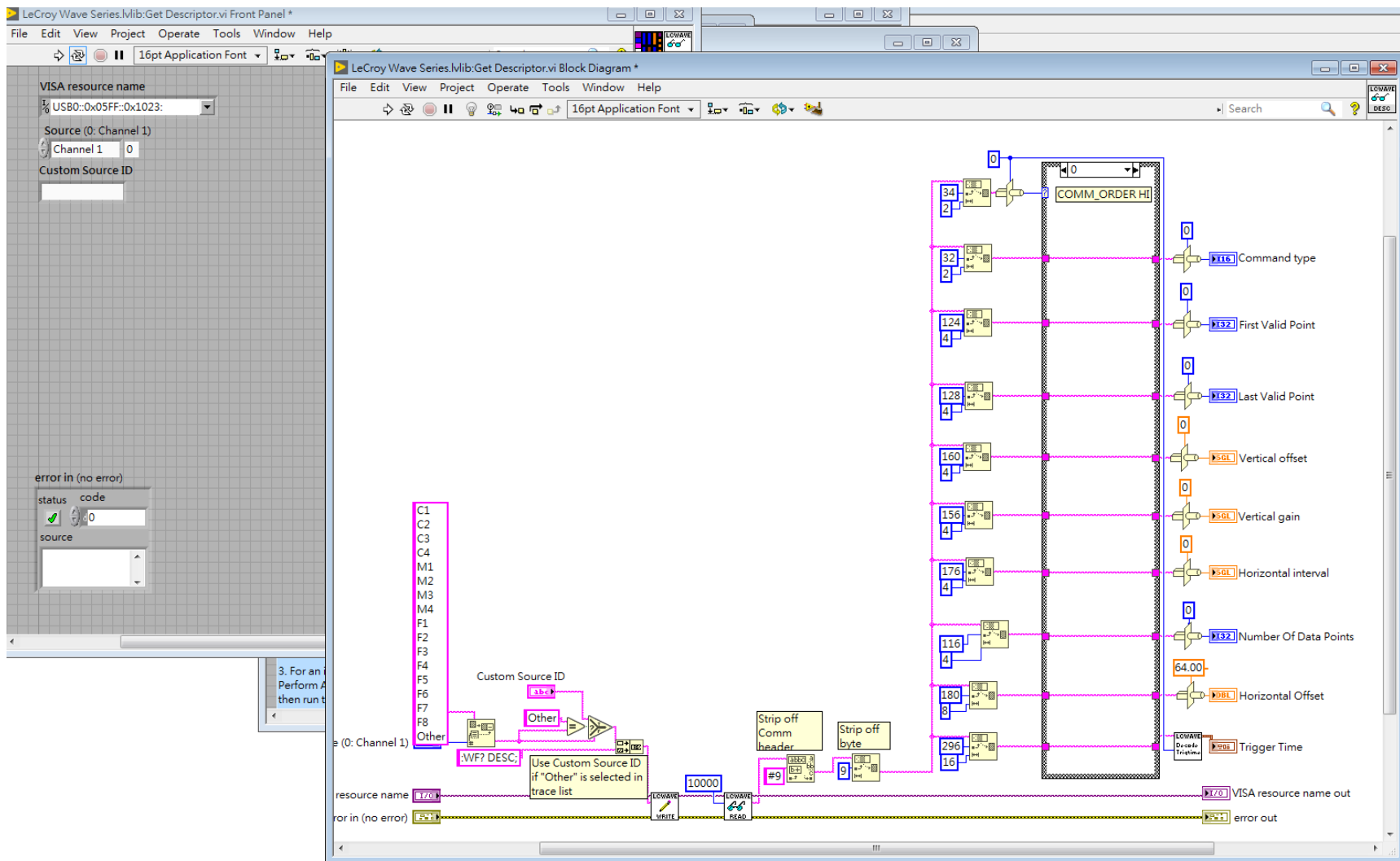
LSIB (Teledyne Lecroy Serial Interface Bus) is geared towards users who

# Data Transfer Speeds



\* Measured with 16-bit data using LSIB-HOSTBOARD

# 這些 VI 底層都寫了什麼鬼?



其實是一整包弄好類似 SCPI 指令, 一般使用者不太有機會直接看400多頁的指令說明用 C/C++ 之類的語言寫出從示波器取值的程式

<http://cdn.teledynelecroy.com/files/manuals/maui-remote-control-and-automation-manual.pdf>

## **MAUI Oscilloscopes Remote Control and Automation Manual**

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### **PRx:VOLT\_DIV, PRx:VDIV**

#### ***Description***

The PRx:VOLT\_DIV command sets the vertical sensitivity at the ADP30x input. The effective gain of the differential probe is factored into the vertical sensitivity.

The valid range of arguments is fixed by the probe type. If an out-of-range value is entered, the oscilloscope will set the vertical sensitivity to the closest value and set the VAB bit (bit 2) in the STB register.

The PRx:VOLT\_DIV? query returns the vertical sensitivity at the probe input of the specified channel.

#### ***Command Syntax***

```
<channel>:VOLT_DIV <sensitivity> [V]
```

```
<channel>:= {PR1, PR2, PR3, PR4}
```

```
<sensitivity>:= 200 mV to 350 V for ADP350; 1 V to 350 V for ADP300.
```

The suffix V is optional.

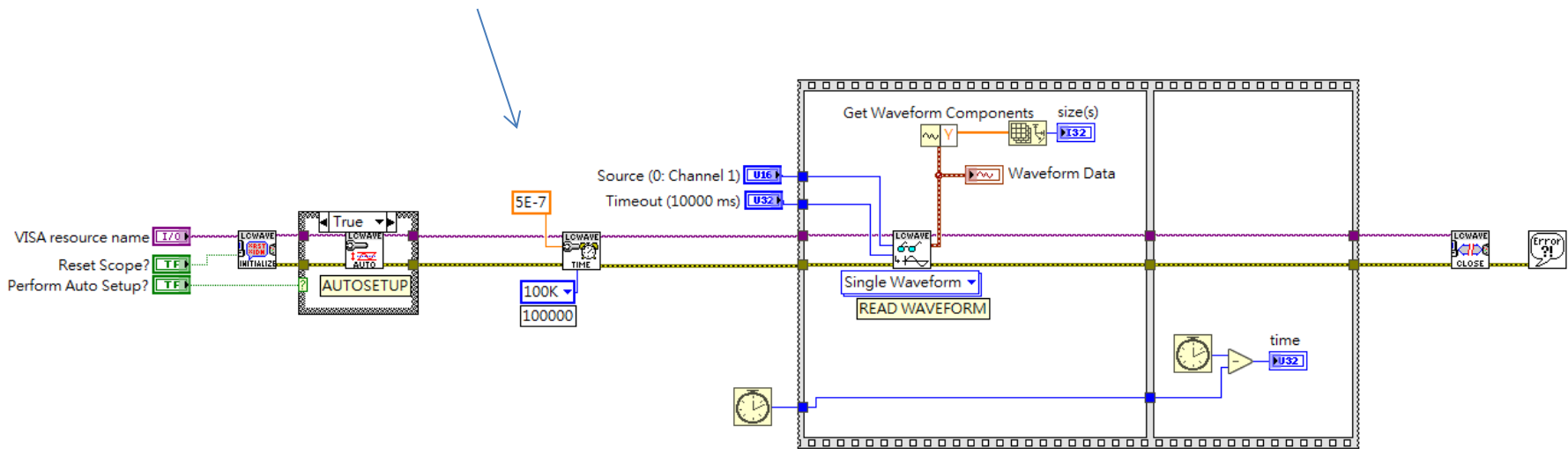
#### ***Query Syntax***

```
<channel>:VOLT_DIV?
```

#### ***Response Format***

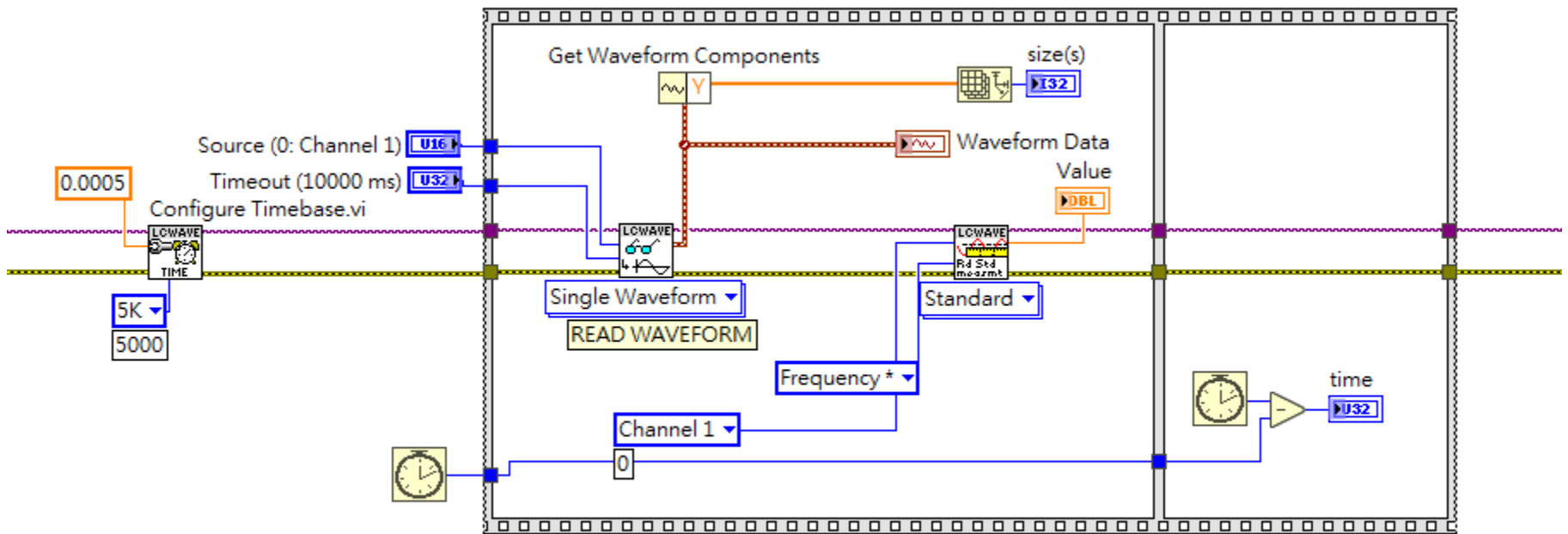
```
<channel>:VDIV <sensitivity>
```

Configure 類型指令放在資料擷取之前, 比如說很常用的 timebase, 示波器的總取樣時間就是  $10 \times \text{timebase}$

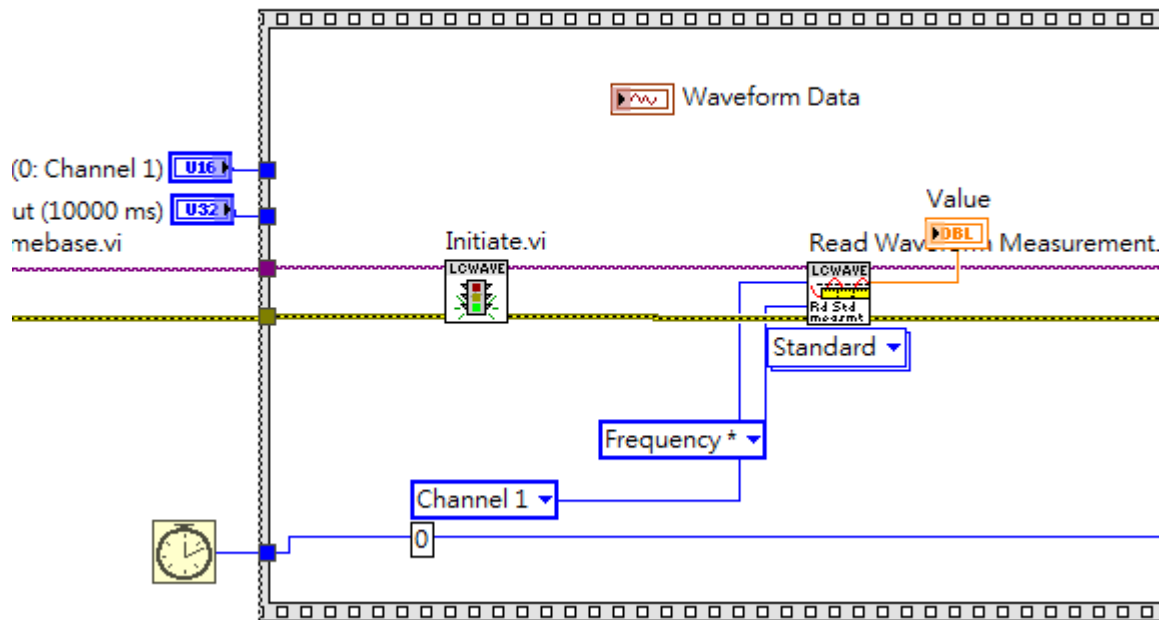




Measurement 類指令可以放在 read waveform 之後

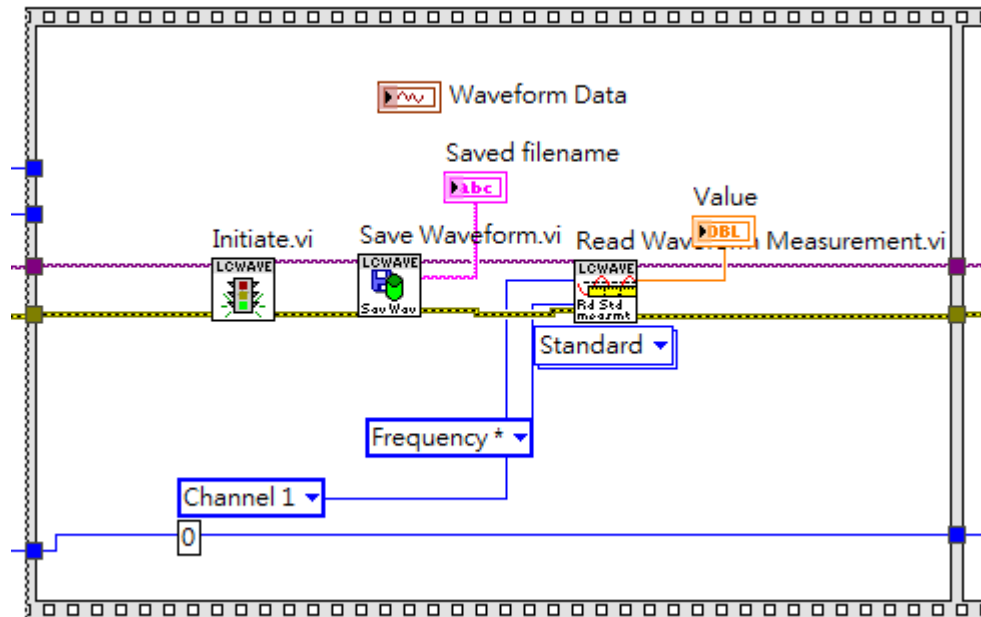


不要 read waveform , 直接下指令 re-arm 示波器取波型, 只取 measurement 的值 ex. 同樣 5M sample point , read waveform 改成 low level 指令的 initiate 就可以將速率從 0.X wfm/sec 提升到 ~10 wfm/sec



直接下令讓 waveform 儲存在示波器中 (現代高性能示波器通常是 x86 電腦, 硬碟都放很大). 速度會比把資料丟到 PC 再存檔更快. 同樣 5Mpts 只需要 276ms 即能完成存取

time	Value	Saved filename
276	999.991	C1-190214-00541.trc



# 要透過 ethernet 控制示波器 Lecroy 需要 VICP passport

<https://teledynelecroy.com/support/softwaredownload/labview.aspx>

## ■ X-Stream DSOs

**Type:** IVI-C and IVI-COM Driver

Created by:



**Designed for:** WaveMaster 8 Zi (-A) Oscilloscopes  
SDA 8 Zi (-A) Oscilloscopes  
DDA 8 Zi (-A) Oscilloscopes  
SDA Oscilloscopes  
SDA 7 Zi (-A) Oscilloscopes  
DDA Oscilloscopes  
DDA 7 Zi (-A) Oscilloscopes  
WaveMaster 8000(a) Oscilloscopes  
WavePro 7 Zi Oscilloscopes  
WavePro 7000(a) Oscilloscopes  
WaveRunner 6 Zi Oscilloscopes  
HRO 12-bit High Resolution Oscilloscopes  
WaveRunner 6000(a) Oscilloscopes  
WaveRunner Xi/MXi(-A) Oscilloscopes  
HDO6000 Oscilloscopes  
HDO4000 Oscilloscopes  
WaveSurfer 3000  
WaveSurfer Xs/MXs(-A) Oscilloscopes  
WaveSurfer Xs/MXs(-B) Oscilloscopes  
WaveSurfer 400 Oscilloscopes

<http://www.pacificmindworks.com/>

IVI Driver 3.2.9.0 x86

IVI Driver 3.2.9.0 x64

Required Components:

- [Latest Teledyne LeCroy VICP Passport](#) (for VICP connections only; not required for GPIB or LXI)





