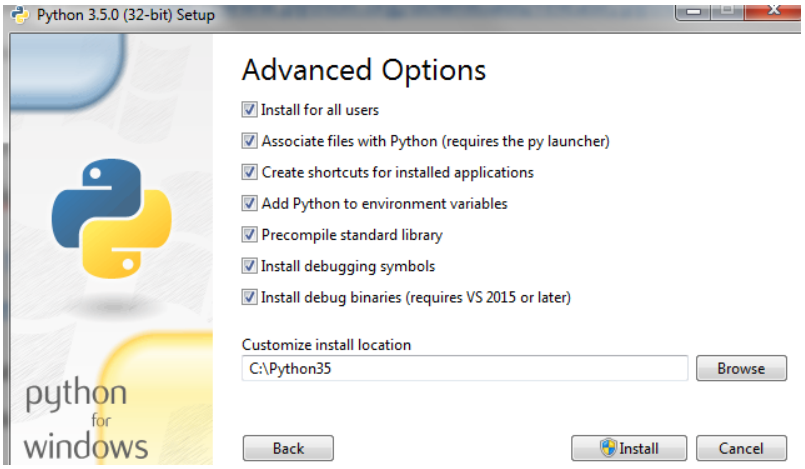
This manual shows how to set-up PyVISA and other python packages to remotely get waveform from oscilloscope and network analyzer

Note: If you've already installed Python packages, please uninstall this and delete its corresponding folder. On this manual, you will download and install suggested packages to avoid software conflict.

1. **First, install following packages. ALL of them are free**
   a. NI VISA for Windows (free): http://www.ni.com/download/ni-visa-15.0.1/5693/en/
   b. NI- 488.2 for Windows (free): http://www.ni.com/download/ni-488.2-16.0.0/6132/en/
   c. Python 3.5.0 (free), 32 bit: https://www.python.org/downloads/release/python-350/

   Choose to customize installation, create a folder **C:\Python35.** Check on options

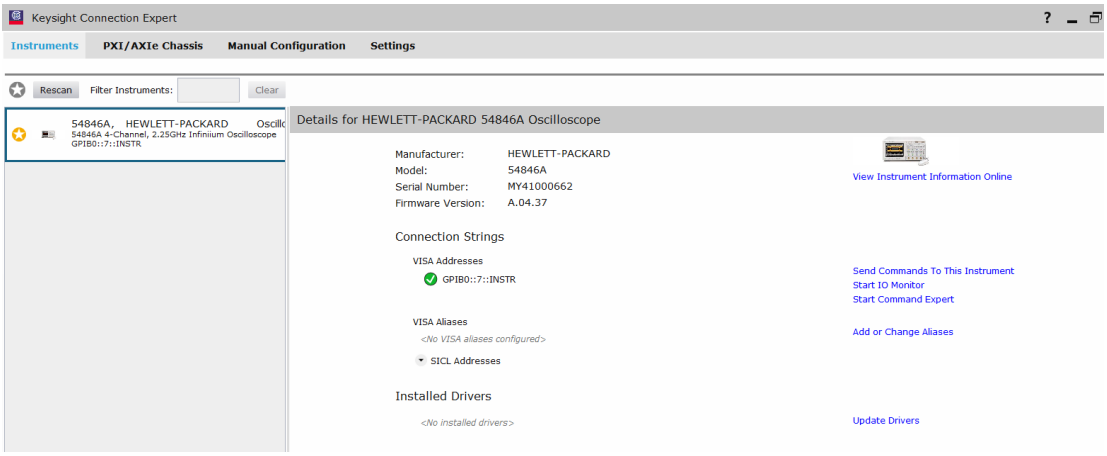


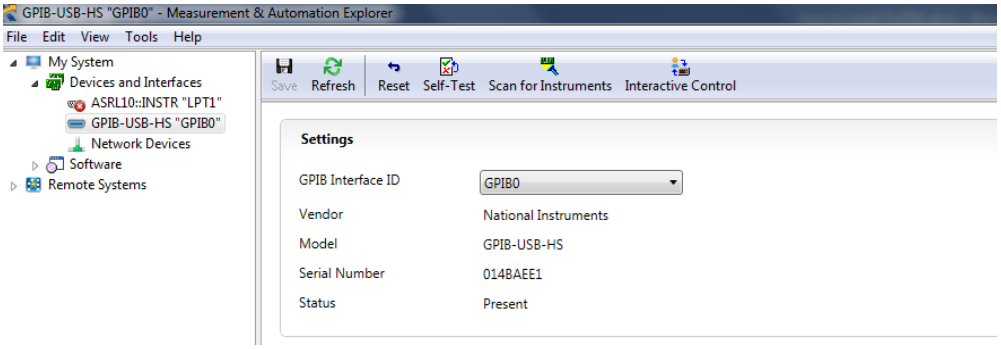
   d. Text editor (free): https://atom.io/
   e. Keysight IO library to check instrument connections and address (free)

      http://www.keysight.com/main/software.jspx?id=2175637&pageMode=CV&cc=US&lc=eng

2. **Enable all running services by Agilent and NI, then check Keysight Connection Expert and NI Max**

   See results of installing below

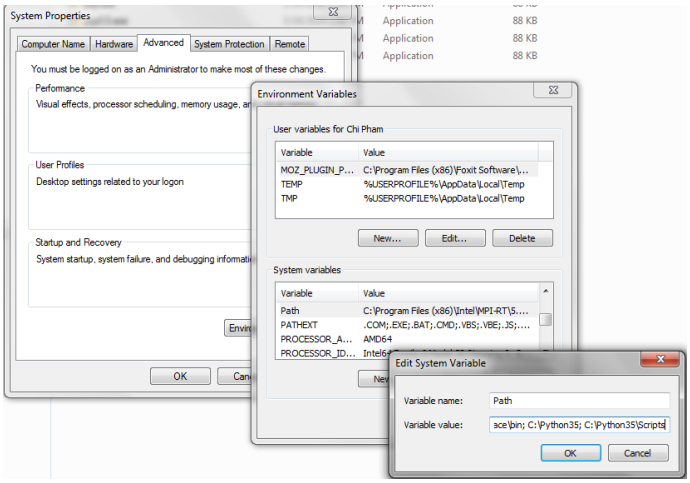




3. After installing all above packages, process to install pyVISA package

a. Add **Python** to your system path by navigating to *Start menu->Control panel->System->Advanced tab->Environment Variables* and adding: **C:\Python35** and **C:\Python35\Scripts** to the *PATH* variable.

b. Restart your computer



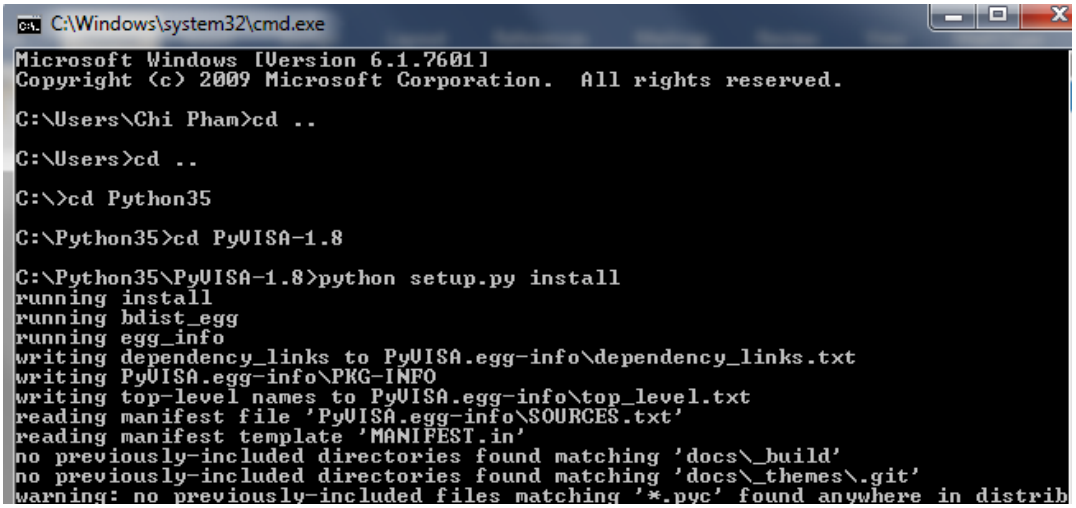
c. Download PyVISA 1.8 : https://pypi.python.org/pypi/PyVISA

d. Extract this package PyVISA to **C:\Python35**

e. Open command line on Window, then navigate to PyVISA-1.8 folder

f. Type: *python setup.py install*

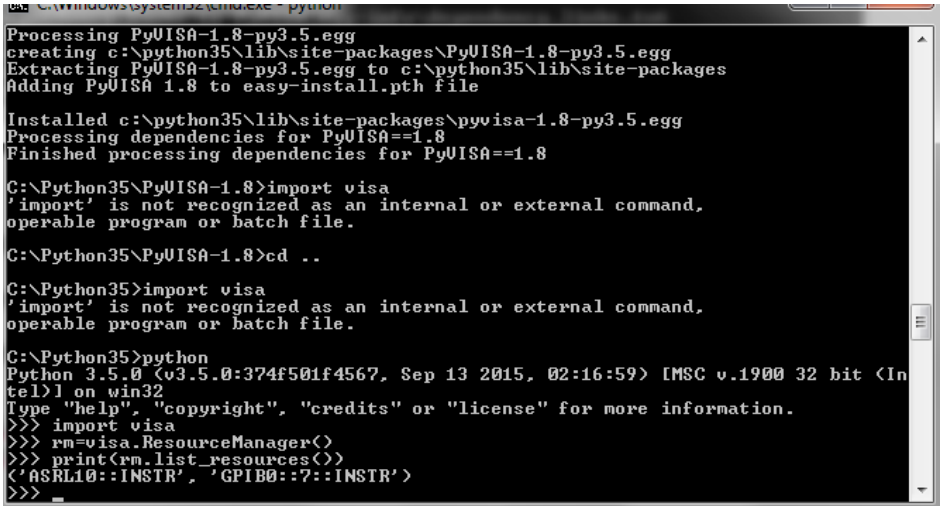
This should automatically install PyVISA to the C:\python\Lib\site-packages\ directory



g. Test your installation

- Using command line, navigating C:\Python35
- Type: python. Then, type

```
>>> import visa
>>> rm = visa.ResourceManager()
>>> print(rm.list_resources())
```



4. Install Python packages: numpy and Matlabplot

- Upgrade your pip

  python -m pip install --upgrade pip

- First, download two packages

  matplotlib-2.0.0b4-cp35-cp35m-win32.whl

  http://www.lfd.uci.edu/~gohlke/pythonlibs/#matplotlib

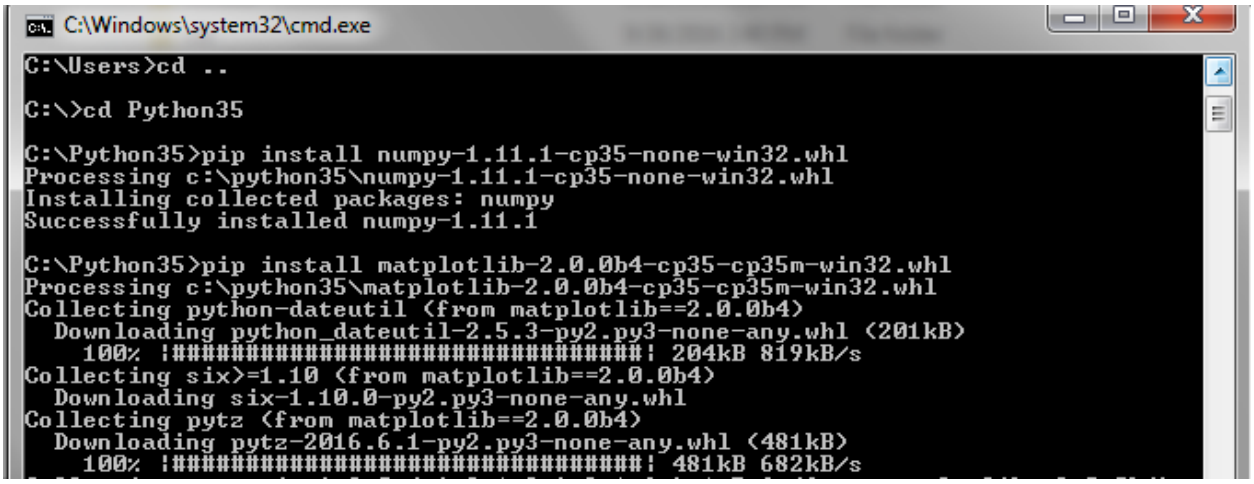
  numpy-1.11.2rc1+mkl-cp35-cp35m-win32.whl

  http://www.lfd.uci.edu/~gohlke/pythonlibs/#numpy

- Copy the downloaded packages to C:\Python35
- Open command line on Windown, navigate to C:\Python35
- Run pip to install these packages:

  Pip install matplotlib-2.0.0b4-cp35-cp35m-win32.whl

  Pip install numpy-1.11.2rc1+mkl-cp35-cp35m-win32.whl



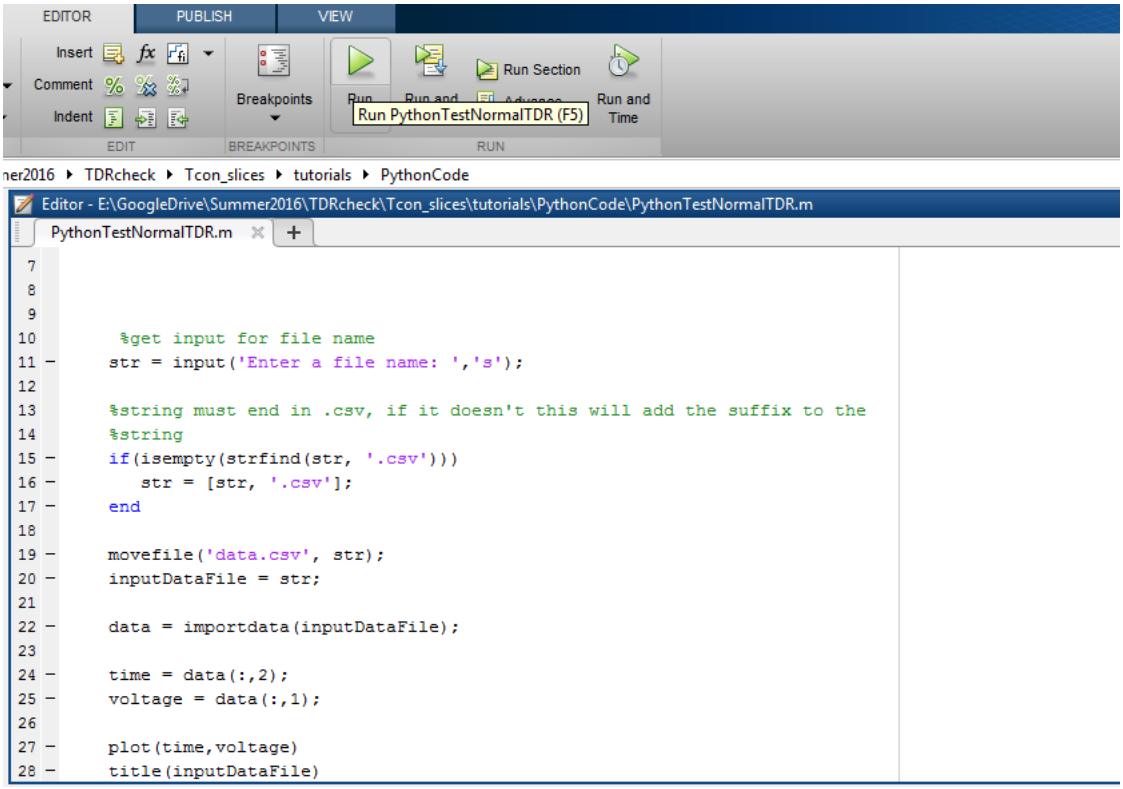
5. Next steps show how to take out measured data using MATLAB (example with normal TDR and TDT).

a. Open **NormalTDR.py** using any text editor, change GPIB address (highlight part on figure below) if this address is different with your current setting, which shows on Keysight Connection Expert.

NormalTDR.py

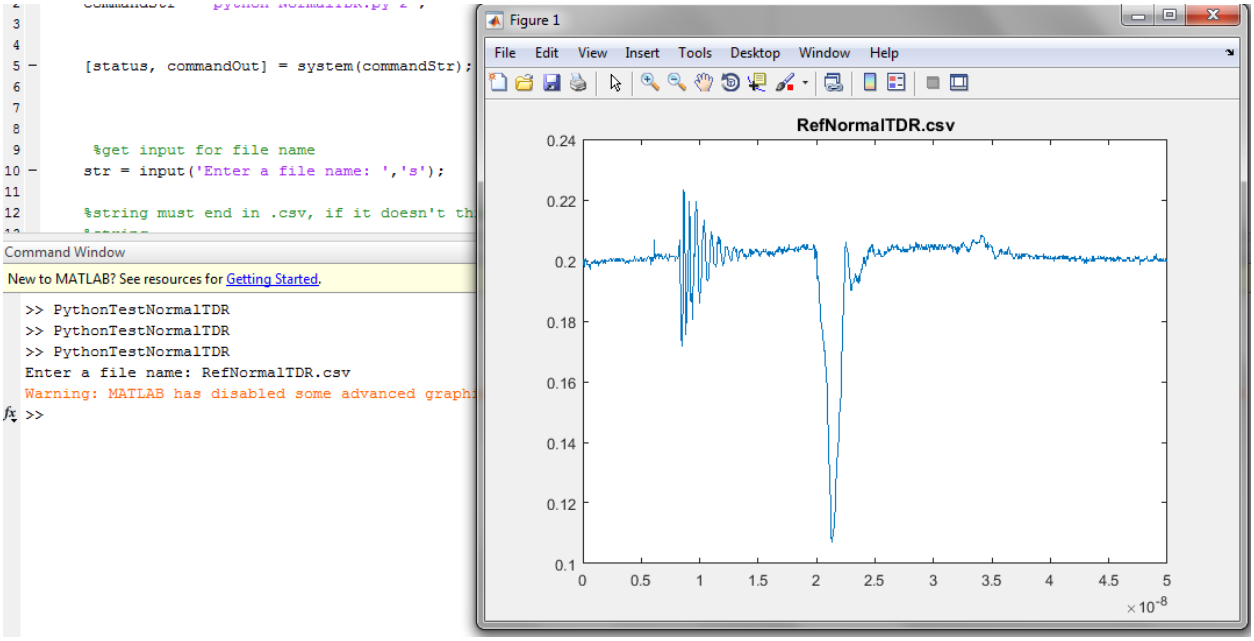
```
# visa is used for interfacing with instruments
# numpy is used for number operations, arrays
# pylab is used for plotting
# os is used for directory operations
import visa
import numpy as np
import pylab
import os

# Choose your instrument to work with
rm = visa.ResourceManager()
my_instrument = rm.open_resource('GPIB0::7::INSTR')

# Set the channel source
my_instrument.write('WAV:SOUR CHAN3')

# WAV:XINC? returns the duration between data points on the x-axis
xinc = float(my_instrument.query('WAV:XINC?'))

```

b. Open **PythonTestNormalTDR.m** on MATLAB. Go to Editor, hit RUN or F5



c. This will ask you to Enter the file name for collected data on Command Window.

For example, type: **RefNormalTDR.csv**. The measured plot will pop up and you can see the RefNormalTDR.csv file on the folder directory where you are running the program



d. Repeat the steps for **PythonTestVSWR.m**