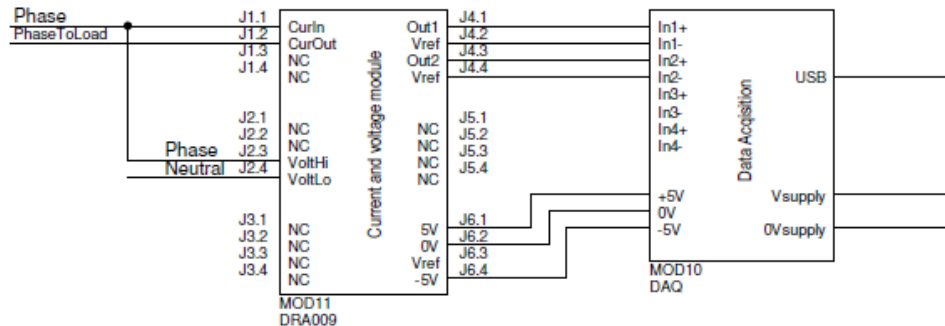


THD Measurement.

Application Note 2.

Typical Connection, DRA009 Single phase voltage and internal current shunt.



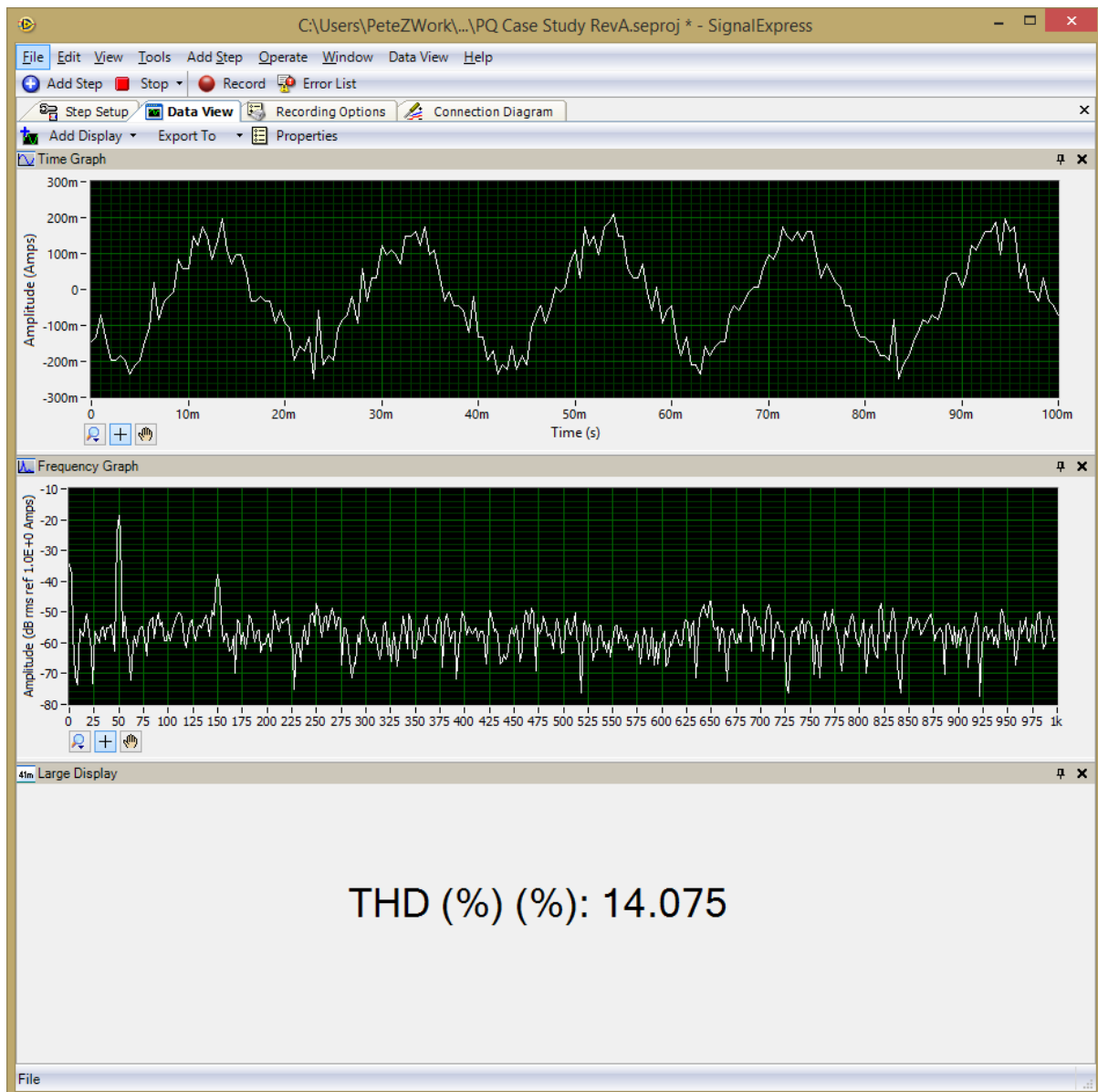
The DRA009 module has a channel configured as an internal current shunt scaled to measure 20A and another as an internal voltage divider to measure 1000V. The bandwidth is DC to 80kHz so this arrangement could be used to measure the phase current of high speed motors, variable frequency aircraft supply systems, 50/60Hz electrical systems, or DC solar power systems for example.

The DRA009 has been connected to a National Instruments USB 6008 DAQ and the current and voltage recorded using Signal Express. The limit of the 6008 is a sampling rate of 2k/sec and Signal Express can calculate up to the 19th harmonic at 50Hz. In this application we could limit the Bandwidth to 10 kHz and reduce the noise on the signal however the following results were recorded with the DRA009 set to its nominal 80 kHz.

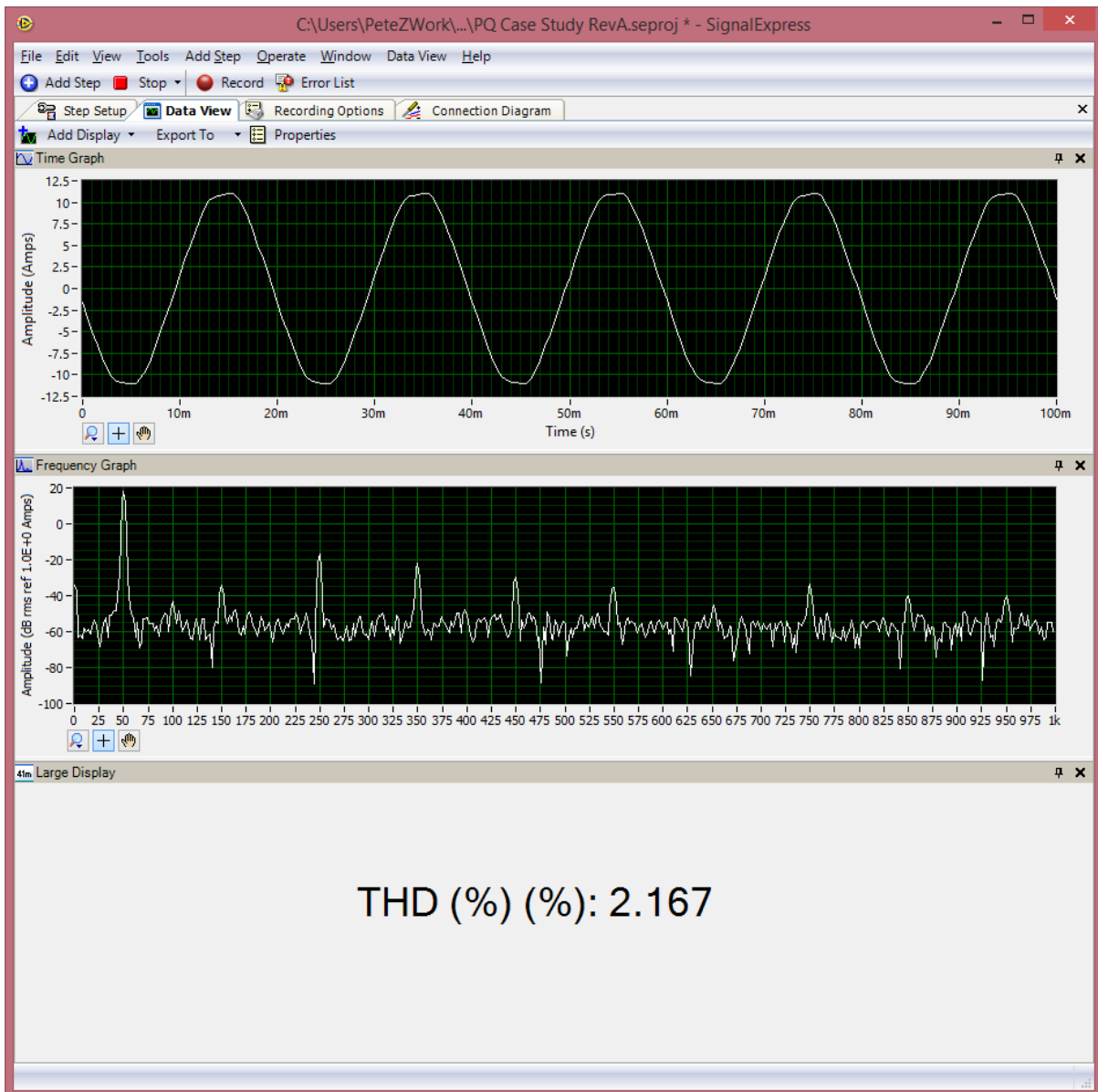
THD measurement

In this case, the load is a fan and a resistive heater. The fan can be turned on by itself or with the heater. The fan draws around 110mArms and the heater around 7.8Arms. The full scale of the DRA009 is 20A peak so the noise in the measurement will affect the low current measurement of the fan alone. See another application note about Low Current Measurement and how this situation can be improved.

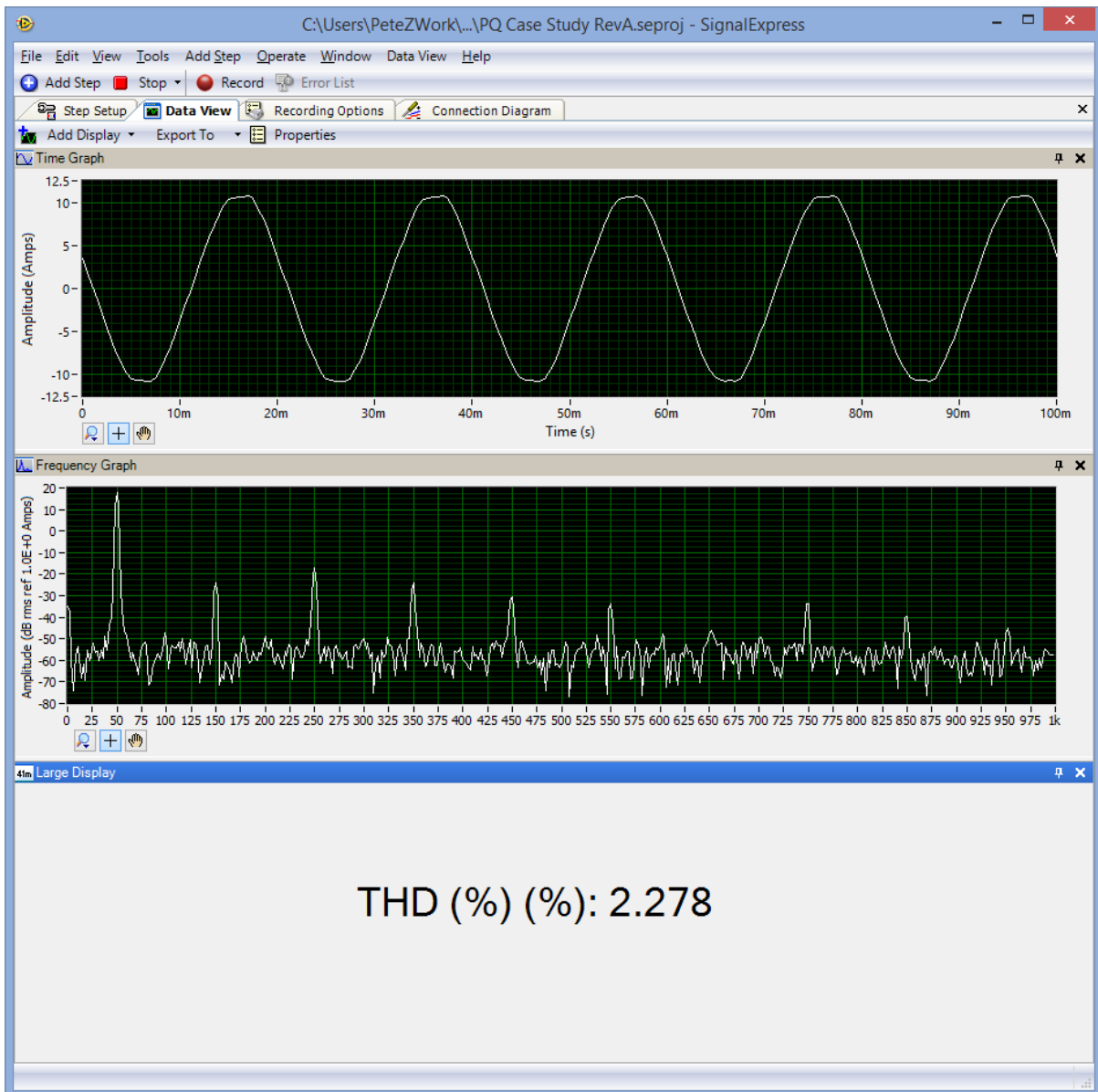
The result for the fan alone has the top trace as the current read direct from the output of the DRA009. The second trace is the spectrum calculated by Signal Express and the numerical display shows the value of THD. The noise on the trace and the accuracy of the THD measurement can be much improved by using the circuit discussed in the Low Current Measurement application note.



The following trace shows the fan and heater switched on together. The current trace at the top appears much less noisy as it operates over half the range of the DRA009.



To demonstrate the DRA009's ability to measure complex waveforms a diode was added to the circuit and the measurement repeated. The first set of traces were before the diode was added using a heater with no fan:



...and these are the traces with the heater in series with a diode:

