1-800-525-8528
www.datatranslation.com

Streaming Continuous Data at 10 GB/Minute Using the DT9862 USB Module and LabVIEW®

While some USB data acquisition devices on the market today are capable of throughput rates as high as 10 MS/s, most of these devices have design limitations, such as small FIFO sizes, that allow users to stream only a few milliseconds of data at a time.

This data "snapshot" might be sufficient for some applications, but what if your application requires continuous streaming for minutes at this high throughput rate?

Many customers have found that Data Translation's DT9862 USB module solves this problem. This application note describes one customer's experience.

Figure 1. The DT9862 is a high-speed, high-performance USB data acquisition module that provides throughput rates up to 10 MHz.

Customer Application

The customer needed to acquire precise measurement data from two analog input channels simultaneously at 10 MHz and continuously stream this data to system memory for several minutes.

The customer's setup included a desktop computer (P8H67-M) with the 64-bit version of Windows 7, and 32 GB of system memory.

For data acquisition, two DT9862 high-speed, high-performance USB 2.0 modules were chosen, due to the DT9862's ability to acquire one channel of analog input data at 10 MHz and with 16-bit resolution.

The customer used National Instruments LabVIEW software with Data Translation's LV-Link 3.0 software to design their data acquisition application.

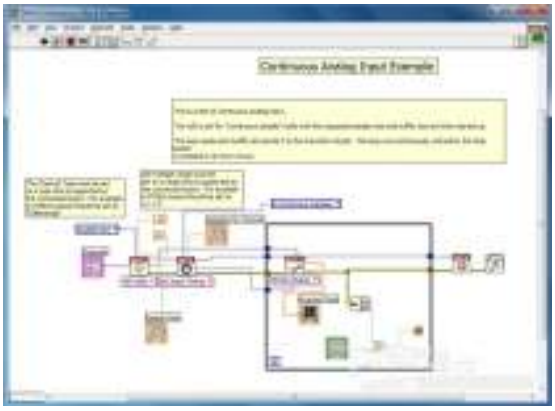

Figure 2. The LV-Link software interface is a library of VIs (Virtual Instruments) that enable LabVIEW programmers to access the data acquisition features of DT-Open Layers-compliant USB and PCI devices.

Challenge

The customer wanted to acquire and stream several minutes worth of data from both modules simultaneously, with both modules started and clocked synchronously.

To solve the synchronicity problem, Data Translation application engineers recommended that the customer use an external trigger to start both modules at the same time. In addition, they recommended that the counter/timer output of one DT9862 module be used to generate the clock input for both DT9862 modules, to ensure that they were both clocked synchronously at the same rate. In LabVIEW, the A/D subsystems of both modules were configured to run at 10 MHz. The high-level wiring diagram is shown in Figure 3.

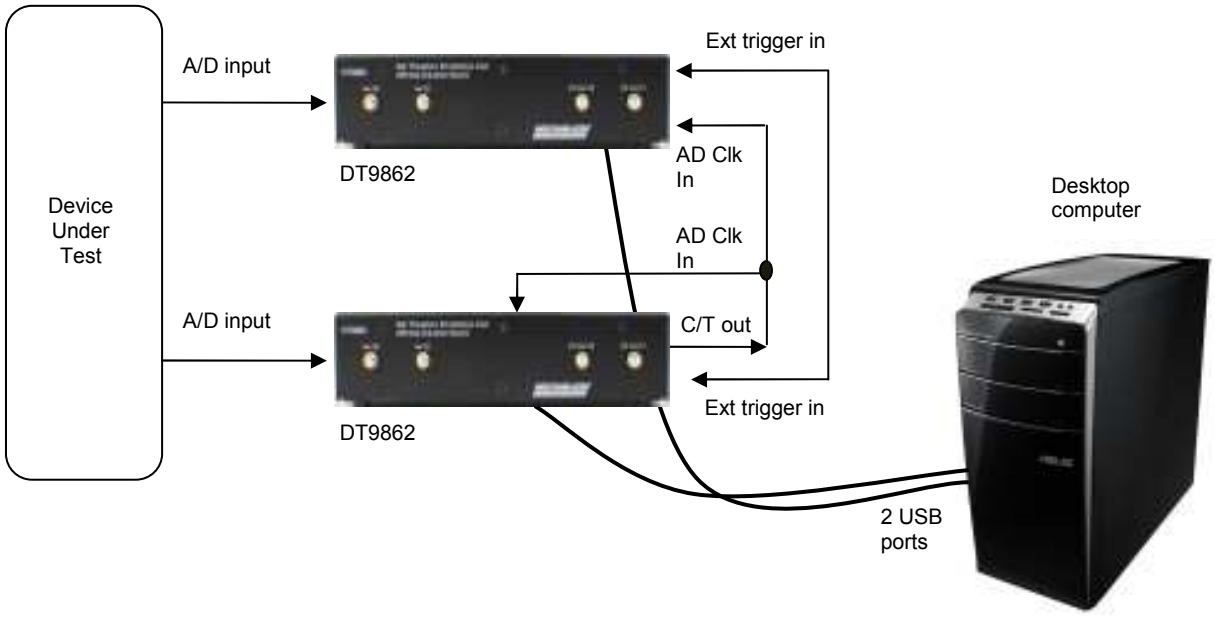

Figure 3. Synchronizing Two Modules

The application engineers further explained that by using a PC whose internal architecture used USB chips tied to the PCI Express (PCIe) bus, the customer could take advantage of the faster data rate, not available with USB 2.0 motherboards, and stream data at the required data rate for 10 MHz acquisition.

It was a requirement that a 64-bit operating system be used, as a 32-bit operating system would not be able to keep up with the data rates and data size required.

Application engineers determined the amount of system memory that the customer required on his computer as follows:

- For each sample on one module: 10 MS/s data rate per channel x 2 bytes per sample = 20 MB/s per channel
- For 1 minute of data: 20 MB/s x 60 s = 1.2 GB/minute per channel for one module
- LV-Link uses 64-bit floating point data, which is 8 bytes/sample, or 4 times more data: 1.2 GB/minute x 4 = 4.8 GB/minute per channel for one module
- 4.8 GB/minute x two modules = 9.6 GB/minute of system memory

Result

The performance of the DT9862 was far superior to the "snapshot" millisecond data capture performance of other high-speed data acquisition devices.

By using the DT9862 with LV-Link 3.0 and LabVIEW, the customer was able to acquire continuous data at 10 MHz from two analog input channels and stream it to the host computer for several minutes without problem.