SIS3150 USB to VME Interface TigerSHARC DSP based example test applications under Labview

Introduction

The SIS3150 is a USB2.0 to VME interface with full VME master capability. The SIS3150 has the option to install one or two Tiger SHARC DSP(s). The DSP(s) can be used to implement realtime applications or to speed up processes beyond USB2.0 execution speed. One of the central advantages is the possibility for fast device under test replacement including power cycle without the need for a reboot of an operating system. 3T BV, based in Enschede and Eindhoven, the Netherlands, www.3t.nl, has implemented two test applications for VME slave cards which are using a single DSP version of the SIS3150. The user interface was implemented using National Instruments Labview.
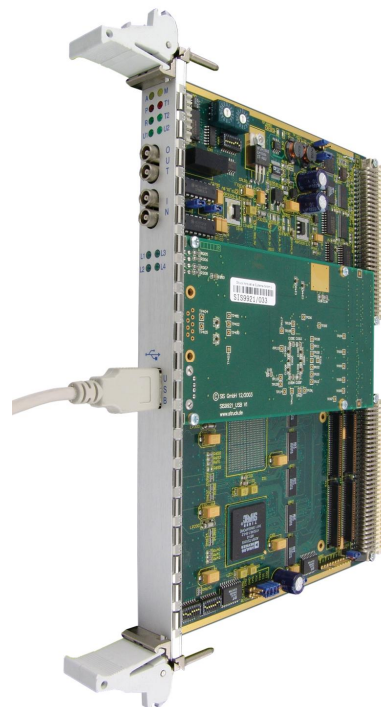
The applications are:
1.) VME interrupt tester
2.) Download accelerator

The two applications are described on the following pages, feel free to contact
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for details or inquiries on the implementation of other test applications.

1.   COMMUNICATION BETWEEN PC AND SIS3150

The way how the communication between PC (LabVIEW) and the TigerSHARC is established is equal for both applications. This is split in two parts; datalink layer and application layer. The datalink layer is equal for both applications. The supported commands in the application layer differ for the applications.
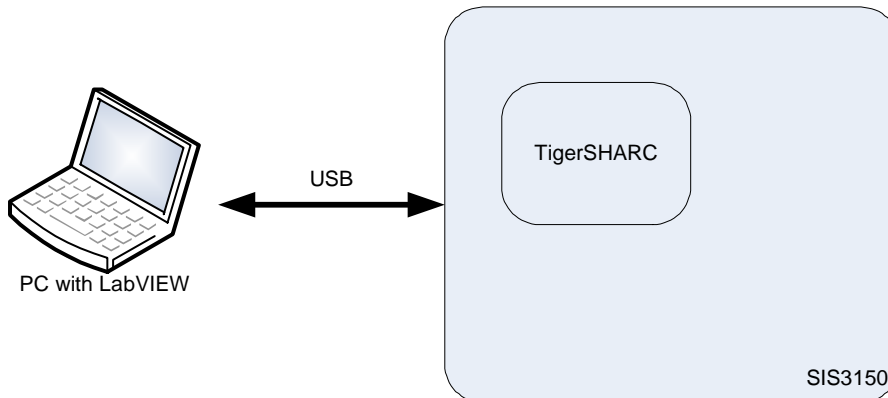

Figure 1 Communication between PC and SIS3150

The LabVIEW applications and the TigerSHARC applications have been created by 3T.

1.1   Datalink layer

The communcation is based on a memory mapped interface. The LabVIEW application can send a command with parameters to the TigerSHARC by writing to specific memory locations of the TIgerSHARC. When a command has been processed by the TigerSHARC, the TigerSHARC application will write this memory locations with possible results.

1.2   Application layer

The application layer implements the handling of the commands that are send by the LabVIEW application. The implemented commands differ for both applications. This is described in the following sections.

2. VME INTERRUPT TESTER

The VME interrupt tester is used to test the VME interrupt functionality of a VME board. It is used for qualification of the VME slave IP that is designed by 3T.

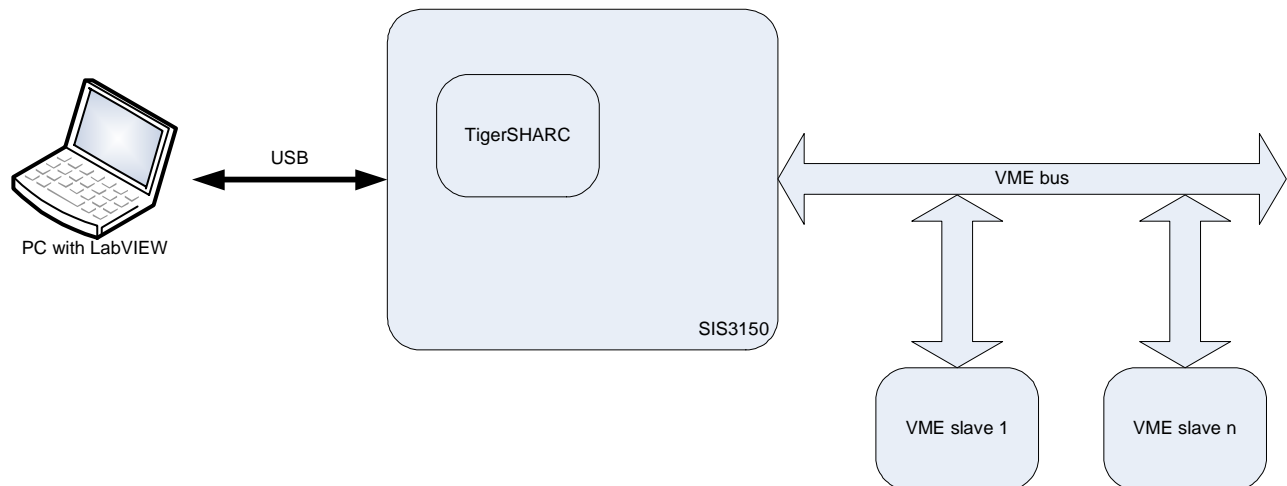The complete system is shown in Figure 2.

Figure 2 VME interrupt tester setup

The main features of the TigerSHARC application are:
1. Initialize all used VME slaves.
2. Initialize Bus Interrupter Module (BIM) for each VME slave (status/ID vector, interrupt level, interrupt enable, RORA/ROAK, etc)
3. Enable/disable interrupts
4. Handle interrupts (e.g. perform a read on a pre-configured address in case of a ROAK interrupt)
5. Counter that counts the amount of occurrences for each interrupt

The main features of the LabVIEW application are:
1. Detect connected VME slaves
2. Read the interrupt counters
3. Enable/disable interrupts
4. Read status
5. Generate interrupt

3. DOWNLOAD ACCELERATOR

The download accelerator is used to speed up the data transfer to a so-called download module. The setup is shown in Figure 3
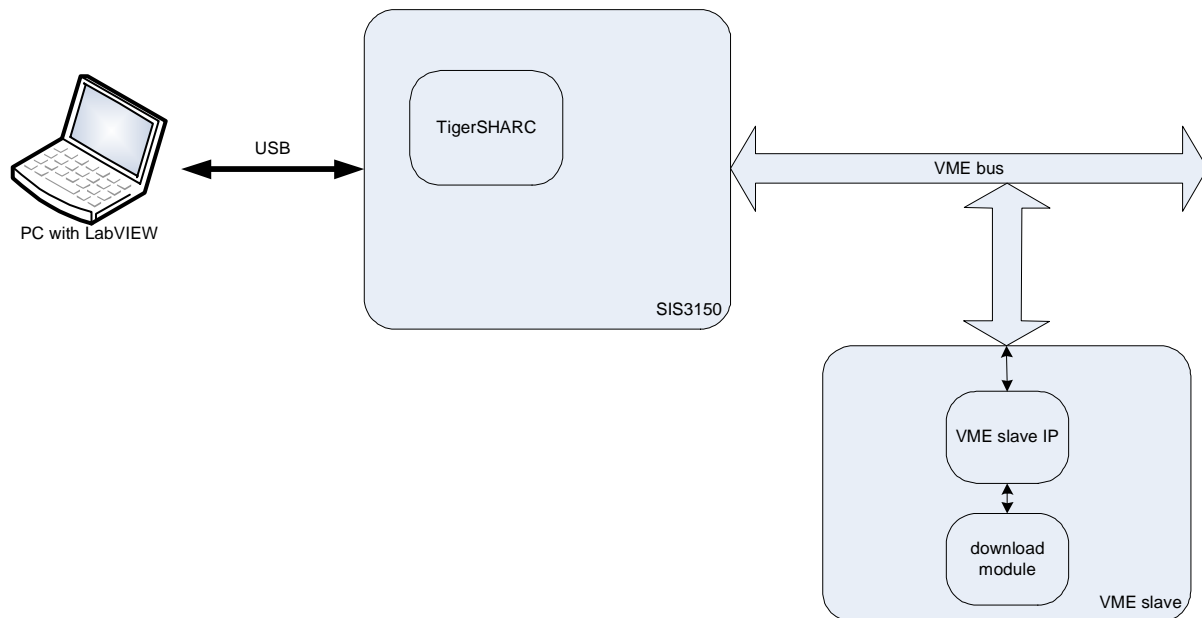

Figure 3 Download accelerator setup

The download module can program the firmware of a VME slave using the VME bus.

This was implemented by separate VME accesses for each word and wait until the word was written to flash. The programming of the firmware took too much times with this solution (several minutes). This solution didn't use the DSP. The complete programming control was implemented on a PC.

In order accelerate the programming, a big block of data is written to the DSP's memory. Subsequently, the DSP will take care of the programming. This approach speeds up the process substantial (about one minute) because the DSP can perform VME accesses to the download module much faster than a PC can do.

The main features of the TigerSHARC application are:
1. Initialize all used VME slaves
2. Initialize download module
3. Read version number from the download module
4. Erase data block of the download module
5. Write data block of the download module
6. Read data block of the download module

The main features of the LabVIEW application are:
1. Detect connected VME slaves
2. Erase/Write/Verify data blocks