HI7188 LabWindows Evaluation Board Program

Introduction

The purpose of this application note is to provide information about the HI7188 evaluation board software written in the National Instruments LabWindows environment. This program is windows-based which makes it easier for customers to use the evaluation kit and understand the device operation. The focus of this literature will be the new LabWindows program. For information concerning the evaluation board [1] or device operation [2], please refer to the specific documents.

System Requirements

- 486 or Higher
- Windows™ 3.1 or Windows™ 95
- 16Mb of RAM
- Hard Drive (2.5Mb Free)
- 1.44Mb Floppy Drive
- VGA Monitor (640 x 480 or Larger)
- 1 Parallel Port

Installation

1. To install the evaluation program insert the HI7188 LabWindows program disk into the 1.44Mb drive.

2. Create a subdirectory on your hard drive named "HI7188."

3. Copy all the files listed below from the program disk into the "HI7188" directory.

FILE	DESCRIPTION
7188cvi.001	Compressed source code for HI7188 Evaluation Program
Setup.exe	Creates LabWindows run time engine and decompresses the evaluation program
Getport.exe	Utility program to identify the computer port address required for communication
Testall5.cfg	Configuration file used by the evaluation program to write and read the calibration RAMs and registers of DUT in an attempt to check gross functionality. The data written/read is 5_{Hex} which equates to 0101_B
Testalla.cfg	Same as Testall5.cfg except the data written/read is A_{Hex} which equates to 1010_B

4. To continue the initialization procedure run the setup utility from the "HI7188" subdirectory. When prompted for the directory to install the CVI runtime engine and program, specify the same "HI7188" directory.

5. The last step in the initialization procedure is to define the communication link between the evaluation board and the host computer. The link is simply the computer parallel port address stored in the file "portadr.dat." The file can be created in several ways listed below:

a. Run the program GETPORT.EXE. This program will obtain the port address in Hex and create the file automatically. If your computer has multiple parallel ports, you need to specify which port the evaluation board is connected to.

b. Run the DOS program "MSD.exe" to identify the port address. Create the file "portadr.dat" using your editor and insert the port address. A typical file would contain 0x378.

c. If the HI7188 program is executed without the port address an error message will be displayed and the program will terminate. After the program is terminated, the GETPORT.EXE will automatically be started.

NOTE: If the port address is wrong, the program will display an error message "Evaluation Board not found."

Using the HI7188 LabWindows Program

MAIN PROGRAM PANEL

The main panel is divided into two sections identified as "Contents of DUT" and "Edit/Modify" (see Figure 1). The purpose of this division is to logically separate the current HI7188 device under test (DUT) programming with an area for edits/modification. This creates a display that easily facilitates editing the DUT programming while keeping the current configuration in view. The main panel has several buttons that allow the user to launch sub-panels that expand the level of detail. These sub-panels include the CNTL (Control Register), CCR2/1 (Channel Configuration Register) and STATs. To obtain help while the program is operating the user can use a right mouse button over all buttons to activate a help screen. Extensive pull down menus are available for all functions.

Contents of DUT Registers and RAMs Section

Data RAM

The Data RAM section displays the last reading from the device's data RAM. The data is displayed in logical channel order one through eight. The data format is Binary, Hex and Volts. There are two user buttons in this section:

IDLE/Read - places the program into a continuous read of the DUT data RAM.

STATs OFF - activates a statistics panel which displays statistics of the data RAM.

Calibration RAMs

The Calibration RAM section displays the current calibration coefficients for the system offset (ORAM), Positive Full Scale (PRAM) and Negative Full Scale (NRAM).

Registers

The register section displays the current Control Register (CNTL) and Channel Configuration Registers (CCR2/1).

Edit/Modify DUT Calibration RAMs and Registers Section

Calibration RAMs

The Calibration RAM editing section displays calibration coefficients for the system offset (ORAM), Positive Full Scale(PRAM) and Negative Full Scale (NRAM). The hex data is displayed in logical channel order from one through eight. To edit, enter Hex data directly into the windows or use the up/down buttons on the left of each window.

Registers

The register edit section displays Control Register(CNTL) and Channel Configuration Registers (CCR2/1).

There are several easy methods to edit the configuration. Enter the data directly into the windows or use the buttons described below:

CNTL - activates the control register panel to detail the system level programming of the HI7188 (Figure 2).

CCR2, CCR1 - activates the Channel Configuration Register panel to detail the channel level programming of the HI7188 (Figure 3).

Initialize Edits - copies the contents of the windows in the "Contents of DUT Registers and RAMs" section to the Edit Modify section. This includes the Calibration RAMs, Control Register and Channel Configuration registers.

Write Registers - Takes the contents of the CNTL, CCR2 and CCR1 windows in the Edit/Modify section and writes them to the DUT. (Note: the Contents section is not updated until a configuration read is performed).

Write All Edits - Takes the contents of the CNTL, CCR2, CCR1 and Calibration RAM windows in the Edit/Modify section and writes them to the DUT. (Note: if performing a calibration do not use this button, this will overwrite the calibration coefficients being internally generated).

MISCELLANEOUS AREAS OF THE MAIN PANEL

Configuration Section Buttons

Read - Performs a read operation of the entire contents of the DUT and updates the appropriate calibration RAM and register boxes in the "contents" section of the main screen.

Restore - prompts the user for a filename. The configuration within the file is then transferred to the Edit / Modify section of the screen. Note: The DUT is not updated until a "write all edits" is performed.

Save - prompts the user for a filename. The configuration within the Edit / Modify section is then saved to the specified filename.

Calibration

This section is an easy way to perform the patented three-point calibration. When these buttons are used the program automatically updates the Edit/Modify CCR2/1 area to prepare for calibration. Below is an example.

1. The system and channel level program has been set.

2. Select the desired calibration either offset, positive or negative full scale.

3. The program will interpret and update the CCR2/1 windows in the edit/modify section.

4. When the input calibration voltage is selected and settled, press the write registers button to execute. Do not press the write all button or calibration coefficients will be overwritten.

5. To view the new calibration coefficients simply press the read button in the configuration section. This will update the calibration RAMs displayed in the contents of DUT section.

Misc Buttons

Save Data RAM - Allows user to specify the number of samples and data attributes to a FILE.

Self Test - Uses the configuration files testall5.cfg and testallA.cfg to write an alternating pattern of 1s and 0s to all RAMs and registers. The program then reads all RAMs and Registers back to compare. This is an attempt to ensure communication and functionality of the DUT.

I/O RESET - asserts a low signal on the I/O reset pin. This will reset the serial interface.

SYS RESET - asserts a low signal on the reset pin. This will completely reset the DUT and reset the evaluation program to the defaults.

CONTROL REGISTER PANEL

The CNTL panel (Figure 2) provides detailed information concerning the system level programming set by the 16-bit control register. This details each bit function and interprets the bit value. The user can easily change each bit with the program automatically interpreting the new bit value and displaying the updated CR byte in binary and hex. There are several buttons at the bottom of the panel for the following purpose.

Control Register Panel Button Descriptions

Done - Closes the Control Register panel and returns, the new 16 bits of information. The new information is **not** written to the DUT until a write is performed.

Read - Reads the DUT as defined by this panel. This panel sets the number of active channels that defines the active channel bytes to be transferred. Be careful when modifying the number of active channels in this panel versus the DUT active channels or synchronism may be lost. An I/O reset may recover for loss of synchronism.

Write - Writes the content of this panel to the DUT.

Save - Saves the contents of the panel to a user defined file.

Restore - Restores **ALL** the contents of a user file to this panel.

CHANNEL CONFIGURATION REGISTER PANEL

The CCR2/1 panel (Figure 3) provides detailed information concerning the channel level programming set by the 32-bit channel configuration registers. This details each bit function and interprets the bit value. The user can easily change each bit with the program automatically interpreting the new bit value and displaying the updated CCR bytes in binary

and hex. There are several buttons at the bottom of the panel for the following purpose.

Control Register Panel Button Descriptions

Done - Closes the CCR panel and returns, the new 64 bits of information. The new information is **not** written to the DUT until a write is performed.
Read - Reads the DUT as defined by this panel.
Write - Writes the content of this panel to the DUT.
Save - Saves the contents of the panel to a user defined file.
Restore - Restores **ALL** the contents of a user file to this panel.

EXAMPLES

Example 1: Initial Startup After Installing Software

1. After the software is loaded onto your computer double click the HI7188 icon. If the port address is correct the main panel (see Figure 1) will appear.

2. To verify the write/read functionality of the DUT, press the self test button in the lower right corner of the main panel. The program will write both CCRs and all calibration RAMs with A's (Hex) followed by reading the values back. The program will then repeat the process with 5s.

3. To easily program the system or "chip" level, activate the Control Register sub panel, by depressing the CNTL button of the main panel. This will enable you to easily visualize the "System" level settings. The Control Register defines the number of active channel, therefore; it must be programmed before the channel level. Write this programming information to the DUT by depressing the "Write" button. Depress the "done" button to return to the main panel.

4. To program the channel specific information activate the Channel Configuration Register(CCR) sub panel by Clicking on the CCR2 or CCR1 button of the main panel. This will enable you to program the "Channel" level information contained in both CCR2 and CCR1 on one panel. Write this programming information to the DUT by depressing the "Write" button. Depress the "done" button to return to the main panel.

5. The device is now programmed for the user configuration but has not been calibrated. To easily perform a complete system calibration, execute the following steps from the main panel:
   a. Apply the "zero scale" voltage to all active channels. Press the Offset Cal button in the Calibration section of the main panel. The program will automatically modify the appropriate bits of the CCR windows of the Edit/Modify section to place the channels in offset calibration. The Write Registers button will change color from yellow to red indicating the DUT needs to be written. To execute this calibration press the Write registers button.

   b. Apply the "Positive Full Scale" voltage to all active channels. Press the Pos. FS Cal button in the Calibration section of the main panel. The program will automatically modify the appropriate bits of the CCR windows in the Edit/Modify section to place the channels in positive full scale calibration. The Write Registers button will change color from yellow to red

indicating the DUT needs to be written. To execute this calibration press the Write registers button.

   c. Apply the "Negative Full scale" voltage to all active channels. Press the Neg. FS Cal button in the Calibration section of the main panel. The program will automatically modify the appropriate bits of the CCR windows in the Edit/Modify section to place the channels in offset calibration. The Write Registers button will change color from yellow to red indicating the DUT needs to be written. To execute this calibration press the Write registers button.

6. The device is now programmed with system and channel level information. In addition, the system offset and gain errors have been removed by the calibration. To update the Contents of the DUT registers and RAMs section of the main panel, press the Read button in the Configuration section. The program will automatically read the Control Register, Channel Configuration Registers and Calibration RAMs fro the DUT and update the main panel. Please note, the calibration bits of CCR2/CCR1 have been reset to zero. The HI7188 will update these bits automatically after performing calibration.

7. To enable the user to edit and modify the DUT contents, press the Initialize Edits button. This will transfer all Register and RAM data from the Contents section to the Edit/modify section.

8. Saving the configuration is achieved by depressing the Save button in the configuration section. Please note, you can only save the information in the edit modify section not the DUT contents section.

9. To read the data RAM, simply press the IDLE/Read button or save data to a file via the Save Data RAM button. To see statistics of the data RAM press the STATs Off button.

Example 2: Restoring the Configuration from a File

1. To restore a saved configuration, select the Restore button on the main panel.

2. Enter the file name for the saved configuration. The program will extract the required information and update the edit/modify section.

3. To update the DUT, select the Write Registers button. The program will write the Control Register and Channel Configuration registers of the DUT. The purpose of writing the control register before updating all RAMs is to ensure the device is programmed for the correct number of active channels. The number of active channels defines the number of bytes transferred during a communication cycle. If the active channels in this program do not match the DUT, synchronization will be lost with the HI7188 serial interface.

4. To confirm the DUT has been properly written, select the read button. Compare the register information in the DUT and edit/modify sections. If they do not match perform a I/O reset and repeat steps 1 through 4. If they do not still do not match after the I/O reset, perform a SYS reset and repeat steps 1 through 4.

5. To update the calibration RAMs, select the Write all edits button. Repeat step 4 to insure the device has been properly reprogrammed.
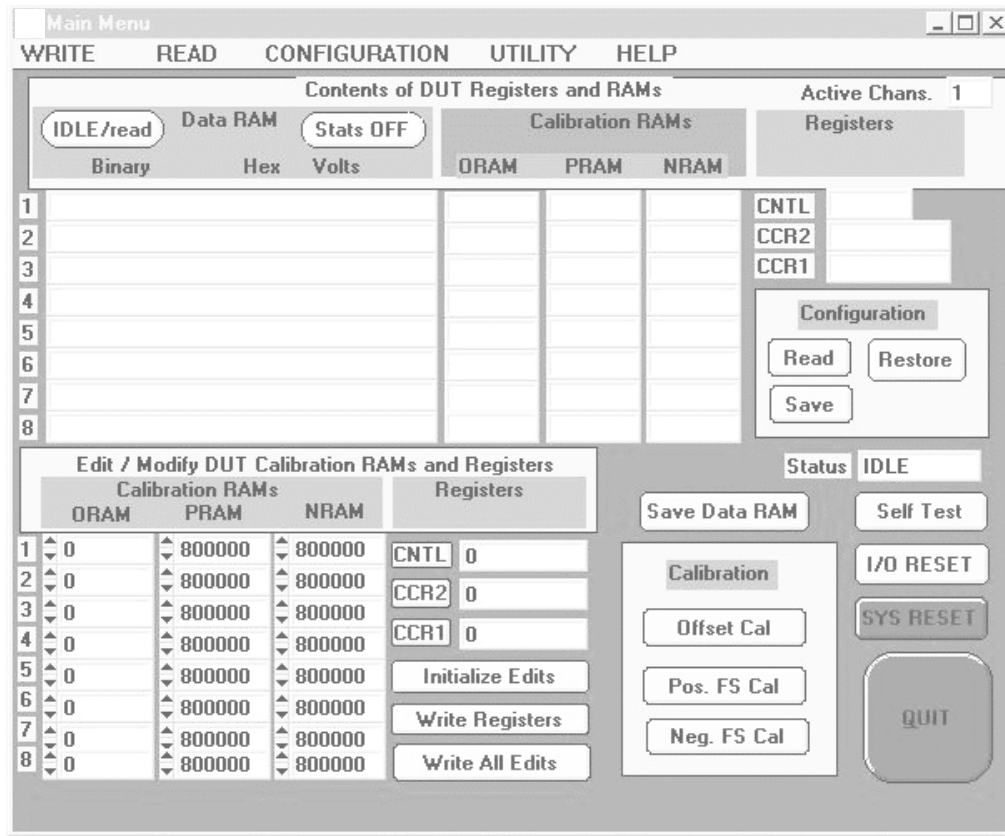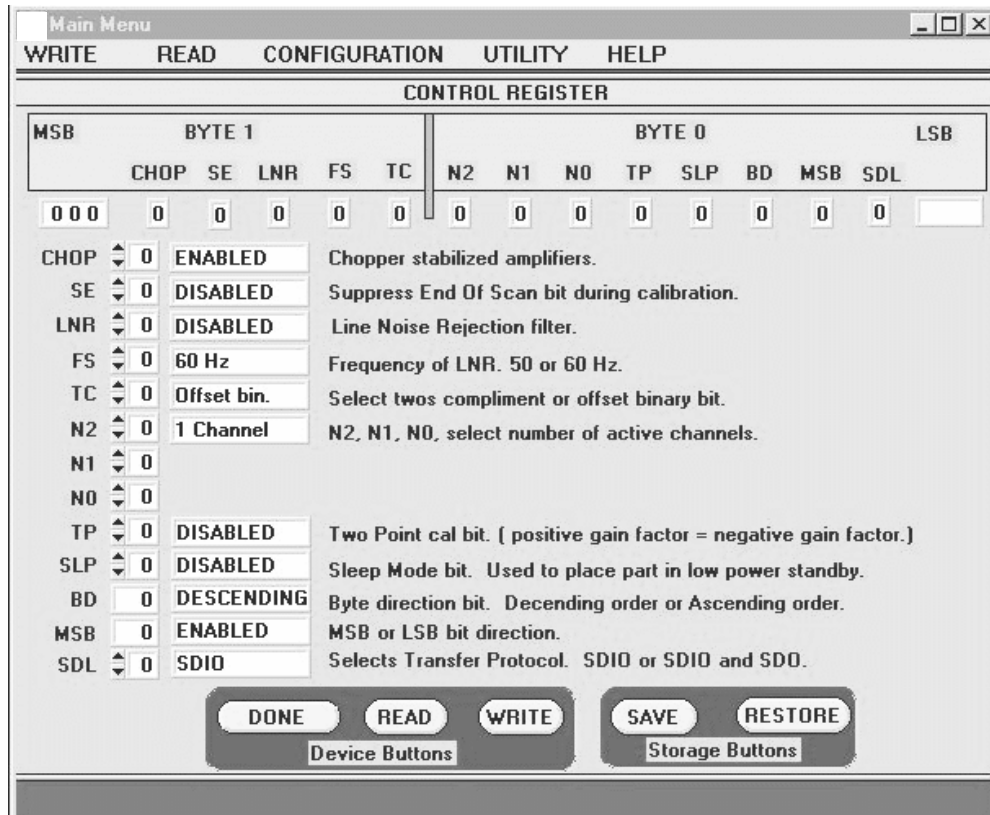
FIGURE 1. MAIN PROGRAM SCREEN

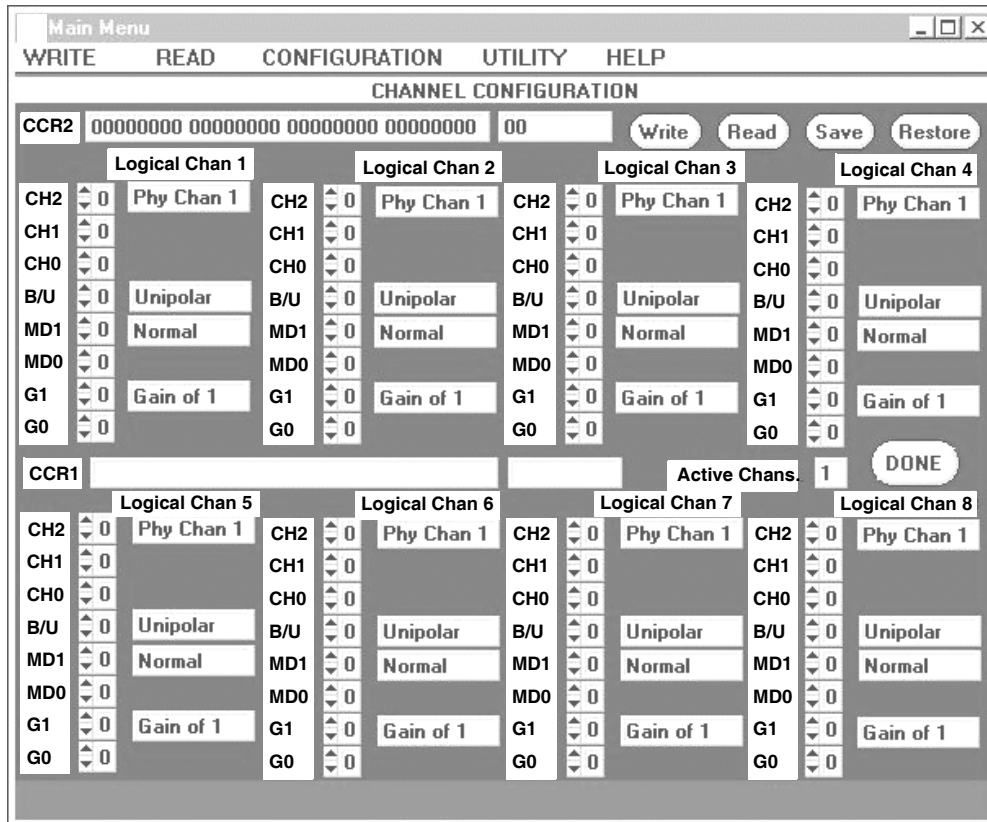**FIGURE 2. CONTROL REGISTER PANEL (CHIP/SYSTEM LEVEL PROGRAMMING)**

intersil

FIGURE 3. CHANNEL CONFIGURATION PANEL (CHANNEL LEVEL PROGRAMMING)

References

For Intersil documents available on the web, see
http://www.intersil.com/

[1] J.J. Kornblum and D.C. Jarman, Using the HI7188
    Evaluation Kit Application Note, AN9518,
    Intersil Corporation.

[2] HI7188 Data Sheet, FN4016,
    Intersil Corporation.

All Intersil U.S. products are manufactured, assembled and tested utilizing ISO9000 quality systems.
Intersil Corporation's quality certifications can be viewed at www.intersil.com/design/quality

For information regarding Intersil Corporation and its products, see www.intersil.com

intersil