

Analog, Digital & Mixed-Signal ICs, Modules, Subsystems & Instrumentation

Software Users Guide

For EasySuite™

High Speed, Low Power Analog-to-Digital Converter
Evaluation Kit Software



2 Elizabeth Drive • Chelmsford, MA 01824
978-250-3343 tel • 978-250-3373 fax • adc@hittite.com
www.hittite.com
Hittite Microwave Corporation Proprietary

140-00031-00
CP110738 rev C

Table of Contents

1	Product Description	3
2	Required Equipment	3
3	Hardware Setup	4
4	Quick Start Guide	4
5	EasySuite™ Installation and Setup	5
5.1	Installing EasySuite™	5
5.2	Connecting the Hardware	5
6	Starting Hittite EasySuite™ Software	6
6.1	ADC Configuration Main Screen.....	7
6.2	Mode Setting Panel.....	7
6.3	Input Configuration Panel	7
6.4	Operation Panel.....	7
6.5	Sampling Speed Panel	8
6.6	The Log Panel	8
6.7	Setting registers in the ADC.....	8
7	Running Measurements	9
7.1	Controlling the measurement.....	9
7.2	Measurement values panel.....	10
8	Interleaving Compensation post processing tool	10
	Appendix	11
	Installation on Linux and Mac.....	11

1 Product Description

EasySuite™ is a set of software tools that enables evaluation of Hittite data converters. It works together with a Xilinx Spartan-6 development kit loaded with the EasyStack™ firmware, and a Hittite EasyBoard™ evaluation board with Hittite's Analog to Digital Converter (ADC) mounted.

The software tool controls the configuration of the ADC and support functions on the EasyBoard™. It manages the triggering of data capture in the FPGA, retrieving the sample set, analyzing it by executing an FFT and calculating performance parameters.

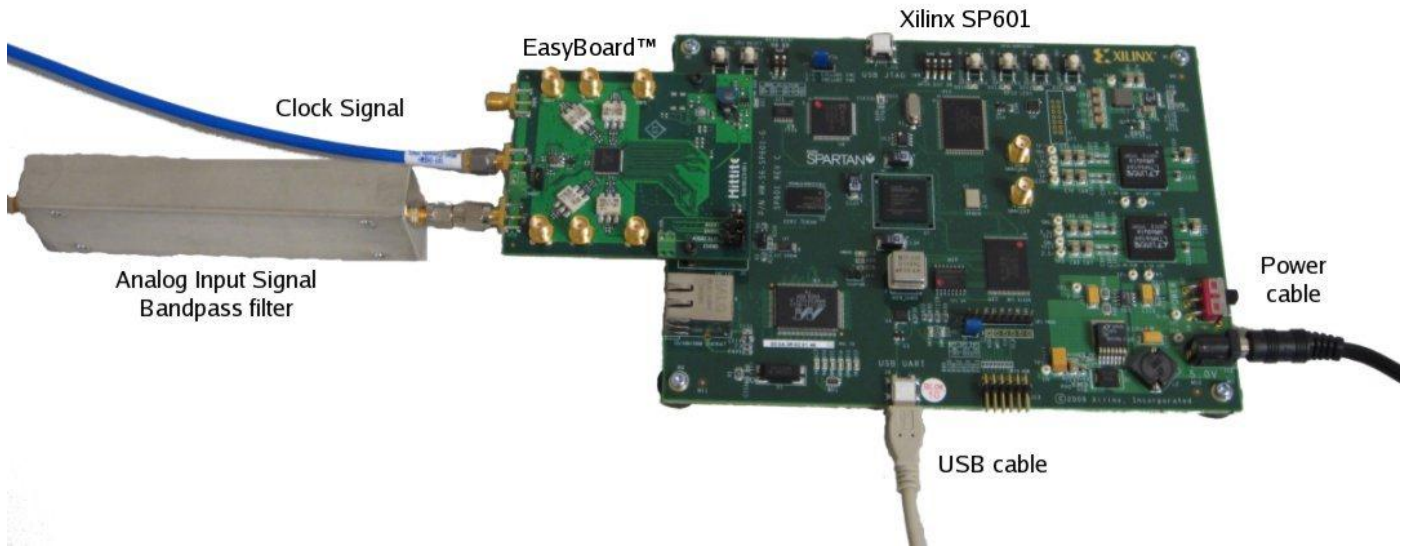
EasySuite™ also includes EasyStack™, an FPGA firmware that handles the LVDS interface with the ADC, data processing and ADC configuration setup. EasyStack™ includes all functionality to control the ADC.

2 Required Equipment

Verify that all the items listed below are available before starting. EasySuite™ will not start without all hardware setup and connected.

- One Hittite EasyBoard™
- Data Sheet for the ADC mounted on the EasyBoard™
- Hardware Users Guide for the relevant EasyBoard™
- Xilinx Spartan-6 development kit, SP601
- Analog high performance signal source and band pass filter
- Low jitter clock source
- Computer with Java run time environment installed.

3 Hardware Setup



4 Quick Start Guide

- Install EasySuite™ by running Setup_EasySuite.exe, see chapter 5.
- Connect the hardware, see section 5.2.
- Connect a low jitter clock signal to the clock input on EasyBoard™.
- Connect an input signal through a band pass filter to one analog input on the EasyBoard™.
- Power on the Xilinx SP601 board. The EasyBoard™ gets power from SP601.
- Start EasySuite™ from the Start menu.
- Choose mode and enter clock frequency.
- Select which input should route to which channel (15XX boards)
- Press Cycle Power.
- Open Measurement Window
- Select active channel
- Press Single Run

5 EasySuite™ Installation and Setup

5.1 Installing EasySuite™

All necessary drivers load automatically during installation. Download and install Setup_EasySuite.exe from www.hittite.com. Run the file (by double-clicking), and follow the instructions during the installation.

Verify that the selection for components to install includes: USB cable driver and Start Menu Shortcuts.

After completing the installation, the EasySuite icon will appear in the start-menu in Windows. The program will be located in the "Hittite Microwave Corp" folder, in the sub-folder "EasySuite", in the Windows Start menu.

If Java is not installed, it can be installed online from the Java website (www.java.com).

5.2 Connecting the Hardware

Connect the Xilinx® provided power supply from an AC wall outlet (using appropriate wall adaptor) to the Xilinx® Spartan-6 evaluation board.

Connect the Hittite EasyBoard™ to the Xilinx® Evaluation board via the FMC connector. Ensure that the board is safely secured with the applied screw socket.

Connect the USB cable between a USB port on the computer and the USB UART port on the Spartan-6 evaluation board

Attach a signal source (source to be captured) to the SMA (RF) connector INP1 on the Hittite EasyBoard™.

Attach a clock signal to the CLK port on the Hittite EasyBoard™.

Locate the power switch on the Xilinx® evaluation board. Apply power to the Xilinx® and Hittite evaluation boards by sliding this switch to the "ON" position. Several green LEDs should illuminate upon power application. A steadily lighting GPIO_LED0 diode indicates that the EasyStack firmware is uploaded.

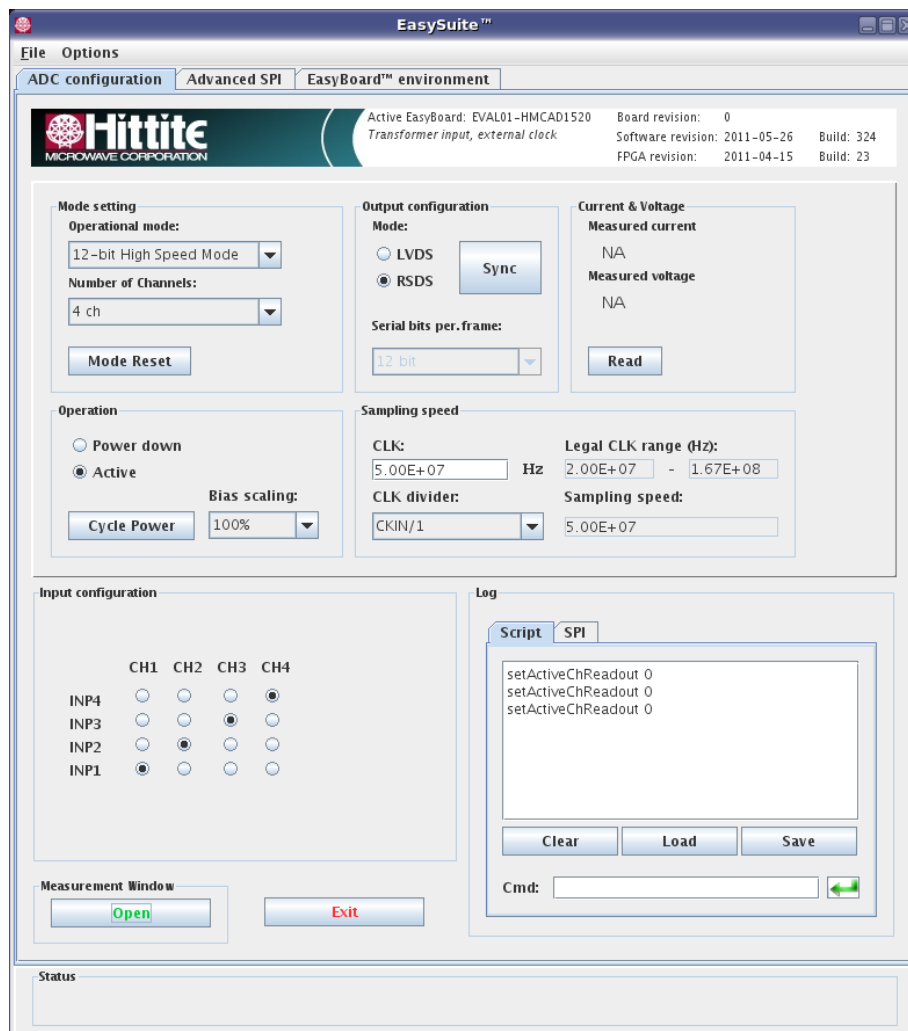
6 Starting Hittite EasySuite™ Software

The Hittite EasySuite™ software tool is programmed in Java 1.6 SDK. This means that as long as Java is installed on the computer, it should be possible to use the tool, regardless of operating system. The software has been tested on Windows XP and CentOS 5.4 (Linux) - Please refer to the Appendix A for additional information regarding installation on Linux systems.

To run the EasySuite™ software, locate the EasySuite™ icon in the folder "Hittite Microwave Corp" and subfolder "EasySuite" in the Windows start-menu. Click on the EasySuite™ menu element to start the software.

The first window prompts for which COM port to connect to. Choose the COM port with the highest number. Ensure that the cable is connected and the power is turned on on the Xilinx® Spartan development board.

The following window provides several tabs located at the top of the window.



6.1 ADC Configuration Main Screen

From the EasySuite™ ADC configuration tab it is possible to select the different operational modes of the attached ADC, RF inputs and other settings regarding the ADC. Each of these controls are located in various “panels” located within this tab.

The other two tabs, Advanced SPI and EasyBoard environment, are for advanced use only, and are not covered in this manual. It is recommended to leave these options at the default setting.

6.2 Mode Setting Panel

The first item to set is the Operational mode which the converter should operate in. For example, if an HMCAD1520 is being evaluated, it is possible to choose between 3 operational modes.

If the user has chosen a High Speed mode, the user can set the number of channels. The user can choose between 1 ch, 2 ch and 4 ch. Refer to the datasheet for the relationship between Number of Channels Mode, Operational Mode and Sampling Speed Range.

The Output configuration panel controls the LVDS interface between the ADC and the FPGA. The Output Configuration Mode sets the drive strength for the serial interface. The user can choose between two standards, LVDS (3.5 mA) and RSDS (1.5 mA).

The Sync button resynchronizes the serial interface between the converter and the FPGA. For certain modes the user can adjust the number of bits per frame in the serial interface. It is recommended to leave this control at its default setting.

6.3 Input Configuration Panel

For the HMCAD15XX series of EasyBoard™ products, it is possible to use the ADC CrossPoint Switch (CPS) array to route analog inputs to any channel in the ADC.

Locate the Input configuration panel. In this panel the user can choose which input should be routed to which channel. The user can set one input to multiple channels or set each input to each channel.

Depending on the choice of Operation mode, 1, 2 or 4 channels will be available to choose from.

6.4 Operation Panel

The Operation panel controls the power down and bias scaling settings of the ADC.

A Cycle Power button is provided to perform a power off/on sequence. After changing operational mode, sample rate, number of channels or serial bits per frame the user must toggle the power to ensure a proper initialization of the interface between ADC and FPGA.

The Cycle Power button will change color when it is necessary to cycle the power.

The Bias scaling setting changes the bias setting for the operational amplifiers inside the ADC. The user can reduce the current consumption by setting the bias scaling to value other than 100%. Please refer to the Hittite product datasheet for further detail on this function.

6.5 Sampling Speed Panel

This evaluation system does not measure the speed of the clock applied to the Hittite EasyBoard™. The user is required to enter the clock speed in to the CLK field so that the frequency plot can scale the X-axis properly.

A clock divider control is provided to allow the user to control function if the ADC provides this functionality. For example, the HMCAD15XX boards have an internal clock divider which allows the user to divide the clock signal by 1, 2, 4 or 8.

Valid speed ranges will be indicated in the GUI based on the Mode setting and CLK divider.

6.6 The Log Panel

EasySuite™ has a command line interface. All activities in the graphical user interface (GUI) will send one or more command lines to the device as well as the script log. This log can be saved to a file. The user can then later, load the saved log file thus allowing the user to return to the same state as when the log was saved.

The SPI tab shows the log over SPI commands sent to the ADC.

The user can also enter commands directly by writing them in the command line field.

6.7 Setting registers in the ADC

The command line in the Log panel can be used to enter any command. One useful command is to set a register value in the ADC.

setRegister

This command updates a register value inside the ADC.

Syntax:

```
setRegister addr value
```

```
    addr (hex)    The address for which register to set
```

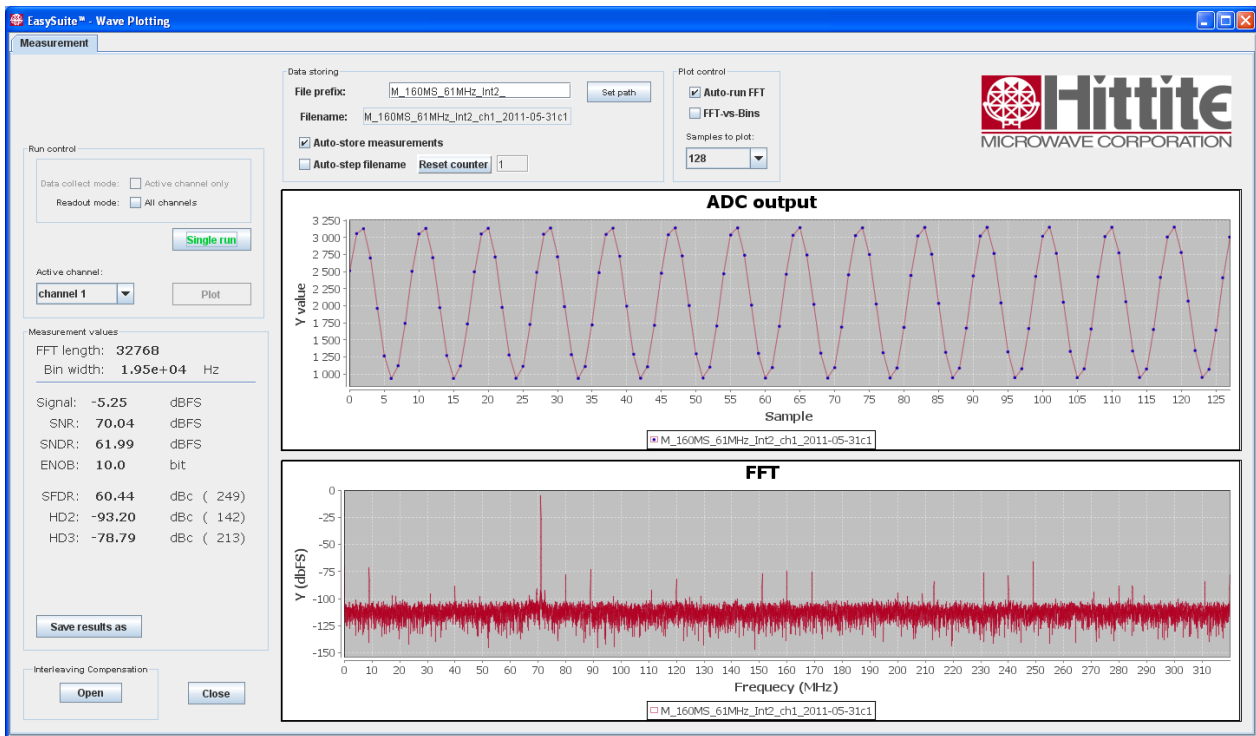
```
    value(hex)   The value for that register
```

Example:

```
setRegister 31 F
```


7 Running Measurements

Before starting any measurement, the user should make sure to click the Cycle Power button in the Operation panel in order to initialize the configuration settings that have been entered. Then click Open Measurement Window button at the bottom of the Input configuration panel. This will launch the EasySuite™ Wave Plotting Window.



The Wave Plotting window contains the run control settings in the upper left corner. Data storing settings are located at the top. In the bottom portion of the window are two charts, one for the transient output and one for the FFT plot.

The performance parameters from a measurement are reported in the Measurement values panel at the left.

7.1 Controlling the measurement

The Run control panel defines which channel should be the active channel. If “Readout mode: All channels” is enabled, all channels will be read in one run. The active channel will be plotted automatically, and the rest can be plotted by changing Active channel and press Plot.

If “Readout mode: All channels” is not enabled, only the active channel will be read out and plotted.

Press “Single run” to activate a measurement.

It is possible to store the sampled dataset by setting Auto-store measurements in the Data storing panel.

7.2 Measurement values panel

This panel reports the performance parameters which the analysis tool puts out. The analysis is a frequency analysis of a pure sine input, finding noise level, harmonics and Effective Number of bits.

8 Interleaving Compensation post processing tool

EasySuite™ includes an interleaving compensation tool. This tool is a post processing (not real time) algorithm which eliminates time interleaving artifacts in the measurement data. It can be started from the EasySuite™ - Wave Plotting windows by clicking Open Interleaving Compensation button in lower left corner.

Be sure to run a measurement before starting the tool, so that there is any data to run compensation on.

The compensation window looks very much like the measurement window. In the upper left corner it is possible to select which compensation type to run, Offset/Gain mismatch and/or Time skew.

Select compensation type and press Compensate for running a compensation of the data that is active in the measurement window.

By enabling Lock coefficients, the compensation coefficients will not be updated when running a new compensation. The coefficients from the previous compensation will be used.

Measurement values from the compensated data will be reported in the Measurement values panel. A new plot of the compensated data will be displayed in the charts.

Appendix

Installation on Linux and Mac

It is possible to use this tool on Linux and Mac. The Windows installation file unwrap a java runtime file (easysuite.jar). This can be copied to any system with java installed. The system is developed on CentOS/RedHat 5.4, so it is well tested on Linux systems.

There are some packages and sysadmin tasks that must be done to make it run smoothly. Here are some tips for fixing this.

For automatic detection of USB devices it is recommended to install a package called fxload in the RedHat world.

The user that runs the software must have write access to the /var/lock directory. This can be enabled by running this command as root:

```
usermod -aG uucp,lock <user>
```