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FEATURES

- Supports evaluation of ADC devices
- Compatible with Windows Vista 32-bit/Vista 64-bit/XP/7
- Plug-and-play FFT analysis
  - 16 to 8192 length
- Automatic ADC part number detection
- FFT data save capability for offline analysis
- Easy interface to ADC demo boards via 34-pin ribbon cable(TS7003 only) or 34-pin socket
- Easy interface to PC host via USB cable
- Displays waveform and FFT, while calculating SNR, and THD continuously
- Zooming in and out function for FFT and waveform plot

Figure 1. Sample ADC Evaluation Board (Top) with Nano River Tech ViperBoard (Bottom)

DESCRIPTION

The evaluation platform GUI is a completely tested user interface that allows for quick and easy evaluation of ADC's. A Nano River Technologies ViperBoard with onboard microcontroller and FPGA is used for signal processing. The ViperBoard interfaces to the ADC via a 34-pin ribbon cable (TS7003 only) or a 34-pin socket and it interfaces to any computer via a USB cable. The GUI is compatible with Windows Vista 32-bit/Vista 64-bit/XP/7.

Note: The assumption is made that the user has successfully connected the Nano River Tech ViperBoard with the desired ADC demo board for evaluation per the instructions in the corresponding ADC demo board manual.

Product data sheet and additional documentation can be found at www.silabs.com.

ORDERING INFORMATION

Order Number	Description
TSDA-VB	Nano River Tech ViperBoard

ADC	Description	Evaluation Platform version required
TS7003	300ksps, Single-supply, 12-Bit Serial-output ADC	2.2.10 or newer
TSM1285	300ksps, Single-supply, 12-Bit Serial-output ADC	2.2.10 or newer
TSA7887	2-channel, 125ksps, 12-Bit Serial-Output ADC	2.2.11
TS7001	2-channel, 187.5ksps, 12-Bit Serial-Output ADC	2.2.11

Table 1. ADCs Supported

ViperBoard Driver	Go to: http://nanorivertech.com/touchstone-driver-app.html
GUI Installer	

Table 2. Location for ViperBoard Driver and GUI installer files

Latest Evaluation Platform Application Version	2.2.11

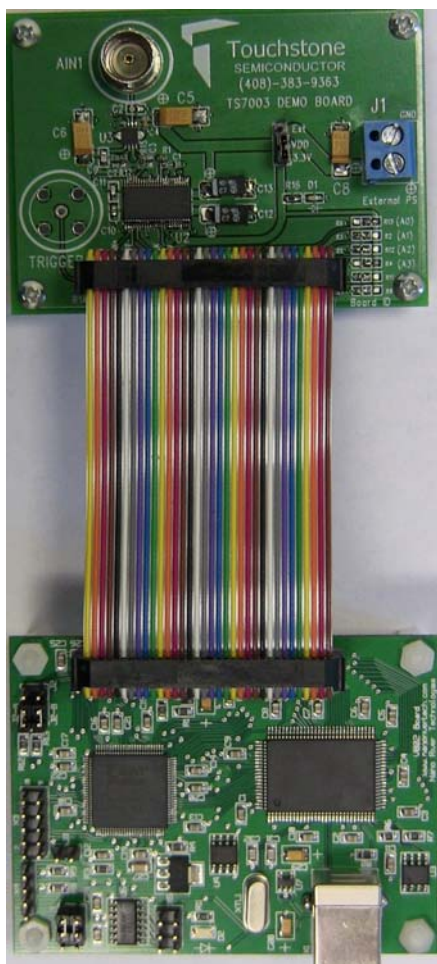**Table 3. Latest Evaluation Platform Application Version**

For ViperBoard licensing information, please see Appendix

ViperBoard Driver and GUI Installation Procedure

Required Equipment

➢ ADC demo board

➢ Nano River Tech ViperBoard

➢ USB cable

➢ 34-pin ribbon cable (TS7003 only)

➢ Computer with Windows Vista 32-bit/Vista 64-bit/XP/7

➢ Internet access

The evaluation platform GUI is a user interface that allows for quick and easy evaluation of all Silicon Labs ADC's. In order to use the GUI, the ViperBoard driver and GUI installer files must be downloaded. The following steps are to be performed:

Installing the ViperBoard Driver

1. To install the ViperBoard driver, go to the web site: *http://nanorivertech.com/touchstone-driver-app.html.*

2. Refer to Figure 3. On this screen, select the driver installation link that is appropriate for the OS on your computer. If applicable, please read the PDF document titled "read first" in red font, which provides simple instructions on how to install the files. Note that every driver installation requires unzipping two files, namely "Viperboard Windows (your OS) Installation 1.1.6" and "libusb v.1.2.5.0 Windows Installation".

   Only the driver for Windows XP does not have a "read first" PDF file nor a separate libusb file. In this case, you only need to unzip the "Viperboard Windows XP Installation 1.1.6" file.

Installing the GUI

3. To install the GUI application, go to the web site: *http://nanorivertech.com/touchstone-driver-app.html.*

4. The zip file is called "Touchstone Evaluation Platform Application 2.2.11". Unzip the file that corresponds to the Windows OS you are using and run the application. Select all the default settings.

Testing the GUI

5. To test if the ViperBoard driver and the GUI have been installed correctly, connect the ADC demo board to the ViperBoard via the 34-pin ribbon cable (TS7003) or 34-pin socket. Refer to Figure 1. Then, connect one end of the USB cable to the USB connector of the ViperBoard and the other end to a USB port on the computer.

6. To run the GUI, go to *Start > All Programs > TouchStoneEvalBoard 2.2.11 > 01 Touchstone Evaluation App*. Refer to Figure 4. The GUI will ask you if you wish to use the last configuration – Click No. Refer to Figure 2. After approximately three seconds, the "status" section on the top right hand side of the GUI screen should read "PC Connected" and the demo board type for the ADC should appear. For example, in Figure 2, the TS7003 demo board is used and as a result, the demo board type reads "TS7003".

Using the GUI for ADC Evaluation

Depending on the ADC to be evaluated, the ADC section of the GUI labeled as number 6 in Figure 5 will change. Please refer to the ADC demo board manual for more information. Table 1 shows the ADCs currently available for evaluation.

GUI Features

The following outlines the various features available in the ADC evaluation platform GUI. Please refer to Figure 5 and note that each section of the GUI is labeled with a number from 1 to 10 corresponding to the following:

1. Under file, you can save data as a CSV file and load data from a CSV file. To take a screen shot of the GUI, select "print" and save the file as a PNG or BMP image. You must enter the suffix at the end of the file name as .PNG or .BMP for a PNG or BMP image file. Select "Exit" to exit the current session.

2. Pressing the "single" button allows for a single conversion. The result (code value) is displayed at the top of the screen at #4. Press "continuous" in order to sample continuously. In this mode, the system acquires samples at the specified sampling rate (see #3), and displays the waveform (#7) and FFT (#8) in the screens below.

The program collects the number of samples entered in "FFT length" field, and then pauses to update the screen before collecting the next set of samples.

3. The sampling rate can be entered while performing a continuous conversion. Once the sampling rate is entered, press "enter" on the keyboard and the plots will be updated. The GUI allows a sampling rate from 100sps to the maximum sampling rate of the ADC. Please refer to the product datasheet.

4. In single conversion mode, after every conversion, the corresponding code is displayed.

5. If the Nano River Tech Viperboard and the ADC demo board have been connected correctly to the PC according to the instructions in the ADC demo board manual, the status boxes will be highlighted in green and will read "PC Connected" along with the part number of the ADC to be tested. If the ViperBoard or the ADC demo board is not connected, the boxes will be highlighted in red. In figure 5, the TS7003 is being evaluated.

6. Depending on the ADC being evaluated, this section will change. In figure 5, the TS7003 is being evaluated. Since the TS7003 offers a shutdown pin, this section provides a button that can be selected to exercise this function. Please refer to the ADC demo board manual for more information.

7. This is a samples vs code plot where a maximum of 8192 samples are taken. After a group of samples have been taken, the program pauses to perform some calculations. Then, the plot will be updated. The units on the x-axis are samples and the units on the y-axis are code. To zoom in on a section of the plot, click on the left mouse button on the section of interest and hold. Then, drag the mouse and a squared box will appear. Let go of the left mouse button after the section of interest is within the square. To zoom out, right click until returning to full view.

8. The FFT plot allows a maximum FFT length of 8192. The FFT can be selected in powers of two as 2^N, where N= 4 to 13. If a value is entered that is different from what is allowed, the GUI will look for the closest value that is allowed. The default number is 8192. Depending on the sample rate and the FFT length, the bin resolution is updated.

9. The type of window for the FFT plot can be selected as Rect, Hanning, Hamming, Bartlett-Hann, and Flat-top. Hanning is default.

10. The SNR and THD values are updated after each group of sample is taken in continuous mode. For optimal SNR and THD values, use a low noise and low distortion signal generator. Please refer to the ADC demo board manual for more information.

Considerations

1. Do not unplug the ADC demo board from the ViperBoard while running a conversion with the GUI. If running a continuous conversion, stop the conversion, disconnect the USB cable from the ViperBoard, disconnect all connections to the ADC demo board, and then swap the ADC demo board with the new one to be evaluated. Then, follow the quick start procedure outlined in the demo board manual

2. All connections to the ADC demo board must be connected and in the ON state before running the GUI. Connections include power supplies, input signals from signal generator, etc.

3. If the GUI is not detecting the ViperBoard or the correct demo board type, disconnect the USB from the ViperBoard, wait one second and then connect the USB to the ViperBoard. Check the status to make sure the GUI is detecting the ViperBoard and the correct ADC demo board type.

4. For optimal SNR and THD results, always use a low noise signal generators and power supplies.

5. If the USB connection to the ViperBoard is accidentally removed while performing a continuous conversion, reconnect the USB to the ViperBoard and wait for the GUI to detect the ViperBoard once again.

6. While a continuous conversion is in progress, the sampling rate, the FFT length, and the FFT window type can be changed. The FFT can be selected in powers of two as 2^N, where N= 4 to 13. If a value is entered that is different from what is allowed, the GUI will look for the closest value that is allowed.
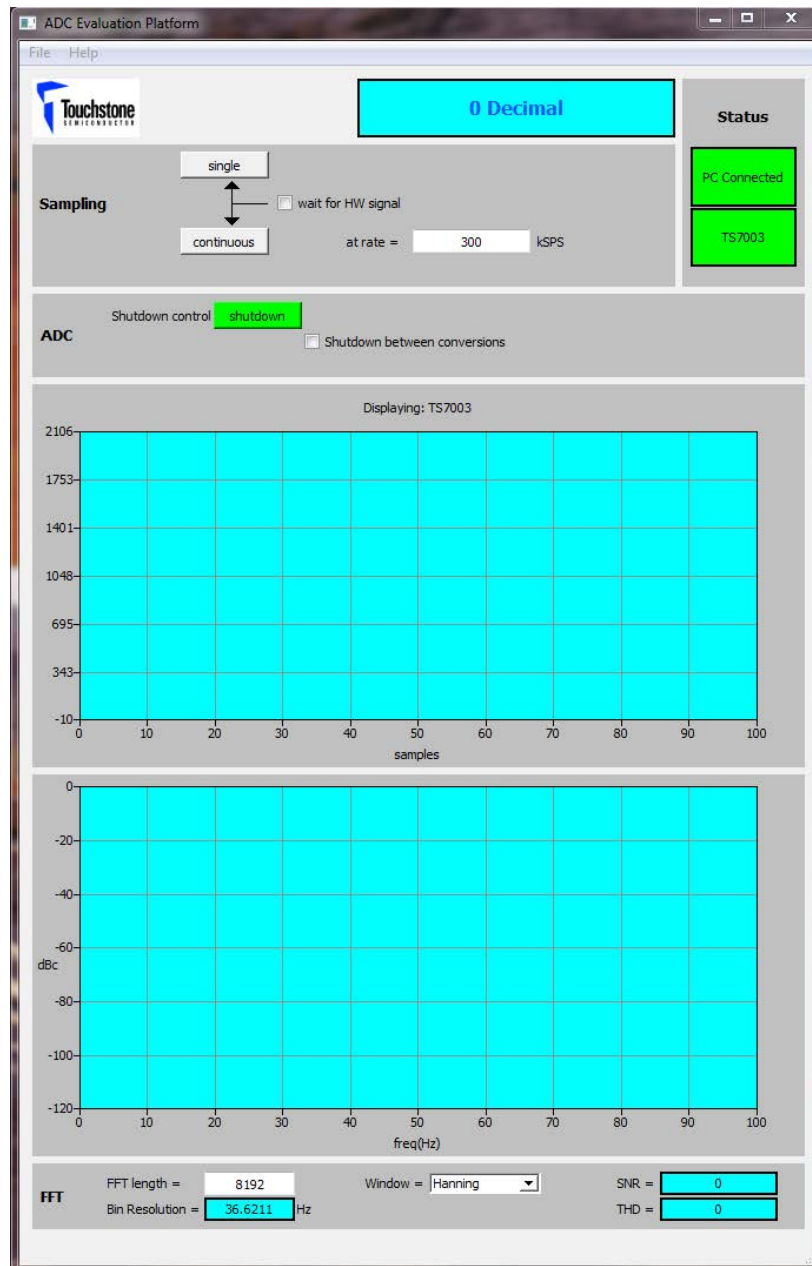
Figure 2. GUI with Nano River Tech Viperboard and TS7003 Demo Board Connected
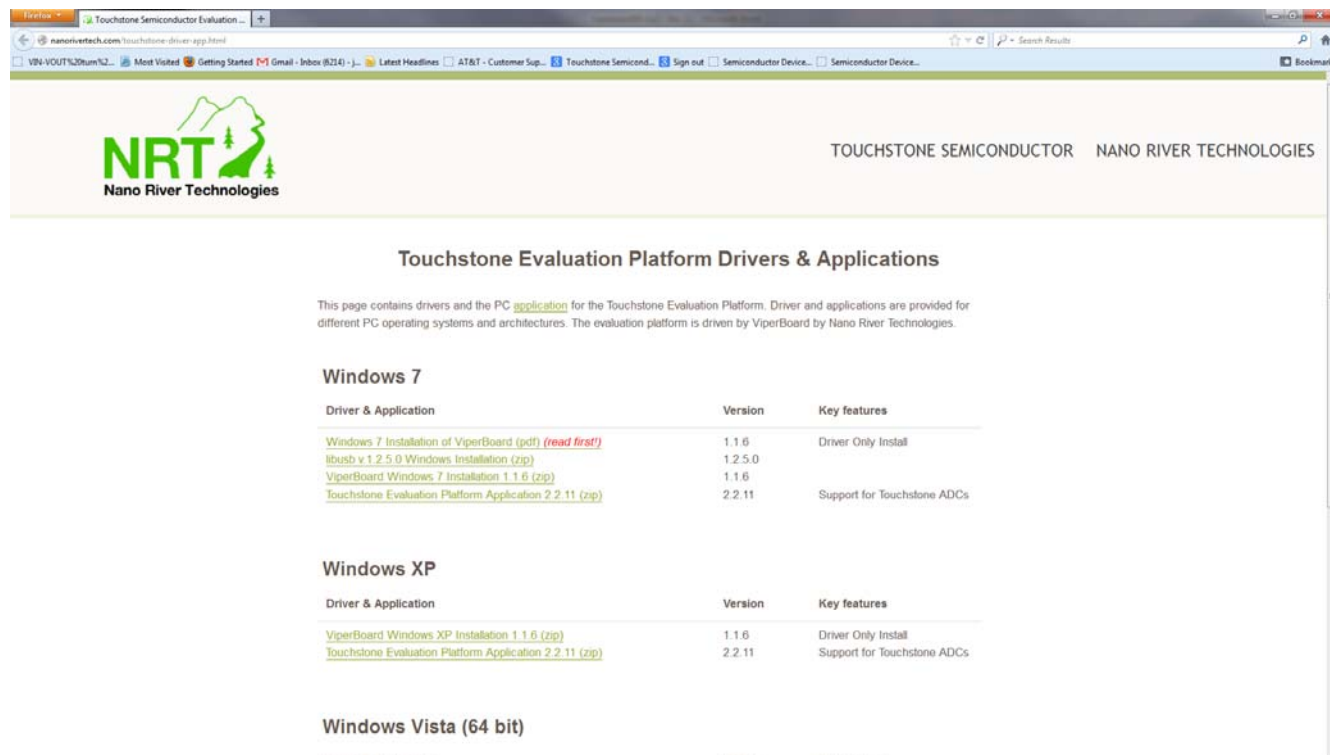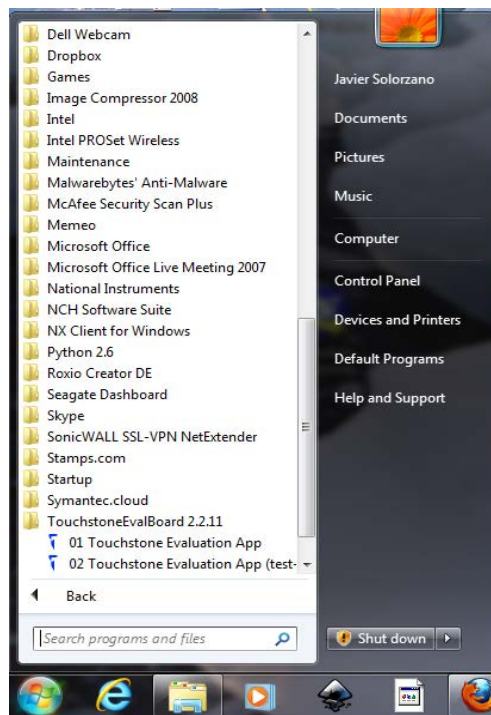
Figure 3. Viperboard Driver Installation Files Page

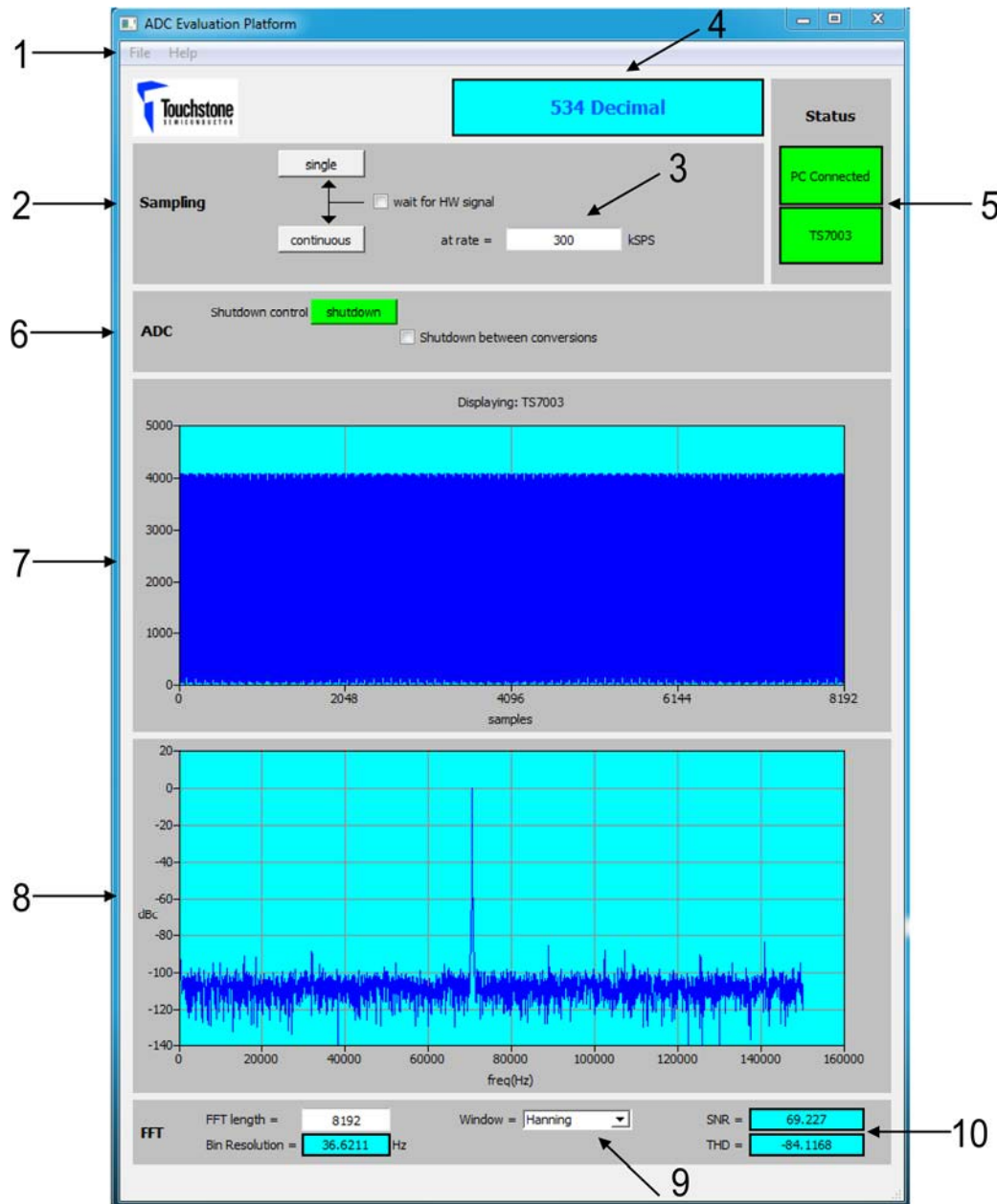
Figure 4. GUI Executable File Location

**Figure 5. Evaluation Platform GUI Features**

APPENDIX

LibUSB Open Source USB Driver

ViperBoard from Nano River Technologies utilises the OpenSource LibUSB-Win32 USB driver.

The LibUSB-Win32 library (DLL) is distributed under the terms of the GNU Lesser General Public License (LGPL). All other components (drivers, services, installer) are distributed under the terms of the GNU General Public License (GPL). This license combination explicitly allows the use of this library in commercial, non Open Source applications. There has been no modification to the library or other components of LibUSB-Win32.

The complete source can be downloaded from:
Link: http://libusb-win32.sourceforge.net/#links
Installer: libusb-win32-filter-bin-0.1.12.1.exe
Version: March 20, 2007
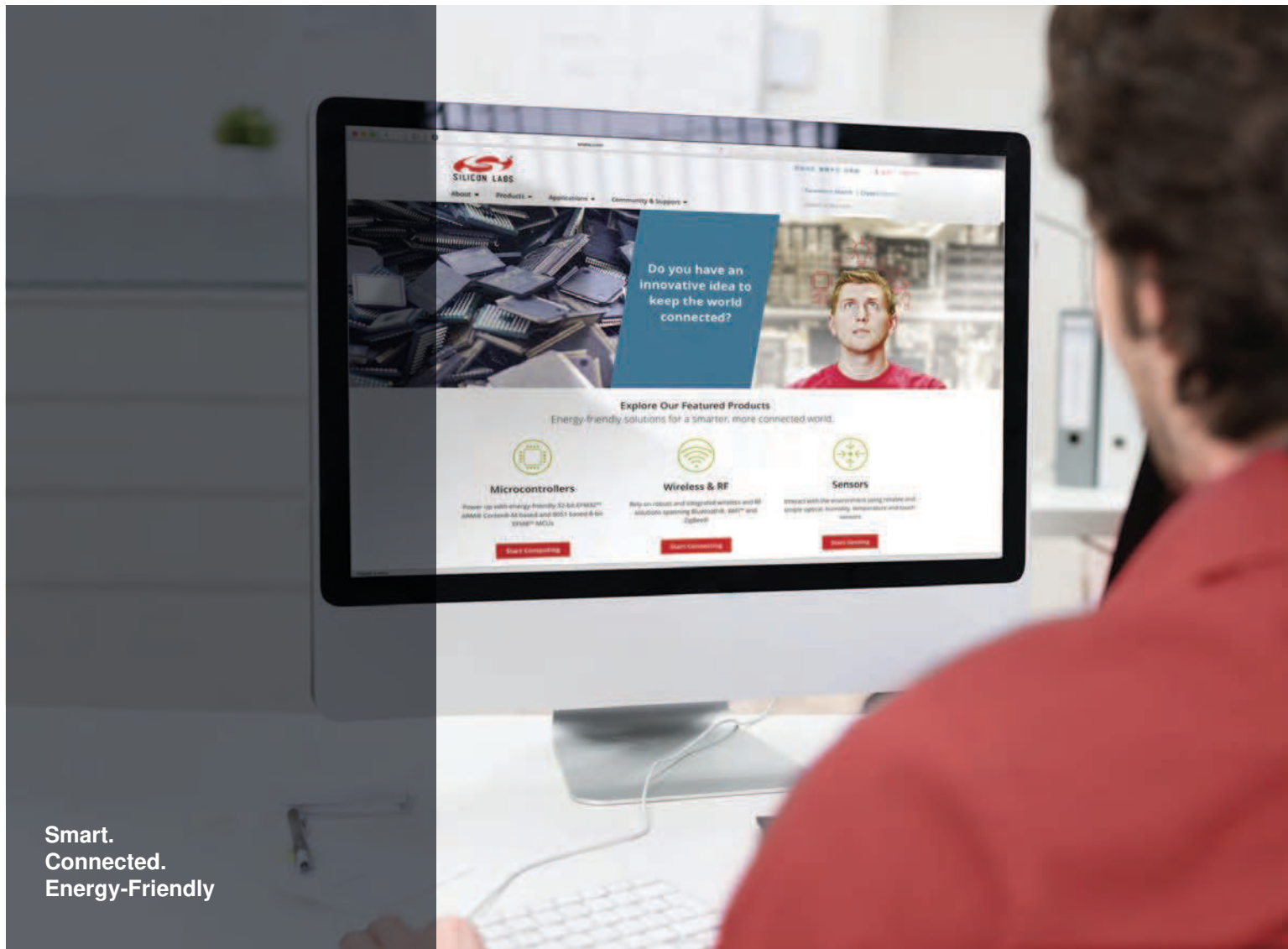
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Connected.
Energy-Friendly**

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