ADS79xxEVM and ADS79xxEVM-PDK

Figure 1. ADS7953EVM (Left) and ADS7953EVM-PDK (Right)

This users guide describes the characteristics, operation, and use of the ADS7953EVM, ADS7957EVM and ADS7961EVM, both by themselves and as part of the ADS7953EVM-PDK, ADS7957EVM-PDK or ADS7961EVM-PDK. These evaluation modules (EVMs) are evaluation boards for the ADS7953, a 12-bit, 16-channel, successive approximation register (SAR) analog-to-digital converter (ADC), and the ADS7957 and ADS7961, which are 10-bit and 8-bit variations of the ADS7953. The EVM allows evaluation of all aspects of the ADS7953, ADS7957 or ADS7961 device. Complete circuit descriptions, schematic diagrams, and bills of material are included in this document.

The following related documents are available through the Texas Instruments website at http://www.ti.com.

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List of Figures

List of Tables

1 EVM Overview

Table 1. EVM-Compatible Device Data Sheets

Device	Literature Number
ADS7953, ADS7952, ADS7951, ADS7950, ADS7957, ADS7956, ADS7955, ADS7954, ADS7961, ADS7960, ADS7959, ADS7958	SLAS605
OPA365	SBOS365
REF5025	SBOS410

1.1 Features

ADS7953EVM/ADS7957EVM/ADS7961 EVM Features:

• Contains all support circuitry needed for the ADS7953/ADS7957/ADS7961

• Voltage reference options: external or onboard

• Buffer options: onboard analog input buffer can be bypassed

• GPIO access with HI or LO alarm options to interrupt host processor

• Compatible with the TI Modular EVM System

ADS7953EVM/ADS7957EVM/ADS7961EVM-PDK Features:

• Easy-to-use evaluation software for Microsoft® Windows® XP

• Data collection to text files

• Built-in analysis tools including scope, FFT, and histogram displays

• Complete control of board settings

• Easily expandable with new analysis plug-in tools from Texas Instruments

For use with a computer, the ADS79xxEVM Performance Demonstration Kit (PDK) is available. This kit combines the ADS7953EVM, ADS7957EVM or ADS7961EVM board with the TMS320VC5507 DSP-based MMB0 motherboard, and includes ADCPro™ software for evaluation.

The MMB0 motherboard allows the ADS79xxEVM to be connected to the computer via an available USB port. This manual shows how to use the MMB0 as part of the ADS79xxEVM-PDK, but does not provide technical details about the MMB0 itself.

ADCPro is a program for collecting, recording, and analyzing data from ADC evaluation boards. It is based on a number of plug-in programs, so it can be expanded easily with new test and data collection plug-ins. The ADS79xxEVM-PDK is controlled by a plugin running in ADCPro. For more information about ADCPro, see the *ADCPro Analog-to-Digital Converter Evalutation Software Users Guide*, available for download from the TI website.

This manual covers the operation of all three ADS7953, ADS7957 and ADS7961 devices refered to as the ADS79xxEVM and the ADS79xxEVM-PDK. Throughout this document, the abbreviation *EVM* and the term *evaluation module* are synonymous with the ADS79xxEVM. For clarity of reading, the rest of this manual will refer only to the ADS7953EVM or ADS7953EVM-PDK. The individual kit contains one ADS7953EVM, ADS7957EVM or ADS7961EVM, but operation of the EVM and kit for the ADS7957 or ADS7961 is identical, unless otherwise noted.

1.2 Introduction

The ADS7953EVM is an evaluation module built to the TI Modular EVM System specification. It can be connected to any of the modular EVM system interface cards available from Texas Instruments.

The ADS7953EVM is available as a stand-alone printed circuit board (PCB) or as part of the ADS7953EVM-PDK, which includes an MMB0 motherboard and software. As a stand-alone PCB, the ADS7953EVM is useful for prototyping designs and firmware.

Note that the ADS7953EVM has no microprocessor and cannot run software. To connect it to a computer, some type of host processor interface capable of generating the necessary control signals is required.

2   Analog Interface

For maximum flexibility, the ADS7953EVM is designed for easy interfacing to multiple analog sources. Samtec part numbers SSW-110-22-F-D-VS-K and TSM-110-01-T-DV-P provide a convenient 10-pin, dual-row, header/socket combination at P1. This header/socket provides access to the analog input pins associated with CH0-CH7 of the ADS7953. Consult Samtec at http://www.samtec.com or call 1-800-SAMTEC-9 for a variety of mating connector options. Samtec part number TMS-108-02-G-D provides access to analog input channels CH8-CH15 at J1.

Most of the pins on P1 and J1 are directly connected to the ADS7953 using a simple R/C filter with no additional overvoltage protection circuitry. Use appropriate caution when handling these pins. Table 2 and Table 3 summarize the pinouts for analog interfaces P1 and J1, respectively.

Table 2. Primary Analog Interface Pinout

Pin Number	Signal	Description
P1.2	CH7	CH7 input
P1.4	CH6	CH6 input
P1.6	CH5	CH5 input
P1.8	CH4	CH4 input
P1.10	CH3	CH3 input
P1.12	CH2	CH2 input
P1.14	CH1	CH1 input
P1.16	CH0	CH0 input
P1.18	EXTREFN	External reference source input (– side of differential input)
P1.20	EXTREFP	External reference source input (+ side of differential input)
J9.15	Unused	—
P1.1-19 (odd)	AGND	Analog ground connections (except J1.15)

Table 3. Secondary Analog Interface Pinout

Pin Number	Signal	Description
J1.2	CH15	CH15 input
J1.4	CH14	CH14 input
J1.6	CH13	CH13 input
J1.8	CH12	CH12 input
J1.10	CH11	CH11 input
J1.12	CH10	CH10 input
J1.14	CH9	CH9 input
J1.16	CH8	CH8 input
J1.1-15 (odd)	AGND	Analog ground connections

3   Digital Interface

3.1   Serial Data Interface

The ADS7953EVM is designed to easily interface with multiple control platforms. Samtec part numbers SSW-110-22-F-D-VS-K and TSM-110-01-T-DV-P provide a convenient 10-pin, dual-row, header/socket combination at P2. This header/socket provides access to the digital control and serial data pins of the ADC. Consult Samtec at http://www.samtec.com or call 1-800-SAMTEC-9 for a variety of mating connector options.

Table 4 describes the P2 serial interface pins.

Table 4. Serial Interface Pins

Pin No.	Pin Name	Signal Name	I/O Type	Pullup	Function
P2.1	CNTL	$\overline{CS}$	In	None	Controls $\overline{CS}$ input, Jumper option with P2.7 via W5
P2.2	GPIO0	GPIO2	In/Out	High	GPIO
P2.3	CLKX	SCLK	In	None	ADS79xx serial clock
P2.4	DGND	DGND	NA	None	Digital Ground
P2.5	CLKR	CLKR	Out	None	serial clock return to DSP
P2.6	GPIO1	GPIO3	In/Out	High	GPIO
P2.7	FSX	FSYNC Xmit	In	None	Controls $\overline{CS}$ input, Jumper option with P2.1 via W5
P2.8	GPIO2	Unused	NA	NA	
P2.9	FSR	FSYNC rtrn	Out	None	
P2.10	DGND	DGND	NA	None	Digital Ground
P2.11	DX	DIN	In	None	ADS79xx SPI data in
P2.12	GPIO3	Unused	NA	NA	
P2.13	DR	DOUT	Out	None	ADS79xx data out
P2.14	GPIO4	Unused	NA	NA	
P2.15	/INT	GPIO0/GPIO1	Out	None	Hi/Lo Alarm Interrupt options
P2.16	SCL	SCL	I²C	n/a	I²C clock
P2.17	TOUT	Unused	NA	NA	
P2.18	DGND	DGND	NA	None	Digital Ground
P2.19	GPIO5	Unused	NA	NA	
P2.20	SDA	SDA	I²C	n/a	I²C data

3.2   Data Output

All output data communications are directed through DOUT. The data from all 16 channels can be observed on the DOUT pin. This is the signal that is used by the ADS7953EVM-PDK to read back and display all the channel data via the ADCPro software.

4 Power Supplies

P3 is the power-supply input connector. Table 5 lists the configuration details for P3. Only +5V analog and +5V digital is required to power the EVM. If desired, a jumper option (W6) is provided to supply the ADS7953 digital core with +3.3V.

Table 5. P3 Configuration: Power-Supply Input

Pin No.	Pin Name	Function	Required
J3.1	+VA	+10V to +15V	No
J3.2	−VA	−10V to −15V	No
J3.3	+5VA	+5V analog supply	Always
J3.4	−5VA	−5V analog supply	No
J3.5	DGND	Digital ground input	Yes
J3.6	AGND	Analog ground input	Yes
J3.7	+1.8VD	1.8V digital supply	No
J3.8	VD1	Not used	No
J3.9	+3.3VD	3.3V digital supply	Yes, if +5VD is not used
J3.10	+5VD	+5V	Yes, if +3.3VD is not used

The ADS7953 digital section can be powered from +3.3V or +5V by means of jumper option W6.

5 Voltage Reference

The ADS7953EVM has three sources for the reference voltage. Jumper W2 can select the REFP voltage from either the REF5025(U3) or from an external source applied to P1.18. Jumper W3 can select the REFM voltage from either the analog ground (AGND) or from an external source applied to P1.20.

6 EVM Operation

The following section provides information on the analog input, digital control, and general operating conditions of the ADS7953EVM.

6.1 Analog Input

Eight of the analog input sources (channels 0-7) can be applied directly to P1 (top or bottom side) or through signal-conditioning modules available for the modular EVM system. The additional eight channel sources (CH8-CH15) can be applied to connector J1. The analog input range on the EVM is identical to that of the installed device and is dependent on the RANGE setting of the ADC (0 to 5V or 0 to 2.5V)

Each input signal can be configured to connect directly to the analog inputs of the ADS7953 through a 33Ω series resistor with an 0.027pF capacitor to AGND. The input to CH0 can use the OPA365 buffer that is provided (default condition, W4 jumpered pins 1-2). Jumper W4 can be placed on pins 2-3 to bypass the unity gain buffer configuration of the OPA365.

6.2 Digital Control

The digital control signals can be applied directly to P5 (top or bottom side). The modular ADS7953EVM can also be connected directly to a DSP or microcontroller interface board, such as the 5-6KInterface or HPA-MCUInterface boards available from Texas Instruments. When purchased as part of a PDK, the ADS7953EVM can be controlled by the MMB0. For a list of compatible interface and/or accessory boards for the EVM or the ADS7953, see the relevant product folder on the TI website. All of the digital signals are controlled directly with pins on P2.

6.3 ADS7953EVM-PDK Power Supply

The analog portion of the ADS7953EVM can either be powered by a 5V source generated via an external power supply using the included CA-2186 cable or by applying the +5VA to the connector on the MMB0 board. The MMB0 board will provide the digital 5V and 3.3V to the ADS7953EVM. To provide +5VA to the ADS7953EVM from the MMB0 board, make sure the jumper at J13 (on the MMB0) is closed from +5V to +5VA.

6.4 Default Jumper Settings

Figure 2 shows the jumpers found on the EVM and the respective factory default conditions for each.
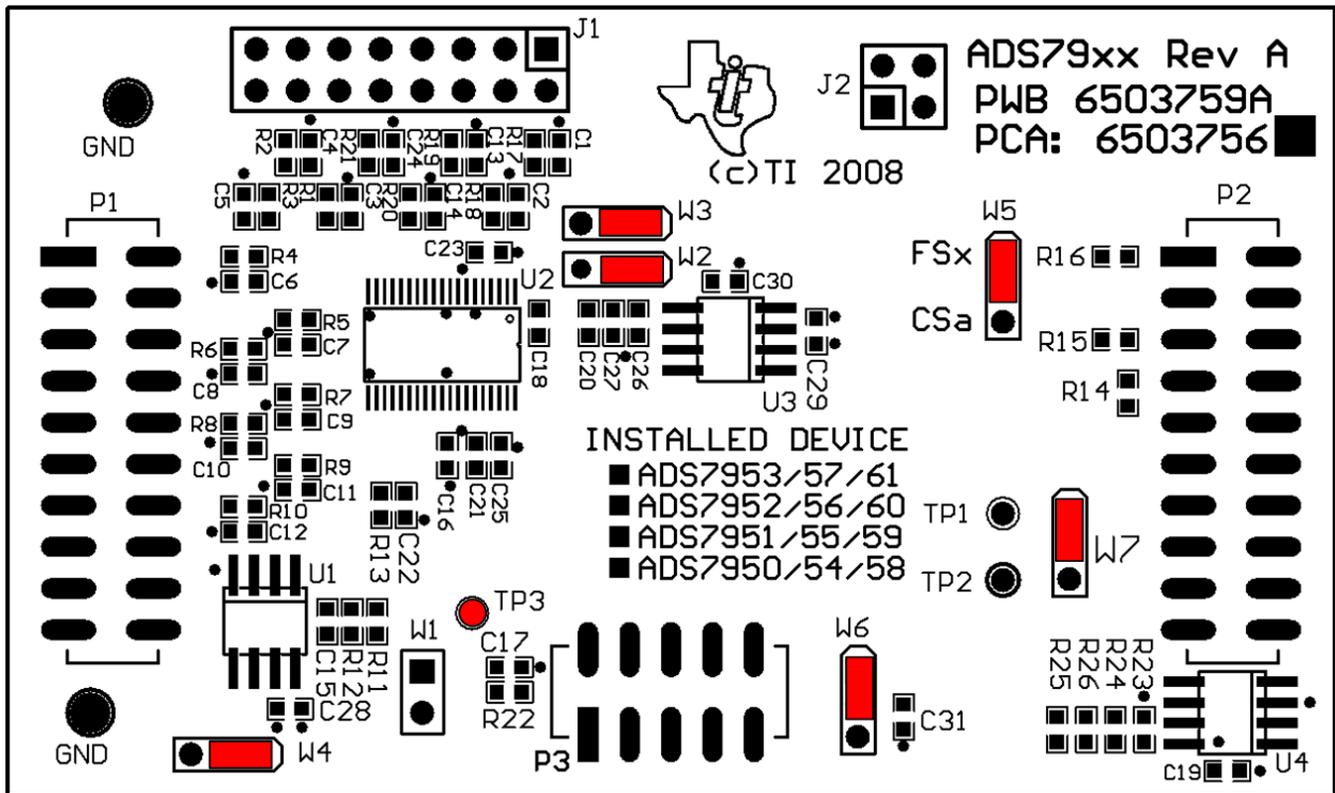
Figure 2. ADS7953EVM Default Jumper Locations

Table 6 lists the jumpers found on the EVM and the respective factory default conditions for each.

Table 6. List of Jumpers

Switch	Default Position	Switch Description
W1	Open	W1 is not installed in production boards
W2	Short 1-2	W2 selects the REFP source, onboard (default) or external via P1.18
W3	Short 1-2	W3 selects the REFM source, AGND (default) or external via P1.20
W4	Short 1-2	W4 selects the CH0 input configuration, buffered (default) or bypassed
W5	Short 1-2	W5 selects the $\overline{CS}$ source on the ADS7953, FSX (default) or CNTL
W6	Short 1-2	W6 selects the DV_{DD} Voltage, +5VD (default) or +3.3VD
W7	Short 1-2	W7 selects the host processor interrupt source, GPIO1 (default) or GPIO0

7   ADS7953EVM-PDK Kit Operation

This section provides information on using the ADS7953EVM-PDK, including setup, program installation, and program usage.

To prepare to evaluate the ADS7953 with the ADS7953EVM-PDK, complete the following steps:

Step 1. Install the ADCPro software (if not already installed) on a PC.

Step 2. Install the ADS7953EVM-PDK EVM plug-in software.

Step 3. Set up the ADS7953EVM-PDK.

Step 4. Connect a proper power supply.

Step 5. Complete the NI-VISA USB driver installation process.

Step 6. Run the ADCPro software.

Step 7. Complete the Microsoft Windows USB driver installation process.

Each task is described in the subsequent sections of this document.

7.1   Installing the ADCPro Software

> **CAUTION**
>
> Do not connect the ADS7953EVM-PDK before installing the software on a suitable PC. Failure to observe this caution may cause Microsoft Windows to not recognize the ADS7953EVM-PDK.

The latest software is available from the TI website at http://www.ti.com/. The ADCPro installer will check for updates when executed (if connected to the Internet), and then gives the option of downloading and installing the latest version. See the *ADCPro Analog-to-Digital Converter Evalutation Software Users Guide* for instructions on installing and using ADCPro.

To install the ADS7953EVM-PDK plug-in, run the file: **ads7953evm-pdk-plugin-1.1.0.exe** (*1.1.0* is the version number, and increments with software version releases). Double-click the file to run it; then follow the instructions shown. Also, use the ADCPro *Update Check* feature to check for newer versions of the ADS7953EVM-PDK plug-in, once one version has been installed.

The software should now be installed, but the USB drivers may not have been loaded by the PC operating system. This step will complete when the ADCPro software is executed.

7.2   Setting Up the ADS7953EVM-PDK

The ADS7953EVM-PDK contains both the ADS7953EVM and the MMB0 motherboard; however, the devices are shipped unconnected. Follow these steps to set up the ADS7953EVM-PDK:

Step 1. Unpack the ADS7953EVM-PDK kit.

Step 2. Set the jumpers and switches on the MMB0 as shown in Figure 3.

- Set the Boot Mode switch to USB.
- Connect +5V and +5VA on jumper block J13 (if +5V is supplied from J14 +5VA).
- Leave +5V and +VA disconnected on jumper block J13.
- If the PDK will be powered from an external power supply via the included CA-2186 cable, connect J12. If the PDK will be powered through the terminal block, disconnect J12 (see Section 7.3 of this document for additional power supply connection details).
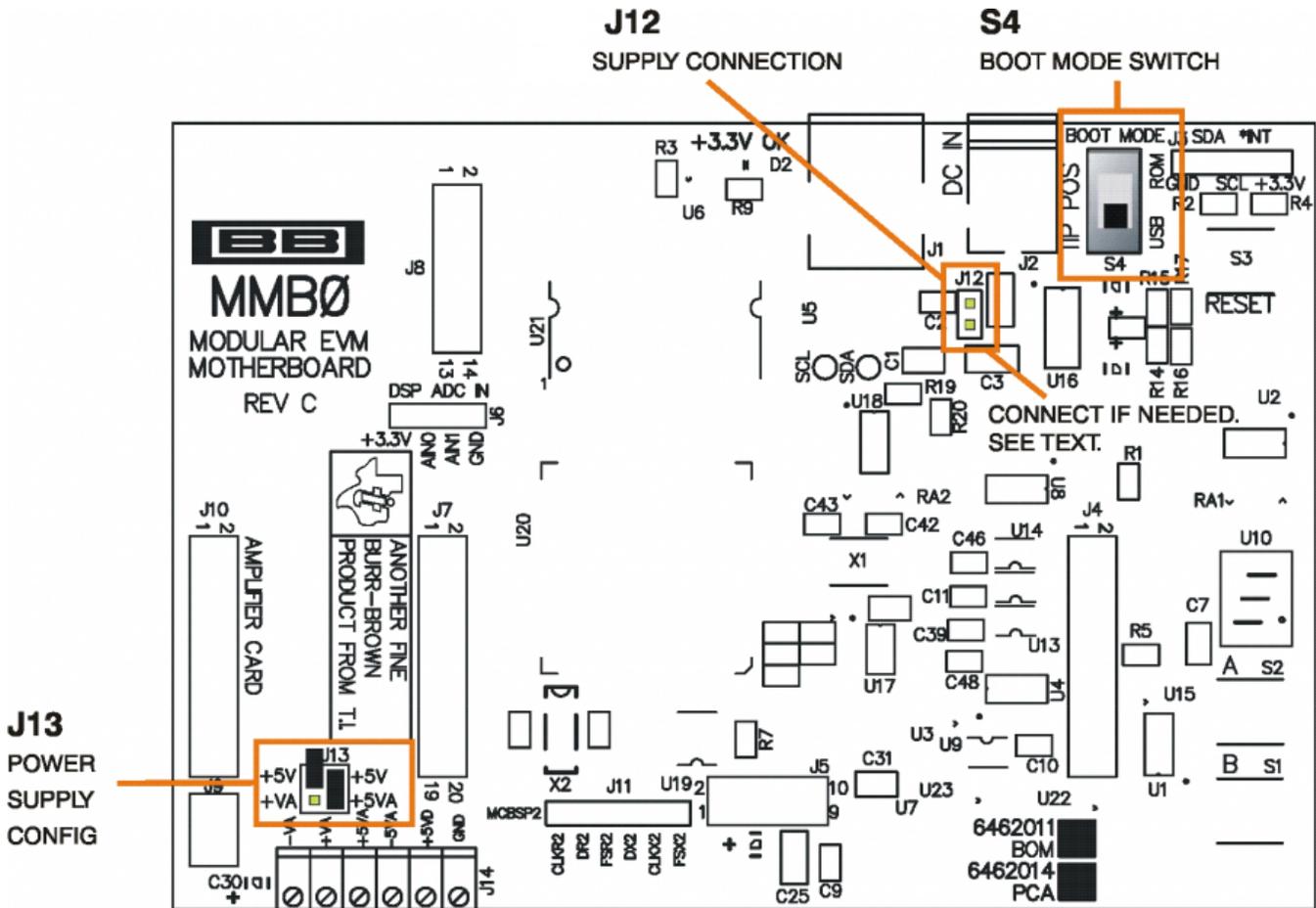
Figure 3. MMB0 Initial Setup

Step 3. Plug the ADS7953EVM into the MMB0. The female portion of P1, P2 and P3 on the EVM align with male connectors J7, J4 and J5 respective on the MMB0.

CAUTION Do not misalign the pins when plugging the ADS7953EVM into the MMB0. Check the pin alignment of P1, P2, and P3 carefully before applying power to the PDK.

Step 4. Verify the jumpers on the ADS7953EVM are as shown in Figure 2 (note that these settings are the factory-configured settings for the EVM).

7.2.1 About the MMB0

The MMB0 is a Modular EVM System motherboard. It is designed around the TMS320VC5507, a DSP with an onboard USB interface from Texas Instruments. The MMB0 also has 16MB of SDRAM installed.

The MMB0 is not intended to be used as a DSP development board, and it is not available separately. TI cannot offer support for the MMB0 except as part of an EVM-PDK kit. For schematics or other information about the MMB0, contact Texas Instruments.

7.3 Connecting the Power Supply

The ADS7953EVM-PDK can be operated with a unipolar +5V supply or a combination of +5V and +3.3V supplies.

When the MMB0 DSP is powered properly, LED D2 glows green. The green light indicates that the 3.3V supply for the MMB0 is operating properly. (It does **not** indicate that the EVM power supplies are operating properly.)

7.3.1 Connecting an External Power Supply

An external power supply can be connected to barrel jack J2 on the MMB0. J2 is located next to the USB connector. The external power supply must output 6V-7V dc. The connector must be sleeve-negative, tip-positive. It should have a current rating of at least 2A.

Jumper J12 on the MMB0 connects an external power supply to the board. To use the an external supply, J12 must be shorted. Figure 4 illustrates how to connect the included CA-2186 cable to the MMB0.


Figure 4. Connecting an External Power Supply

7.3.2 Connecting a Laboratory Power Supply

A laboratory power supply can be connected through terminal block J14 on the MMB0, as shown in Figure 5.

To use a unipolar lab power supply configuration:

• Disconnect J12 on the MMB0.
• Connect a +5V dc supply to the +5VD terminal on J14.
• Connect ground of the dc supply to the GND terminal on J14.

It is not necessary to connect a +5V dc supply voltage to the +5VA terminal on J14 if the +5V/+5VA position on J13 is shorted.

Figure 5. Laboratory Power-Supply Connection

7.4 Running the Software and Completing Driver Installation

Note: The software is continually under development. These instructions and screen images are current at the time of this writing, but may not exactly match future releases.

The program for evaluating the ADS7953EVM-PDK is called ADCPro. This program uses plug-ins to communicate with the EVM. The ADS7953EVM-PDK plug-in is included in the ADS7953EVM-PDK package.

The program currently runs only on Microsoft Windows platforms of Windows XP; Windows Vista is **NOT** supported at the time of this writing.

If this is the first time installing ADCPro and the EVM plug-ins, follow these procedures to run ADCPro and complete the necessary driver installation.

7.4.1 NI-VISA USB Device Driver Installation

1. After the ADCPro software is installed, apply power to the PDK and connect the board to an available PC USB port.
2. The computer should recognize new hardware and begin installing the drivers for the hardware. Figure 6 through Figure 10 are provided for reference to show the installation steps.
   - For the first screen, Figure 6, it is not necessary to search for the software; it has already been installed to the PC.
   - For the remaining steps, accept the default settings.

Figure 6. NI-VISA Driver Installation
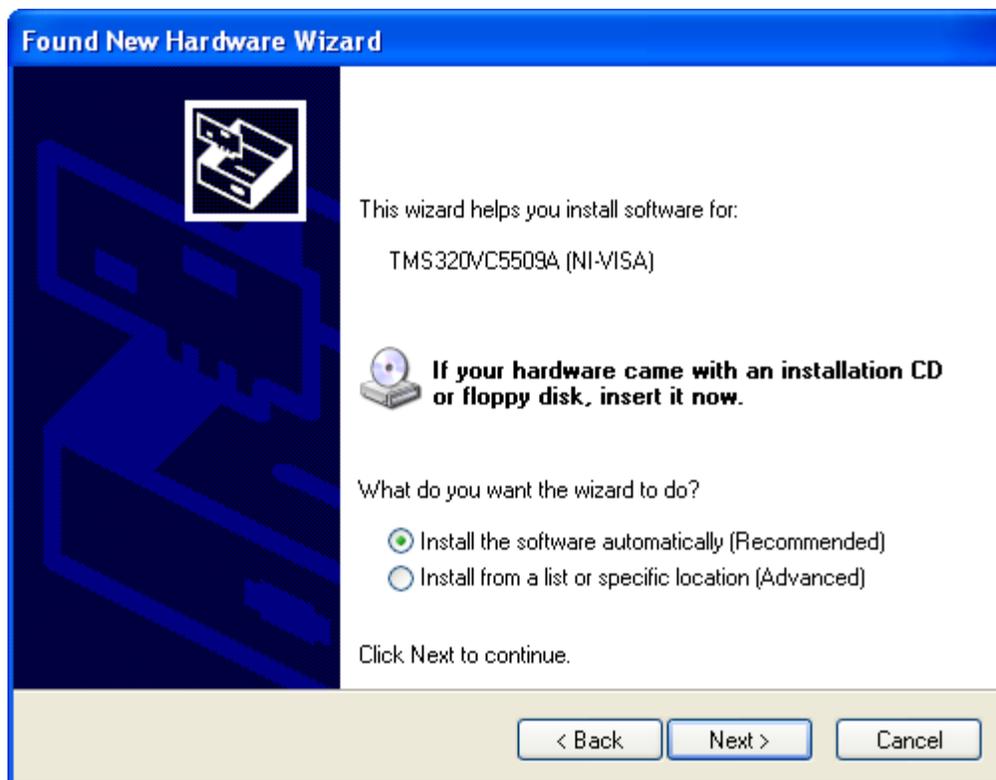
**Figure 7. NI-VISA Driver Installation Question**
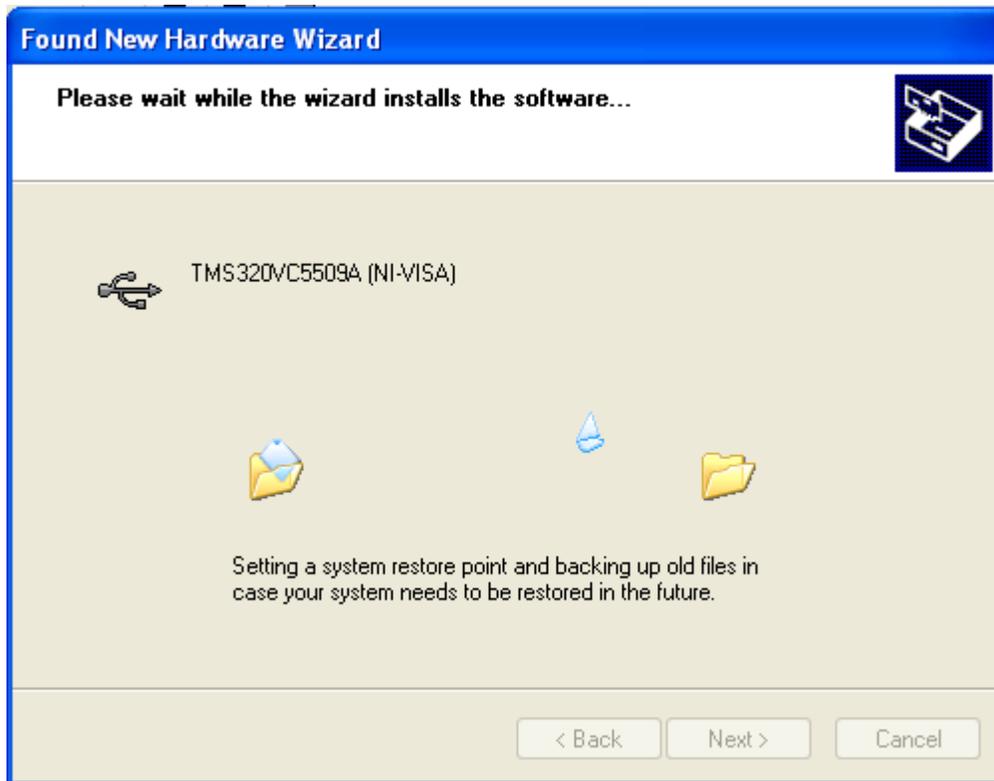
Figure 8. NI-VISA Driver Installing
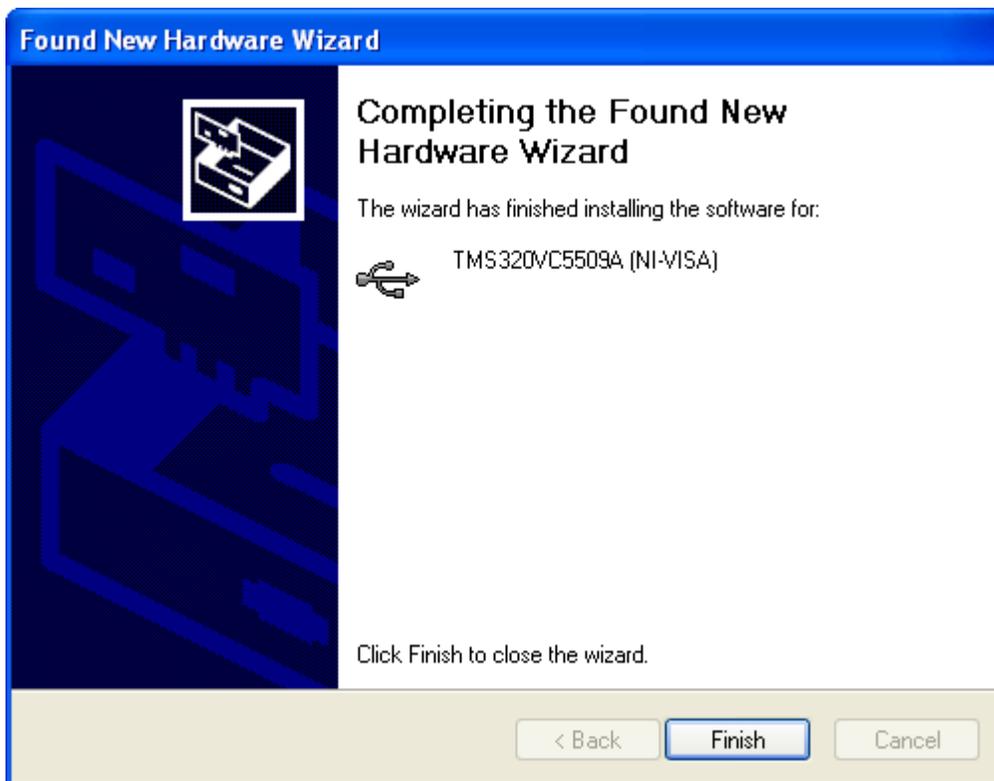
Figure 9. NI-VISA Driver Complete Installation

This procedure should complete the installation of the NI-VISA drivers. Verify the proper installation by opening the Device Manager and locating as shown in Figure 10.

Figure 10. NI-VISA Driver Verification Using Device Manager

Once ADCPro is installed, install the ADS7953EVM-PDK software to allow ADCPro to recognize the evaluation board.

7.4.2 USBStyx Driver Installation

Start the software by selecting *ADCPro* from the Windows Start menu. The screen in Figure 11 appears.
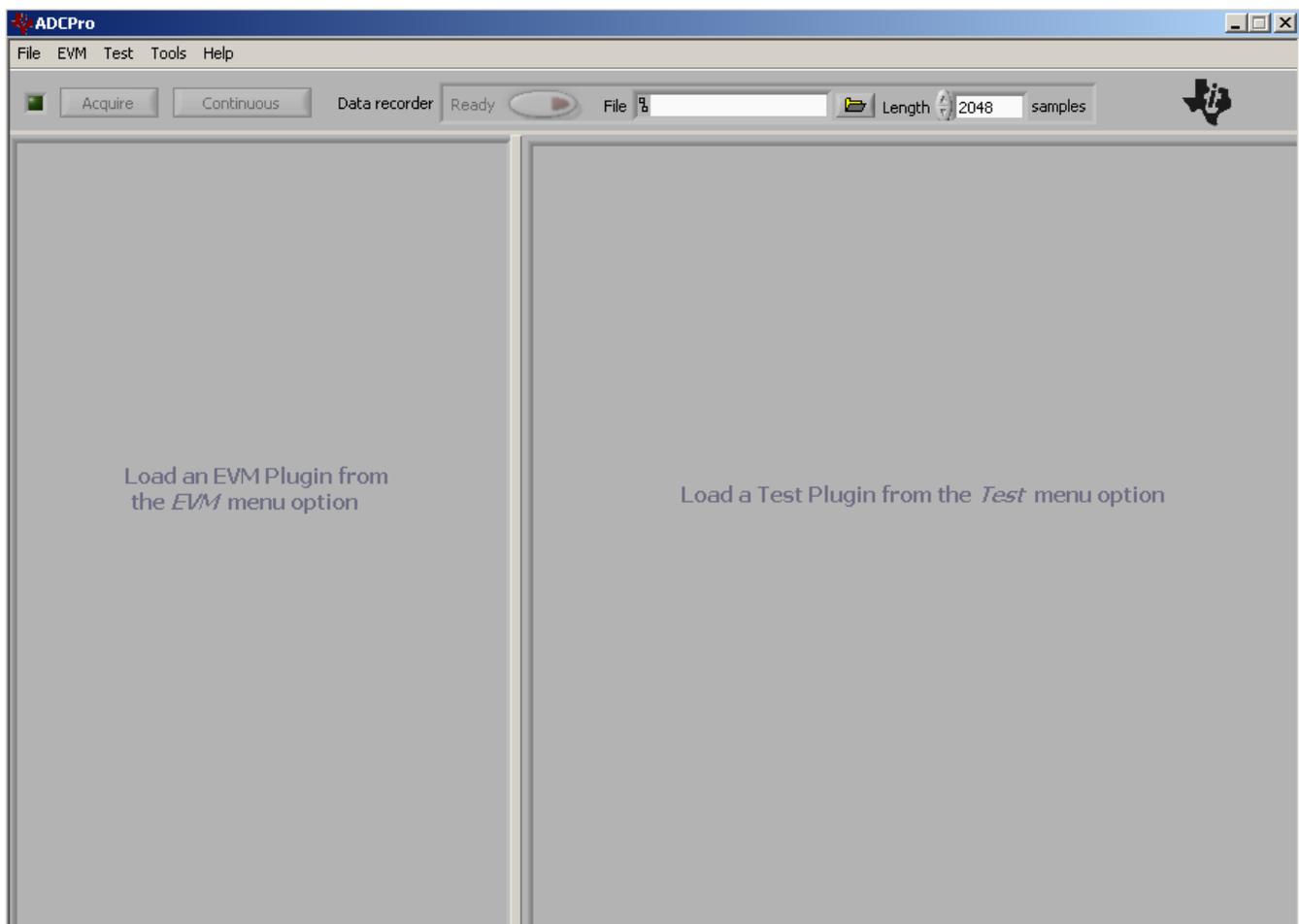
Figure 11. ADCPro Software Start-up Display Window

1. Select *ADS7953EVM* from the EVM drop-down menu. The ADS7953EVM-PDK plugin appears in the left pane, as shown in Figure 12.
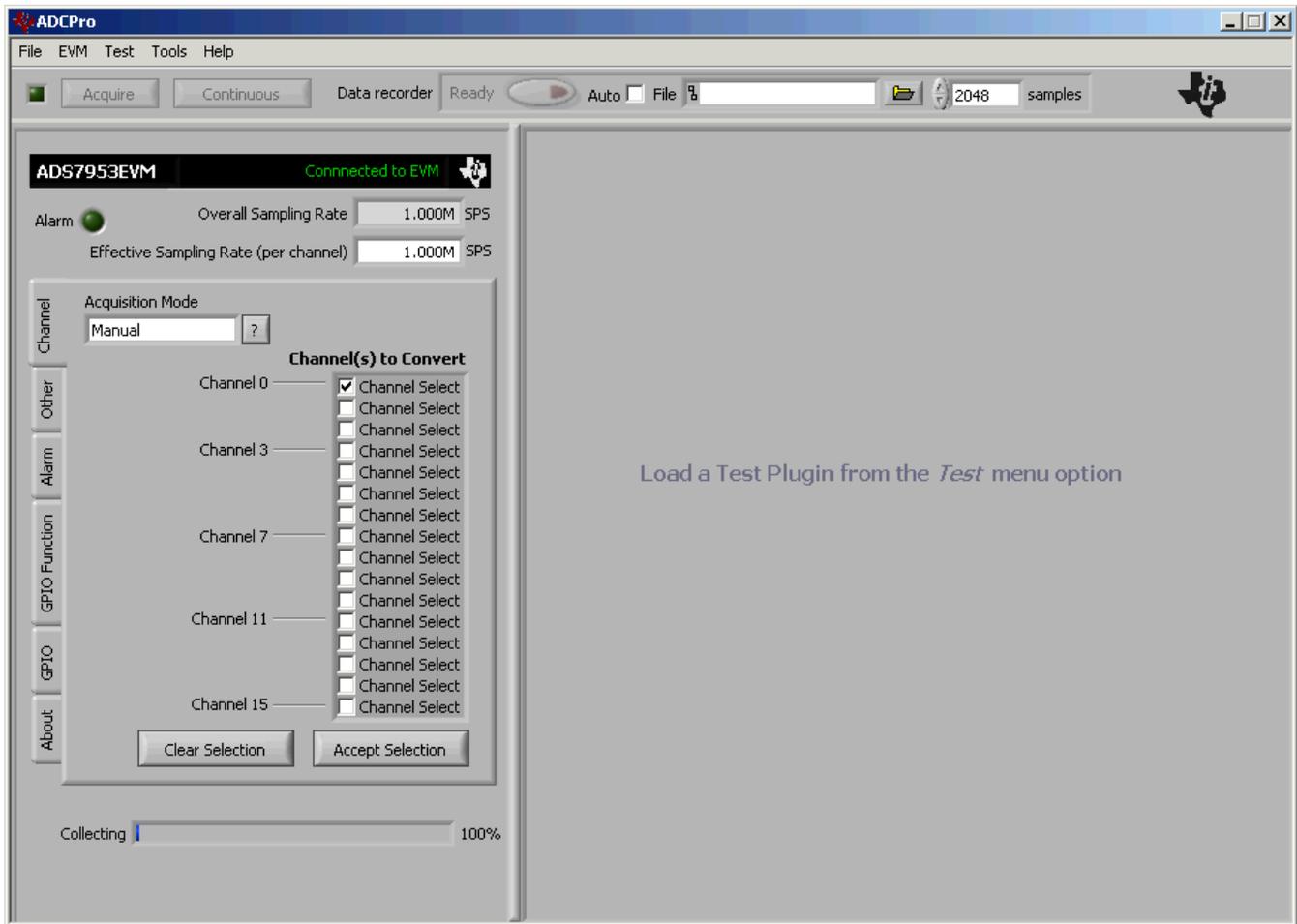
Figure 12. ADS7953EVM-PDK Plug-In Display Window

2. The ADS7953EVM-PDK plug-in window has a status area at the top of the screen. When the plug-in is first loaded, the plug-in searches for the board. The user will see a series of messages in the status area indicating this action.

3. If the operating system drivers have not been loaded, Windows will display the Windows Install New Driver Wizard sequence (illustrated in Figure 13 through Figure 17). Accept the default settings.

   - **NOTE:** During the driver installation, a message may appear indicating the firmware load has TIMED OUT. Click OK and continue driver installation. The plug-in will attempt to download the firmware again once the driver installation completes.

Figure 13. Install New Driver Wizard Screen 1
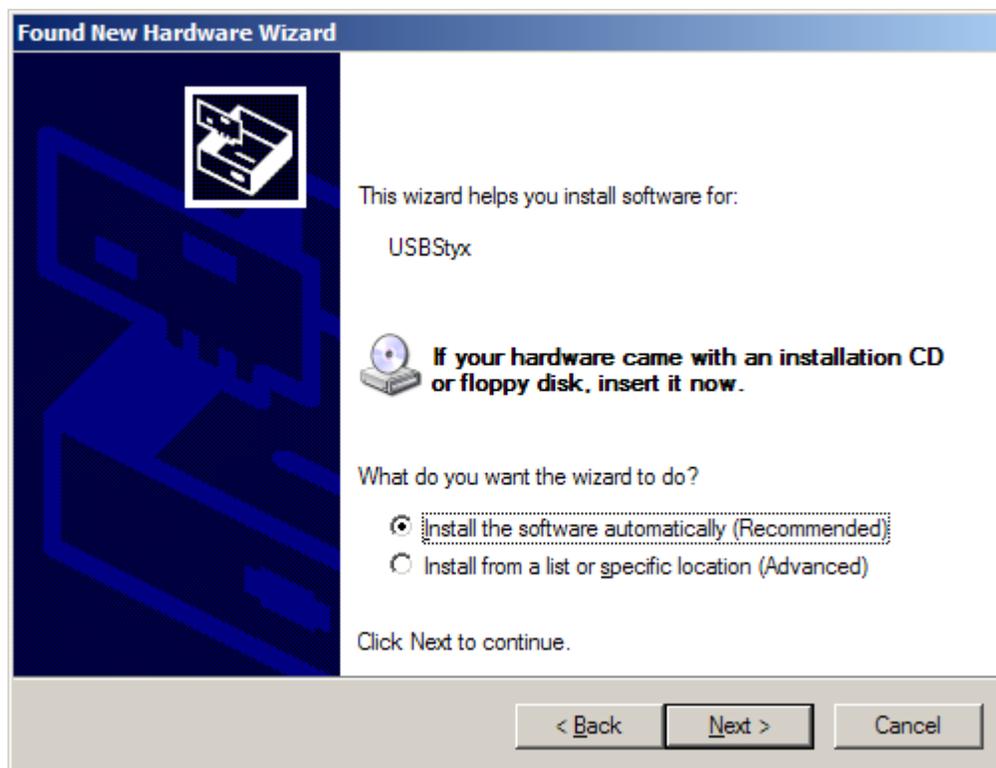
Figure 14. Install New Driver Wizard Screen 2
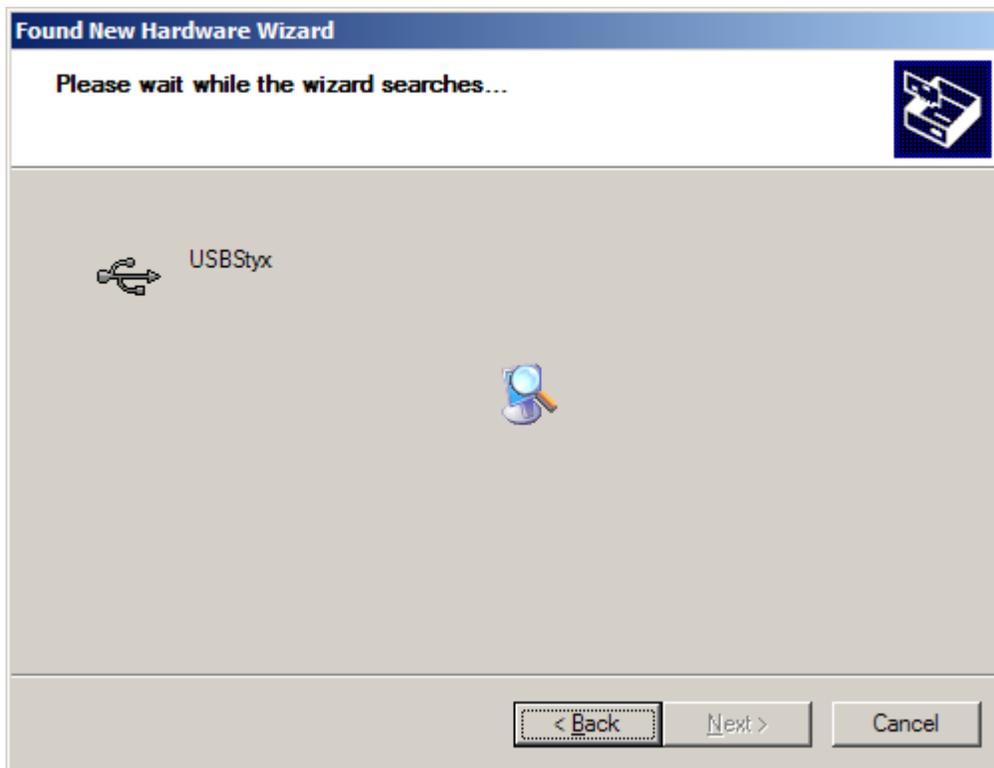
**Figure 15. Install New Driver Wizard Screen 3**
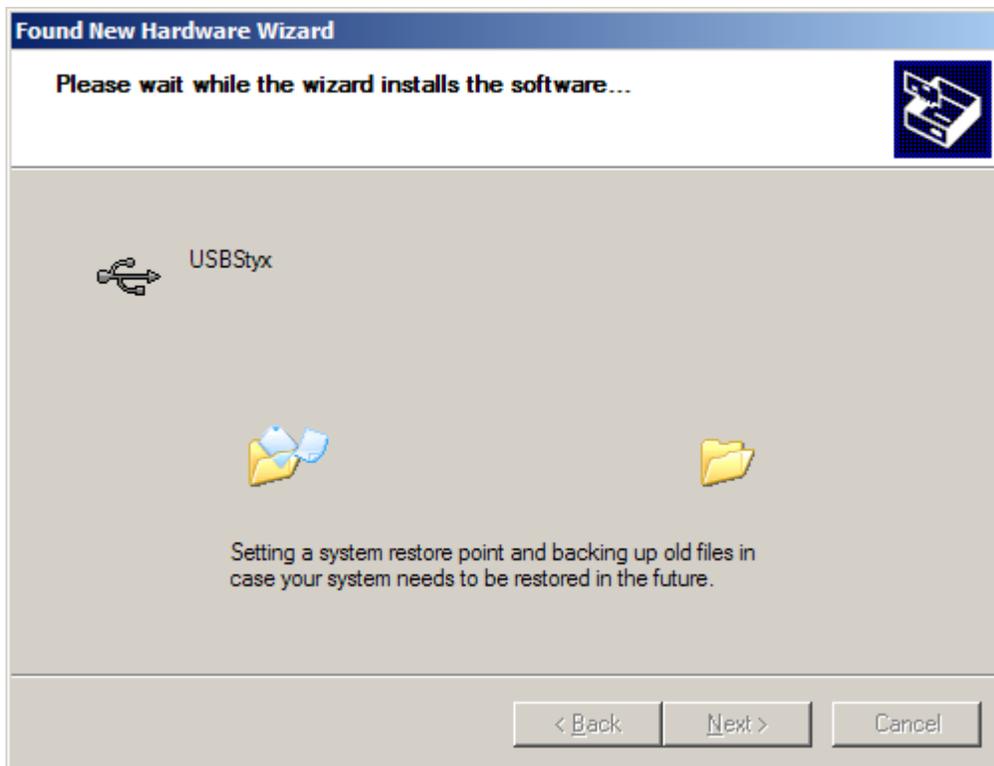
Figure 16. Install New Driver Wizard Screen 4

Figure 17. Install New Driver Wizard Screen 5

4. Once Windows finishes installing the software driver, the plug-in downloads the firmware to the MMB0. The status area will display *Connected to EVM* when the device is connected and ready to use. If the firmware does not load properly, try resetting the MMB0 by pressing reset and then reloading the plug-in.

5. Verify the proper installation of the USBStyx driver using the Device Manager. Note that the first driver item, NI-VISA USB Devices, will disappear and a new item, LibUSB-Win32 Devices will appear, as Figure 18 shows.

Figure 18. USBSytx Driver Verification Using Device Manager

The driver installation wizard sequence should not appear again, unless the board is connected to a different USB port.

8   Evaluating Performance with the ADCPro Software

The evaluation software is based on ADCPro, a program that operates using a variety of plug-ins. (The ADS7953EVM plug-in is installed as described in the previous section.)

To use ADCPro, load an EVM plug-in and a test plug-in. To load an EVM plug-in, select it from the *EVM* menu. To load a test plug-in, select it from the *Test* menu. To unload a plug-in, select the *Unload* option from the corresponding menu.

Only one of each kind of plug-in can be loaded at a time. If selecting a different plugin, the previous plugin is unloaded.

8.1   Using the ADS7953EVM-PDK Plug-in

The ADS7953EVM-PDK plug-in for ADCPro provides complete control over all settings of the ADS7953. It consists of a tabbed interface (see Figure 19), with different functions available on different tabs. These controls are described in this section.

The user can adjust the ADS7953EVM settings when not acquiring data. During acquisition, all controls are disabled and settings may not be changed.

When a setting is changed on the ADS7953EVM plug-in, the setting immediately updates on the board.

Settings on the ADS7953EVM correspond to settings described in the ADS7953 product data sheet; see the ADS7953 data sheet for details.

Because the effective sampling rate of the ADS7953 depends upon settings of the Clock Freq and the number of channels being sampled, the **Sampling Rate** indicator in the upper right corner of the plug-in interface is always visible and updates whenever a setting changes that affects the effective 'per-channel' sampling rate.

8.1.1 Channel Tab

The ADS7953 can acquire from one to sixteen channels sequentially or in a user defined pattern. The Channel Tab (as shown in Figure 19) provides the control to turn each channel on or off. By default, manual channel mode is enabled. In manual mode, any single channel may be selected for conversion.
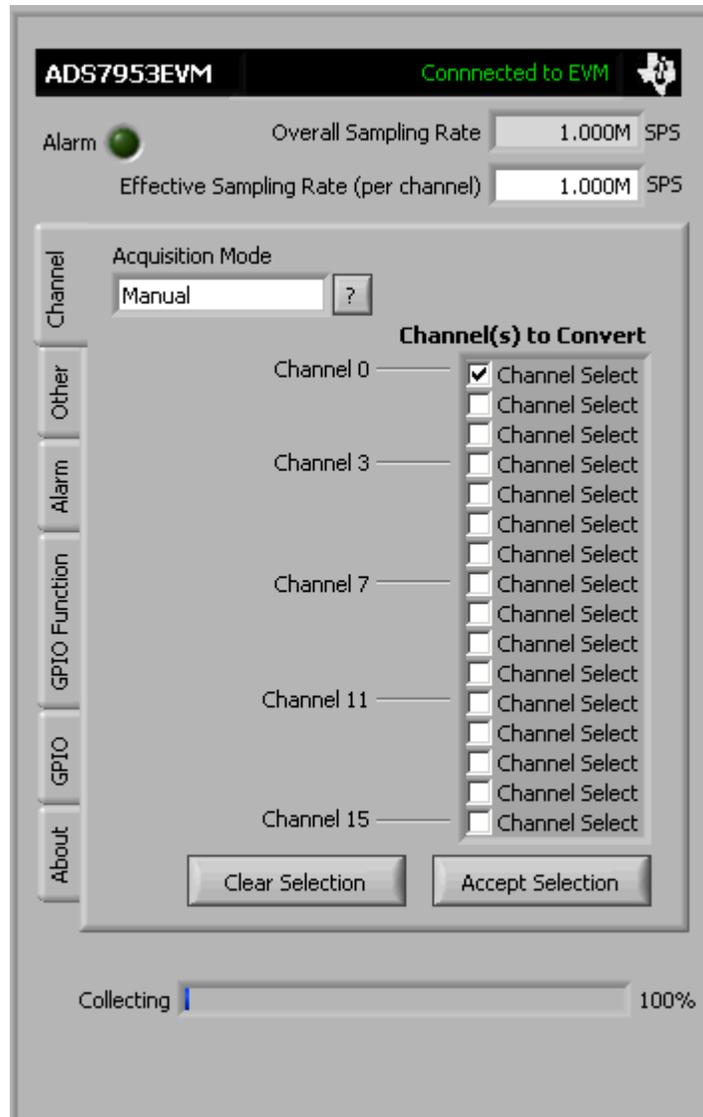

Figure 19. Channel Enable

Evaluating Performance with the ADCPro Software

In addition, the Manual Control button (shown in Figure 20) can be used to enable or disable auto scan modes 1 and 2. Auto 1 Mode allows the selection of any number of channels from the channel selection list. Auto 2 Mode allows the selection of the highest channel to convert. All channels below this will be converted once this selection is made by pressing the 'Accept Selection' button.
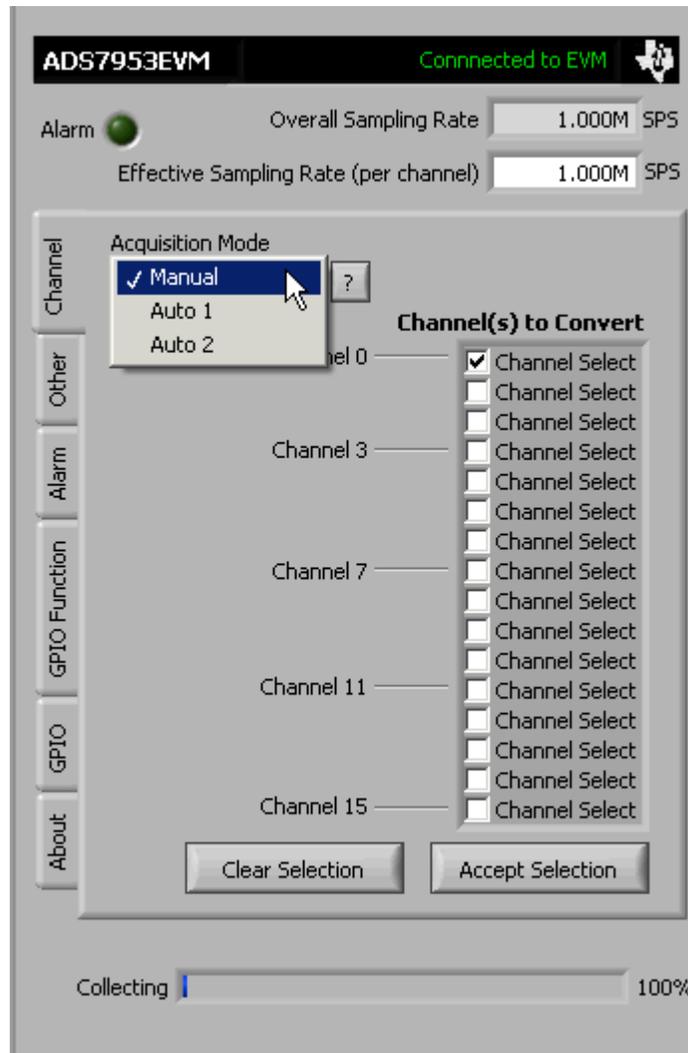
Figure 20. Manual Channel Control

ADS79xxEVM and ADS79xxEVM-PDK 21

8.1.2   Other Tab

The ADS7953 requires a clock to operate. The maximum frequency is selected by default for the different operating modes, providing the maximum 1MSPS throughput rate specified in the datasheet.

The clock setting can be modified in this tab by accepting the default SPI or clock stop mode, a continuous clock mode with the fastest possible serial clock, or a continuous clock mode with a variable frequency.

The analog input range can also be specified in this tab as well as the contents of the four MSBs of channel data (GPIO status or Channel Address of the conversion results).
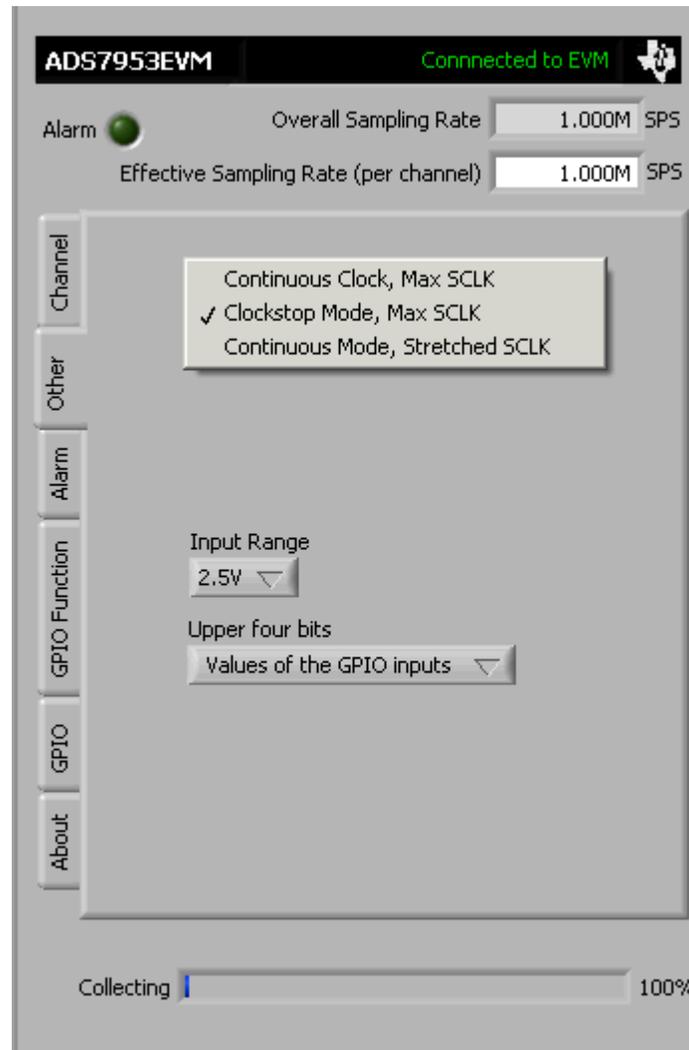
Figure 21. Serial Clock, Input Range and MS Nibble settings

8.1.3   Alarm Tab

The ADS7953 offers configurable alarm outputs for both high and low alarm selections. The configuration of the alarm function takes place in two steps, the first of which is the setting of the alarm limits. In the Alarm Tab, the hex values for high and low limits are entered for each channel requiring the alarm function. To enable the alarm functions, the GPIO Function tab must be considered next.
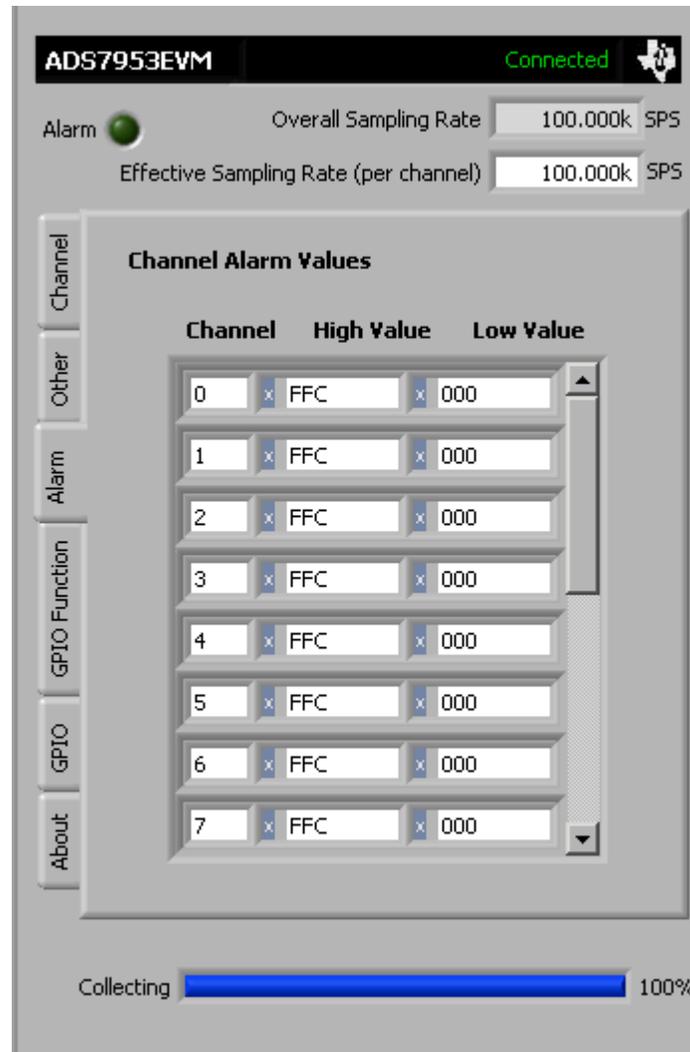

Figure 22. High and Low Alarm Limits by Channel

8.1.4 GPIO Function Tab

The GPIO0, GPIO1, GPIO2 and GPIO3 pins on the ADS7953 can function as simple general purpose inputs/outputs or as specialized control and monitor functions. The alarm function described in the previous section is processed by GPIO0 and GPIO1. Refer to the data sheet for specific details on GPIO0 and GPIO1 options. GPIO2 can be used to configure the input range of the ADS7953 (2.5V max or 5.0V max), and GPIO3 can be used as a power down input pin.
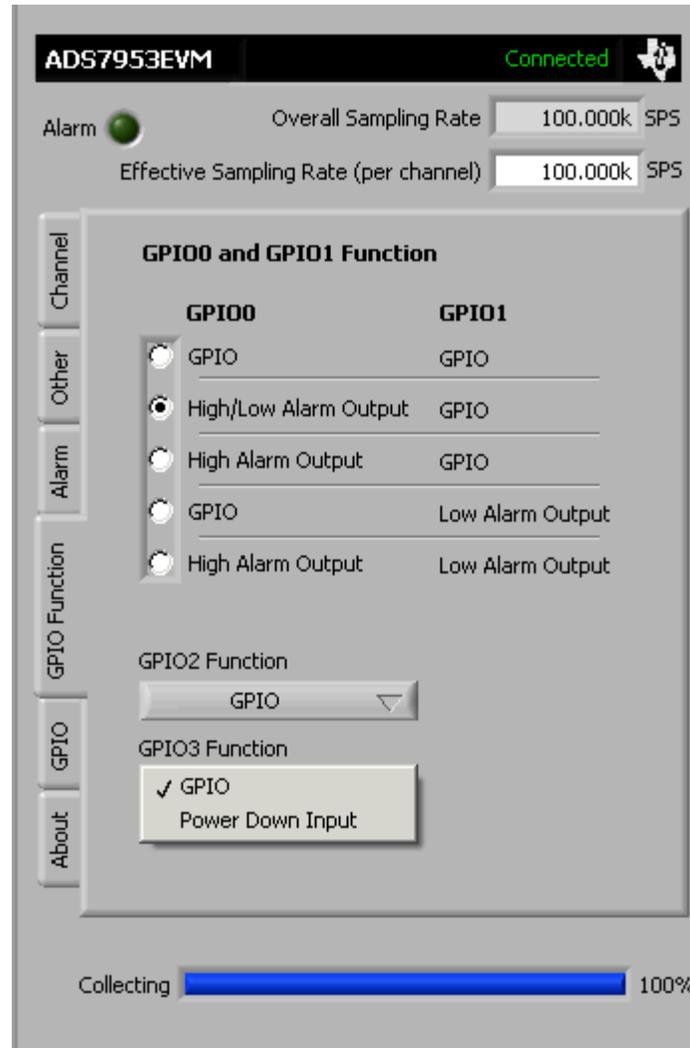
Figure 23. GPIO and System Monitor Control options

8.1.5   GPIO Tab

The GPIO Tab provides a means to monitor and control GPIO functions. If a GPIO is selected in the GPIO Function tab to perform a specialized function, it will appear 'grayed out' in the GPIO tab. For pins configured as GP outputs, a push button will enable the user to set the desired output state. GP Inputs are monitored with an LED display (bright green = logic high).
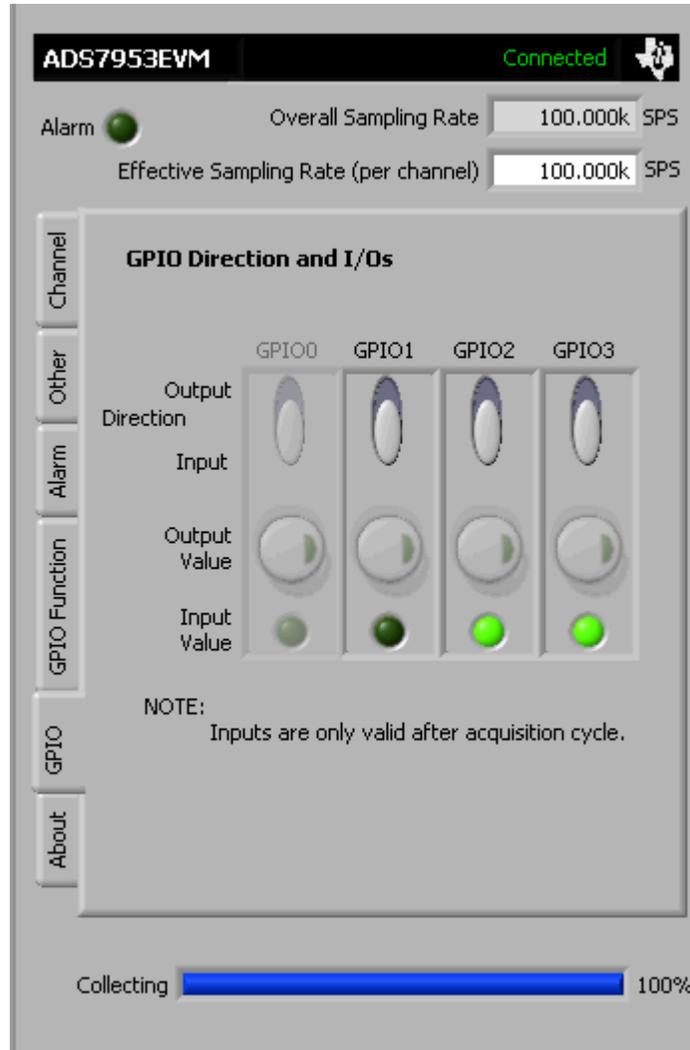
Figure 24. GPIO selection, controls and indicators

8.1.6 Collecting Data

Once the user has configured the ADS7953 for the test scenario, press the ADCPro **Acquire** button to start the collection of the number of datapoints specified in the Test plug-in *Block Size* control. The ADS7953EVM-PDK plug-in disables all the front panel controls while acquiring, and displays a progress bar as shown in Figure 25.
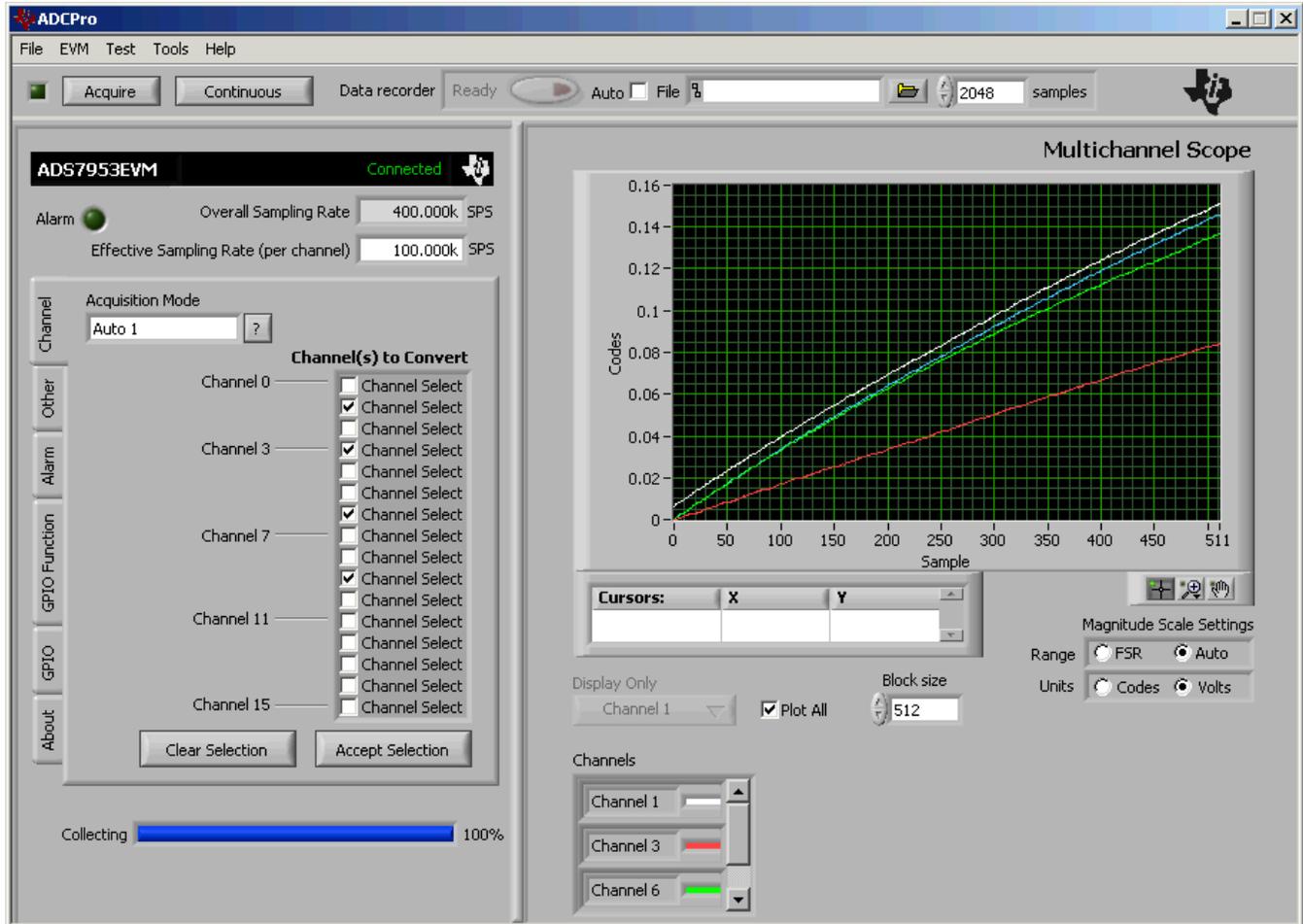
Figure 25. Progress Bar While Collecting Data

For more information on testing analog-to-digital converters in general and using ADCPro and Test plug-ins, refer to the *ADCPro Analog-to-Digital Converter Evalutation Software Users Guide*.

8.2 Troubleshooting

If ADCPro stops responding while the ADS7953EVM-PDK is connected, try unplugging the power supply from the PDK. Unload and reload the plug-in before reapplying power to the PDK.

9 Schematic and Bill of Materials

Complete schematics for the ADS7953EVM are appended to this user guide. The bill of materials is provided in Table 7. Gerber files are available on request. Please e-mail support@ti.com and ask for details on how to receive the files.

Figure 26. ADS7953EVM Schematic

9.1 Bill of Materials

Note: All components should be compliant with the European Union Restriction on Use of Hazardous Substances (RoHS) Directive. Some part numbers may be either leaded or RoHS. Verify that purchased components are RoHS-compliant. (For more information about TI's position on RoHS compliance, see the TI website.)

Table 7. ADS7953EVM Bill of Materials

Item No.	Qty	Ref Des	Description	Vendor	Part Number
1	1	N/A	Printed Wiring Board	TI	
2	0	C15	Not Installed		
3	0	R11 R14 R24	Not Installed		
4	16	C1 - C14 C22 C24	CAP CER 270PF 50V C0G 5% 0603	TDK	C1608C0G1H271J
5	4	C16 C19 C23 C25	CAP CER 0.10UF 25V X7R 10% 0603	TDK	C1608X7R1E104K
6	6	C17 C18 C21 C26 C27	CAP CERAMIC 10UF 6.3V X5R 0603	Panasonic	ECJ-1VB0J106M
7	4	C20 C28 C29 C30	CAP CER 1.0UF 16V X7R 0603	Taiyo Yuden	EMK107B7105KA-T
8	1	J1	8X2X.1 Header	Samtec	TMS-108-02-G-D
9	1	J2	2X2X.1 Header	Samtec	TMS-102-02-G-S
10	2	P1 P2 (top side)	10 Pin, Dual Row, SMT Header (20 P	Samtec	TSM-110-01-T-DV-P
11	2	P1B P2B (bottom side)	10 Pin, Dual Row, SMT Socket (20 P	Samtec	SSW-110-22-F-D-VS-K
12	1	P3 (top side)	5 Pin, Dual Row, SMT Header (10 Po	Samtec	TSM-105-01-T-DV-P
13	1	P3B (bottom side)	5 Pin, Dual Row, SMT Socket (10 Po	Samtec	SSW-105-22-F-D-VS-K
14	19	R1 - R10 R13 R15 -	RES 33.0 OHM 1/10W 1% 0603 SMD	Yageo	RC0603FR-0733RL
15	1	R12	RES 0.0 OHM 1/10W 5% 0603 SMD	Yageo	RC0603JR-070RL
16	1	R22	RES 10.0 OHM 1/10W 1% 0603 SMD	Yageo	RC0603FR-0710RL
17	2	R25 R26	RES 47.5K OHM 1/10W 1% 0603 SMD	Yageo	RC0603FR-0747K5L
18	3	TP1 TP2 TP3	TEST POINT PC MINI .040D RED	Keystone	5001
19	2	GND GND	TEST POINT PC MULTI PURPOSE BLK	Keystone	5011
20	1	U1	2.2V, 50MHz, Low-Noise, Single-Sup	TI	OPA365AID
21	1	U2	12/10/8-Bit, 1 MSPS, 16/12/8/4-Cha	TI	ADS7953/52/51/50
22	1	U3	Low-Noise, Very Low Drift, Precisi	TI	REF5025ID
23	1	U4	IC SERIAL EEPROM 256K 2.5V 8-SOIC	Microchip	24LC256T-I/SN
24	0	W1	Not Installed	Samtec	TMS-102-02-G-S
25	6	W2 - W7	3 Pin , 2mm Header	Samtec	TMM-103-01-T-S

Revision History

Changes from C Revision (August 2011) to D Revision **Page**

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

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        3.1.1 *Notice applicable to EVMs not FCC-Approved:*

        This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

        3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

        CAUTION

        This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

        Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

        FCC Interference Statement for Class A EVM devices

        NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

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Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

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1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,

2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or

3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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