TLV320AIC3253EVM-K

This user's guide describes the characteristics, operation, and use of the TLV320AIC3253EVM-K. This evaluation module (EVM) features a complete stereo audio codec with several inputs and outputs, extensive audio routing, mixing, and effects capabilities. A complete circuit description, schematic diagram, and bill of materials are also included.

The following related documents are available through the Texas Instruments Web site at www.ti.com.

EVM-Compatible Device Data Sheets

Device	Literature Number
TLV320AIC3253	SLOS631
TAS1020B	SLES025

Contents

1 EVM Overview 3
2 EVM Description and Basics 3
3 TLV320AIC3253EVM-K Setup and Installation 7
4 AIC3253 Control Software 11
Appendix A EVM Connector Descriptions 19
Appendix B TLV320AIC3253EVM Schematic 23
Appendix C TLV320AIC3253EVM Layout Views 24
Appendix D TLV320AIC3253EVM Bill of Materials 28
Appendix E USB-MODEVM Schematic 30
Appendix F USB-MODEVM Bill of Materials 31
Appendix G Writing Scripts 33

List of Figures

1 TLV320AIC3253EVM-K Block Diagram 4
2 Initial Screen of TLV320AIC3253EVM-K Software 9
3 Compatibility Tab 10
4 Playback Script Tab 12
5 Program Device Pop-Up Window 12
6 Equalizers miniDSP Application 13
7 Spectrum Analyzer 14
8 Audio Inputs Panel 15
9 Status Flags Panel 16
10 Register Tables Panel 17
11 Command-line Interface Panel 18
12 Top Layer 24
13 Mid-Layer 1 24
14 Mid-Layer 2 25

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15 Bottom Layer 25
16 Top Overlay 26
17 Bottom Overlay 26
18 Drill Drawing 27
19 Composite 27

List of Tables

1 USB-MODEVM SW2 Settings 5
2 List of Jumpers and Switches 5
3 Analog Interface Pinout 19
4 Alternate Analog Connectors 20
5 Digital Interface Pinout 21
6 Power Supply Pin Out 22
7 TLV320AIC3253EVM Bill of Materials 28
8 USB-MODEVM Bill of Materials 31

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1 EVM Overview

1.1 Features

- Full-featured evaluation board for the TLV320AIC3253 stereo audio codec.
- USB connection to PC provides power, control, and streaming audio data for easy evaluation.
- Digital microphone connections
- Connection points for external control and digital audio signals for quick connection to other circuits/input devices.

The TLV320AIC3253EVM-K is a complete evaluation kit, which includes a universal serial bus (USB)-based motherboard and evaluation software for use with a personal computer running the Microsoft Windows™ operating system (XP).

1.2 Introduction

The TLV320AIC3253EVM is in the Texas Instruments (TI) modular EVM form factor, which allows direct evaluation of the device performance and operating characteristics and eases software development and system prototyping.

The TLV320AIC3253EVM-K is a complete evaluation/demonstration kit, which includes a USB-based motherboard called the USB-MODEVM Interface board and evaluation software for use with a personal computer (PC) running the Microsoft Windows operating systems.

The TLV320AIC3253EVM-K is operational with one USB cable connection to a PC. The USB connection provides power, control, and streaming audio data to the EVM for reduced setup and configuration. The EVM also allows external control signals, audio data, and power for advanced operation, which allows prototyping and connection to the rest of the development or system evaluation.

2 EVM Description and Basics

This section provides information on the analog input and output, digital control, power, and general connection of the TLV320AIC3253EVM-K.

2.1 TLV320AIC3253EVM-K Block Diagram

The TLV320AIC3253EVM-K consists of two separate circuit boards, the USB-MODEVM and the TLV320AIC3253EVM. The USB-MODEVM is built around the TAS1020B streaming audio USB controller with an 8051-based core. The motherboard features two positions for modular EVMs, or one double-wide serial modular EVM can be installed. The TLV320AIC3253EVM is one of the double-wide modular EVMs that is designed to work with the USB-MODEVM.

The simple diagram of Figure 1 shows how the TLV320AIC3253EVM is connected to the USB-MODEVM. The USB-MODEVM Interface board is intended to be used in USB mode, where control of the installed EVM is accomplished using the onboard USB controller device. Provision is made, however, for driving all the data buses (I^2C™, SPI™, I^2S, etc.) externally. The source of these signals is controlled by SW2 on the USB-MODEVM. See Table 1 for details on the switch settings.

The USB-MODEVM has two EVM positions that allow for the connection of two small evaluation module or one larger evaluation module. The TLV320AIC3253EVM is designed to fit over both of the smaller evaluation module slots as shown in Figure 1

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2.1.1 USB-MODEVM Interface Board

The simple diagram of Figure 1 shows only the basic features of the USB-MODEVM Interface board.

Because the TLV320AIC3253EVM is a double-wide modular EVM, it is installed with connections to both EVM positions, which connects the TLV320AIC3253 digital control interface to the I^2C port realized using the TAS1020B, as well as the TAS1020B digital audio interface.

In the factory configuration, the board is ready to be used with the USB-MODEVM. To view all the functions and configuration options available on the USB-MODEVM board, see the USB-MODEVM Interface Board schematic in Appendix G.

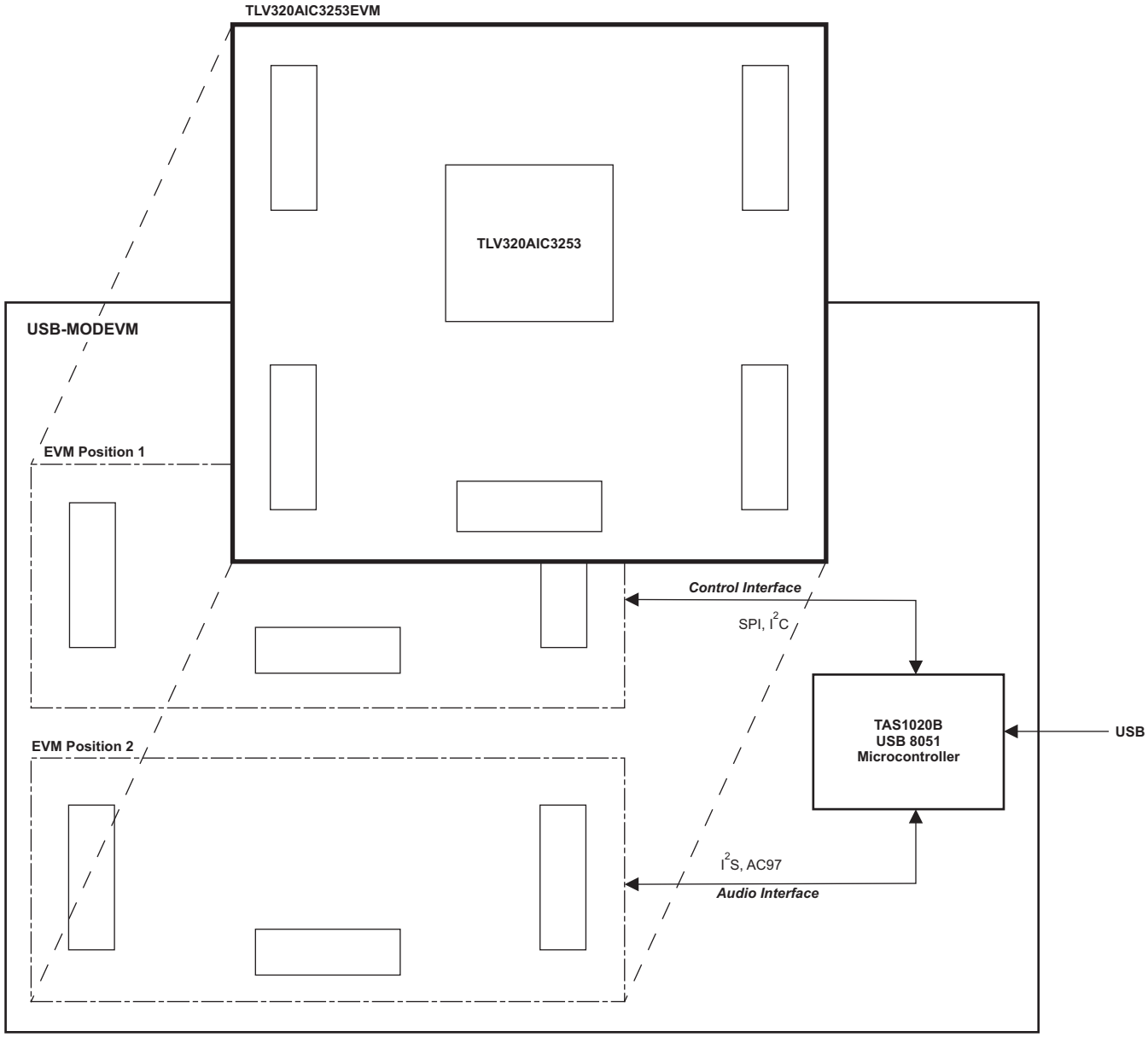

Figure 1. TLV320AIC3253EVM-K Block Diagram

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2.2 Default Configuration and Connections

2.2.1 USB-MODEVM

Table 1 provides a list of the SW2 settings on the USB-MODEVM. For use with the TLV320AIC3253EVM, SW-2 positions 1, 3, 4, 5, 6, and 7 must be set to ON, whereas SW-2.2 and SW-2.8 must be set to OFF. If the TLV320AIC3253EVM is to be used with an external audio interface, SW2.4 and SW2.5 also need to be set to OFF and such interface must be connected as explained in Section 2.4

Table 1. USB-MODEVM SW2 Settings

SW-2 Switch Number	Label	Switch Description
1	A0	USB-MODEVM EEPROM I^{2}C Address A0 ON: A0 = 0 OFF: A0 = 1
2	A1	USB-MODEVM EEPROM I^{2}C Address A1 ON: A1 = 0 OFF: A1 = 1
3	A2	USB-MODEVM EEPROM I^{2}C Address A2 ON: A2 = 0 OFF: A2 = 1
4	USB I^{2}S	I^{2}S Bus Source Selection ON: I^{2}S Bus connects to TAS1020 OFF: I^{2}S Bus connects to USB-MODEVM J14
5	USB MCK	I^{2}S Bus MCLK Source Selection ON: MCLK connects to TAS1020 OFF: MCLK connects to USB-MODEVM J14
6	USB SPI	SPI Bus Source Selection ON: SPI Bus connects to TAS1020 OFF: SPI Bus connects to USB-MODEVM J15
7	USB RST	RST Source Selection ON: EVM Reset Signal comes from TAS1020 OFF: EVM Reset Signal comes from USB-MODEVM J15
8	EXT MCK	External MCLK Selection ON: MCLK Signal is provided from USB-MODEVM J10 OFF: MCLK Signal comes from either selection of SW2-5

2.2.2 TLV320AIC3253 Jumper Locations

Table 2 provides a list of jumpers found on the EVM and their factory default conditions.

Table 2. List of Jumpers and Switches

Jumper	Default Position	Jumper Description
W1	1-2	Sets IOVDD to 3.3V (default) or 1.8V.
W2	2-3	Sets DIGMIC_PWR to 3.3V (default) or 1.8V.
W3	Removed	Connects GPIO2 to $\overline{\text{RESET}}$ line.
W4	Installed	Provides a means to measure LDOin/HPVDD current.
W5	Installed	Provides a means to measure AVDD current. *When using the internal LDO, this jumper should be removed.*
W6	Installed	Provides a means to measure DVDD current.
W7	Installed	Provides a means to measure IOVDD current.
W8	Removed	Connects 16-Ω load to HPL outputs.
W9	Removed	Connects 16-Ω load to HPR outputs.
W10	Removed	When installed, shorts across the output capacitor on HPL; remove this jumper if using AC-coupled output drive.
W11	Removed	When installed, shorts across the output capacitor on HPR; remove this jumper if using AC-coupled output drive.
W12	Removed	When inserted, connects MICBIAS to J2.4 for headset detection use.

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Table 2. List of Jumpers and Switches (continued)

Jumper	Default Position	Jumper Description
W13	Installed	When installed, it selects onboard EEPROM as firmware source.
W14	2-3	When SW1 is configured for I2C, selects SCLK source for digital microphone or headset detection use.
W15	Installed	Connects MISO to USB-MODEVM. Remove this jumper for digital microphone use.
SW1	Toward I2C	When set to I2C, the I2C signals from P12/J12 are connected to the codec and SPI_SELECT is set low. When set to SPI, the SPI signals from P12/J12 are connected to the codec and SPI_SELECT is pulled to IOVDD.

2.3 Analog Signal Connections

2.3.1 Analog Inputs

The analog input sources can be applied directly to terminal block J5 or input jack J4. The connection details can be found in Appendix A.

2.3.2 Analog Output

The analog outputs are available from terminal block J1 or output jacks J2 and J3. Note that J3 is provided for signal-to-noise ratio (SNR) measurements only. The connection details can be found in Appendix A.

2.4 Digital Signal Connections

The digital inputs and outputs of the EVM can be monitored through P12 and P22. If external signals need to be connected to the EVM, digital inputs must be connected via J14 and J15 on the USB-MODEVM and the SW2 switch must be changed accordingly (see Section 2.2.1). The connector details are available in Section A.2.

2.5 Power Connections

The TLV320AIC3253EVM can be powered independently when being used in stand-alone operation or by the USB-MODEVM when it is plugged onto the motherboard.

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2.5.1 Stand-Alone Operation

When used as a stand-alone EVM, power is applied to P23/J23 directly, making sure to reference the supplies to the appropriate grounds on that connector.

CAUTION

Verify that all power supplies are within the safe operating limits shown on the TLV320AIC3253 data sheet before applying power to the EVM.

P23/J23 provides connection to the common power bus for the TLV320AIC3253EVM. Power is supplied on the pins listed in Table 6.

The TLV320AIC3253EVM-K motherboard (the USB-MODEVM Interface board) supplies power to P23/J23 of the TLV320AIC3253EVM. Power for the motherboard is supplied either through its USB connection or via terminal blocks on that board.

2.5.2 USB-MODEVM Operation

The USB-MODEVM Interface board can be powered from several different sources:

- USB
- 6-Vdc to 10-Vdc AC/DC external wall supply (not included)
- Laboratory power supply

When powered from the USB connection, JMP6 must have a shunt from pins 1–2 (this is the default factory configuration). When powered from 6-Vdc to 10-Vdc power supply, either through the J8 terminal block or J9 barrel jack, JMP6 must have a shunt installed on pins 2–3. If power is applied in any of these ways, onboard regulators generate the required supply voltages, and no further power supplies are necessary.

If laboratory supplies are used to provide the individual voltages required by the USB-MODEVM Interface, JMP6 must have no shunt installed. Voltages are then applied to J2 (+5VA), J3 (+5VD), J4 (+1.8VD), and J5 (+3.3VD). The +1.8VD and +3.3VD can also be generated on the board by the onboard regulators from the +5VD supply; to enable this configuration, the switches on SW1 need to be set to enable the regulators by placing them in the ON position (lower position, looking at the board with text reading right-side up). If +1.8VD and +3.3VD are supplied externally, disable the onboard regulators by placing SW1 switches in the OFF position.

Each power supply voltage has an LED (D1-D7) that illuminates when the power supplies are active.

3 TLV320AIC3253EVM-K Setup and Installation

The following section provides information on using the TLV320AIC3253EVM-K, including setup, program installation, and program usage.

3.1 Software Installation

1. Download the latest version of the AIC3253 Control Software (CS) located in the TLV320AIC3253EVM-K Product Folder.
2. Open the self-extracting installation file.
3. Extract the software to a known folder.
4. Install the EVM software by double-clicking the **Setup** executable, and follow the directions. The user may be prompted to restart their computer.

This installs all the TLV320AIC3253EVM-K software and required drivers onto the PC.

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3.2 EVM Connections

1. Ensure that the TLV320AIC3253EVM is installed on the USB-MODEVM Interface board, aligning J11, J12, J21, J22, and J23 with the corresponding connectors on the USB-MODEVM.
2. Verify that the jumpers and switches are in their default conditions.
3. Attach a USB cable from the PC to the USB-MODEVM Interface board. The default configuration provides power, control signals, and streaming audio via the USB interface from the PC. On the USB-MODEVM, LEDs D3, D4, D5, and D7 illuminate to indicate that the USB is supplying power.
4. For the first connection, the PC recognizes new hardware and begins an initialization process. The user may be prompted to identify the location of the drivers or allow the PC to automatically search for them. Allow the automatic detection option.
5. Once the PC confirms that the hardware is operational, D2 on the USB-MODEVM illuminates to indicate that the firmware has been loaded and the EVM is ready for use. **If D2 does not illuminate, verify that the EEPROM jumper and switch settings conform to Table 1 and Table 2.**

After the TLV320AIC3253EVM-K software installation (described in Section 3.2) is complete, evaluation and development with the TLV320AIC3253 can begin.

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The TLV320AIC3253EVM-K software can now be launched. The user sees an initial screen that looks similar to Figure 2.

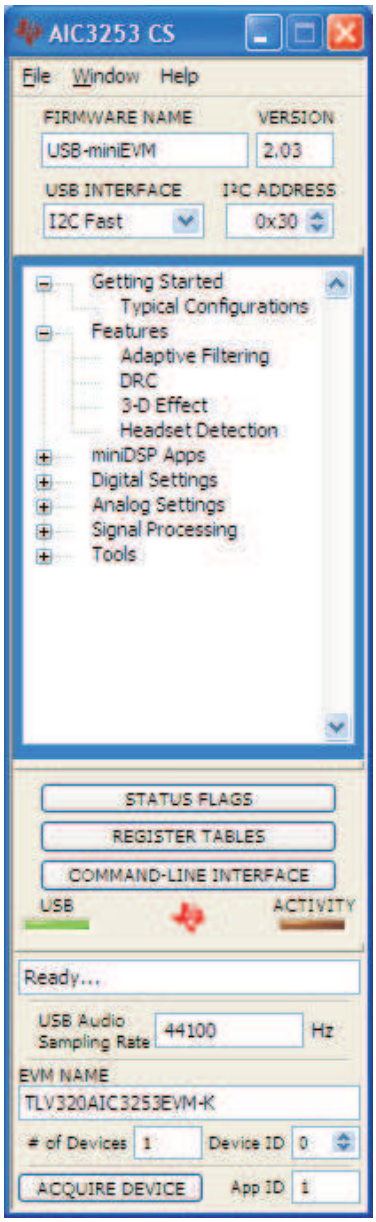

Figure 2. Initial Screen of TLV320AIC3253EVM-K Software

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If running the software in Windows Vista or Windows 7, right-click the AIC3253EVM-K CS shortcut and select *Properties*. Configure the *Compatibility* tab as shown in Figure 3

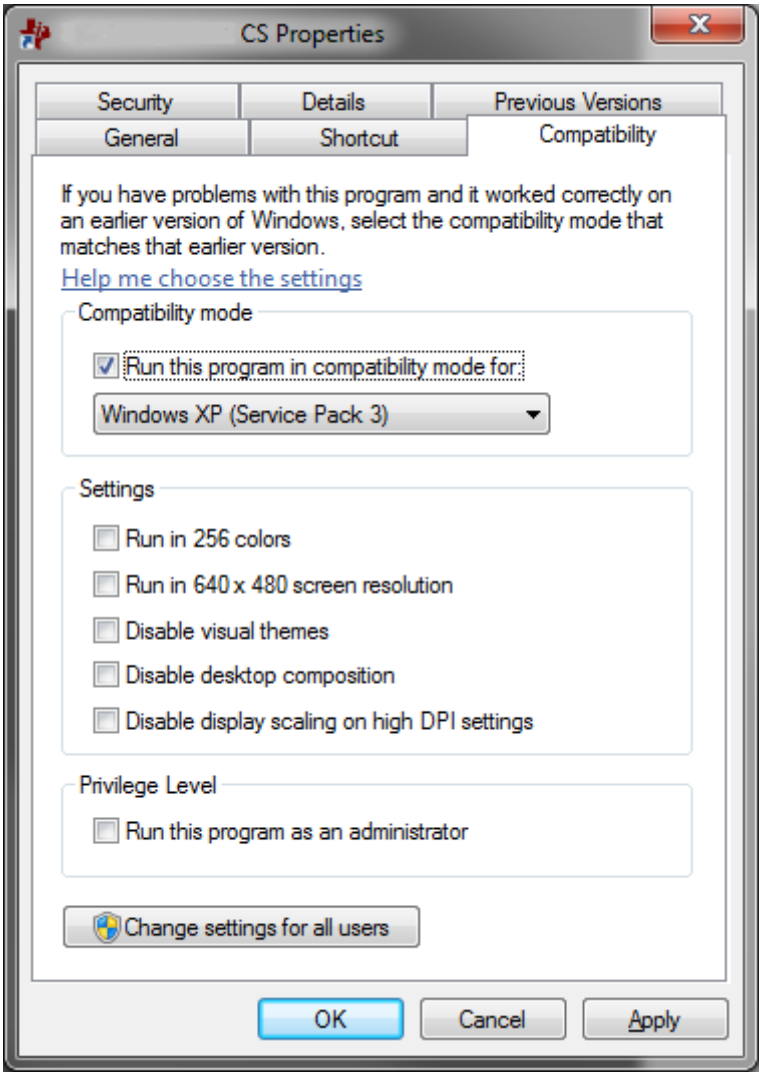

Figure 3. Compatibility Tab

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4 AIC3253 Control Software

The AIC3253 Control Software (CS) is an intuitive, easy-to-use, powerful tool to learn, evaluate, and control the TLV320AIC3253. This tool was specifically designed to make learning the TLV320AIC3253 software easy. The following sections describe the operation of this software.

NOTE: For configuration of the codec, the TLV320AIC3253 block diagram located in the TLV320AIC3253 data sheet is a good reference to help determine the signal routing.

4.1 Main Panel Window

The Main Panel window, shown in Figure 2, provides easy access to all the features of the AIC3253 CS. The Firmware Name and Version boxes provide information about the firmware loaded into the EVM's EEPROM.

The USB-MODEVM Interface drop-down menu allows the user to select which communication protocol the TAS1020B USB Controller uses to communicate with the TLV320AIC3253 or to toggle the TAS1020B GPIO pins. The TLV320AIC3253 supports I^2C Standard, I^2C Fast, and 8-bit register SPI. The USB-MODEVM Interface selection is global to all panels, including the Command-Line Interface. To communicate to the TLV320AIC3253 using SPI, SW1 must be switched towards SPI and W15 must be inserted on the TLV320AIC3253EVM.

The Panel Selection Tree provides access to typical configurations, features, and other panels that allow the user to control the TLV320AIC3253. The tree is divided into several categories which contain items that pop up panels. A panel can be opened by double-clicking any item inside a category in the Panel Selection Tree.

Below the Panel Selection Tree are three buttons that pop up the following:

- Status Flags - Allows the user to monitor the TLV320AIC3253 status flags.
- Register Tables - A tool to monitor register pages.
- Command-Line Interface - A tool to execute/generate scripts and monitor register activity.

The USB LED indicates if the EVM kit is recognized by the software and the ACTIVITY LED illuminates every time a command request is sent.

The dialog box at the bottom of the Main Panel provides feedback of the current status of the software.

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4.1.1 Typical Configurations

This panel can help users to quickly become familiar with the TLV320AIC3253. This panel has controls relevant to the selected configuration; a tab shows the script that will be loaded for that particular configuration. Each script includes a brief description of the selected configuration, as shown in Figure 4.

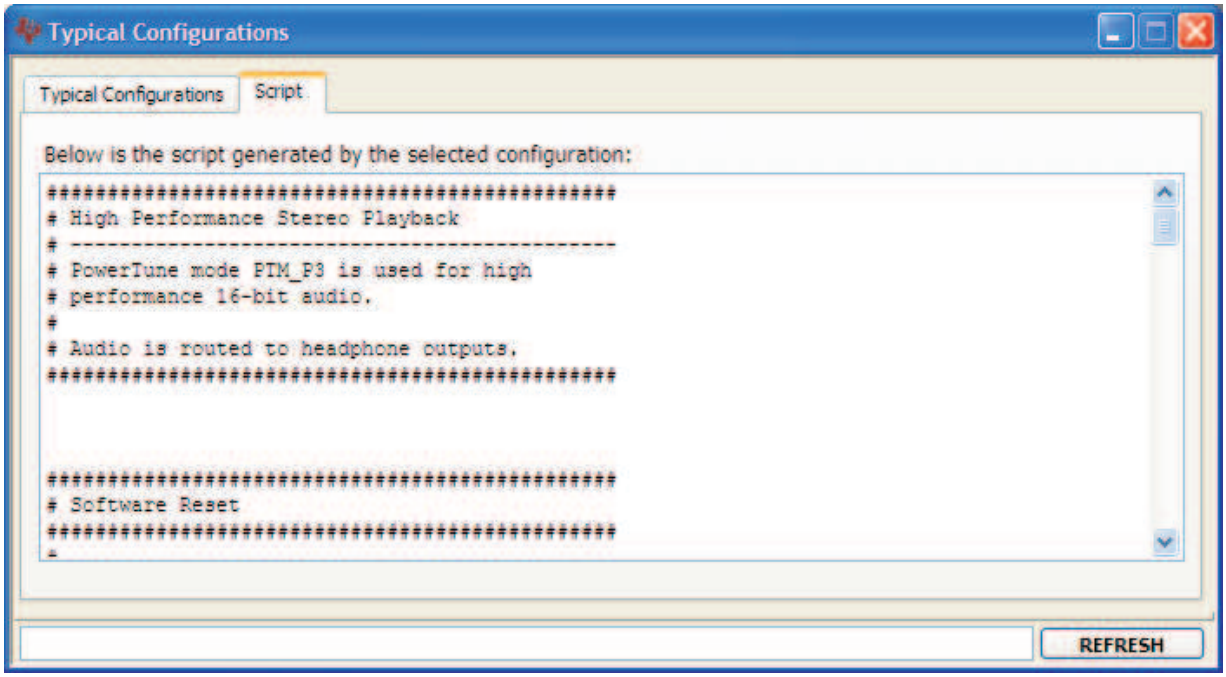

Figure 4. Playback Script Tab

4.1.2 Features

The **Features** category allows the user to evaluate various features of the TLV320AIC3253. Each of the **Features** panels include an **Information** tab that explains the feature and provides hardware setup information for easy evaluation.

Any item in the **Features** category can be accessed by a double-click. As soon as a **Features** panel opens, a pop-up message appears asking to program the codec for that feature (see Figure 5). A command script is sent to the codec if the **OK** button is clicked. This script programs all registers necessary to evaluate the feature. This can be bypassed by clicking the **Cancel** button.

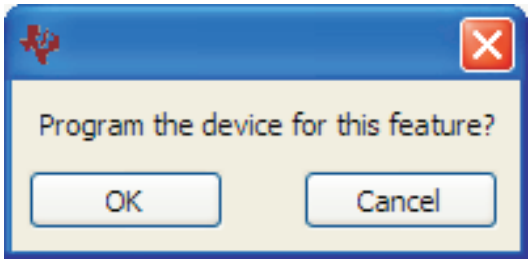

Figure 5. Program Device Pop-Up Window

The script corresponding to each feature can be accessed at the Installation Directory\DATA\EVM folder. Also, each script can be manually customized and loaded as the feature's start-up script as long as the file name remains the same.

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4.1.3 miniDSP Applications

The TLV320AIC3253 features two miniDSP cores, one for the ADC and another for the DAC.

Currently, the AIC3253 CS has two DAC miniDSP applications: Equalizers and Spectrum Analyzer. Visit the TLV320AIC3253EVM-K product folder for updates and availability on new miniDSP applications.

See the miniDSP section in the data sheet (SLOS631) for information on how to develop custom miniDSP algorithms.

4.1.3.1 Equalizers

The Equalizers miniDSP application features 20 cascaded biquad filters per DAC channel (Figure 6). Each of the 40 20-Band EQ sliders modify its corresponding biquad filter in the cascade as a function of gain. Each **Master** slider controls the digital volume control of the TLV320AIC3253. All sliders can be set to track the opposing channel slider movement by turning on the **Lock L+R** switch. Preset configurations are available at the red selection box below the graphic equalizer. A frequency slider movement changes any preset to Custom.

The **Small Speaker EQ** section, contains filter presets that are suitable for small speaker applications. Emphasizing certain frequencies and reducing low-frequency energy provides higher volume with less distortion and more intelligible speech and music for small speakers. These presets use the first seven biquads of the cascade for filtering whereas the rest of the 13 graphic equalizer sliders can be used to emphasize other frequencies. This feature is enabled by setting the green ON/OFF switch to ON.

Although an option is available to program the codec for this feature when the panel pops up, provision is made to re-program this miniDSP application by clicking the **Program EQ into miniDSP** button.

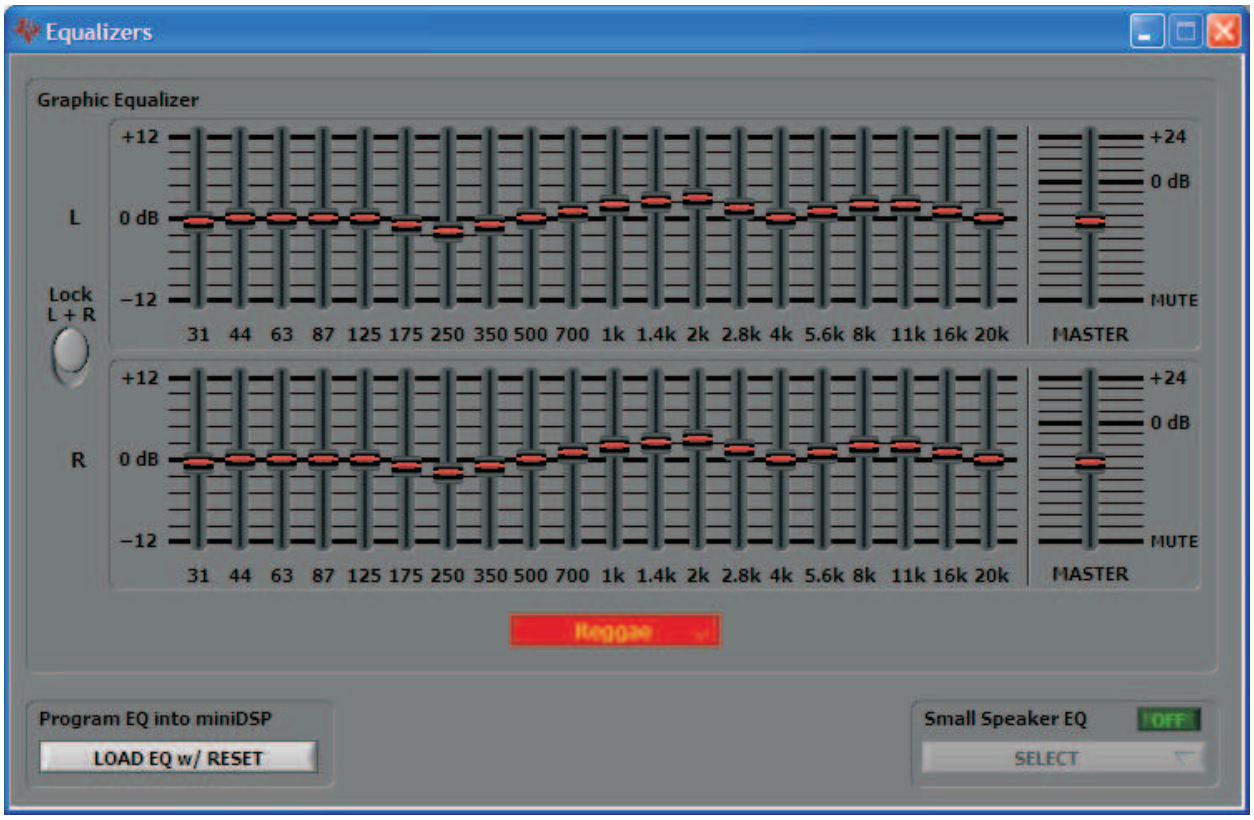

Figure 6. Equalizers miniDSP Application

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4.1.3.2 Spectrum Analyzer

The 20-Band Spectrum Analyzer provides a visual representation of the frequency content of the input signal (Figure 70. If **Both Channels** is selected in the selection box below the display window, the AIC3253 CS polls the registers related to both channels. To enable polling, set the ON/OFF switch to ON.

Modifying the DAC volume control does not affect the spectrum reading because the analysis is done before the DAC volume control.

Although an option is available to program the codec for this feature when the panel pops up, provision is made to re-program this miniDSP application by clicking the **Program Spectrum Analyzer into miniDSP** button.

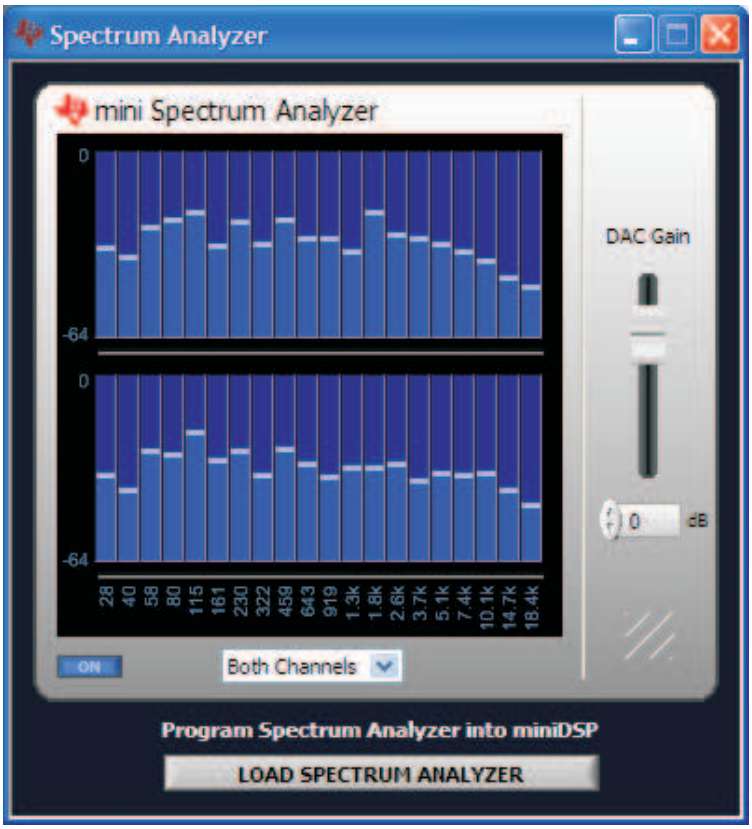

Figure 7. Spectrum Analyzer

4.1.4 Control Categories

The **Digital Settings**, **Analog Settings**, and **Signal Processing** categories provide control of many registers and other features of the TLV320AIC3253 . These categories are intended for the advanced user. Hovering the mouse cursor on top of a control displays a tip strip that contains page, register, and bit information. As an example, hovering on top of the 'J' control of the Clocks / Interface panel, as shown in Figure 8 displays p0_r6_b5-0 which means that this control writes to Page 0/Register 6, Bits D5 to D0.

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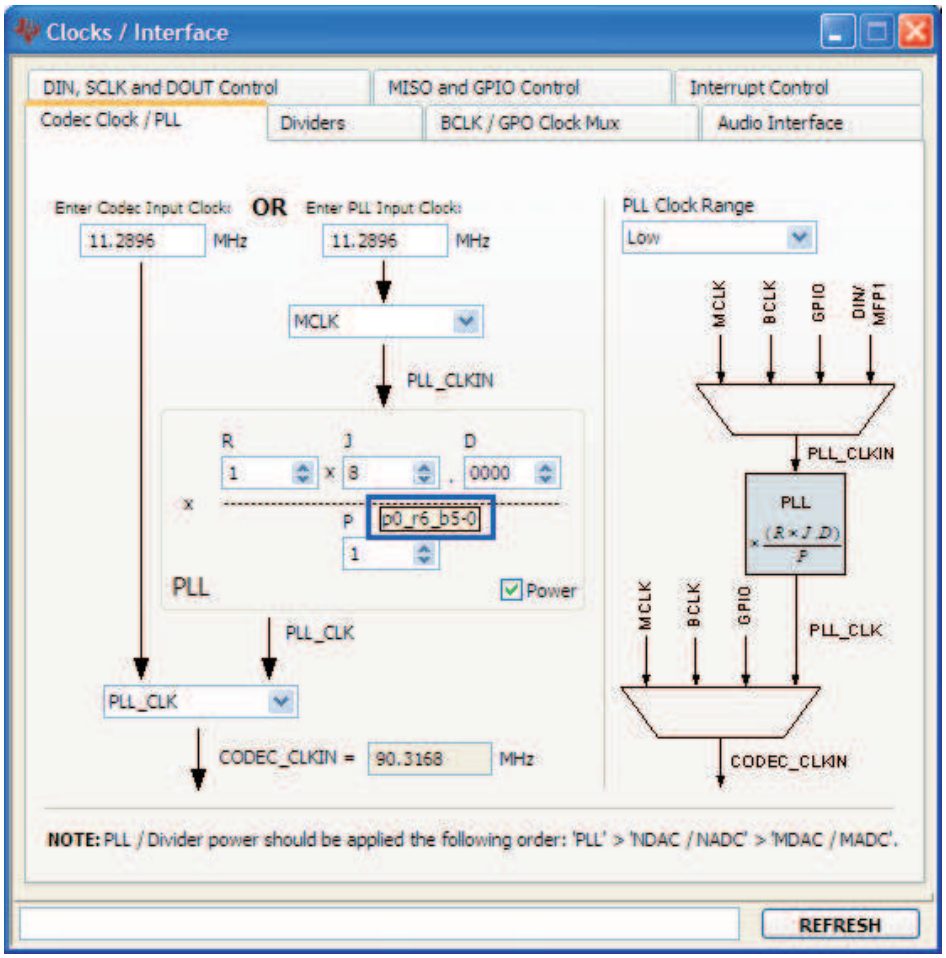

Figure 8. Audio Inputs Panel

Before changing a control, see the data sheet to ensure that a particular control is compatible with the current state of the codec. As an example, some controls in the **Analog Setup** panel must be modified in a particular order as described in the data sheet. Other controls must only be modified with a specific hardware setup, such as powering up the AVDD LDO.

All controls update their status with respect to the register contents in the following conditions:

- A panel is opened.
- The **Execute Command Buffer** button in the **Command-Line Interface** is pressed (if enabled to do so).
- The **Refresh** button at the bottom right of a panel is pressed.

4.2 Status Flags Panel

The TLV320AIC3253 status flags can monitored in the **Status Flags** panel (Figure 9) which is located below the **Panel Selection Tree** . Pressing the **POLL** button continuously reads all the registers relevant to each flag and updates those flags accordingly. The rate at which the registers are read can be modified by changing the value in the **Polling Interval** numeric control. Note that a smaller interval reduces responsiveness of other controls, especially volume sliders, due to bandwidth limitations. By default, the polling interval is 200 ms and can be set to a minimum of 20 ms.

The **Sticky Flags** tab contains indicators whose corresponding register contents clear every time a read is performed to that register. To read all the sticky flags, click the **Read Sticky Flags** button.

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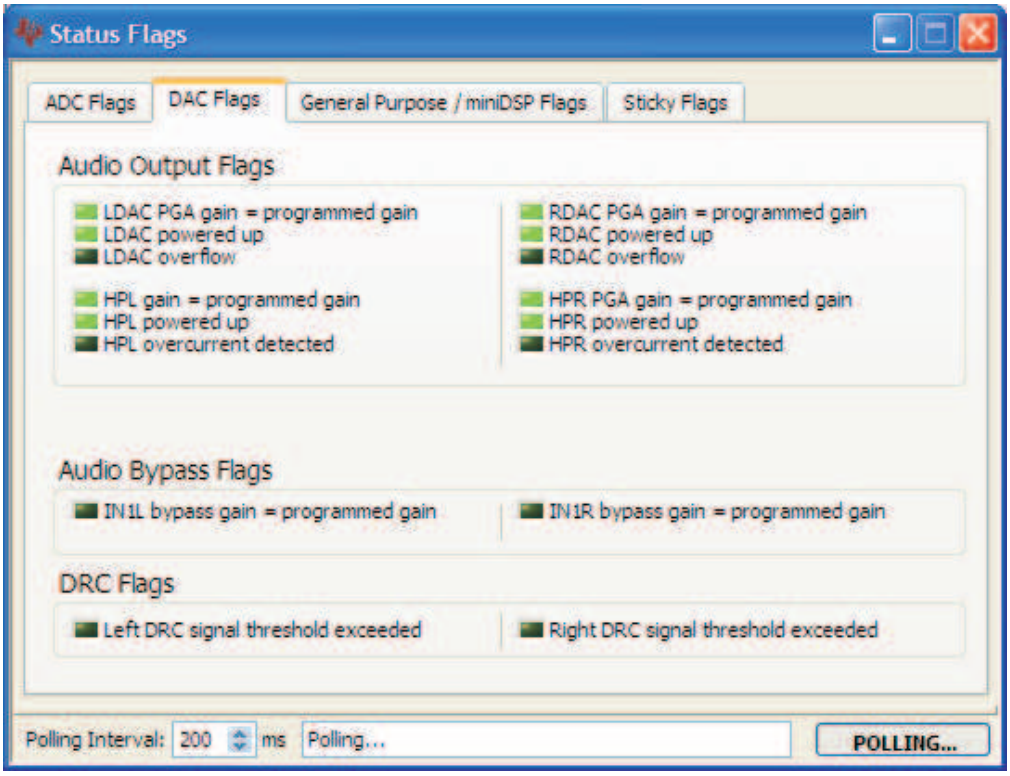

Figure 9. Status Flags Panel

4.3 Register Tables Panel

The contents of configuration and coefficient pages of the TLV320AIC3253 can be accessed through the **Register Tables** panel (Figure 10).

The **Page Number** control changes to the page to be displayed in the register table. The register table contains page information such as the register name, reset value, current value, and a bitmap of the current value. The contents of the selected page can be exported into a spreadsheet by clicking the **Dump to Spreadsheet** button.

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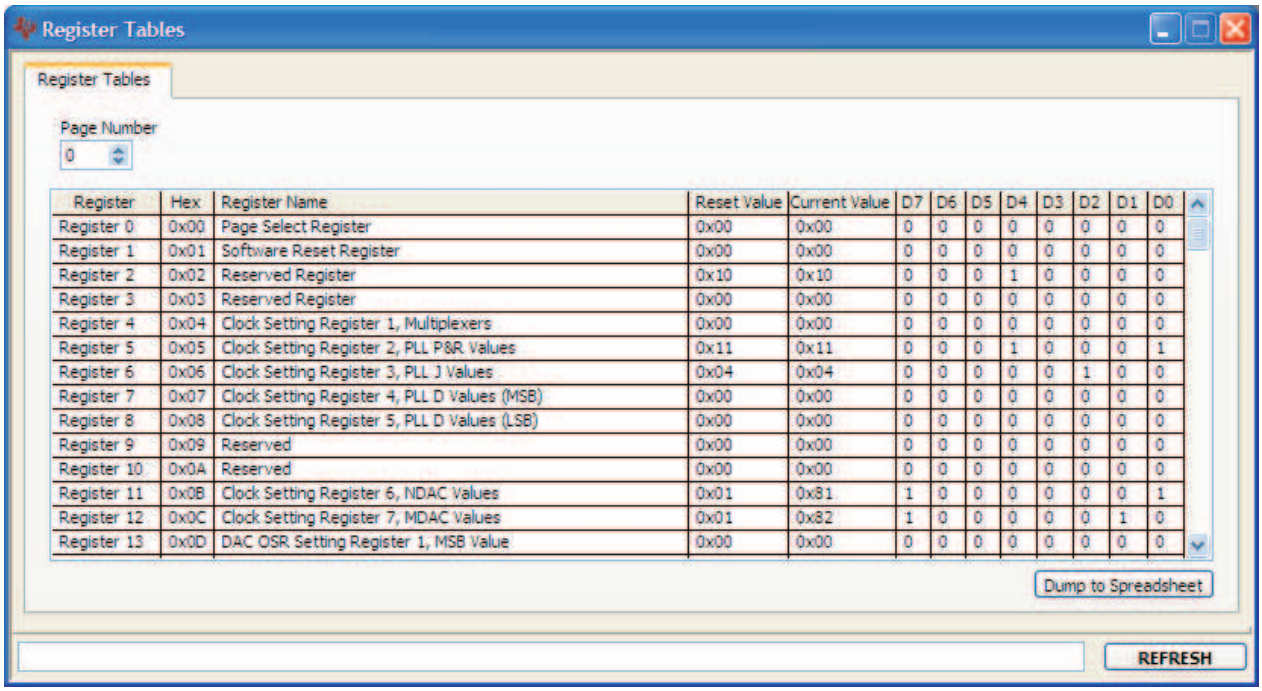

Register	Hex	Register Name	Reset Value	Current Value	D7	D6	D5	D4	D3	D2	D1	D0
Register 0	0x00	Page Select Register	0x00	0x00	0	0	0	0	0	0	0	0
Register 1	0x01	Software Reset Register	0x00	0x00	0	0	0	0	0	0	0	0
Register 2	0x02	Reserved Register	0x10	0x10	0	0	0	1	0	0	0	0
Register 3	0x03	Reserved Register	0x00	0x00	0	0	0	0	0	0	0	0
Register 4	0x04	Clock Setting Register 1, Multiplexers	0x00	0x00	0	0	0	0	0	0	0	0
Register 5	0x05	Clock Setting Register 2, PLL P&R Values	0x11	0x11	0	0	0	1	0	0	0	1
Register 6	0x06	Clock Setting Register 3, PLL J Values	0x04	0x04	0	0	0	0	0	1	0	0
Register 7	0x07	Clock Setting Register 4, PLL D Values (MSB)	0x00	0x00	0	0	0	0	0	0	0	0
Register 8	0x08	Clock Setting Register 5, PLL D Values (LSB)	0x00	0x00	0	0	0	0	0	0	0	0
Register 9	0x09	Reserved	0x00	0x00	0	0	0	0	0	0	0	0
Register 10	0x0A	Reserved	0x00	0x00	0	0	0	0	0	0	0	0
Register 11	0x0B	Clock Setting Register 6, NDAC Values	0x01	0x81	1	0	0	0	0	0	0	1
Register 12	0x0C	Clock Setting Register 7, MDAC Values	0x01	0x82	1	0	0	0	0	0	1	0
Register 13	0x0D	DAC OSR Setting Register 1, MSB Value	0x00	0x00	0	0	0	0	0	0	0	0

Figure 10. Register Tables Panel

4.4 Command-Line Interface Panel

The **Command-Line Interface** panel provides a means to communicate with the TLV320AIC3253 using a simple scripting language (described in Section G.1). The TAS1020B USB Controller (located on the USB-MODEVM motherboard) handles all communication between the PC and the TLV320AIC3253.

A script is loaded into the command buffer, either by loading a script file using the **File** menu or by pasting text from the clipboard using the Ctrl-V key combination (Figure 11).

When the command buffer is executed, the return data packets which result from each individual command are displayed in the **Command History** control. This control is an array (with a maximum size of 100 elements) that contains information about each command as well as status. The **Interface** box displays the interface used for a particular command in the **Command History** array. The Command box displays the type of command executed (i.e., write, read) for a particular interface. The Flag Retries box displays the number of read iterations performed by a **Wait for Flag** command (see Section G.1 for details). The **Register Data** array displays the register number and data bytes that correspond to a particular command.

The **Information** tab provides additional information related to the **Command History** as well as additional settings. The **Syntax** and **Examples** tabs provide useful information related to the scripting language.

The **File** menu provides some options for working with scripts. The first option, *Open Script File...*, loads a command file script into the command buffer. This script can then be executed by pressing the **Execute Command Buffer** button. The contents of the **Command Buffer** can be saved using the *Save Script File...* option.

Both the **Command Buffer** and **Command History** can be cleared by clicking their corresponding **Clear** buttons.

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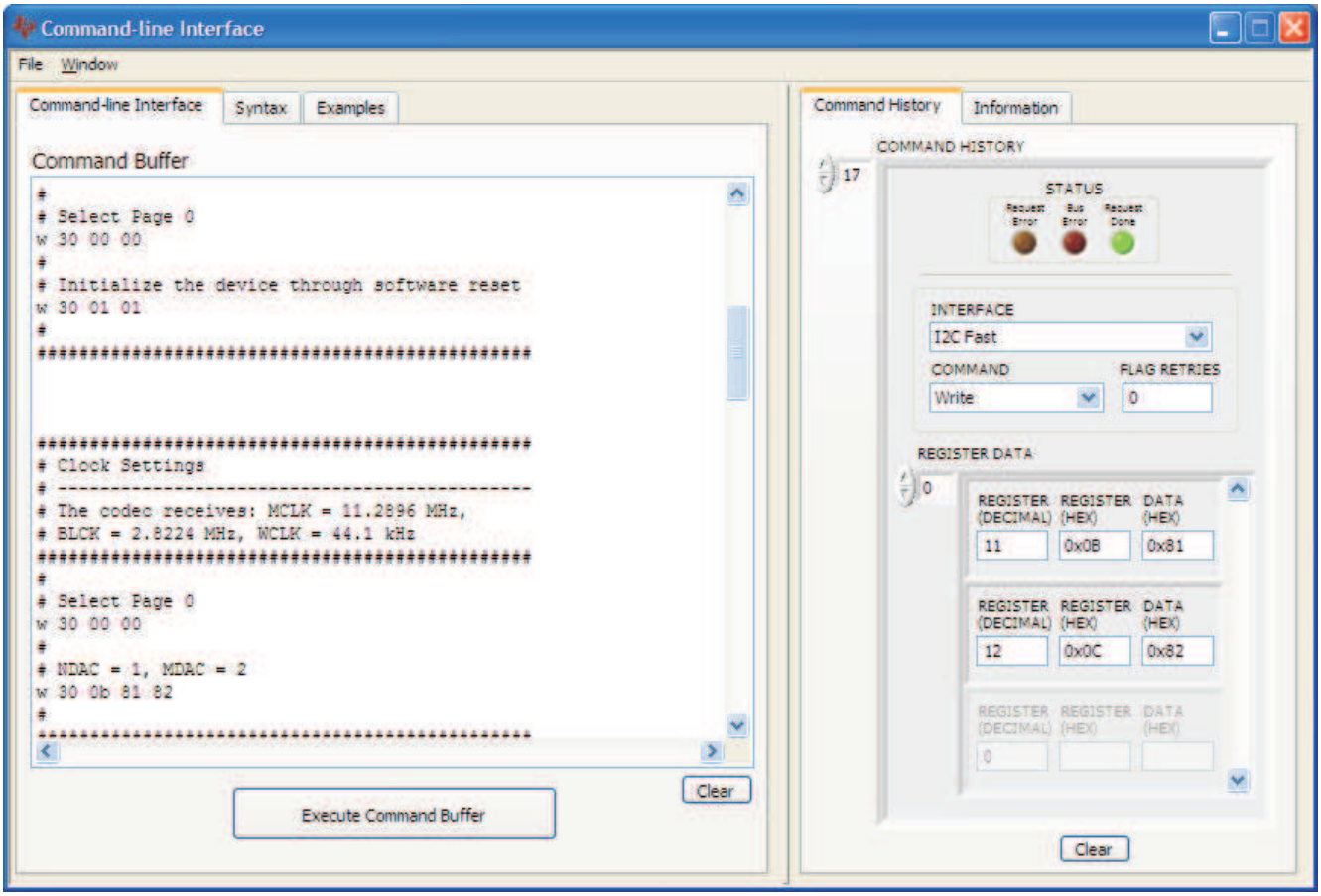

Figure 11. Command-line Interface Panel

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Appendix A EVM Connector Descriptions

This appendix contains the connection details for each of the main connectors on the EVM.

A.1 Analog Interface Connectors

A.1.1 Analog Dual-Row Socket Details, J11 and J21

The TLV320AIC3253EVM has two analog dual-row sockets located at the bottom of the board. These sockets provide support to the EVM and connect the analog ground plane of the EVM to the USB-MODEVM analog ground. Consult Samtec at www.samtec.com or call 1-800-SAMTEC-9 for a variety of mating connector options. Table 3 summarizes the analog interface pinout for the TLV320AIC3253EVM.

Table 3. Analog Interface Pinout

PIN NUMBER	SIGNAL	DESCRIPTION
J11.1	NC	Not Connected
J11.2	NC	Not Connected
J11.3	NC	Not Connected
J11.4	NC	Not Connected
J11.5	NC	Not Connected
J11.6	NC	Not Connected
J11.7	NC	Not Connected
J11.8	NC	Not Connected
J11.9	AGND	Analog Ground
J11.10	NC	Not Connected
J11.11	AGND	Analog Ground
J11.12	NC	Not Connected
J11.13	AGND	Analog Ground
J11.14	NC	Not Connected
J11.15	NC	Not Connected
J11.16	NC	Not Connected
J11.17	AGND	Analog Ground
J11.18	NC	Not Connected
J11.19	AGND	Analog Ground
J11.20	NC	Not Connected
J21.1	NC	Not Connected
J21.2	NC	Not Connected
J21.3	NC	Not Connected
J21.4	NC	Not Connected
J21.5	NC	Not Connected
J21.6	NC	Not Connected
J21.7	NC	Not Connected
J21.8	NC	Not Connected
J21.9	AGND	Analog Ground
J21.10	NC	Not Connected
J21.11	AGND	Analog Ground
J21.12	NC	Not Connected
J21.13	AGND	Analog Ground
J21.14	NC	Not Connected
J21.15	NC	Not Connected
J21.16	NC	Not Connected
J21.17	AGND	Analog Ground
J21.18	NC	Not Connected
J21.19	AGND	Analog Ground

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Table 3. Analog Interface Pinout (continued)

PIN NUMBER	SIGNAL	DESCRIPTION
J21.20	NC	Not Connected

A.1.2 Analog Screw Terminal and Audio Jack Details, J1 to J10

The analog inputs and outputs can be accessed through screw terminals or audio jacks.

Table 4 summarizes the screw terminals and audio jacks available on the TLV320AIC3253EVM.

Table 4. Alternate Analog Connectors

DESIGNATOR	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6
J1 (HEADPHONE)	HPL	GND	HPR			
J2 (HEADSET OUTPUT)	GND	HPL	HPR	SCLK	NC	NC
J3 (HEADPHONE TEST ONLY)	GND	HPL	HPR	NC	NC	
J4 (LINE IN)	GND	INL	INR	NC	NC	
J5 (LINE IN)	INL	GND	INR			
J6 (DIG_MIC 1)	DIG_MIC_PWR	DIG_MIC_CLK	DIG_MIC_DATA	DIG_MIC_GND		
J7 (DIG_MIC 2)	DIG_MIC_PWR	DIG_MIC_CLK	DIG_MIC_DATA	DIG_MIC_GND		

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A.2 Digital Interface Connectors, P12/J12 and P22/J22

The TLV320AIC3253EVM 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 P12/J12 and P22/J22. These headers/sockets provide access to the digital control and serial data pins of the device. Consult Samtec at www.samtec.com or call 1-800- SAMTEC-9 for a variety of mating connector options. Table 5 summarizes the digital interface pinout for the TLV320AIC3253EVM.

Table 5. Digital Interface Pinout

PIN NUMBER	SIGNAL	DESCRIPTION
P12.1/J12.1	NC	Not Connected
P12.2/J12.2	NC	Not Connected
P12.3/J12.3	SCLK	SPI Serial Clock
P12.4/J12.4	DGND	Digital Ground
P12.5/J12.5	NC	Not Connected
P12.6/J12.6	NC	Not Connected
P12.7/J12.7	/SS	SPI Chip Select
P12.8/J12.8	$\overline{\text{RESET}}$	TAS1020B Reset
P12.9/J12.9	NC	Not Connected
P12.10/J12.10	DGND	Digital Ground
P12.11/J12.11	MOSI	SPI MOSI Slave Serial Data Input
P12.12/J12.12	NC	Not Connected
P12.13/J12.13	MISO	SPI MISO Slave Serial Data Output
P12.14/J12.14	$\overline{\text{RESET}}$	TAS1020B Reset
P12.15/J12.15	NC	Not Connected
P12.16/J12.16	SCL	I^2C Serial Clock
P12.17/J12.17	NC	Not Connected
P12.18/J12.18	DGND	Digital Ground
P12.19/J12.19	NC	Not Connected
P12.20/J12.20	SDA	I^2C Serial Data Input/Output
P22.1/J22.1	NC	Not Connected
P22.2/J22.2	NC	Not Connected
P22.3/J22.3	BCLK	Audio Serial Data Bus Bit Clock (Input/Output)
P22.4/J22.4	DGND	Digital Ground
P22.5/J22.5	NC	Not Connected
P22.6/J22.6	NC	Not Connected
P22.7/J22.7	WCLK	Audio Serial Data Bus Word Clock (Input/Output)
P22.8/J22.8	NC	Not Connected
P22.9/J22.9	NC	Not Connected
P22.10/J22.10	DGND	Digital Ground
P22.11/J22.11	DIN	Audio Serial Data Bus Data Input (Input)
P22.12/J22.12	NC	Not Connected
P22.13/J22.13	DOUT	Audio Serial Data Bus Data Output (Output)
P22.14/J22.14	NC	Not Connected
P22.15/J22.15	NC	Not Connected
P22.16/J22.16	NC	Not Connected
P22.17/J22.17	MCLK	Master Clock Input
P22.18/J22.18	DGND	Digital Ground
P22.19/J22.19	NC	Not Connected
P22.20/J22.20	NC	Not Connected

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Note that P22/J22 comprises the signals needed for an I²S™ serial digital audio interface; the control interface (I²C™ and $\overline{\text{RESET}}$) signals are routed to P12/J12.

A.3 Power Supply Connector Pin Header, P23/J23

P23/J23 provides connection to the common power bus for the TLV320AIC3253EVM. Power is supplied on the pins listed in Table 6.

Table 6. Power Supply Pin Out

SIGNAL	PIN NUMBER		SIGNAL
NC	P23.1/J23.1	P23.2/J23.2	NC
+5VA	P23.3/J23.3	P23.4/J23.4	NC
DGND	P23.5/J23.5	P23.6/J23.6	AGND
+1.8VD	P23.7/J23.7	P23.8/J23.8	NC
+3.3VD	P23.9/J23.9	P23.10/J23.10	NC

The TLV320AIC3253EVM-K motherboard (the USB-MODEVM Interface board) supplies power to P23/J23 of the TLV320AIC3253EVM. Power for the motherboard is supplied either through its USB connection or via terminal blocks on that board.

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Appendix B TLV320AIC3253EVM Schematic

The schematic diagram for the TLV320AIC3253EVM is provided as a reference.

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Revision History		
REV	ECN Number	Approved

Daughtercard_Interface
Daughtercard_Interface.SCH

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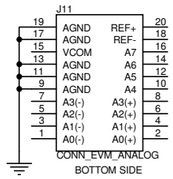
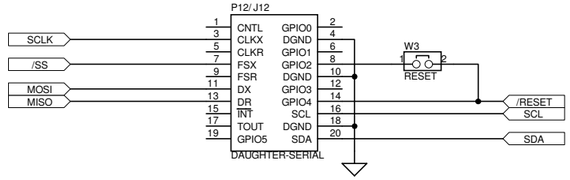
SEMICONDUCTOR GROUP

12500 T.I. Boulevard, Dallas, Texas 75243 USA

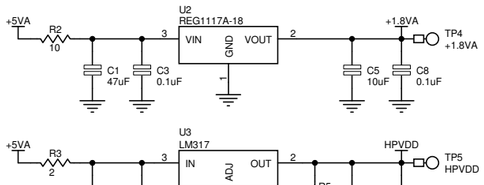
ENGINEER **Mike Tsecouras**	TITLE **TLV320AIC3253_RGE_EVM**		
DRAWN BY **Steve Leggio**			
DOCUMENT CONTROL NO. **N/A**	SIZE **A**	DATE **18-Mar-2009**	REV **01**
SHEET **1** OF **3**	FILE		

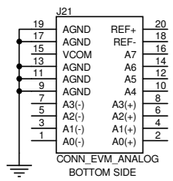
REVISION HISTORY		
REV	ENGINEERING CHANGE NUMBER	APPROVED

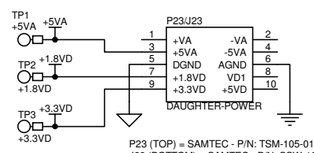




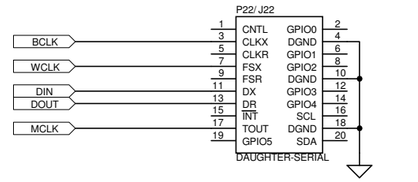
P12 (TOP) = SAMTEC - P/N: TSM-110-01-L-DV-P
J12 (BOTTOM) = SAMTEC - P/N: SSW-110-22-F-D-V



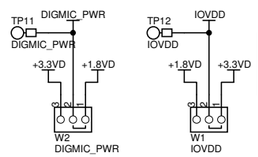




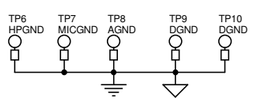
P23 (TOP) = SAMTEC - P/N: TSM-105-01-L-DV-P
J23 (BOTTOM) = SAMTEC - P/N: SSW-105-22-F-D-V



P22 (TOP) = SAMTEC - P/N: TSM-110-01-L-DV-P
J22 (BOTTOM) = SAMTEC - P/N: SSW-110-22-F-D-V



For any IOVDD (W1) jumper setting, ensure that IOVDD SELECT switches on the USB-MODEVM are set accordingly.



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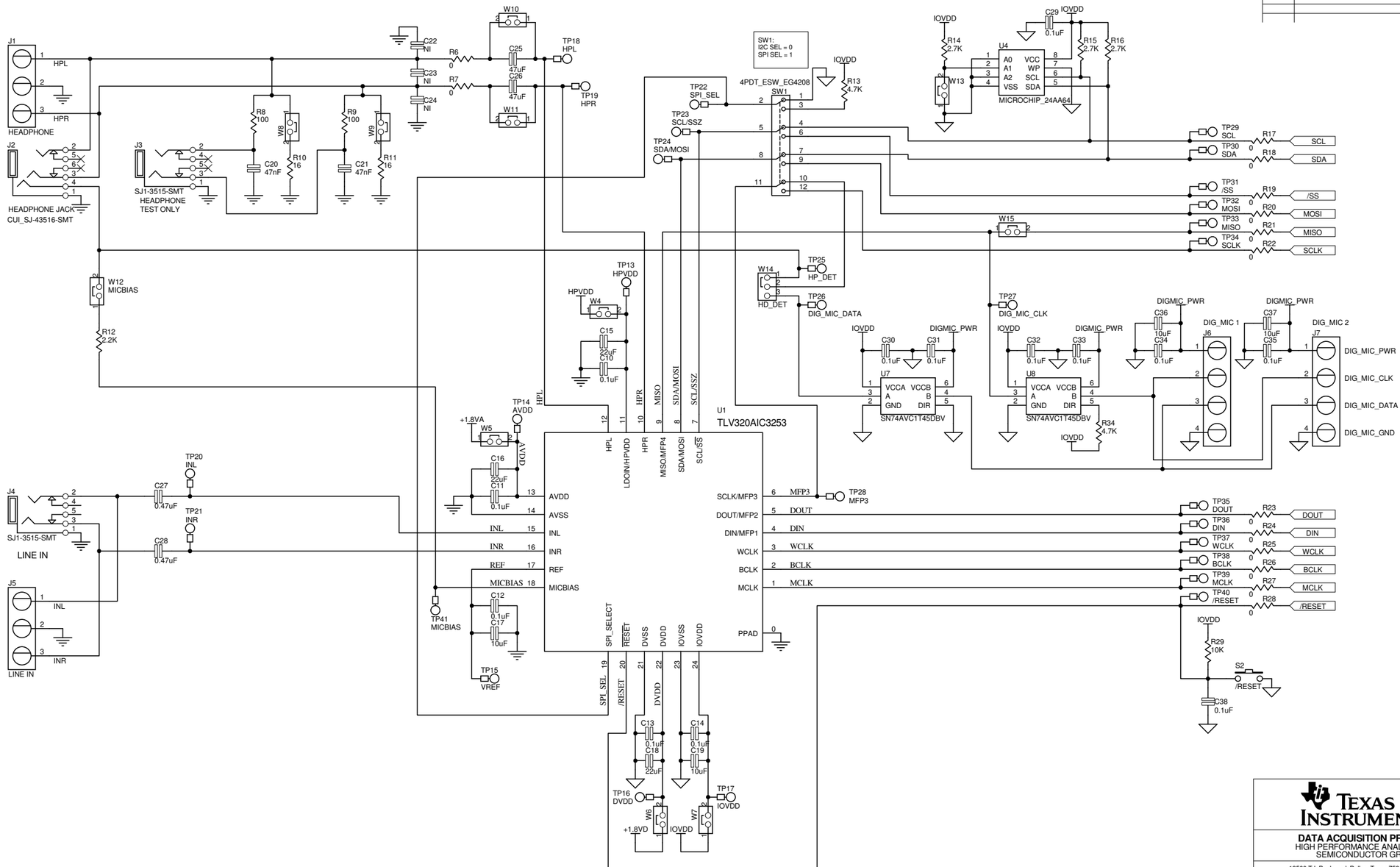
DRAWN BY **STEVE LEGGIO**			
DOCUMENT CONTROL NO.**N/A**	SIZE **B**	DATE **18-Mar-2009**	REV **01**
SHEET **2** OF **3**	FILE		

Revision History		
REV	ECN Number	Approved



ENGINEER **Mike Tsecouras**	TITLE **TLV320AIC3253_RGE_EVM**
DRAWN BY **Steve Leggio**	
DOCUMENT CONTROL NO **N/A**	SIZE **A** DATE **18-Mar-2009** REV **01**
SHEET **1** OF **3**	FILE

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Appendix C TLV320AIC3253EVM Layout Views

C.1 Layout Views

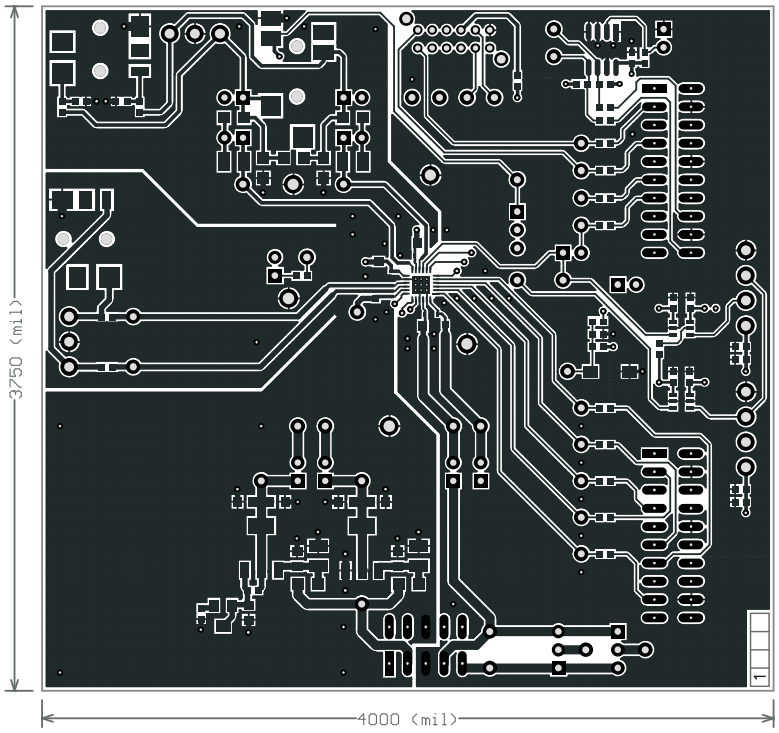

Figure 12. Top Layer

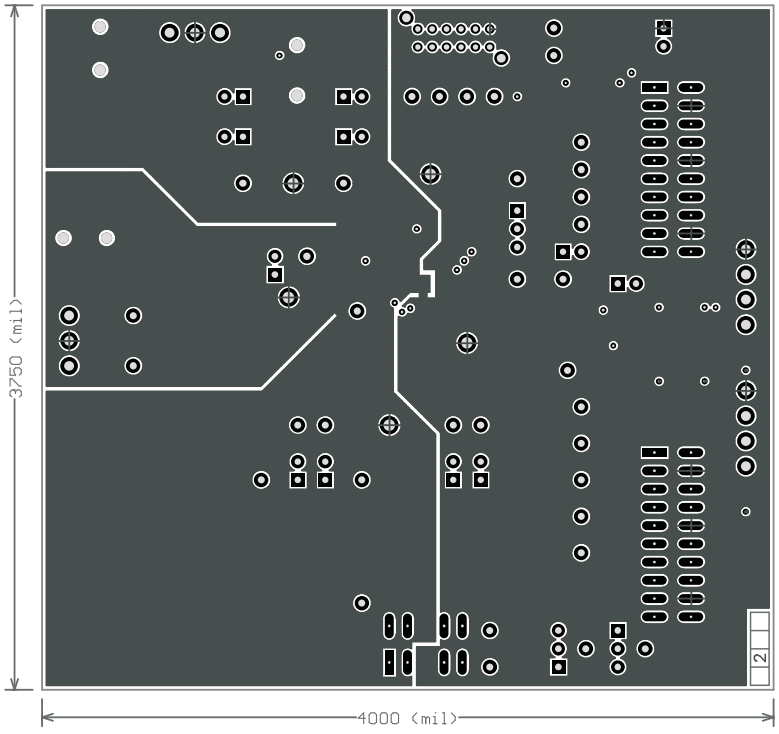

Figure 13. Mid-Layer 1

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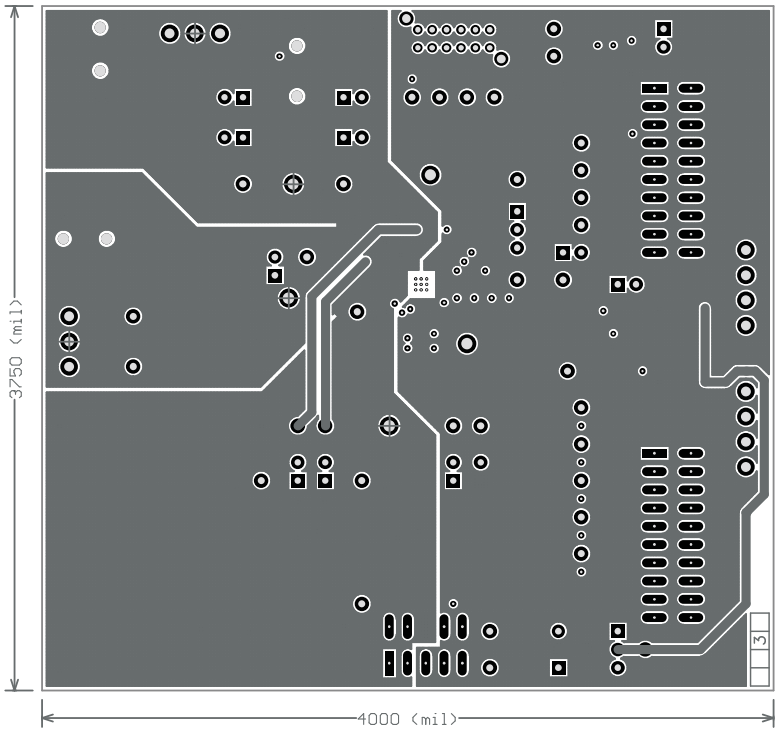

Figure 14. Mid-Layer 2

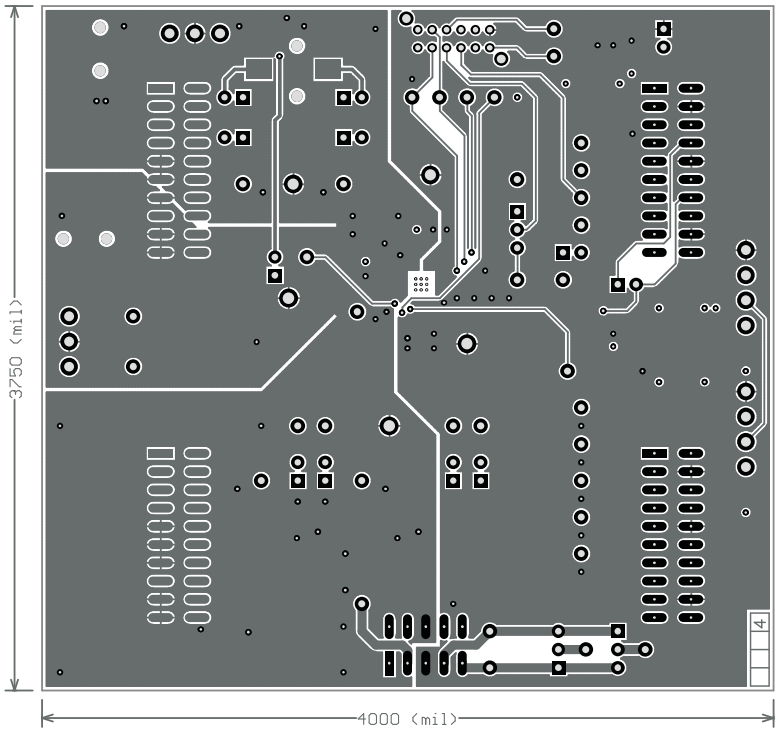

Figure 15. Bottom Layer

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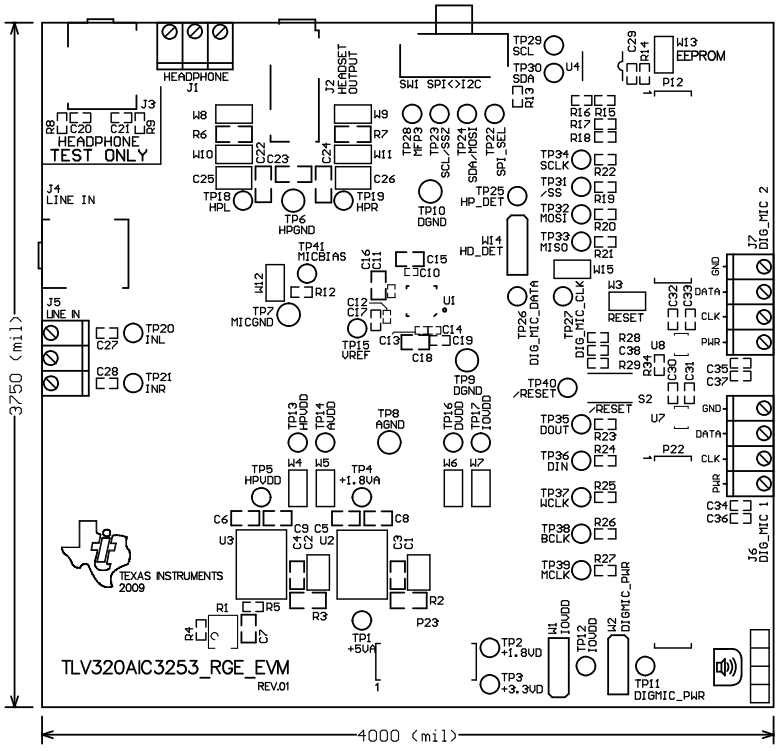

Figure 16. Top Overlay

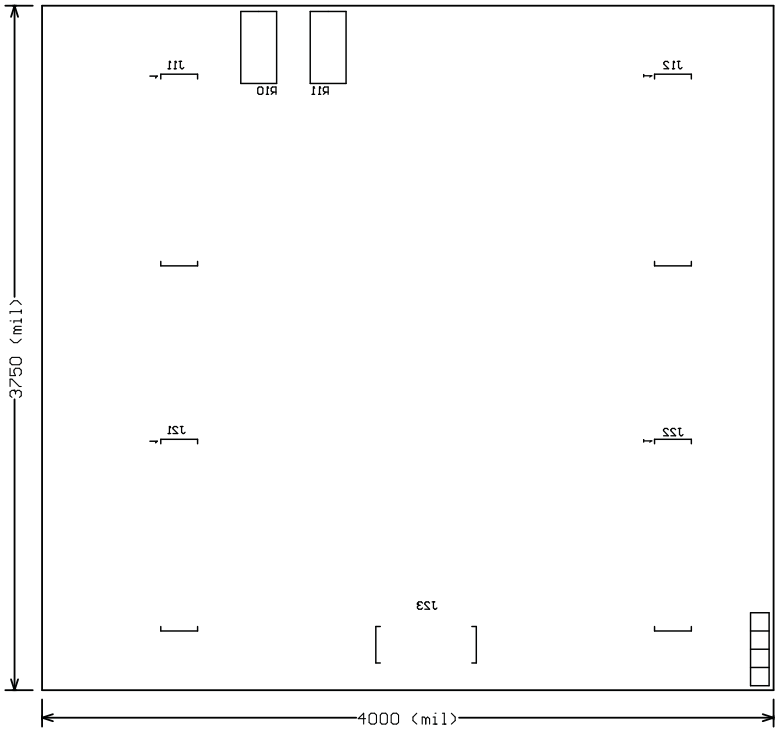

Figure 17. Bottom Overlay

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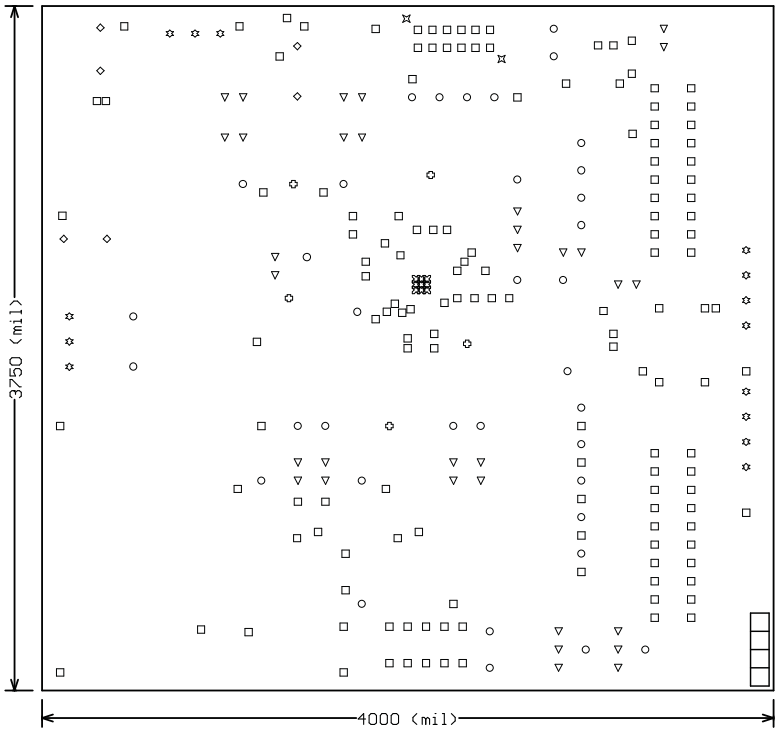

Figure 18. Drill Drawing

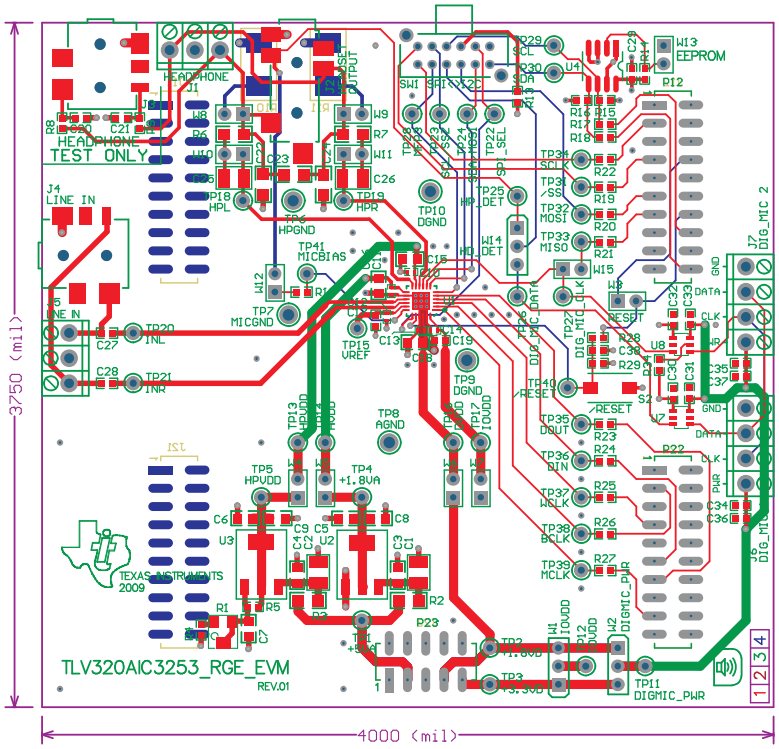

Figure 19. Composite

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Appendix D TLV320AIC3253EVM Bill of Materials

The complete bill of materials for the TLV320AIC3253EVM is provided as a reference.

Table 7. TLV320AIC3253EVM Bill of Materials

PCB					
Qty	**Value**	**Ref Des**	**Description**	**Vendor**	**Part number**
1		N/A	TLV320AIC3253_RGE_EVM_REV01 (PWB)	Texas Instruments	
RESISTORS					
Qty	**Value**	**Ref Des**	**Description**	**Vendor**	**Part number**
12	0	R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28	RES ZERO OHM 1/10W 5% 0603 SMD	Panasonic	ERJ-3GEY0R00V
2	0	R6, R7	RES ZERO OHM 1/4W 5% 1206 SMD	Panasonic	ERJ-8GEY0R00V
1	2	R3	RESISTOR 2.0 OHM 1/4W 5% 1206	Panasonic	ERJ-8GEYJ2R0V
1	10	R2	RES 10 OHM 1/4W 5% 1206 SMD	Panasonic	ERJ-8GEYJ100V
2	16	R10, R11	RES 16 OHM 1W 5% 2512 SMD	Panasonic	ERJ-1TYJ160U
1	47	R4	RES 47 OHM 1/10W 5% 0603 SMD	Panasonic	ERJ-3GEYJ470V
2	100	R8, R9	RES 100 OHM 1/10W 1% 0603 SMD	Panasonic	ERJ-3EKF1000V
1	240	R5	RES 240 OHM 1/10W 5% 0603 SMD	Panasonic	ERJ-3GEYJ241V
1	500	R1	TRIMPOT 500 OHM 4MM TOP ADJ SMD	Bourns Inc.	3214W-1-501E
1	2.2K	R12	RES 2.2K OHM 1/10W 5% 0603 SMD	Panasonic	ERJ-3GEYJ222V
3	2.7K	R14, R15, R16	RES 2.7K OHM 1/10W 5% 0603 SMD	Panasonic	ERJ-3GEYJ272V
3	4.7K	R13, R29, R34	RES 4.7K OHM 1/10W 5% 0603 SMD	Panasonic	ERJ-3GEYJ472V
CAPACITORS					
Qty	**Value**	**Ref Des**	**Description**	**Vendor**	**Part number**
2	47000pF	C20, C21	CAP CER 47000PF 50V X7R 10% 0603	TDK Corporation	C1608X7R1H473K
5	0.1uF	C10, C11, C12, C13, C14	CAP CER .10UF 6.3V X5R 10% 0402	TDK Corporation	C1005X5R0J104K
8	0.1uF	C29, C30, C31, C32, C33, C34, C35, C38	CAP CER .1UF 25V X7R 0603	TDK Corporation	C1608X7R1E104K
4	0.1uF	C3, C4, C8, C9	CAP .1UF 25V CERAMIC X7R 0805	Panasonic	ECJ-2VB1E104K
2	0.47uF	C27, C28	CAP CER .47UF 10V X5R 10% 0603	Panasonic	C1608X5R1A474K
4	10uF	C17, C19, C36, C37	CAP CERAMIC 10UF 6.3V X5R 0603	Panasonic	ECJ-1VB0J106M
3	10uF	C5, C6, C7	CAP CERAMIC 10UF 10V X5R 0805	Panasonic	ECJ-2FB1A106K
3	22uF	C15, C16, C18	CAP CER 22UF 6.3V X5R 20% 0805	TDK Corporation	C2012X5R0J226M
4	47uF	C1, C2, C25, C26	CAP CER 47UF 10V X5R 1210	Murata	GRM32ER61A476KE 20L
3	no value – not installed	C22, C23, C24	CAP 1206	N/A	N/A
INTEGRATED CIRCUITS					
Qty	**Value**	**Ref Des**	**Description**	**Vendor**	**Part number**
1		U1	Audio Codec	Texas Instruments	TLV320AIC3253IRGE
1		U2	Single Output LDO, 1.0A, Fixed(1.8V)	Texas Instruments	REG1117A-1.8 (SOT-223, DCY)
1		U3	3-Pin 1.5-A Adjustable Voltage Regulator	Texas Instruments	LM317DCY
1		U4	IC SERIAL EEPROM 64K 2.5V 8-SOIC	MicroChip	24LC64-I/SN
2		U7, U8	Single-Bit Dual-Supply Bus Transceiver	Texas Instruments	SN74AVC1T45DBVR

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Table 7. TLV320AIC3253EVM Bill of Materials (continued)

MISCELLANEOUS ITEMS					
Used	**Value**	**Ref Des**	**Description**	**Vendor**	**Part number**
1		S2	SWITCH LT TOUCH 6X3.5 240GF SMD	Panasonic	EVQ-5PN04K
1		SW1	SWITCH SLIDE 4PDT 30V RT ANGLE	E-Switch	EG4208
2		P12, P22	20 Pin SMT Plug Header	Samtec	TSM-110-01-L-DV-P
4		J11, J12, J21, J22	20 pin SMT Socket Header	Samtec	SSW-110-22-F-D-VS-K
1		P23	10 Pin SMT Plug Header	Samtec	TSM-105-01-L-DV-P
1		J23	10 pin SMT Socket Header	Samtec	SSW-105-22-F-D-VS-K
1		J2	JACK AUDIO MINI(3.5MM ,4-COND PCB-RA ROHS	CUI Inc.	SJ-43516-SMT
2		J3, J4	3.5mm Audio Jack, T-R-S, SMD	CUI Inc.	SJ1-3515-SMT
2		J1, J5	Screw Terminal Block, 3 Position	On Shore Technology	ED555/3DS
2		J6, J7	Screw Terminal Block, 4 Position	On Shore Technology	ED555/4DS
12	not installed	TP1, TP2, TP3, TP4, TP5, TP11, TP12, TP13, TP14, TP15, TP16, TP17	TEST POINT PC MINI .040"D RED	Keystone Electronics	5000
24	not installed	TP18, TP19, TP20, TP21, TP22, TP23, TP24, TP25, TP26, TP27, TP28, TP29, TP30, TP31, TP32, TP33, TP34, TP35, TP36, TP37, TP38, TP39, TP40, TP41	TEST POINT PC MINI .040"D WHITE	Keystone Electronics	5002
5		TP6, TP7, TP8, TP9, TP10	TEST POINT PC MULTI PURPOSE BLK	Keystone Electronics	5011
12		W3, W4, W5, W6, W7, W8, W9, W10, W11, W12, W13, W15	2 Pin Thru-hole Plug Header (Jumper), 0 .1" spacing	Samtec	TSW-102-07-L-S
3		W1, W2, W4	3 Position Jumper , 0 .1" spacing	Samtec	TSW-103-07-L-S
	Installed per test procedure.	Installed per test procedure.	Header Shorting Block	Samtec	SNT-100-BK-T

ATTENTION:

Alternate Resistor and Capacitor vendors may be used. In this case substitutions must have like descriptions.

All components should be RoHS compliant. Some part numbers may be either leaded or RoHS. Verify purchased components are RoHS compliant.

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Appendix E USB-MODEVM Schematic

The schematic diagram for USB-MODEVM Interface Board is provided as a reference.

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REVISION HISTORY		
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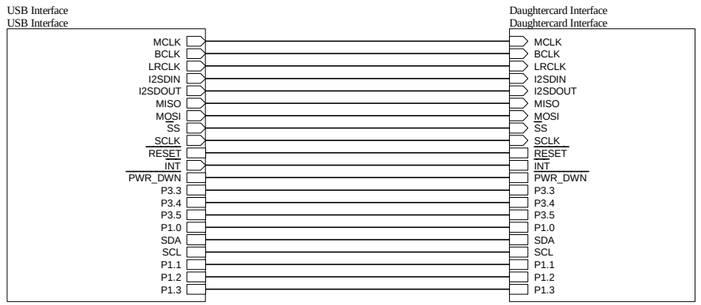

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HIGH-PERFORMANCE ANALOG DIVISION
SEMICONDUCTOR GROUP

6730 SOUTH TUCSON BLVD., TUCSON, AZ 85706 USA

ENGINEER **FRYE D. ZERKETTS**	TITLE **untitled**		
DRAWN BY **I. C. SPOTTS**			
DOCUMENT CONTROL NO.**1234567**	SIZE **B**	DATE **dd MMM yyyy**	REV **A**
SHEET **1** OF **1**	FILE **???**		

REVISION HISTORY		
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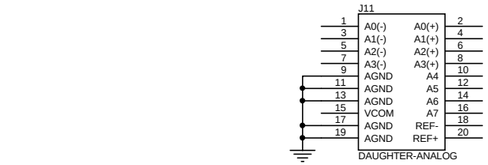
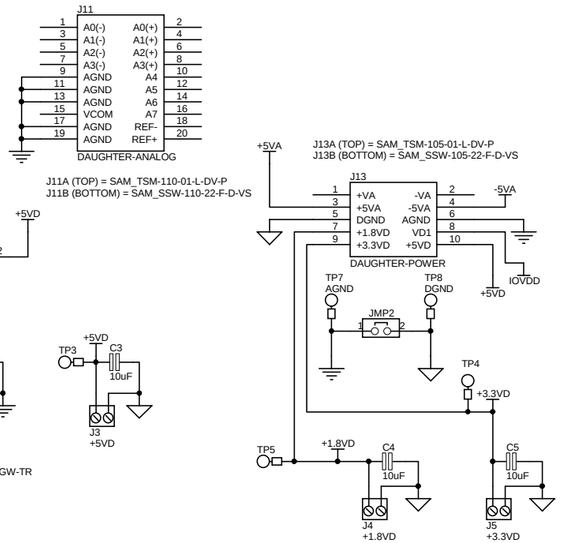
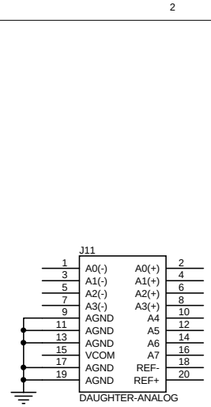
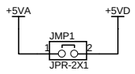






J11A (TOP) = SAM_TSM-110-01-L-DV-P
J11B (BOTTOM) = SAM_SSW-110-22-F-D-VS



J13A (TOP) = SAM_TSM-105-01-L-DV-P
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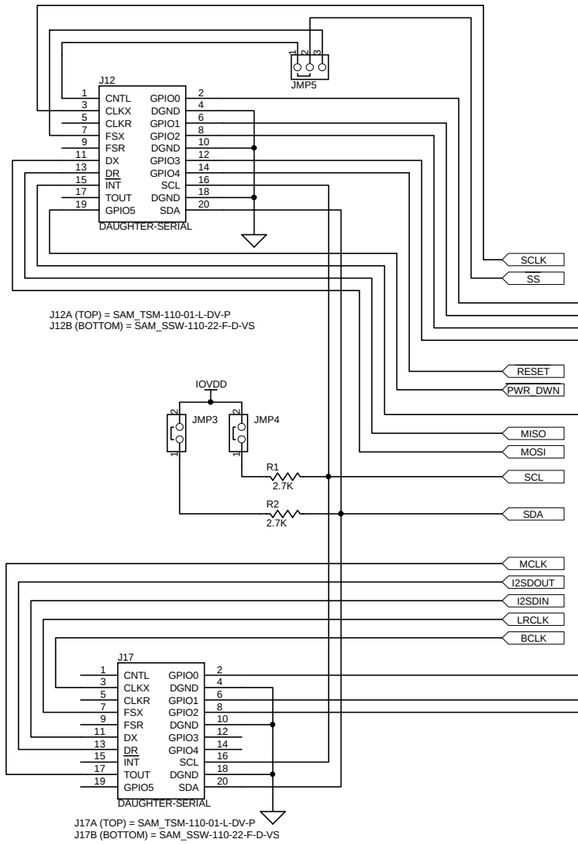

J12A (TOP) = SAM_TSM-110-01-L-DV-P
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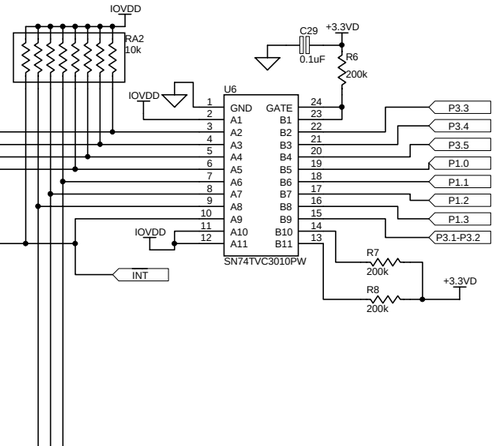
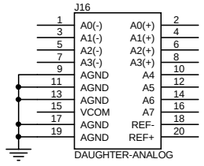
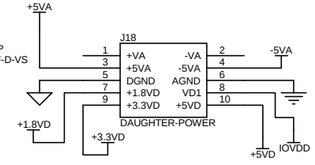




J16A (TOP) = SAM_TSM-110-01-L-DV-P
J16B (BOTTOM) = SAM_SSW-110-22-F-D-VS



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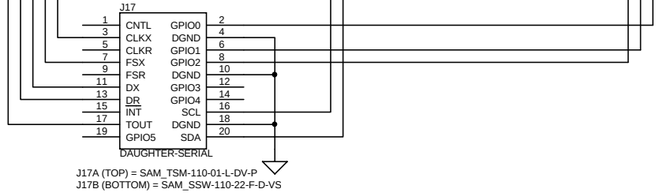

J17A (TOP) = SAM_TSM-110-01-L-DV-P
J17B (BOTTOM) = SAM_SSW-110-22-F-D-VS

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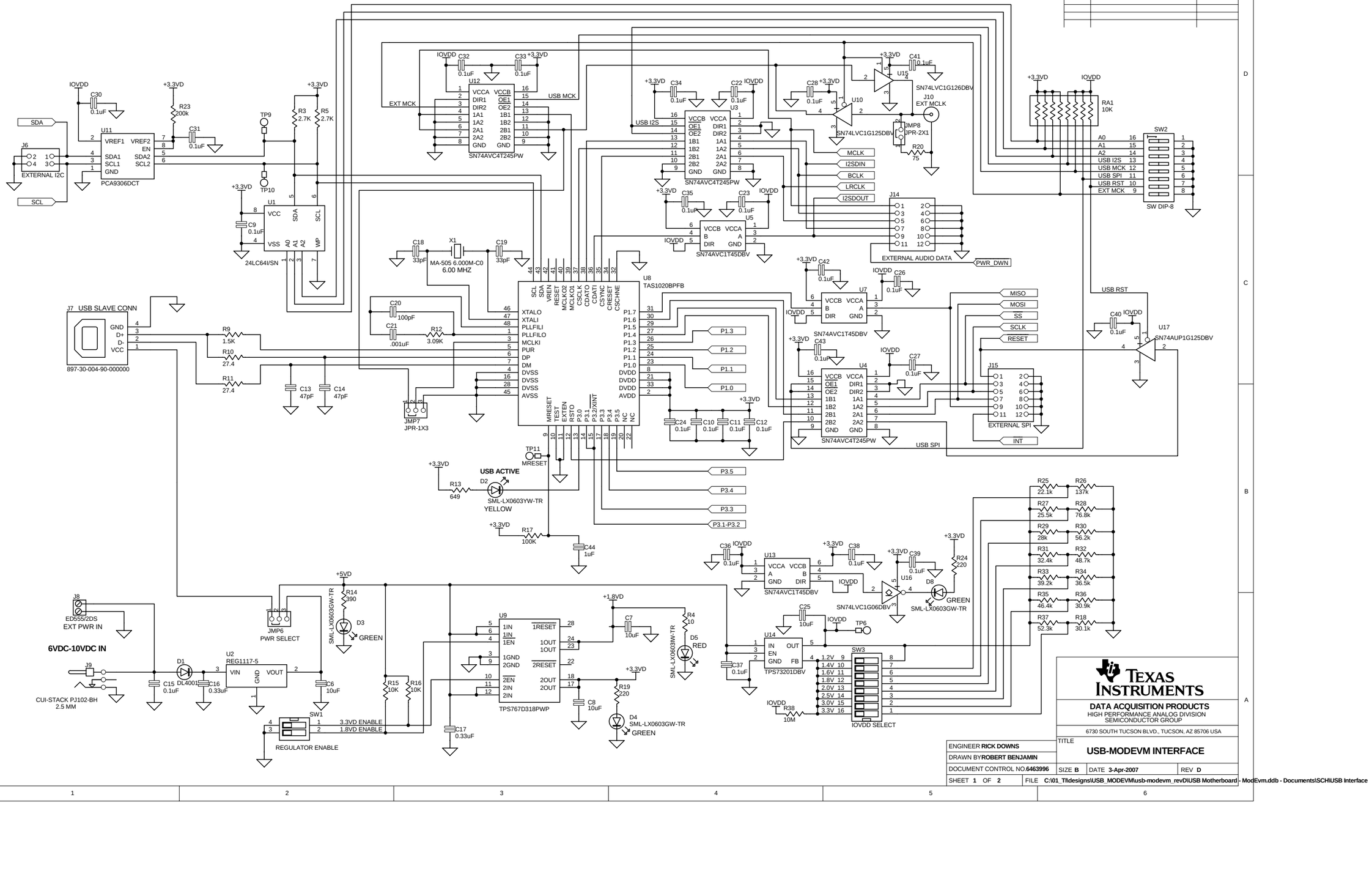
ENGINEER **RICK DOWNS**	TITLE **USB-MODEVM INTERFACE**		
DRAWN BY **ROBERT BENJAMIN**			
DOCUMENT CONTROL NO. **6463996**	SIZE **B**	DATE **3-Apr-2007**	REV **D**
SHEET **2** OF **2**	FILE **C:\01_TI\designs\USB_MODEVM\usb-modevm_revD\USB Motherboard - ModEvm.ddb - Documents\SCH\Daughtercard Interface**		

REVISION HISTORY		
REV	ENGINEERING CHANGE NUMBER	APPROVED



Appendix F USB-MODEVM Bill of Materials

The complete bill of materials for USB-MODEVM Interface Board is provided as a reference.

Table 8. USB-MODEVM Bill of Materials

Designators	Description	Manufacturer	Mfg. Part Number
R4	10Ω 1/10W 5% Chip Resistor	Panasonic	ERJ-3GEYJ1300V
R10, R11	27.4Ω 1/16W 1% Chip Resistor	Panasonic	ERJ-3EKF27R4V
R20	75Ω 1/4W 1% Chip Resistor	Panasonic	ERJ-14NF75R0U
R19	220Ω 1/10W 5% Chip Resistor	Panasonic	ERJ-3GEYJ221V
R14, R21, R22	390Ω 1/10W 5% Chip Resistor	Panasonic	ERJ-3GEYJ391V
R13	649Ω 1/16W 1% Chip Resistor	Panasonic	ERJ-3EKF6490V
R9	1.5KΩ 1/10W 5% Chip Resistor	Panasonic	ERJ-3GEYJ1352V
R1–R3, R5–R8	2.7KΩ 1/10W 5% Chip Resistor	Panasonic	ERJ-3GEYJ272V
R12	3.09KΩ 1/16W 1% Chip Resistor	Panasonic	ERJ-3EKF3091V
R15, R16	10KΩ 1/10W 5% Chip Resistor	Panasonic	ERJ-3GEYJ1303V
R17, R18	100kΩ 1/10W 5%Chip Resistor	Panasonic	ERJ-3GEYJ1304V
RA1	10KΩ 1/8W Octal Isolated Resistor Array	CTS Corporation	742C163103JTR
C18, C19	33pF 50V Ceramic Chip Capacitor, ±5%, NPO	TDK	C1608C0G1H330J
C13, C14	47pF 50V Ceramic Chip Capacitor, ±5%, NPO	TDK	C1608C0G1H470J
C20	100pF 50V Ceramic Chip Capacitor, ±5%, NPO	TDK	C1608C0G1H101J
C21	1000pF 50V Ceramic Chip Capacitor, ±5%, NPO	TDK	C1608C0G1H102J
C15	0.1µF 16V Ceramic Chip Capacitor, ±10%, X7R	TDK	C1608X7R1C104K
C16, C17	0.33µF 16V Ceramic Chip Capacitor, ±20%, Y5V	TDK	C1608X5R1C334K
C9–C12, C22–C28	1µF 6.3V Ceramic Chip Capacitor, ±10%, X5R	TDK	C1608X5R0J1305K
C1–C8	10µF 6.3V Ceramic Chip Capacitor, ±10%, X5R	TDK	C3216X5R0J1306K
D1	50V, 1A, Diode MELF SMD	Micro Commercial Components	DL4001
D2	Yellow Light Emitting Diode	Lumex	SML-LX0603YW-TR
D3– D7	Green Light Emitting Diode	Lumex	SML-LX0603GW-TR
D5	Red Light Emitting Diode	Lumex	SML-LX0603IW-TR
Q1, Q2	N-Channel MOSFET	Zetex	ZXMN6A07F
X1	6MHz Crystal SMD	Epson	MA-505 6.000M-C0
U8	USB Streaming Controller	Texas Instruments	TAS1020BPFB
U2	5V LDO Regulator	Texas Instruments	REG1117-5
U9	3.3V/1.8V Dual Output LDO Regulator	Texas Instruments	TPS767D318PWP
U3, U4	Quad, 3-State Buffers	Texas Instruments	SN74LVC125APW
U5–U7	Single IC Buffer Driver with Open Drain o/p	Texas Instruments	SN74LVC1G07DBVR
U10	Single 3-State Buffer	Texas Instruments	SN74LVC1G125DBVR
U1	64K 2-Wire Serial EEPROM I^2C	Microchip	24LC64I/SN
	USB-MODEVM PCB	Texas Instruments	6463995
TP1–TP6, TP9–TP11	Miniature test point terminal	Keystone Electronics	5000
TP7, TP8	Multipurpose test point terminal	Keystone Electronics	5011
J7	USB Type B Slave Connector Thru-Hole	Mill-Max	897-30-004-90-000000
J13, J2–J5, J8	2-position terminal block	On Shore Technology	ED555/2DS
J9	2.5mm power connector	CUI Stack	PJ-102B
J130	BNC connector, female, PC mount	AMP/Tyco	414305-1
J131A, J132A, J21A, J22A	20-pin SMT plug	Samtec	TSM-110-01-L-DV-P
J131B, J132B, J21B, J22B	20-pin SMT socket	Samtec	SSW-110-22-F-D-VS-K
J133A, J23A	10-pin SMT plug	Samtec	TSM-105-01-L-DV-P
J133B, J23B	10-pin SMT socket	Samtec	SSW-105-22-F-D-VS-K
J6	4-pin double row header (2x2) 0.1"	Samtec	TSW-102-07-L-D
J134, J135	12-pin double row header (2x6) 0.1"	Samtec	TSW-106-07-L-D
JMP1–JMP4	2-position jumper, 0.1" spacing	Samtec	TSW-102-07-L-S

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Table 8. USB-MODEVM Bill of Materials (continued)

Designators	Description	Manufacturer	Mfg. Part Number
JMP8–JMP14	2-position jumper, 0.1" spacing	Samtec	TSW-102-07-L-S
JMP5, JMP6	3-position jumper, 0.1" spacing	Samtec	TSW-103-07-L-S
JMP7	3-position dual row jumper, 0.1" spacing	Samtec	TSW-103-07-L-D
SW1	SMT, half-pitch 2-position switch	C&K Division, ITT	TDA02H0SK1
SW2	SMT, half-pitch 8-position switch	C&K Division, ITT	TDA08H0SK1
	Jumper plug	Samtec	SNT-100-BK-T

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Appendix G Writing Scripts

G.1 Writing Scripts

A script is simply a text file that contains data to send to the serial control buses.

Each line in a script file is one command. No provision is made for extending lines beyond one line, except for the **>** command. A line is terminated by a carriage return.

The first character of a line is the command. Commands are:

i Set interface bus to use
r Read from the serial control bus
w Write to the serial control bus
> Extend repeated write commands to lines below a **w**
Comment
b Break
d Delay

f Wait for Flag

The first command, **I**, sets the interface to use for the commands to follow. This command must be followed by one of the following parameters:

i2cstd	Standard mode I^2C bus
i2cfast	Fast mode I^2C bus
spi8	SPI bus with 8-bit register addressing
spi16	SPI bus with 16-bit register addressing

For example, if a fast mode I^2C bus is to be used, the script begins with:

I i2cfast

A double quoted string of characters following the **b** command can be added to provide information to the user about each breakpoint. When the script is executed, the software's command handler halts as soon as a breakpoint is detected and displays the string of characters within the double quotes.

The Wait for Flag command, **f,** reads a specified register and verifies if the bitmap provided with the command matches the data being read. If the data does not match, the command handler retries for up to 200 times. This feature is useful when switching buffers in parts that support the adaptive filtering mode. The command f syntax follows:

```
f [i2c address] [register] [D7][D6][D5][D4][D3][D2][D1][D0]
where 'i2c address' and 'register' are in hexadecimal format
and 'D7' through 'D0' are in binary format with values of 0,
1 or X for don't care.
```

Anything following a comment command **#** is ignored by the parser, provided that it is on the same line.

The delay command **d** allows the user to specify a time, in milliseconds, that the script pauses before proceeding. **The delay time is entered in decimal format.**

A series of byte values follows either a read or write command. Each byte value is expressed in hexadecimal, and each byte must be separated by a space. Commands are interpreted and sent to the TAS1020B by the program.

The first byte following an **r** (read) or **w** (write) command is the I^2C slave address of the device (if I^2C is used) or the first data byte to write (if SPI is usednote that SPI interfaces are not standardized on protocols, so the meaning of this byte varies with the device being addressed on the SPI bus). The second byte is the starting register address that data will be written to (again, with I^2C; SPI varies. Following these two bytes are data, if writing; if reading, the third byte value is the number of bytes to read, (expressed in hexadecimal).

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For example, to write the values 0xAA 0x55 to an I^2C device with a slave address of 0x30, starting at a register address of 0x03, the user writes:

```
#example script
I i2cfast
w 30 03 AA 55
r 30 03 02
```

This script begins with a comment, specifies that a fast I^2C bus will be used, then writes *0xAA 0x55* to the I^2C slave device at address 0x30, writing the values into registers 0x03 and 0x04. The script then reads back two bytes from the same device starting at register address 0x03. Note that the slave device value does not change. It is unnecessary to set the R/$\overline{W}$ bit for I^2C devices in the script; the read or write commands does that.

If extensive repeated write commands are sent and commenting is desired for a group of bytes, the **>** command can be used to extend the bytes to other lines that follow. A usage example for the **>** command follows:

```
#example script for '>' command
I i2cfast
# Write AA and BB to registers 3 and 4, respectively
w 30 03 AA BB
# Write CC, DD, EE and FF to registers 5, 6, 7 and 8, respectively
> CC DD EE FF
# Place a commented breakpoint
b "AA BB CC DD EE FF was written, starting at register 3"
# Read back all six registers, starting at register 3
r 30 03 06
```

The following example demonstrates usage of the Wait for Flag command, **f**:

```
I i2cfast
# Switch to Page 44
w 30 00 2C
# Switch buffers
w 30 01 05
# Wait for bit D0 to clear. 'x' denotes a don't care.
f 30 01 xxxxxxx0
```

Any text editor can be used to write these scripts; Jedit is an editor that is highly recommended for general usage. For more information, go to: http://www.jedit.org.

Once the script is written, it can be used in the command window by running the program, and then selecting *Open Script File...* from the File menu. Locate the script and open it. The script is then displayed in the command buffer. The user can also edit the script once it is in the buffer and save it by selecting *Save Script File...* from the File menu.

Once the script is in the command buffer, it can be executed by pressing the *Execute Command Buffer* button. If there are breakpoints in the script, the script executes to that point, and the user is presented with a dialog box with a button to press to continue executing the script. When ready to proceed, push that button and the script continues.

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EVM Warnings and Restrictions

It is important to operate this EVM within the input voltage range of 6 V to 10 V and the output voltage range of 6 V to 10 V .

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

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During normal operation, some circuit components may have case temperatures greater than 85° C. The EVM is designed to operate properly with certain components above 85° C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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