ADSPSC835W-EV-SOM ® Manual

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DEVICES**

Copyright Information

Regulatory Compliance

The *ADSPSC835W-EV-SOM* evaluation board is designed to be used solely in a laboratory environment. The board is not intended for use as a consumer-end product or as a portion of a consumer-end product. The board is an open system design, which does not include a shielded enclosure and, therefore, may cause interference to other electrical devices in close proximity. This board should not be used in or near any medical equipment or RF devices.

The *ADSPSC835W-EV-SOM* evaluation board contains ESD (electrostatic discharge) sensitive devices. Electrostatic charges readily accumulate on the human body and equipment and can discharge without detection. Permanent damage may occur on devices subjected to high-energy discharges. Proper ESD precautions are recommended to avoid performance degradation or loss of functionality. Store unused boards in the protective shipping package.

Contents

1 Preface

Thank you for purchasing the Analog Devices, Inc. System-on-Module (SoM) *ADSPSC835W-EV-SOM* evaluation board.

The *ADSPSC835W-EV-SOM* primarily hosts the ADSP-SC835W audio processor, 8 Gbit of ISSI DDR3 memory, a 512 Mbit Quad SPI FLASH, voltage regulation, a FTDI UART to USB interface, and a high speed external connector array that contains all of the peripheral I/O signals. Through the high speed external connector array, the *ADSPSC835W-EV-SOM* is intended for use with a growing family of SoM carrier products that contain a variety of peripherals to support different applications. The SoM carrier base products that exist today are the *EV-SOMCRR-EZKIT* and *EV-SOMCRR-EZLITE*.

The CrossCore Embedded Studio® (CCES) software development tool chain is required for a full evaluation of this hardware platform. The *ADSPSC835W-EV-SOM* can also be used in a limited standalone mode while not plugged into a SoM Carrier such as the *EV-SOMCRR-EZKIT* or *EV-SOMCRR-EZLITE*. The standalone mode is useful for evaluating the CCES Software Development Tools and benchmarking software algorithms that do not require peripheral I/O.

The evaluation board is designed to be used in conjunction with the CrossCore Embedded Studio®3.0.0+ development environment for advanced application code development and debug, with features that enable the ability to:

- Create, compile, assemble, and link application programs written in C++, C, and assembly
- Load, run, step, halt, and set breakpoints in application programs
- Read and write data and program memory
- Read and write core and peripheral registers

Purpose of This Manual

This manual provides instructions for installing the product hardware (board). This manual describes the operation and configuration of board components and provides guidelines for running code on the board.

Manual Contents

The manual consists of:

- *Using the board*

  Provides basic board information.

- *Hardware Reference*

  Provides information about the hardware aspects of the board.

- *Bill of Materials*

  A companion file in PDF format that lists all of the components used on the board is available on the website at http://www.analog.com/ADSPSC839W-EV-SOM.

- *Schematic*

  A companion file in PDF format documenting all of the circuits used on the board is available on the website at http://www.analog.com/ADSPSC839W-EV-SOM.

Technical Support

You can reach Analog Devices technical support in one of the following ways:

- Post your questions in the processors and DSP support community at EngineerZone®:

  http://ez.analog.com/community/dsp

- Submit your questions to technical support directly at:

  http://www.analog.com/support

- E-mail your questions about processors, DSPs, and tools development software from *CrossCore Embedded Studio* or *VisualDSP++*®:

  If using CrossCore Embedded Studio or VisualDSP++ choose *Help > Email Support*. This creates an e-mail to processor.tools.support@analog.com and automatically attaches your CrossCore Embedded Studio or VisualDSP++ version information and `license.dat` file.

- E-mail your questions about processors and processor applications to:

  processor.support@analog.com

- Contact your Analog Devices sales office or authorized distributor. Locate one at:

  http://www.analog.com/adi-sales

Supported Integrated Circuit

This evaluation system supports the Analog Devices ADSP-SC835W IC.

Supported Tools

Information about code development tools for the *ADSPSC835W-EV-SOM* evaluation board and ADSP-SC83x product family is available at:

http://www.analog.com/ADSPSC839W-EV-SOM

Product Information

Product information can be obtained from the Analog Devices website and the online help system.

Information about the ADSP-SC835W product family is available at:

Analog Devices Website

The Analog Devices website, http://www.analog.com, provides information about a broad range of products - analog integrated circuits, amplifiers, converters, transceivers, and digital signal processors.

To access a complete technical library for each processor family, go to http://www.analog.com/processors/technical_library. The manuals selection opens a list of current manuals related to the product as well as a link to the previous revisions of the manuals. When locating your manual title, note a possible errata check mark next to the title that leads to the current correction report against the manual.

Also note, MyAnalog.com is a free feature of the Analog Devices website that allows customization of a web page to display only the latest information about products you are interested in. You can choose to receive weekly e-mail notifications containing updates to the web pages that meet your interests, including documentation errata against all manuals. MyAnalog.com provides access to books, application notes, data sheets, code examples, and more.

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EngineerZone

EngineerZone is a technical support forum from Analog Devices, Inc. It allows you direct access to ADI technical support engineers. You can search FAQs and technical information to get quick answers to your embedded processing and DSP design questions.

Use EngineerZone to connect with other DSP developers who face similar design challenges. You can also use this open forum to share knowledge and collaborate with the ADI support team and your peers. Visit http://ez.analog.com to sign up.

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2   Using the Board

This chapter provides information on the major components and peripherals on the board, along with instructions for installing and setting up the emulation software.

Product Overview

Below is an image of the *ADSPSC835W-EV-SOM* board.
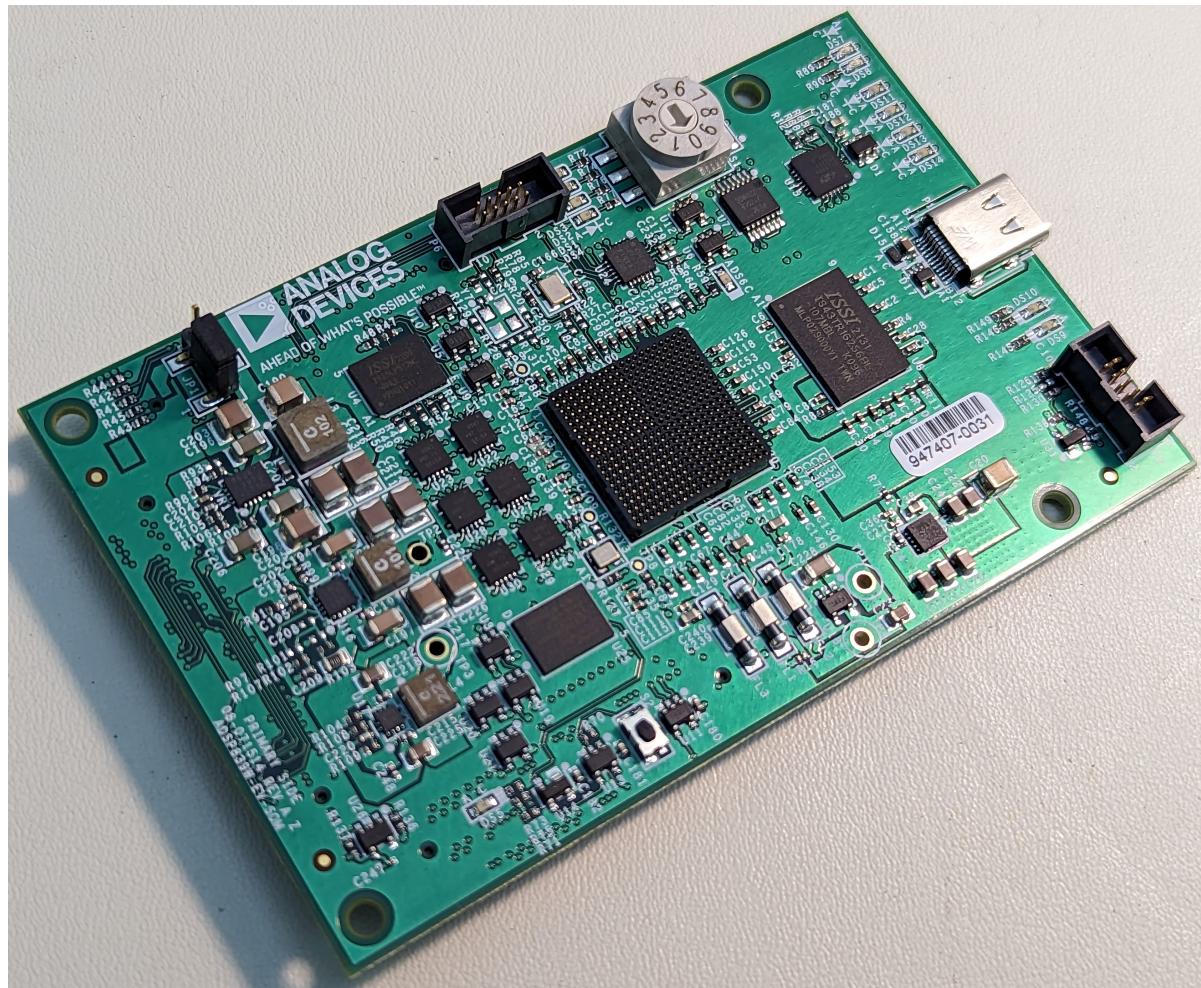
Figure 2-1: Board View

The board features:

- Analog Devices ADSP-SC835W processor

  - SHARC-FX Core

  - 400 ball BGA

  - 25 MHz oscillator

- DDR3 Memory

  - 256Mx16 bit (4Gbit)

  - ISSI IS43TR16256BL-107MBL

  - 1.39V

- SPI Flash Quad (`SPI2`) Memory

  - 512Mbit

  - ISSI IS25LP512M - 512M-bit Serial Flash Memory with Dual and Quad SPI

  - Single/Dual/Quad SPI

- HyperFlash Memory

  - 512Mbit FLASH/64Mbit RAM

  - Cypress S71KL512SC0BHB003

  - xSPI HyperBus Device

- Debug Interface (JTAG)

  - JTAG 10-pin 0.05" header

- LEDs

  - Eight LEDs: one power (green), one board reset (red), three general-purpose (amber), one fault (red) and two UART leds (amber)

- Pushbuttons

  - One pushbutton, RESET

- SoM Interface Connector

  - DAI

  - SPORT

- SPI

- UART

- TWI

- Link Port

- GPIO

- MLB

- `RESET`

- `GND`/3.3V/5V/12V output

Package Contents

Your *ADSPSC835W-EV-SOM* package contains the following items.

- *ADSPSC835W-EV-SOM* board

Contact the vendor where you purchased your *ADSPSC835W-EV-SOM* evaluation board or contact Analog Devices, Inc. if any item is missing.

Default Configuration

The ***Default Hardware Setup*** figure shows the default settings for jumpers and switches and the location of the jumpers, switches, connectors, and LEDs. Confirm that your board is in the default configuration before using the board.

Default Config
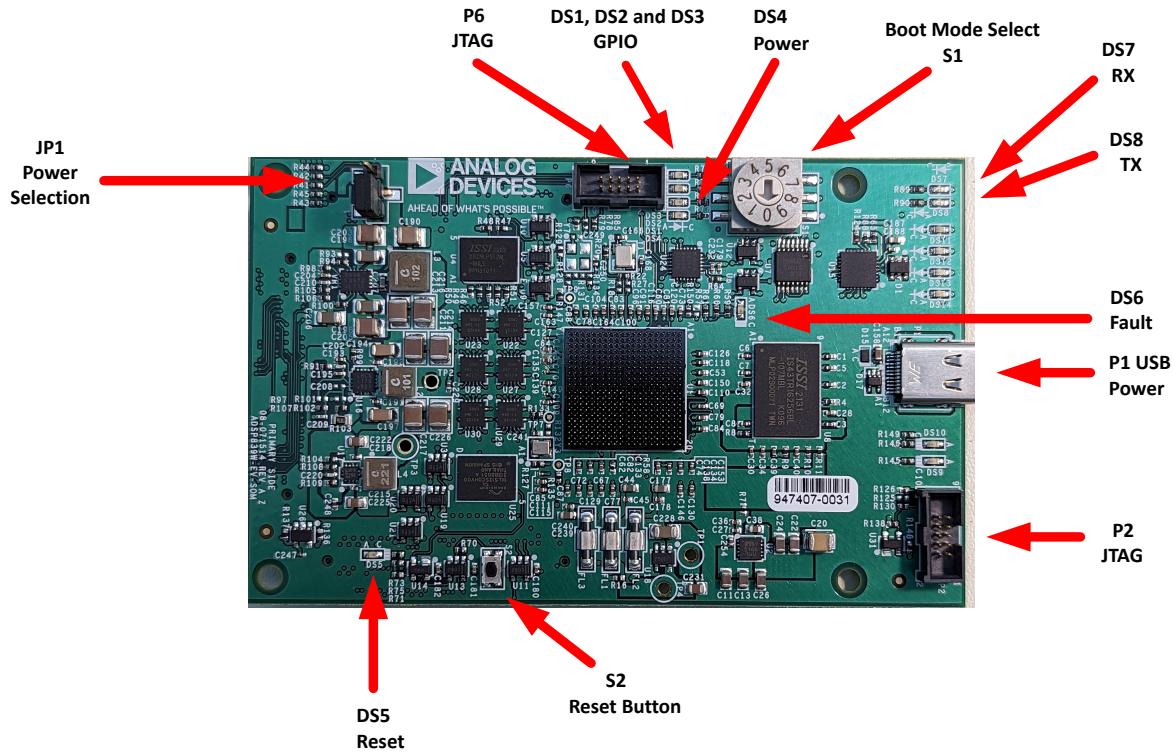
Figure 2-2: Default Hardware Setup

CrossCore Embedded Studio (CCES) Setup

Information on using the CCES tools is available at: https://analog.com/cces-quickstart

Debug Interface

The *ADSPSC835W-EV-SOM* provides a JTAG connection via P6. This is for attaching an emulator, such as the ICE-1000 or ICE-2000 for debugging.

When the *ADSPSC835W-EV-SOM* is connected to a carrier board the Debug Agent on the carrier board can be used. To use this Debug Agent, all postions on SW1 (on the carrier board) must be in the ON position. If an emulator, such as the ICE-1000 or ICE-2000, is used instead all postions on SW1 must be in the OFF position.

A second JTAG connector P2 is used with a JLNIK emulator to connect to the R5 Safety Core on the *ADSPSC835W-EV-SOM* board.

Board Power

The *ADSPSC835W-EV-SOM* is powered via USB Type C when the board is in standalone mode. When in this mode the jumper on JP1 should be on Pins 1-2 to select power input from USB Type C. When the

ADSPSC835W-EV-SOM is connected to a carrier board the power is supplied via the carrier board. When in this mode the jumper on `JP1` should be on Pins 2-3 to select power input from the carrier board.

Power-On-Self Test

The Power-On-Self-Test Program (POST) tests all the EZ-KIT carrier board peripherals and validates functionality as well as connectivity to the processor. Once assembled, each EZ-KIT carrier board is fully tested for an extended period of time with POST for all the compatible SoM modules. All EZ-KIT carrier boards are shipped with POST preloaded into flash memory. The POST is executed by resetting the board and connecting the USB To UART to your PC with an open terminal window. The POST also can be used as a reference for a custom software design or hardware troubleshooting.

Note that the source code for the POST program is included in the Board Support Package (BSP) along with the readme file that describes how the board is configured to run POST.

Example Programs

Example programs are provided with the *ADSPSC835W-EV-SOM* Board Support Package (BSP) to demonstrate various capabilities of the product. The programs can be found in the `ADSPSC835W-EV-SOM\examples` installation folder. Refer to the readme file provided with each example for more information.

Reference Design Information

A reference design info package is available for download on the Analog Devices Web site. The package provides information on the schematic design, layout, fabrication, and assembly of the board.

The information can be found at:

http://www.analog.com/ADSPSC839W-EV-SOM

IS25LP512M - 512M-bit Serial Flash Memory with Dual and Quad SPI

The IS25LP512M Serial Flash memory offers a versatile storage solution with high flexibility and performance in a simplified pin count package. ISSI's "Industry Standard Serial Interface" Flash is for systems that require limited space, a low pin count, and low power consumption. The device is accessed through a 4-wire SPI Interface consisting of a Serial Data Input (SI), Serial Data Output (SO), Serial Clock (SCK), and Chip Enable (CE#) pins, which can also be configured to serve as multi-I/O (see pin descriptions).

The device supports Dual and Quad I/O, as well as standard, Dual Output, and Quad Output SPI. Clock frequencies of up to 133MHz allow for equivalent clock rates of up to 532MHz (133MHz x 4) which equates to 66.5Mbytes of data throughput. The IS25xE series of Flash adds support for DTR (Double Transfer Rate) commands that transfer addresses and read data on both edges of the clock. These transfer rates can outperform 16-bit Parallel Flash memories, allowing for efficient memory access to support XIP (eXecute In Place) operation.

The memory array is organized into programmable pages of 256/512 bytes. This family supports page program mode where 1 to 256/512 bytes of data are programmed in a single command.

QPI (Quad Peripheral Interface) supports 2-cycle instructions, further reducing instruction times. Pages can be erased in groups of 4Kbyte sectors, 32Kbyte blocks, 64K/256Kbyte blocks, and/or the entire chip. The uniform sector and block architecture allows for a high degree of flexibility so that the device can be utilized for a broad variety of applications requiring solid data retention.

IS43TR16256BL - 256Mx16 4Gb DDR3 SDRAM

- Low Voltage (L): VDD and VDDQ = 1.35V + 0.1V, -0.067V - Backward compatible to 1.5V

- High speed data transfer rates with system frequency up to 933 MHz

- 8 internal banks for concurrent operation

- 8n-Bit pre-fetch architecture

- Programmable CAS Latency

- Programmable Additive Latency: 0, CL-1,CL-2

- Programmable CAS WRITE latency (CWL) based on tCK

- Programmable Burst Length: 4 and 8

- Programmable Burst Sequence: Sequential or Interleave

- BL switch on the fly

- Auto Self Refresh(ASR)

- Self Refresh Temperature(SRT)

- Refresh Interval: 7.8 μs (8192 cycles/64 ms) Tc= -40°C to 85°C 3.9 μs (8192 cycles/32 ms) Tc= 85°C to 95°C 1.95 μs (8192 cycles/16 ms) Tc= 95°C to 105°C 0.97 μs (8192 cycles/8 ms) Tc= 105°C to 115°C

- Partial Array Self Refresh

- Asynchronous RESET pin

- TDQS (Termination Data Strobe) supported (x8 only)

- OCD (Off-Chip Driver Impedance Adjustment)

- Dynamic ODT (On-Die Termination)

- Driver strength : RZQ/7, RZQ/6 (RZQ = 240 Ω)

- Write Leveling

- Up to 200 MHz in DLL off mode

LT8636 - 42V, 5A/7A Peak Synchronous Step-Down Silent Switcher with 2.5µA Quiescent Current

The LT8636 synchronous step-down regulator features Silent Switcher architecture designed to minimize EMI emissions while delivering high efficiency at high switching frequencies. Peak current mode control with a 30ns minimum on-time allows high step-down ratios even at high switching frequencies.

The LT8636's ultralow 2.5µA quiescent current—with the output in full regulation—enables applications requiring highest efficiency at very small load currents. A CLKOUT pin enables synchronizing other regulators to the LT8636.

Burst Mode operation enables ultralow standby current consumption, forced continuous mode can control frequency harmonics across the entire output load range, or spread spectrum operation can further reduce EMI emissions. Soft-start and tracking functionality is accessed via the TR/SS pin, and an accurate input voltage UVLO threshold can be set using the EN/UV pin.

LTC3307A - 5V, 3A Synchronous Step-Down Silent Switcher in 2mm × 2mm LQFN

The LTC3307A is a very small, high efficiency, low noise, monolithic synchronous 3A step-down DC/DC converter operating from a 2.25V to 5.5V input supply. Using constant frequency, peak current mode control at switching frequencies up to 3MHz and minimum on-time as low as 22ns, this regulator achieves fast transient response with small external components. Silent Switcher architecture minimizes EMI emissions.

The LTC3307A operates in forced continuous or pulse skip mode for low noise, or low-ripple Burst Mode operation for high efficiency at light loads, ideal for battery-powered systems. The IC regulates output voltages as low as 500mV. Other features include output overvoltage protection, short-circuit protection, thermal shutdown, clock synchronization, and up to 100% duty cycle operation for low dropout. The device is available in a low profile 12-lead 2mm × 2mm × 0.74mm LQFN package with exposed pad for low thermal resistance.

LTC3310S - 5V, 10A Synchronous Step-Down Silent Switcher 2 in 3mm × 3mm LQFN

The LTC3310S is a very small, low noise, monolithic step-down DC/DC converter capable of providing up to 10A of output current from a 2.25V to 5.5V input supply. The device employs Silent Switcher 2 architecture with internal hot loop bypass capacitors to achieve both low EMI and high efficiency at switching frequencies as high as 5MHz. For systems with higher power requirements, multi-phasing parallel converters is readily implemented.

The LTC3310S uses a constant-frequency, peak current mode control architecture for fast transient response. A 500mV reference allows for low voltage outputs. 100% duty cycle operation delivers low drop out.

Other features include a power good signal when the output is in regulation, precision enable threshold, output overvoltage protection, thermal shutdown, a temperature monitor, clock synchronization, mode selection and output short circuit protection.

ADP151 - Ultralow Noise, 200 mA, CMOS Linear Regulator

The ADP151 is an ultralow noise, low dropout (LDO) linear regulator that operates from 2.2 V to 5.5 V and provides up to 200 mA of output current. The low 135 mV dropout voltage at 200 mA load improves efficiency and allows operation over a wide input voltage range.

Using an innovative circuit topology, the ADP151 achieves ultralow noise performance without the necessity of a bypass capacitor, making the device ideal for noise-sensitive analog and RF applications. The ADP151 also achieves ultralow noise performance without compromising the power supply rejection ratio (PSRR) or transient line and load performance. The low 265 µA of operating supply current at 200 mA load makes the ADP151 suitable for battery-operated portable equipment.

The ADP151 also includes an internal pull-down resistor on the EN input.

The ADP151 is specifically designed for stable operation with tiny 1 µF, ±30% ceramic input and output capacitors to meet the requirements of high performance, space constrained applications.

The ADP151 is capable of 16 fixed output voltage options, ranging from 1.1 V to 3.3 V.

Short-circuit and thermal overload protection circuits prevent damage in adverse conditions. The ADP151 is available in tiny 5-lead TSOT, 6-lead LFCSP, and 4-ball, 0.4 mm pitch, halide-free WLCSP packages for the smallest footprint solution to meet a variety of portable power application requirements.

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