ADSP-BF592 EZ-KIT Lite®
Evaluation System Manual

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Analog Devices, Inc.
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ANALOG DEVICES

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Regulatory Compliance

The ADSP-BF592 EZ-KIT Lite 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 ADSP-BF592 EZ-KIT Lite has been certified to comply with the essential requirements of the European EMC directive 2004/108/EC and therefore carries the "**CE**" mark.

The ADSP-BF592 EZ-KIT Lite has been appended to Analog Devices, Inc. EMC Technical File (EMC TF) referenced **DSPTOOLS1**, issue 2 dated June 4, 2008 and was declared CE compliant by an appointed Notified Body (No.0673) as listed below.

Notified Body Statement of Compliance: Z600ANA2.039 dated June 22 2010.

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The EZ-KIT Lite evaluation system 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 EZ-KIT Lite boards in the protective shipping package.

CONTENTS

Contents

Contents

PREFACE

Thank you for purchasing the ADSP-BF592 EZ-KIT Lite®, Analog Devices, Inc. low-cost, low-power consumption evaluation system for the ADSP-BF592 Blackfin® processors.

Blackfin processors embody a type of embedded processor designed specifically to meet the computational demands and power constraints of today's embedded audio, video, and communications applications. They deliver breakthrough signal-processing performance and power efficiency within a reduced instruction set computing (RISC) programming model.

Blackfin processors support a media instruction set computing (MISC) architecture. This architecture is the natural merging of RISC, media functions, and digital signal processing (DSP) characteristics. Blackfin processors deliver signal-processing performance in a microprocessor-like environment.

Based on the Micro Signal Architecture (MSA), Blackfin processors combine a 32-bit RISC instruction set, dual 16-bit multiply accumulate (MAC) DSP functionality, and eight-bit video processing performance that had previously been the exclusive domain of very-long instruction word (VLIW) media processors.

The evaluation board is designed to be used in conjunction with the CrossCore® Embedded Studio (CCES) and VisualDSP++® development environments to test capabilities of the ADSP-BF592 Blackfin processors. The development environment aids advanced application code development and debug, such as:

- Create, compile, assemble, and link application programs written in C++, C, and ADSP-BF592 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
- Plot memory

Access to the processor from a personal computer (PC) is achieved through a USB port or an external JTAG emulator. The USB interface provides unrestricted access to the ADSP-BF592 processor and evaluation board peripherals. Analog Devices JTAG emulators offer faster communication between the host PC and target hardware. Analog Devices carries a wide range of in-circuit emulation products. To learn more about Analog Devices emulators and processor development tools, go to http://www.analog.com/dsp/tools.

The ADSP-BF592 EZ-KIT Lite provides example programs to demonstrate the evaluation board capabilities.

Product Overview

The board features:

- Analog Devices ADSP-BF592 Blackfin processor
    - Core performance up to 400 MHz
    - 64-lead LFCSP
- Programmable VDDINT core power
    - Analog Devices AD5258 TWI digital potentiometer
    - Analog Devices ADP1715 low dropout linear regulator
- SPI external flash memory
    - Numonyx M25P16 – 16 Mb
- Audio codec
    - Analog Devices SSM2603 stereo, 24-bit analog-to-digital and digital-to-analog converters
    - Highly efficient headphone amplifier
    - Stereo line input and monaural microphone input
- Universal asynchronous receiver/transmitter (UART)
    - ADM3202 RS-232 line driver/receiver
    - DB9 female connector

- LEDs
    - Eight LEDs: one board reset (red), three general-purpose (amber), one power (green), one battery good indicator (green), one battery low indicator (amber) and one battery charging indicator (amber)
- Push buttons
    - Four push buttons: one reset, two programmable flags, and one wake-up with debounce logic
- Expansion interface II
    - Next generation of the expansion interface design, provides access to most of the processor signals
- Land grid array
    - Easy probing of all port pins
- Other features
    - JTAG ICE 14-pin header
    - Battery charger for a 3.7V single sell Li-Ion battery

For information about the hardware components of the EZ-KIT Lite, refer to "ADSP-BF592 EZ-KIT Lite Hardware Reference" on page 2-1.

Purpose of This Manual

The *ADSP-BF592 EZ-KIT Lite Evaluation System Manual* provides instructions for installing the product hardware (board). The text describes operation and configuration of the board components and provides guidelines for running your own code on the ADSP-BF592 EZ-KIT Lite. Finally, a schematic and a bill of materials are provided for reference.

Intended Audience

The primary audience for this manual is a programmer who is familiar with Analog Devices processors. This manual assumes that the audience has a working knowledge of the appropriate processor architecture and instruction set.

Programmers who are unfamiliar with Analog Devices processors can use this manual but should supplement it with other texts that describe your target architecture. For the locations of these documents, see "Related Documents".

Programmers who are unfamiliar with CCES or VisualDSP++ should refer to the online help and user's manuals.

Manual Contents

The manual consists of:

- Chapter 1, "Using ADSP-BF592 EZ-KIT Lite" on page 1-1.
  Describes EZ-KIT Lite functionality from a programmer's perspective and provides an easy-to-access memory map.
- Chapter 2, "ADSP-BF592 EZ-KIT Lite Hardware Reference" on page 2-1.
  Provides information about the EZ-KIT Lite hardware components.

- Appendix A, "ADSP-BF592 EZ-KIT Lite Bill Of Materials" on page A-1.
  Provides a list of components used to manufacture the EZ-KIT Lite board.
- Appendix B, "ADSP-BF592 EZ-KIT Lite Schematic" on page B-1.
  Provides the resources for board-level debugging, can be used as a reference guide.

What's New in This Manual

This is revision 1.1 of the *ADSP-BF592 EZ-KIT Lite Evaluation System Manual*. The manual has been updated to include CCES information. In addition, modifications and corrections based on errata reports against the previous manual revision have been made.

For the latest version of this manual, please refer to the Analog Devices Web site.

Technical Support

You can reach Analog Devices processors and DSP technical support in 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++**:

  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` or
  `processor.china@analog.com` (Greater China support)

- In the **USA only**, call **1-800-ANALOGD** (1-800-262-5643)

- Contact your Analog Devices sales office or authorized distributor. Locate one at:
  `www.analog.com/adi-sales`

- Send questions by mail to:
  Processors and DSP Technical Support
  Analog Devices, Inc.
  Three Technology Way
  P.O. Box 9106
  Norwood, MA 02062-9106
  USA

Supported Processors

This evaluation system supports Analog Devices ADSP-BF592 Blackfin embedded processors.

Product Information

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

Analog Devices Web Site

The Analog Devices Web site, www.analog.com, provides information about a broad range of products—analog integrated circuits, amplifiers, converters, 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 is a free feature of the Analog Devices Web site 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 provides access to books, application notes, data sheets, code examples, and more.

Visit myAnalog to sign up. If you are a registered user, just log on. Your user name is your e-mail address.

EngineerZone

EngineerZone is a technical support forum from Analog Devices. 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.

Related Documents

For additional information about the product, refer to the following publications.

Table 1. Related Processor Publications

Title	Description
ADSP-BF592 Blackfin Embedded Processor Data Sheet	General functional description, pinout, and timing of the processor
ADSP-BF59x Blackfin Processor Hardware Reference	Description of the internal processor architecture and all register functions
Blackfin Processor Programming Reference	Description of all allowed processor assembly instructions

Notation Conventions

Text conventions used in this manual are identified and described as follows.

Example	Description
Close command (**File** menu)	Titles in reference sections indicate the location of an item within the development environment's menu system (for example, the **Close** command appears on the **File** menu).
`{this | that}`	Alternative required items in syntax descriptions appear within curly brackets and separated by vertical bars; read the example as `this` or `that`. One or the other is required.

Notation Conventions

Example	Description
`[this | that]`	Optional items in syntax descriptions appear within brackets and separated by vertical bars; read the example as an optional `this` or `that`.
`[this,…]`	Optional item lists in syntax descriptions appear within brackets delimited by commas and terminated with an ellipse; read the example as an optional comma-separated list of `this`.
`.SECTION`	Commands, directives, keywords, and feature names are in text with `letter gothic` font.
`filename`	Non-keyword placeholders appear in text with italic style format.
	**Note:** For correct operation, ... A Note provides supplementary information on a related topic. In the online version of this book, the word **Note** appears instead of this symbol.
	**Caution:** Incorrect device operation may result if ... **Caution:** Device damage may result if ... A Caution identifies conditions or inappropriate usage of the product that could lead to undesirable results or product damage. In the online version of this book, the word **Caution** appears instead of this symbol.
	**Warning:** Injury to device users may result if ... A Warning identifies conditions or inappropriate usage of the product that could lead to conditions that are potentially hazardous for the devices users. In the online version of this book, the word **Warning** appears instead of this symbol.

1 USING ADSP-BF592 EZ-KIT LITE

This chapter provides specific information to assist you with development of programs for the ADSP-BF592 EZ-KIT Lite evaluation system.

The following topics are covered.

- "Example Programs" on page 1-18
- "Board Design Database" on page 1-18

For information about the graphical user interface, including the boot loading, target options, and other facilities of the EZ-KIT Lite system, refer to the online help.

For more detailed information about the ADSP-BF592 Blackfin processor, see documents referred to at "Related Documents".

Package Contents

Your ADSP-BF592 EZ-KIT Lite package contains the following items.

- ADSP-BF592 EZ-KIT Lite board
- USB cable

If any item is missing, contact the vendor where you purchased your EZ-KIT Lite or contact Analog Devices, Inc.

Default Configuration

The EZ-KIT Lite evaluation system 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 EZ-KIT Lite boards in the protective shipping package.

The ADSP-BF592 EZ-KIT Lite board is designed to run outside your personal computer as a standalone unit. You do not have to open your computer case.

When removing the EZ-KIT Lite board from the package, handle the board carefully to avoid the discharge of static electricity, which can damage some components. Figure 1-1 shows the default jumper and switch settings used in installation. Confirm that your board is in the default configuration before using the board.

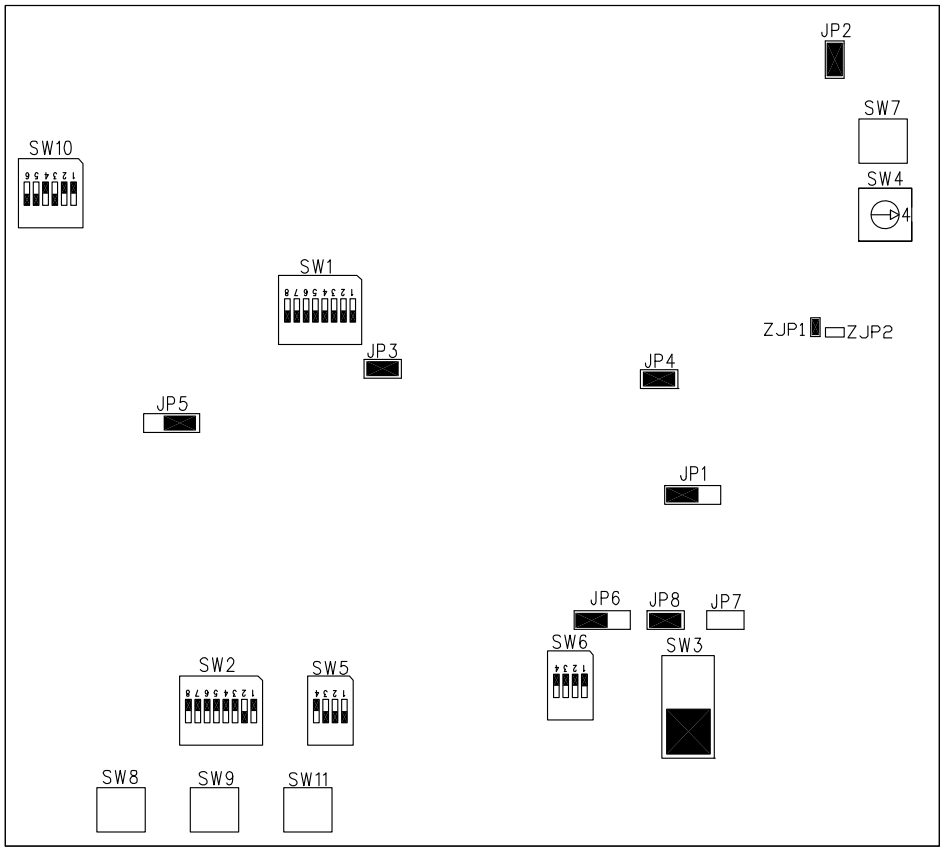


Figure 1-1. EZ-KIT Lite Hardware Setup

CCES Install and Session Startup

For information about CCES and to download the software, go to www.analog.com/CCES. A link for the ADSP-BF592 EZ-KIT Lite Board Support Package (BSP) for CCES can be found at http://www.analog.com/Blackfin/EZKits.

Follow these instructions to ensure correct operation of the product software and hardware.

Step 1: Connect the EZ-KIT Lite board to a personal computer (PC) running CCES using one of two options: an Analog Devices emulator or via the debug agent.

Using an Emulator:

1. Plug one side of the USB cable into the USB connector of the emulator. Plug the other side into a USB port of the PC running CCES.
2. Attach the emulator to the header connector P2 (labeled JTAG) on the EZ-KIT Lite board.

Using the on-board Debug Agent:

1. Plug one side of the provided USB cable into the USB connector of the debug agent ZP1 (labeled USB).
2. Plug the other side of the cable into a USB port of the PC running CCES.

Step 2: Attach the provided cord and appropriate plug to the 5V power adaptor.

1. Plug the jack-end of the power adaptor into the power connector P9 (labeled 5V) on the EZ-KIT Lite board.
2. Plug the other side of the power adaptor into a power outlet. The power LED (labeled LED5) is lit green when power is applied to the board.
3. Power the emulator (if used). Plug the jack-end of the assembled power adaptor into the emulator and plug the other side of the power adaptor into a power outlet. The enable/power indicator is lit green when power is applied.

Step 3 (if connected through the debug agent): Verify that the yellow USB monitor LED (labeled ZLED2) and the green power LED (labeled ZLED1) on the debug agent are both on. This signifies that the board is communicating properly with the host PC and ready to run CCES.

Session Startup

It is assumed that the CrossCore Embedded Studio software is installed and running on your PC.

Note: If you connect the board or emulator first (before installing CCES) to the PC, the Windows driver wizard may not find the board drivers.

1. Navigate to the CCES environment via the **Start** menu.

   Note that CCES is not connected to the target board.

2. Use the system configuration utility to connect to the EZ-KIT Lite board.

   If a debug configuration exists already, select the appropriate configuration and click **Apply and Debug** or **Debug**. Go to step 8.

   To create a debug configuration, do one of the following:

   - Click the down arrow next to the little bug icon, select **Debug Configurations**
   - Choose **Run > Debug Configurations**.

   The **Debug Configuration** dialog box appears.

3. Select **CrossCore Embedded Studio Application** and click  (**New launch configuration**).

   The **Select Processor** page of the **Session Wizard** appears.

4. Ensure **Blackfin** is selected in **Processor family**. In **Processor type**, select **ADSP-BF592**. Click **Next**.

   The **Select Connection Type** page of the **Session Wizard** appears.

5. Select one of the following:

   - For standalone debug agent connections, **EZ-KIT Lite** and click **Next**.
   - For emulator connections, **Emulator** and click **Next**.

   The **Select Platform** page of the **Session Wizard** appears.

6. Do one of the following:
    - For standalone debug agent connections, ensure that the selected platform is **ADSP-BF592 EZ-KIT** Lite via Debug Agent.
    - For emulator connections, choose the type of emulator that is connected to the board.
7. Click **Finish** to close the wizard.

   The new debug configuration is created and added to the program(s) to load list.
8. In the **Program(s) to load** section, choose the program to load when connecting to the board. If not loading any program upon connection to the target, do not make any changes.

   Note that while connected to the target, there is no way to choose a program to download. To load a program once connected, terminate the session.

To delete a configuration, go to the **Debug Configurations** dialog box and select the configuration to delete. Click ✖ and choose **Yes** when asked if you wish to delete the selected launch configuration. Then **Close** the dialog box.

To disconnect from the target board, click the terminate button (red box) or choose **Run > Terminate**.

To delete a session, choose **Target > Session > Session List**. Select the session name from the list and click **Delete**. Click **OK**.

VisualDSP++ Install and Session Startup

For information about VisualDSP++ and to download the software, go to www.analog.com/VisualDSP.

There are two options to connect the EZ-KIT Lite hardware to a personal computer (PC) running VisualDSP++: via an Analog Devices emulator or via the onboard debug agent.

To connect the EZ-KIT Lite to a PC via an emulator:

1. Plug the 5V adaptor into connector P9 (labeled 5V) or plug the USB cable into connector ZP1 (labeled USB).
2. Attach the emulator to the header connector P2 (labeled JTAG) on the EZ-KIT Lite.

To connect the EZ-KIT Lite to a PC via the debug agent:

1. Plug one side of the provided USB cable into the USB connector of the debug agent ZP1 (labeled USB). Plug the other side of the cable into a USB port of the PC running VisualDSP++.
2. Verify that the yellow USB monitor LED on the debug agent, ZLED2, is lit. This signifies that the board is communicating properly with the host PC and ready to run VisualDSP++.

Session Startup

1. If you are running VisualDSP++ for the first time, navigate to the VisualDSP++ environment via the **Start > Programs** menu. The main window appears. Note that VisualDSP++ is not connected to any session. Skip the rest of this step to step 2.

If you have run VisualDSP++ previously, the last opened session appears on the screen. You can override the default behavior and force VisualDSP++ to start a new session by pressing and holding down the **Ctrl** key while starting VisualDSP++. Do not release the **Ctrl** key until the **Session Wizard** appears on the screen. Go to step 3.

2. To connect to a new EZ-KIT Lite session, start **Session Wizard** by selecting one of the following.
   - From the **Session** menu, **New Session**.
   - From the **Session** menu, **Session List**. Then click **New Session** from the **Session List** dialog box.
   - From the **Session** menu, **Connect to Target**.
3. The **Select Processor** page of the wizard appears on the screen. Ensure **Blackfin** is selected in **Processor family**. In **Choose a target processor**, select **ADSP-BF592-A**. Click **Next**.
4. The **Select Connection Type** page of the wizard appears on the screen. For standalone debug agent connections, select **EZ-KIT Lite** and click **Next**. For emulator connections, select **Emulator** and click **Next**.
5. The **Select Platform** page of the wizard appears on the screen. For standalone debug agent connections, ensure that the selected platform is **ADSP-BF592 EZ-KIT Lite via Debug Agent.** For emulator connections, choose the type of emulator that is connected. Specify your own **Session name** for the session or accept the default name.

   The session name can be a string of any length; although, the box displays approximately 32 characters. The session name can include space characters. If you do not specify a session name, VisualDSP++ creates a session name by combining the name of the

selected platform with the selected processor. The only way to change a session name later is to delete the session and open a new session.

Click **Next**.

6. The **Finish** page of the wizard appears on the screen. The page displays your selections. Check the selections. If you are not satisfied, click **Back** to make changes; otherwise, click **Finish**. VisualDSP++ creates the new session and connects to the EZ-KIT Lite. Once connected, the main window's title is changed to include the session name set in step 5.

To disconnect from a session, click the disconnect button  or select **Session > Disconnect from Target**.

To delete a session, select **Session > Session List**. Select the session name from the list and click **Delete**. Click **OK**.

CCES Evaluation License

The ADSP-BF592 EZ-KIT Lite software is part of the Board Support Package (BSP) for the Blackfin ADSP-BF59x family. The EZ-KIT Lite is a licensed product that offers an unrestricted evaluation license for 90 days after activation. Once the evaluation period ends, the evaluation license becomes permanently disabled. If the evaluation license is installed but not activated, it allows 10 days of unrestricted use and then becomes disabled. The license can be re-enabled by activation.

An evaluation license can be upgraded to a full license. Licenses can be purchased from:

- Analog Devices directly. Call (800) 262-5645 or 781-937-2384 or go to:
  http://www.analog.com/buyonline.
- Analog Devices, Inc. local sales office or authorized distributor. To locate one, go to:
  http://www.analog.com/salesdir/continent.asp.

The EZ-KIT Lite hardware must be connected and powered up to use CCES with a valid evaluation or full license.

VisualDSP++ Evaluation License

The ADSP-BF592 EZ-KIT Lite installation is part of the VisualDSP++ installation. The EZ-KIT Lite is a licensed product that offers an unrestricted evaluation license for the first 90 days. Once the initial unrestricted 90-day evaluation license expires:

- VisualDSP++ restricts a connection to the ADSP-BF592 EZ-KIT Lite via the USB port of the debug agent interface only. Connections to simulators and emulation products are no longer allowed.
- The linker restricts a user program to ¼ of memory (64K bytes), which is 16K bytes for code space with no restrictions for data space.
- The EZ-KIT Lite hardware must be connected and powered up to use VisualDSP++ with a valid evaluation or permanent license.

Memory Map

The ADSP-BF592 processor has a single unified 4G memory space for instructions and data storage. See Table 1-1.

The processor's memory details can be found in the *ADSP-BF59x Blackfin Processor Hardware Reference Manual*.

Table 1-1. ADSP-BF592 Processor Memory Map

Start Address	Content
0xFFFF FFFF	CORE MEMORY MAPPED REGISTERS (2M BYTES)
0xFFE0 0000	SYSTEM MEMORY MAPPED REGISTERS (2M BYTES)
0xFFC0 0000	RESERVED
0xFFB0 1000	INTERNAL SCRATCHPAD RAM (4K BYTES)
0xFFB0 0000	RESERVED
0xFFA2 0000	L1 ROM (64K BYTES)
0xFFA1 0000	RESERVED
0xFFA0 8000	INSTRUCTION BANK SRAM (32K BYTES))
0xFFA0 0000	RESERVED
0xFF80 8000	DATA BANK SRAM (32K BYTES)
0xFF80 0000	RESERVED
0xEF00 1000	BOOT ROM (4K BYTES)
0xEF00 0000	RESERVED

SPI Flash Memory Interface

SPI flash memory of the ADSP-BF592 EZ-KIT Lite is a 16 Mb Numonyx M25P16 device. The device is selected via the SPI0_SEL1 signal.

SPI flash memory is pre-loaded with boot code for the power-on-self test (POST) program. For more information, refer to "Power-On-Self Test" on page 1-14.

Audio Interface

The audio interface of the EZ-KIT Lite consists of a low-power stereo codec, SSM2603, with an integrated headphone driver and associated passive components. There are two inputs, a stereo line in, and a mono microphone, as well as two outputs, a headphone, and a stereo line out. The codec has two integrated stereo analog-to-digital converters (ADCs), two digital-to-analog converters (DACs), and requires minimal external circuitry.

The codec is connected to the processor via the processor's serial port 0. SPORT0 is disconnected from the codec by turning OFF switch SW1, which makes available SPORT0 to the expansion interface II. See "SPORT0 Enable Switch (SW1)" on page 2-7 for more information about SW1.

The codec is controlled via a 2-wire interface (TWI).

Mic gain values of 14 dB, 0 dB, or -6 dB are selectable through switch SW10. For more information, see "MIC Gain Switch (SW10)" on page 2-10.

Microphone bias is provided through a low-noise reference voltage. A jumper on positions 2 and 3 of JP5 connects the MICBIAS signal to the audio jack. Placing a jumper on positions 1 and 2 of JP5 connects the bias directly to the mic signal. For more information, see "MIC Select Jumper (JP5)" on page 2-13.

J2 and J3 are 3.5 mm connectors for the audio portion of the board. J2 connects the mic on the top portion and line-in on the bottom. J3 connects the headphone on the top portion and line-out on the bottom. If there is no 3.5 mm cable plugged into the bottom of either J2 or J3, the signals are looped back inside the connector. For more information, see "Dual Audio Connectors (J2–3)" on page 2-19.

For testing, SW10 position 4 connects the MICIN signal to the right headphone. SW10 positions 5 and 6 loop the output of the codec to the input when no cables are connected to J4 and J5.

Power-On-Self Test

The power-on-self-test program (POST) tests all EZ-KIT Lite peripherals and validates functionality as well as connectivity to the processor. Once assembled, each EZ-KIT Lite if fully tested for an extended period of time with a POST. All EZ-KIT Lite boards are shipped with a POST preloaded into one of their on-board flash memories. The POST is executed by resetting the board and pressing the proper push button(s). The POST also can be used for reference for a custom software design or hardware troubleshooting. Note that the source code for the POST program is included in the development environment's installation directory along with the readme file, which describes how the board is configured to run a POST.

The POST program is only available when using VisualDSP++.

Expansion Interface II

The expansion interface II allows an Analog Devices EZ-Extender® or a custom-design daughter board to be tested across various hardware platforms that have the same expansion interface.

The expansion interface II implemented on the ADSP-BF592 EZ-KIT Lite consists of three connectors, which are 0.1 in. shrouded headers (P4-6). The connectors contain a majority of the ADSP-BF592 processor's signals. For pinout information, go to "ADSP-BF592 EZ-KIT Lite Schematic" on page B-1. The mechanical dimensions of the expansion connectors can be obtained by contacting "Technical Support".

For more information about daughter boards, visit the Analog Devices Web site at:
http://www.analog.com/processors/tools/blackfin.

Limits to current and interface speed must be taken into consideration when using the expansion interface. Current for the expansion interface II is sourced from the EZ-KIT Lite; therefore, the current should be limited to 200 mA for 5V and 300 mA for the 3.3V planes. A separate power connector and a regulator must be designed on a daughter card if more current is required. Additional circuitry can add extra loading to signals, decreasing their maximum effective speed.

Analog Devices does not support and is not responsible for the effects of additional circuitry.

Power Architecture

The ADSP-BF592 EZ-KIT Lite has three primary voltage sources: a lithium ion battery (not included), a 5V wall adaptor, and VBUS supplied over a USB cable. There is an OR'ing circuit, which allows the board to draw power from any supply source that has the highest voltage potential.

The lithium ion battery leads are inserted into connector P3. The SW3 switch connects the battery to the EZ-KIT Lite when the switch is ON. To change the battery, press in the white tabs and slide out the battery lead. For more information, see "Battery Switch (SW3)" on page 2-7.

An ADP2291 lithium ion battery charger IC charges the 950 mAh battery. The charge rate is selected by a jumper. See Table 1-2 for details.

The lithium battery is monitored by the BQ27500 fuel gauge (U17). All battery statistics can be read from the fuel gauge, including time to empty, current voltage, and current consumption rate. To access the fuel gauge, use the I^2C interface: ensure that SW6 has all positions ON. For more information, see "Fuel Gauge Enable Switch (SW6)" on page 2-8.

Table 1-2. Charge Rate Selection

Mode	JP6 Jumper	JP8 Jumper	Charge Rate
Charge	2 and 3	OFF	250 mA
Shutdown	OFF	ON	None
Control Shutdown	1 and 2	ON	None/250 mA

VDDINT Programmable Regulator

By default, the ADSP-BF592 processor's core runs at 1.4V. The EZ-KIT Lite board contains a programmable regulator that supplies the processor's core with a voltage between 1.1 and 1.4. The voltage is adjusted by writing to the AD5258 digital potentiometer via the TWI.

Table 1-3 shows the appropriate step and corresponding voltage values. For an example of writing to the AD5258 potentiometer, refer to the POST example. For more information on the acceptable voltage/frequency values, refer to the *ADSP-BF592 Blackfin Embedded Processor* data sheet and *ADSP-BF59x Blackfin Processor Hardware Reference Manual*. For more information about the digital potentiometer, refer to the AD5258 data sheet.

Table 1-3. Voltage Values

Step Value	Voltage (V)
57	1.10
46	1.15
36	1.20
27	1.25
18	1.30
10	1.35
3	1.40

Power Measurements

Two locations are provided for measuring the current draw from various power planes. Precision 0.1 ohm shunt resistors are available on the VDDEXT and VDDINT voltage domains. For current draw, the jumper is removed, voltage across the resistor can be measured using an oscilloscope, and the value of the resistor can be measured using a precision multi-meter. Once the voltage and resistance are measured, the current can be calculated by dividing the voltage by the resistance. For the highest accuracy, a differential probe should be used for measuring the voltage across the resistor. For more information, refer to "VDDEXT Power Jumper (JP3)" on page 2-12 and "VDDINT Power Jumper (JP4)" on page 2-12.

Board Design Database

A `.zip` file containing all of the electronic information required for the design, layout, fabrication and assembly of the product is available for download from the Analog Devices board design database at: `http://www.analog.com/board-design-database`.

Example Programs

Example programs are provided with the ADSP-BF592 EZ-KIT Lite to demonstrate various capabilities of the product. The programs are included in the product installation kit and can be found in the `Examples` folder of the installation. Refer to a readme file provided with each example for more information.

CCES users are encouraged to use the example browser to find examples included with the EZ-KIT Lite Board Support Package.

2 ADSP-BF592 EZ-KIT LITE HARDWARE REFERENCE

This chapter describes the hardware design of the ADSP-BF592 EZ-KIT Lite board.

The following topics are covered.

- "System Architecture" on page 2-2
  Describes the board's configuration and explains how the board components interface with the processor.
- "Programmable Flags" on page 2-3
  Shows the locations and describes the programmable flags (PFs).
- "Push Buttons and Switches" on page 2-6
  Shows the locations and describes the push buttons and switches.
- "Jumpers" on page 2-11
  Shows the locations and describes the configuration jumpers.
- "LEDs" on page 2-15
  Shows the locations and describes the LEDs.
- "Connectors" on page 2-18
  Shows the locations and provides part numbers for the on-board connectors. In addition, the manufacturer and part number information is provided for the mating parts.

System Architecture

This section describes the processor's configuration on the EZ-KIT Lite board (Figure 2-1).

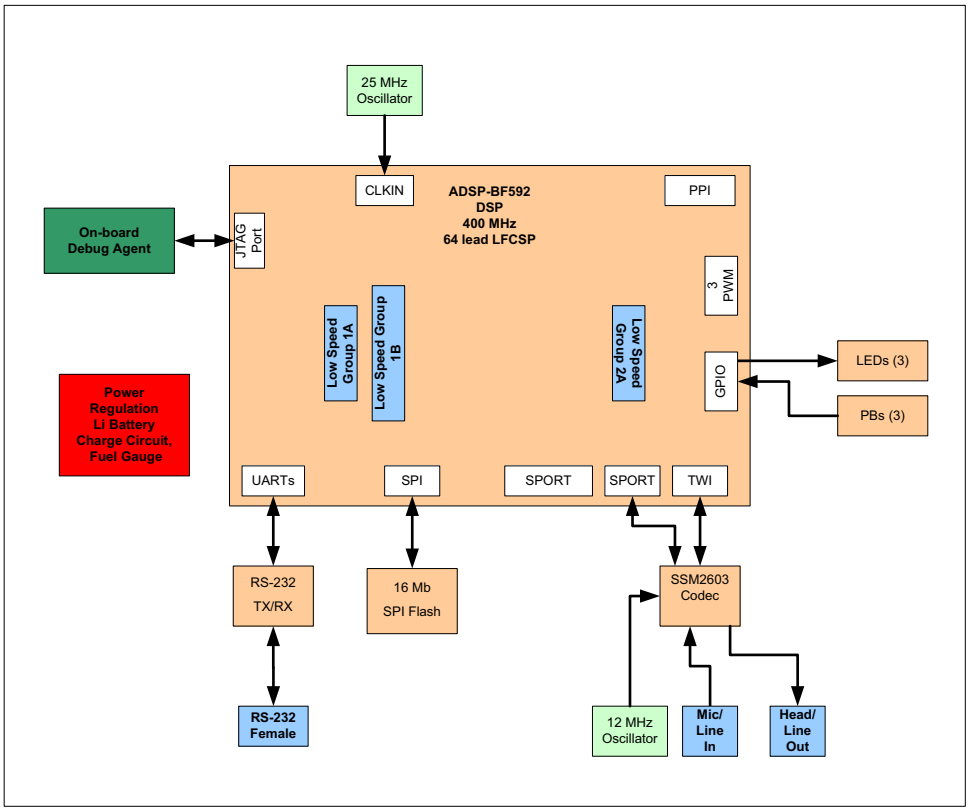


Figure 2-1. EZ-KIT Lite Block Diagram

The EZ-KIT Lite is designed to demonstrate the ADSP-BF592 Blackfin processor capabilities. The processor has an I/O voltage of 3.3V. The core voltage of the processor is controlled by an Analog Devices ADP1715 low dropout regulator (LDO) and an Analog Devices AD5258 digipot, which is configurable over the 2-wire interface (TWI) signals. Refer to the

power-on-self test (POST) example in the ADSP-BF592 installation directory for information on how to set up the TWI interface.

The core voltage and clock rate can be set up on the fly by the processor. The input clock is 25 MHz. The core and system clock are programmable via the PLL_DIV register of the processor. The core clock runs at a maximum of 400 MHz. The default boot mode for the processor is SPI flash boot. See "Boot Mode Select Switch (SW4)" on page 2-8 for information on how to change the default boot mode.

Programmable Flags

The processor has 32 general-purpose input/output (GPIO) signals spread across two ports (PF and PG). The pins are multi-functional and depend on the ADSP-BF592 processor setup. Table 2-1 and Table 2-2 show how the programmable flag pins are used on the EZ-KIT Lite.

Table 2-1. Port F Programmable Flag Connections

Processor Pin	Other Processor Function	EZ-KIT Lite Function
PF0	DRSEC1/PPI8/WAKEN1	Default: LED0. Land grid array, expansion interface II
PF1	DRPRI1/PPI9	Default: LED1. Land grid array, expansion interface II
PF2	RSCLK1/PPI10	Default: LED2. Land grid array, expansion interface II
PF3	RFS1/PPI11	Default: PB0. Land grid array, expansion interface II
PF4	DTSEC1/PPI12	Default: PB1. Land grid array, expansion interface II
PF5	DTPRI1/PPI13	Default: CHARGE_OFF. Land grid array, expansion interface II
PF6	TSCLK1/PPI14	Default: Not used. Land grid array, expansion interface II

Table 2-1. Port F Programmable Flag Connections (Cont'd)

Processor Pin	Other Processor Function	EZ-KIT Lite Function
PF7	TFS1/PPI15	Default: Not used. Land grid array, expansion interface II
PF8	TMR2/SPIOSSEL2/WAKEN0	Default: SPIOSSEL2. Land grid array, expansion interface II
PF9	TMR0/PPI_FS1/SPIOSSEL3	Default: UART_CTS. Land grid array, expansion interface II
PF10	TMR1/PPI_FS2	Default: UART_RTS. Land grid array, expansion interface II
PF11	UART_TX/SPIOSSEL4	Default: UART_TX. Land grid array, expansion interface II
PF12	UART_RX/SPIOSSEL7/TACI2_0	Default: UART_RX. Land grid array, expansion interface II
PF13	SPIOMOSI/SPI1SSEL3	Default: SPIOMOSI. Land grid array, expansion interface II
PF14	SPIOMISO/SPI1SSEL4	Default: SPIOMISO. Land grid array, expansion interface II
PF15	SPIOSCK/SPI1SSEL5	Default: SPIOSCK. Land grid array, expansion interface II

Table 2-2. Port G Programmable Flag Connections

Processor Pin	Other Processor Function	EZ-Kit Lite Function
PG0	DRSEC0/SPIOSSEL1/SPIOSS	Default: Not used. Land grid array, expansion interface II
PG1	DRPRI0/SPI1SSEL1/WAKEN3	Default: DRPRI0. Land grid array, expansion interface II
PG2	RSCLK0/SPIOSSEL5	Default: RSCLK0. Land grid array, expansion interface II
PG3	RFS0/PPI_FS3	Default: RFS0. Land grid array, expansion interface II
PG4	HWAIT/DTSEC0/SPIOSSEL6	Default: Not used. Land grid array, expansion interface II

Table 2-2. Port G Programmable Flag Connections (Cont'd)

PG5	DTPRI0/SPI1SSEL6	Default: DTPRI0. Land grid array, expansion interface II
PG6	TSCLK0	Default: TSCLK0. Land grid array, expansion interface II
PG7	TFS0/SPI1SSEL7	Default: TFS0. Land grid array, expansion interface II
PG8	SPI1SCK/PPI0	Default: Not used. Land grid array, expansion interface II
PG9	SPI1MOSI/PPI1	Default: Not used. Land grid array, expansion interface II
PG10	SPI1MISO/PPI2	Default: Not used. Land grid array, expansion interface II
PG11	SPI1SSEL5/PPI3	Default: Not used. Land grid array, expansion interface II
PG12	SPI1SSEL2/PPI4/WAKEN2	Default:WAKEN2. Land grid array, expansion interface II
PG13	SPI1SSEL1/SPI1SS/PPI5	Default: Not used. Land grid array, expansion interface II
PG14	SPI1SSEL4/PPI6/TACLK1	Default: Not used. Land grid array, expansion interface II
PG15	SPI1SSEL6/PPI7/TACLK2	Default: Not used. Land grid array, expansion interface II

Push Buttons and Switches

This section describes operation of the push buttons and switches. The push button and switch locations are shown in Figure 2-2.

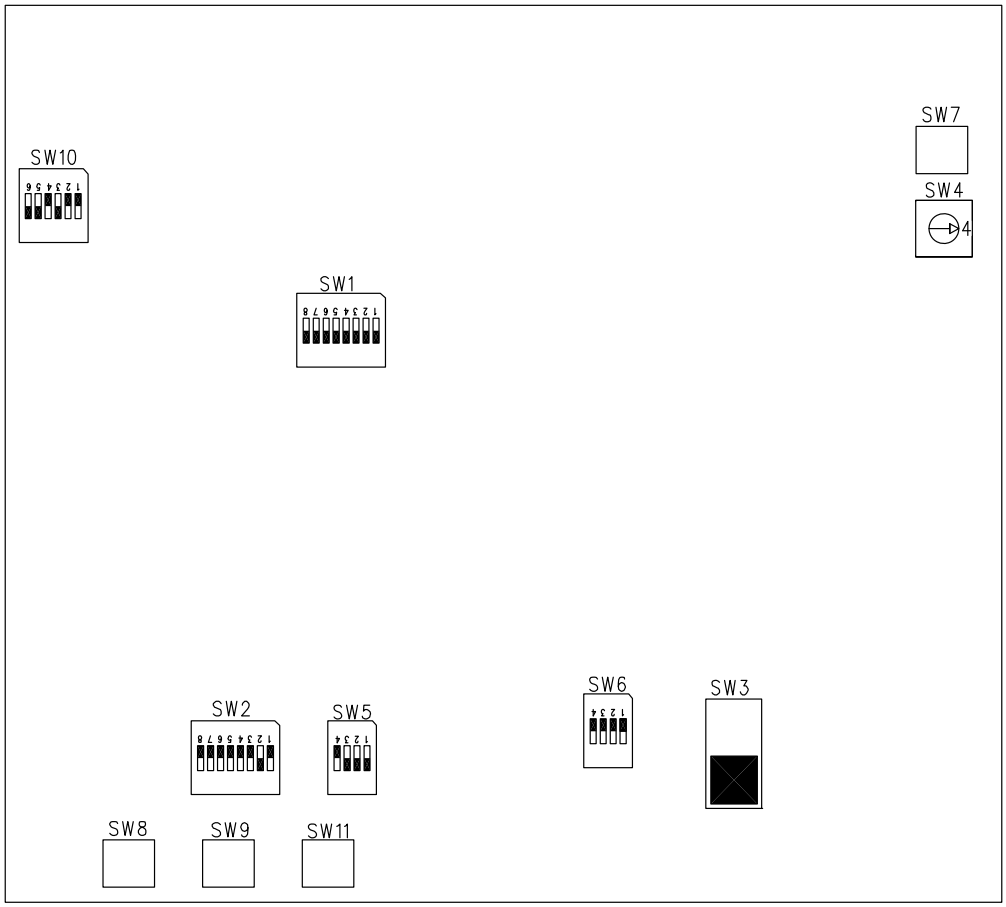


Figure 2-2. Push Button and Switch Locations

SPORT0 Enable Switch (SW1)

The SPORT0 enable switch (SW1) disconnects the codec from the SPORT0 interface of the processor and allows the SPORT0 signals to be used on the expansion interface. Refer to "Audio Interface" on page 1-13 for more information.

UART Setup Switch (SW2)

The UART setup switch (SW2) configures UART signals between the DCE connector (J1) and processor. Table 2-3 shows operation of the switches turned on. See "DCE UART Connector (J1)" on page 2-19 for more information.

Table 2-3. UART Setup Switch (SW2)

SW2 Position	Function
1 and 3	Enable flow control
2	Disconnects the UART_RX signal from the processor; the UART_RX signal can be used for another function
4	Connects the RTS and CTS signals together
5	Allows the host to reset the EZ-KIT Lite via the CTS signal
6 and 7	Selects the source for the CTS signal
8	Loopback mode. Connects the RX and TX signals together. This mode is for testing only.

Battery Switch (SW3)

The battery switch (SW3) connects and disconnects the lithium ion battery from the EZ-KIT Lite power. When the switch is ON, the board can run from the battery. Jumper JP7 must be removed when SW3 is OFF. By default, SW3 is OFF.

Boot Mode Select Switch (SW4)

The rotary boot mode select switch (SW4) determines the boot mode of the processor. Table 2-4 shows the available boot mode settings. By default, the ADSP-BF592 processor boots from SPI flash memory.

Table 2-4. Boot Mode Select Switch (SW4)

SW4 Position	Processor Boot Mode
0	Idle—no boot
1	Reserved
2	SPI1 master boot from Flash, using SPI1SSEL5
3	SPI1 slave boot from external master
4	**SPI0 master boot from flash memory using SPI0SSEL2 (default)**
5	Boot from PPI port
6	Boot from UART host device
7	Boot from Internal L1 ROM

Push Button Enable Switch (SW5)

The push button enable switch (SW5) disconnects all of the associated push button circuits from the general-purpose I/O (GPIO) pins of the processor and makes available the I/O signals to the expansion interface.

Fuel Gauge Enable Switch (SW6)

The fuel gauge enable switch (SW6) disconnects the battery good (BAT_GD) and battery low (BAT_LOW) signals from their respective LEDs (LED7-8) (see Table 2-5). The switch also disconnects TWI signals between the processor and fuel gauge. The TWI signals on the fuel gauge operate only when a clock on the SCL signal is running at up to 100 kHz. If the TWI bus interfaces with devices operating at above 100 kHz frequency, turn SW6 OFF to prevent the bus from hanging. By default, SW6 is all OFF.

Table 2-5. Table 10. Fuel Gauge Select Switch (SW6)

SW6 Position	Function
1	BAT_GD
2	BAT_LOW
3	SCL
4	SDA

Reset Push Button (SW7)

The reset push button (SW7) resets the processor's ICs via a hardware reset. The reset push button does not reset the on-board debug agent. The reset push button does not reset the following ICs.

- SPI flash (U4)
- Audio codec (U7)
- UART0 (U12)
- Fuel gauge (U17)

The reset push button does not reset the debug agent once it has been connected to a PC. The USB chip is not reset when the push button is pressed after the USB cable has been plugged in and communication with the PC has been initialized correctly. After USB communication has been initialized, the only way to reset the USB chip is by powering down the board.

Programmable Flag Push Buttons (SW8–9)

Two momentary push buttons (SW8 and SW9) are provided for general-purpose user input. The push buttons are connected to the PF3 and PF4 GPIO pins of the processor, respectively. The push buttons are active high and, when pressed, send a high (1) to the processor. The push button enable

switch (SW5) disconnects all of the push buttons from their corresponding GPIO pins of the processor and allows the I/O signals to be used on the expansion interface. Refer to "Push Button Enable Switch (SW5)" on page 2-8 for more information.

MIC Gain Switch (SW10)

The microphone gain switch (SW10) sets the gain of the MIC signal, which is connected to the top 3.5 mm jack (J2). The gain can be set to 14 dB, 0 dB, or –6 dB by turning ON position 1, 2, or 3 of the switch (see Table 2-6). When the corresponding position for the desired gain is ON, the remaining positions should be OFF. Refer to "Audio Interface" on page 1-13 for more information about the audio codec.

Table 2-6. Table 11. MIC Gain Switch (SW10)

Gain	SW10 Switch Settings
5 (14 dB)	ON, OFF, OFF, OFF
1 (0 dB)	OFF, ON, OFF, OFF
0.5 (–6 dB)	**OFF, OFF, ON, OFF (default)**
Unused	OFF, OFF, OFF, OFF

WAKE_EN Switch (SW11)

The WAKE_EN momentary push button (SW11) is provided for an optional power feature input. The push button is connected to the WAKE_EN signal of the processor. The push button is active high and, when pressed, sends a high (1) to the processor. The WAKE_EN signal can be configured as a dedicated WAKE input signal from hibernation. Refer to the *ADSP-BF59x Blackfin Processor Programming Reference* for more information. The push button enable switch (SW5) disconnects all of the push buttons from their corresponding GPIO pins of the processor and makes available the I/O signals to the expansion interface. Refer to "Push Button Enable Switch (SW5)" on page 2-8 for more information.

Jumpers

This section describes functionality of the configuration jumpers. Figure 2-3 shows the jumper locations.

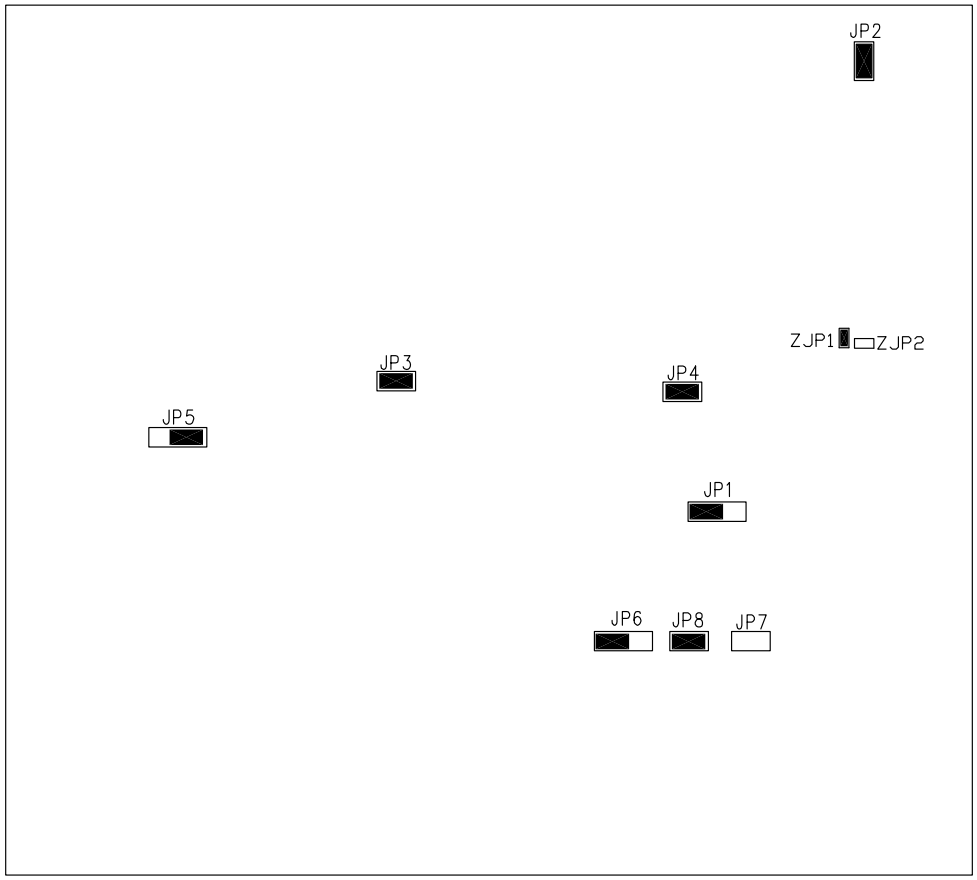


Figure 2-3. Configuration Jumper Locations

Reset Jumper (JP1)

The reset jumper (JP1) selects between the 3.3V regulator and battery voltage as a monitored input for the reset signal. When a jumper is on positions 2 and 3 of JP1, the BAT_P signal is monitored, which is useful when using the lithium ion battery. When a jumper is on positions 1 and 2 of JP1, the 3.3V regulator is monitored. JP1 installed on positions 1 and 2 must be used when no battery is wired to connector P3 (see "Battery Connector (P3)" on page 2-20). The SENSE2 input pin of the ADM13305 voltage reset supervisor is set up to drive the $\overline{\text{RESET\_3V}}$ signal low when a voltage of less than 3.16V is measured. By default, JP1 is installed on positions 1 and 2.

SPI Flash CS Enable Jumper (JP2)

The SPI flash CS enable jumper (JP2) connects the SPI0_SEL2 signal to SPI flash memory. By default, JP1 is installed and SPI flash is connected.

VDDEXT Power Jumper (JP3)

The VDDEXT power jumper (JP3) is used to measure the processor's I/O voltage and current. By default, JP3 is ON, and the current flows through the two-pin IDC header. To measure power, remove the jumper on JP3 and measure the voltage across the precision resistor and resistance value. For more information, refer to "Power Measurements" on page 1-17.

VDDINT Power Jumper (JP4)

The VDDINT power jumper (JP4) is used to measure the processor's core voltage and current. By default, JP4 is ON, and the current flows through the two-pin IDC header. To measure power, remove the jumper on JP4 and measure the voltage across the precision resistor and resistance value. For more information, refer to "Power Measurements" on page 1-17.

MIC Select Jumper (JP5)

The microphone select jumper (JP5) connects the MICBIAS signal to the MICIN (JP5 on 1 and 2) or the 3.5 mm audio connector J2 pin 3 (JP5 on 2 and 3). See "Dual Audio Connectors (J2–3)" on page 2-19 for more information. By default, JP5 is installed on positions 2 and 3.

CHG Control Jumper (JP6)

The charge control jumper (JP6) selects the control line for the MOSFET signal attached to the charge rate adjustment pin of the ADP2291 linear charger.

When no jumper is installed, the on-board pull-up holds the gate of the MOSFET ON. Placing a jumper on positions 1 and 2 of JP6 enables the processor's flag pin (PF5) to control the gate of MOSFET. Placing a jumper on positions 2 and 3 of JP6 pulls the MOSFET gate to ground, disconnecting the drain and the source. For more information on the ADP2291 single cell lithium ion battery charger, see "Power Measurements" on page 1-17. By default, JP6 is installed on positions 2 and 3.

BATT Installed Jumper (JP7)

The battery installed jumper (JP7) serves as an indicator to the BQ27500 fuel gauge that a lithium ion battery is installed. When using the battery, install a jumper on JP7 before turning ON the battery's power switch (SW3). See "Battery Switch (SW3)" on page 2-7 for more information. By default, JP7 is uninstalled.

R89 Jumper (JP8)

The R89 JMP jumper (JP8) provides a means to short out a R89 set resistor in the charge rate circuit of the single cell lithium ion battery. JP8 bypasses R89 when installed and effectively makes a zero ohm connection.

For more information about the ADP2291 battery charger, see "Power Measurements" on page 1-17. By default, JP8 is installed.

DA Test Mode Jumper (ZP1)

The debug agent test mode jumper (ZJP1) is used for testing purposes only. By default, ZP1 is installed.

Windows/Linux Jumper (ZJP2)

The Windows/Linux jumper (ZJP2) selects between Windows and Linux operating systems for the driver loaded on the debug agent. When the jumper is not installed, the debug agent is configured for Windows. When the jumper is installed, the debug agent is configured for Linux. By default, ZJP2 is not installed (Windows mode).

LEDs

This section describes the on-board LEDs. Figure 2-3 shows the LED locations.

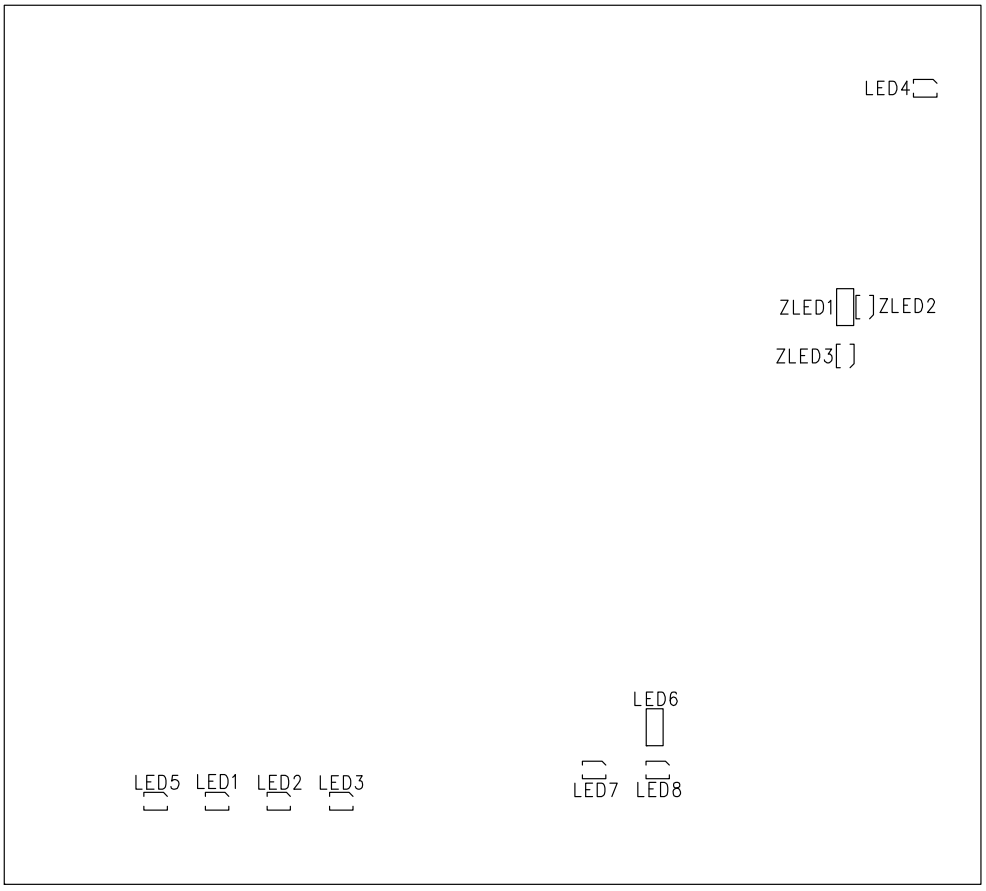


Figure 2-4. LED Locations

GPIO LEDs (LED1–3)

Three LEDs (LED1, LED2, and LED3) are connected to the three general-purpose I/O pins of the processor (see Table 2-7). The LEDs are active high and lit by writing a "1" to the correct programmable flag signal.

Table 2-7. GPIO LEDs

LED Reference Designator	Processor Programmable Flag Pin
LED1	PF0
LED2	PF1
LED3	PF2

Reset LED (LED4)

When LED4 is lit (red), it indicates that the master reset of the processor is active. The reset signal is controlled by the Analog Devices ADM13305 supervisory reset circuit.

Power LED (LED5)

When LED5 is lit solid (green), it indicates that power is being supplied to the board properly.

Battery Charging LED (LED6)

When LED6 is lit (yellow), it indicates that the lithium ion battery is receiving a charge from either the 5V wall adaptor (P9) or the USB connector (ZP1).

Battery Low LED (LED7)

When LED7 is lit (yellow), it indicates that the BQ27500 fuel gauge (U17) has detected that the remaining capacity of the lithium ion battery is low. The low threshold can be programmed; for more information, refer to the BQ27500 data sheet provided by the product manufacturer.

BATT GOOD LED (LED8)

When LED8 is lit (green), it indicates that the BQ27500 fuel gauge (U17) has initialized the lithium ion battery successfully. LED8 is not a battery capacity indicator. When the battery switch (SW3) is OFF, but the battery installed jumper (JP7) is ON, the BATT GOOD LED still illuminates. Ensure that JP7 is installed only when SW3 is ON.

DA PWR LED (ZLED1)

When ZLED1 is lit (green), it indicates that the debug agent is powered.

DA MON LED (ZLED2)

When ZLED2 is lit (amber), it indicates that the debug agent is configured via USB.

DA STAT LED (ZLED3)

When ZLED3 is lit (amber), it indicates that the debug agent is ignoring the EMU signal.

Connectors

This section describes connector functionality and provides information about mating connectors. The connector locations are shown in Figure 2-5.

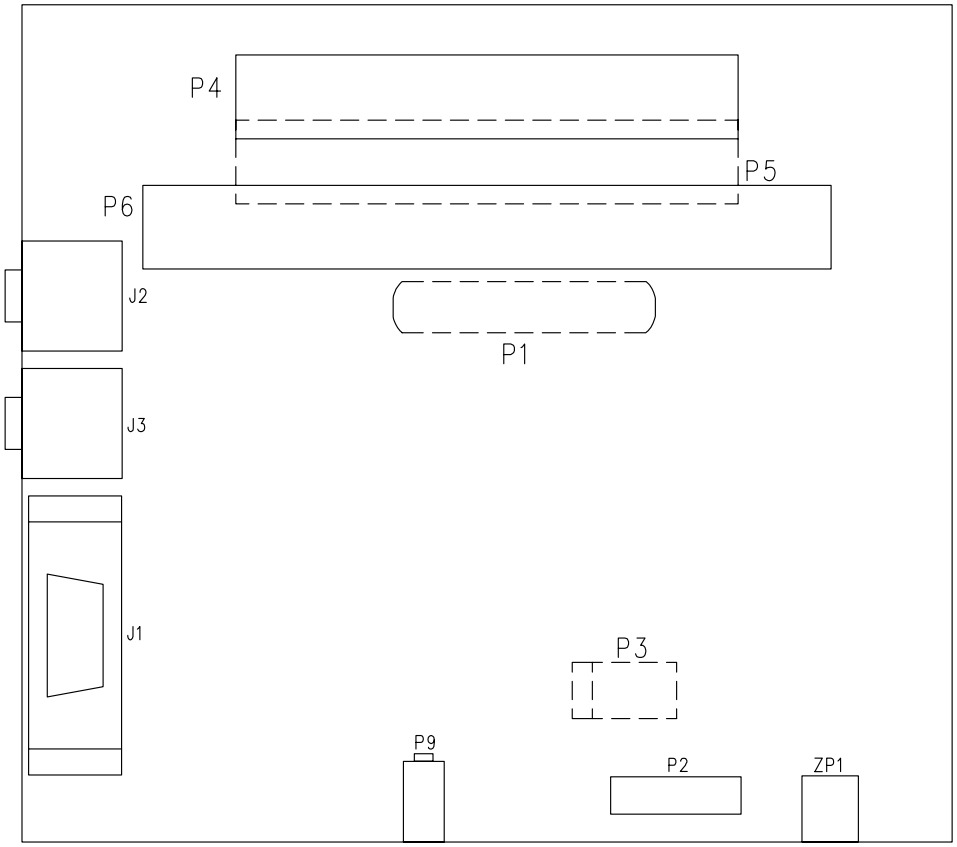


Figure 2-5. Connector Locations

DCE UART Connector (J1)

The pinout of the J1 connector can be found in "ADSP-BF592 EZ-KIT Lite Schematic" on page B-1.

Part Description	Manufacturer	Part Number
IDC header	FCI	68737-410HLF
Mating Connector		
IDC socket	DIGI-KEY	S4205-ND

Dual Audio Connectors (J2–3)

The pinout of the J2-3 connectors can be found in "ADSP-BF592 EZ-KIT Lite Schematic" on page B-1.

Part Description	Manufacturer	Part Number
3.5 mm dual stereo jack	SWITCHCRAFT	35RAPC7JS
Mating Cable		
3.5 mm male/male 6' cable	RANDOM	10A3-01106

DMAX Land Grid Array Connector (P1)

The DMAX land grid array areas (P1) are intended for the probing of the processor signals. The pads are exposed and designed to attach a Tektronix logic analyzer to the connectors listed in the following table. For more information about the land grid array, consult the Tektronix web site.

Part Description	Manufacturer	Part Number
Primary retention	Tektronix	020290800
Alternate retention	Tektronix	020291000

JTAG Connector (P2)

The JTAG header (P2) is the connecting point between the JTAG interface and ADSP-BF592 processor.

Pin 3 is missing to provide keying. Pin 3 in the mating connector should have a plug.

When an emulator is used with the EZ-KIT Lite, the on-board debug agent is bypassed.

Battery Connector (P3)

P3 is a connection point of a single 3.3V lithium ion battery. Ensure that the positive lead of the battery is inserted to the side labeled +, and the negative terminal is inserted to the side labeled -. To remove the battery leads, press the white plastic button in and slide out the lead. The battery is not connected until the SW22 switch is ON.

Part Description	Manufacturer	Part Number
Wire to board, push-in, 16-28 AWG	WEIDMULLER	281-2020-ND
Mating Battery		
3.7V lithium ion battery, 950mAh	MOUSER	5169-UBP563450

Expansion Interface II Connectors (P4–5)

P4 and P5 are board-to-board connectors providing signals for the SPI, TWI, UART, SPORT, and GPIO signals of the processor. The connectors are located on the upper edge of the board (one connector is on the top and one is on the bottom). For more information, see "Expansion Interface II" on page 1-14.

Part Description	Manufacturer	Part Number
50-position 0.1", TH header	SAMTEC	TSSH-125-01-L-D
Mating Connector		
50-position 0.1", SMT socket	SAMTEC	SSW-125-22-F-D-VS

Expansion Interface II Connector (P6)

P6 is a board-to-board connector providing signals for the PPI, TWI, and GPIO signals of the processor. The connector is located on the upper edge of the board. For more information, see "Expansion Interface II" on page 1-14.

Part Description	Manufacturer	Part Number
70-position 0.1", TH header	SAMTEC	TSSH-135-01-L-D
Mating Connector		
70-position 0.1", SMT socket	SAMTEC	SSW-135-22-F-D-VS

Power Connector (P9)

Part Description	Manufacturer	Part Number
0.65 mm power jack	CUI	045-0883R
Mating Connector		
5.0VDC@3.6A power supply	GLOBETEK	GS-1750(R)

USB Connector (ZP1)

Part Description	Manufacturer	Part Number
USB mini-b	MOLEX	54819-0519
Mating Cable		
6’ mini USB cable	ASSMANN	AK672M/2-3

A ADSP-BF592 EZ-KIT LITE BILL OF MATERIALS

The bill of materials corresponds to "ADSP-BF592 EZ-KIT Lite Schematic" on page B-1.

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
1	1	74LVC14A SOIC14	U1	TI	74LVC14AD
2	1	IDT74FCT3244 APY SSOP20	U5	IDT	IDT74FCT3244A PYG
3	1	25MHZ OSC003	U10	EPSON	SG-8002CA MP
4	2	SN74LVC1G08 SOT23-5	U15-16	TI	SN74LVC1G08D BVR
5	1	SI4411DY SO-8	U2	VISHAY	Si4411DY-T1-E3
6	1	MIC2025-1 SOIC8	U14	DIGI-KEY	576-1057-ND
7	1	12MHZ OSC003	U11	EPSON	SG-8002CA-MP
8	1	NJT4030P SOT-223	VR2	ON SEMI	NJT4030PT1G
9	1	SI1012R SC-75A	Q1	VISHAY	SI1012R-T1-E3
10	2	SI2333DS SOT23D	Q2-3	VISHAY	SI2333DS-T1-E3
11	1	BF592 M25P16 U4	U4	NUMONYX	M25P16-VMW6G
12	1	ADM3202ARNZ SOIC16	U12	ANALOG DEVICES	ADM3202ARNZ

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
13	1	ADSP-BF592 LFCSP64_E	U18	ANALOG DEVICES	ADSP-BF592KCPZ-4
14	1	ADP1864AUJZ SOT23-6	VR1	ANALOG DEVICES	ADP1864AUJZ-R7
15	1	ADP1715 MSOP8	VR3	ANALOG	ADP1715ARMZ-R7
16	1	ADP2291 MSOP8	U9	ANALOG DEVICES	ADP2291ARMZ-R7
17	1	ADM13305-4 SOIC8	U13	ANALOG DEVICES	ADM13305-4ARZ
18	1	AD5258 MSOP10	U3	ANALOG DEVICES	AD5258BRMZ10
19	1	AD8619ARUZ TSSOP14	U6	ANALOG DEVICES	AD8619ARUZ
20	1	SSM2603 ICS009	U7	ANALOG DEVICES	SSM2603CPZ-R2
21	1	ADP121-AUJZ25 TSOT5	VR4	ANALOG DEVICES	ADP121-AUJZ25R7
22	2	DIP8 SWT016	SW1-2	C&K	TDA08H0SB1
23	1	DIP6 SWT017	SW10	CTS	218-6LPST
24	2	DIP4 SWT018	SW5-6	ITT	TDA04HOSB1
25	1	DB9 9PIN CON038	J1	NORCOMP	191-009-213-L-571
26	4	IDC 2X1 IDC2X1	JP3-4,JP7-8	FCI	90726-402HLF
27	2	IDC 3X1 IDC3X1	JP5-6	FCI	90726-403HLF
28	1	IDC 7X2 IDC7X2	P2	SAMTEC	TSW-107-07-T-D

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
29	7	IDC 2PIN_JUMPER_ SHORT	SJ1-2,SJ4-5,SJ7-9	DIGI-KEY	S9001-ND
30	1	PWR .65MM CON045	P9	DIG	CP1-023-ND
31	1	5A RESETABLE FUS005	F2	MOUSER	650-RGEF500
32	4	MOMENTARY SWT024	SW7-9,SW11	PANASONIC	EVQ-Q2K03W
33	2	IDC 25x2 IDC25x2_SMTA	P4-5	SAMTEC	TSSH-125-01-L-DV-A
34	1	IDC 35x2 IDC35x2_SMTA	P6	SAMTEC	TSSH-135-01-L-DV-A
35	1	IDC 2X1 IDC2X1_SMT	JP2	SAMTEC	TSM-102-01-T-SV
36	1	POWER 2X1 CON064	P3	WEIDMULLER	1824420000
37	1	SPDT SWT026	SW3	NKK SWITCHES	CS12ANW03
38	1	IDC 3X1 IDC3X1_SMT	JP1	SAMTEC	TSM-103-01-T-SV
39	1	ROTARY SWT027	SW4	COPAL	S-8110
40	4	YELLOW LED001	LED1-3,LED7	DIGI-KEY	P512TR-ND
41	3	100 1/10W 5% 0805	R62-63,R118	VISHAY	CRCW0805100RJNEA
42	8	600 100MHZ 200MA 0603	FER1-7,FER10	DIGI-KEY	490-1014-2-ND
43	2	600 100MHZ 500MA 1206	FER12-13	STEWARD	HZ1206B601R-10

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
44	2	10UF 16V 20% CAP002	CT3-4	PANASONIC	EEE1CA100SR
45	1	190 100MHZ 5A FER002	FER14	MURATA	DLW5BSN191SQ2
46	1	YELLOW LED009	LED6	PANASONIC	LNJ416Q8YRA
47	3	1UF 10V 10% 0805	C34,C78,C81	AVX	0805ZC105KAT2A
48	6	10UF 6.3V 10% 0805	C5,C13,C20,C23, C33,C75	AVX	08056D106KAT2A
49	1	4.7UF 6.3V 10% 0805	C62	AVX	08056D475KAT2A
50	16	0.1UF 10V 10% 0402	C9-12,C16,C19, C22,C29-32,C38-40,C55,C76	AVX	0402ZD104KAT2A
51	15	0.01UF 16V 10% 0402	C1,C3,C17-18, C21,C25-28,C35-37,C41,C56,C77	AVX	0402YC103KAT2A
52	29	10K 1/16W 5% 0402	R1,R4-6,R11-14, R18-19,R35,R42, R46-47,R49-57, R64-65,R111-112, R115,R117	VISHAY	CRCW040210K0FKED
53	1	0 1/16W 5% 0402	R99	PANASONIC	ERJ-2GE0R00X
54	9	33 1/16W 5% 0402	R2-3,R7,R9,R15, R31,R44-45,R119	VISHAY	CRCW040233R0JNEA
55	1	1A SK12 DO-214AA	D6	DIODES INC	B120B-13-F
56	4	0.1UF 16V 10% 0603	C46-47,C50,C52	AVX	0603YC104KAT2A

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
57	1	10UF 10V +80/-20% 0805	C45	PANASONIC	ECJ-2FF1A106Z
58	4	1UF 16V 10% 0603	C8,C44,C70-71	KEMET	C0603C105K4PACTU
59	1	68PF 50V 5% 0603	C63	AVX	06035A680JAT2A
60	3	4.7UF 6.3V 20% 0603	C54,C57-58	PANASONIC	ECJ-1VB0J475M
61	4	470PF 50V 5% 0603	C42-43,C49,C64	AVX	06033A471JAT2A
62	3	220UF 6.3V 20% D2E	CT1-2,CT5	SANYO	10TPE220ML
63	9	100K 1/10W 5% 0603	R66-70,R82,R86-87,R97	VISHAY	CRCW0603100KJNEA
64	5	330 1/10W 5% 0603	R48,R58-61	VISHAY	CRCW0603330RJNEA
65	3	1M 1/10W 5% 0603	R74-76	VISHAY	CRCW06031M00FNEA
66	2	0 1/10W 5% 0603	R23,R26	PHYCOMP	232270296001L
67	1	1K 1/10W 5% 0603	R88	DIGI-KEY	311-1.0KGRTR-ND
68	8	100PF 50V 5% 0603	C24,C65-68,C72-74	PANASONIC	ECJ-1VC1H101J
69	2	100 1/16W 5% 0402	R24-25	DIGI-KEY	311-100JRTR-ND
70	1	24.9K 1/10W 1% 0603	R107	DIGI-KEY	311-24.9KHTR-ND
71	4	0.05 1/2W 1% 1206	R98,R105-106,R108	SEI	CSF 1/2 0.05 1%R

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
72	3	10UF 16V 10% 1210	C51,C53,C59	AVX	1210YD106KAT2A
73	2	GREEN LED001	LED5,LED8	PANASONIC	LN1361CTR
74	1	RED LED001	LED4	PANASONIC	LN1261CTR
75	2	1000PF 50V 5% 1206	C60-61	AVX	12065A102JAT2A
76	1	255.0K 1/10W 1% 0603	R109	VISHAY	CRCW06032553FK
77	1	80.6K 1/10W 1% 0603	R110	DIGI-KEY	311-80.6KHRCT-ND
78	2	18K 1/16W 5% 0402	R92,R121	DIGI-KEY	311-18KJRCT-ND
79	2	12.0K 1/16W 1% 0402	R8,R10	DIGI-KEY	311-12.0KLRCT-ND
80	2	430 1/16W 1% 0402	R94-95	DIGI-KEY	311-430LRCT-ND
81	3	5A MBRS540T3G SMC	D5,D7-8	ON SEMI	MBRS540T3G
82	1	2.5UH 30% IND013	L1	COILCRAFT	MSS1038-252NLB
83	1	33.0K 1/16W 1% 0402	R17	ROHM	MCR01MZPF3302
84	5	47.0K 1/16W 1% 0402	R22,R32,R38-40	ROHM	MCR01MZPF4702
85	1	5.6K 1/16W 5% 0402	R36	PANASONIC	ERJ-2GEJ562X
86	1	1.0K 1/16W 1% 0402	R100	PANASONIC	ERJ-2RKF1001X
87	2	1UF 50V 10% 0603	C82-83	DIGI-KEY	587-1257-2-ND

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
88	3	220PF 50V 10% 0402	C2,C6,C15	DIGI-KEY	311-1035-2-ND
89	4	5.6K 1/16W 0.5% 0402	R28-30,R37	SUSUMU	RR0510P-562-D
90	2	680 1/16W 1% 0402	R41,R90	BC COMPO-NENTS	2312 275 16801
91	1	90.9K 1/16W 5% 0402	R34	DIGI-KEY	541-90.9KLCT-ND
92	1	40.2K 1/16W 5% 0402	R33	DIGI-KEY	541-40.2KLCT-ND
93	3	100K 1/16W 5% 0402	R16,R43,R81	DIGI-KEY	541-100KJTR-ND
94	1	2.2UF 25V 10% 0805	C48	DIGI-KEY	490-3331-1-ND
95	6	1.00K 1/10W 0.1% 0603	R71-73,R83,R85, R93	DIGI-KEY	RG16P1.0KBCT-ND
96	1	0.2 1/4W 1% 0805	R84	SUSUMU	RL1220S-R20-F
97	1	40K 1/16W 0.1% 0402	R89	STACKPOLE	RNC 10 T9 40K 0.1% R
98	1	1.8M 1/16W 1% 0402	R91	DIGI-KEY	541-1.80MLCT-ND
99	1	10K 1/100W 1% THERMAT-2	R114	SEMITEC	103AT-2
100	1	76.8K 1/16W 1% 0402	R120	DIGI-KEY	541-76.8KLCT-ND
101	1	1.2K 1/16W 1% 0402	R103	VISHAY	CRCW04021K20FK ED
102	2	4.3 1/4W 5% 1206	R101,R104	PANASONIC	ERJ-8GEYJ4R3V

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
103	1	2.67K 1/16W 1% 0402	R102	PANASONIC	ERJ-2RKF2671X
104	3	1.0M 1/16W 1% 0402	R20-21,R27	VISHAY	CRCW04021M00FKED
105	1	0.02 1/2W 1% 1206	R80	OHMITE	LVK12R020FER
106	1	15K 1/16W 5% 0402	R96	PANASONIC	ERJ-2GEJ153X
107	3	330 100MHZ 1.5A 0805	FER8-9,FER11	MURATA	BLM21PG331SN1D
108	2	30A GSOT05 SOT23-3	D2-3	VISHAY	GSOT05-GS08
109	1	30A GSOT03 SOT23-3	D4	VISHAY	GSOT03-GS08
110	1	7A VESD01-02V-GS08 SOD-52	D1	VISHAY	VESD01-02V-GS08

ADSP-B
S

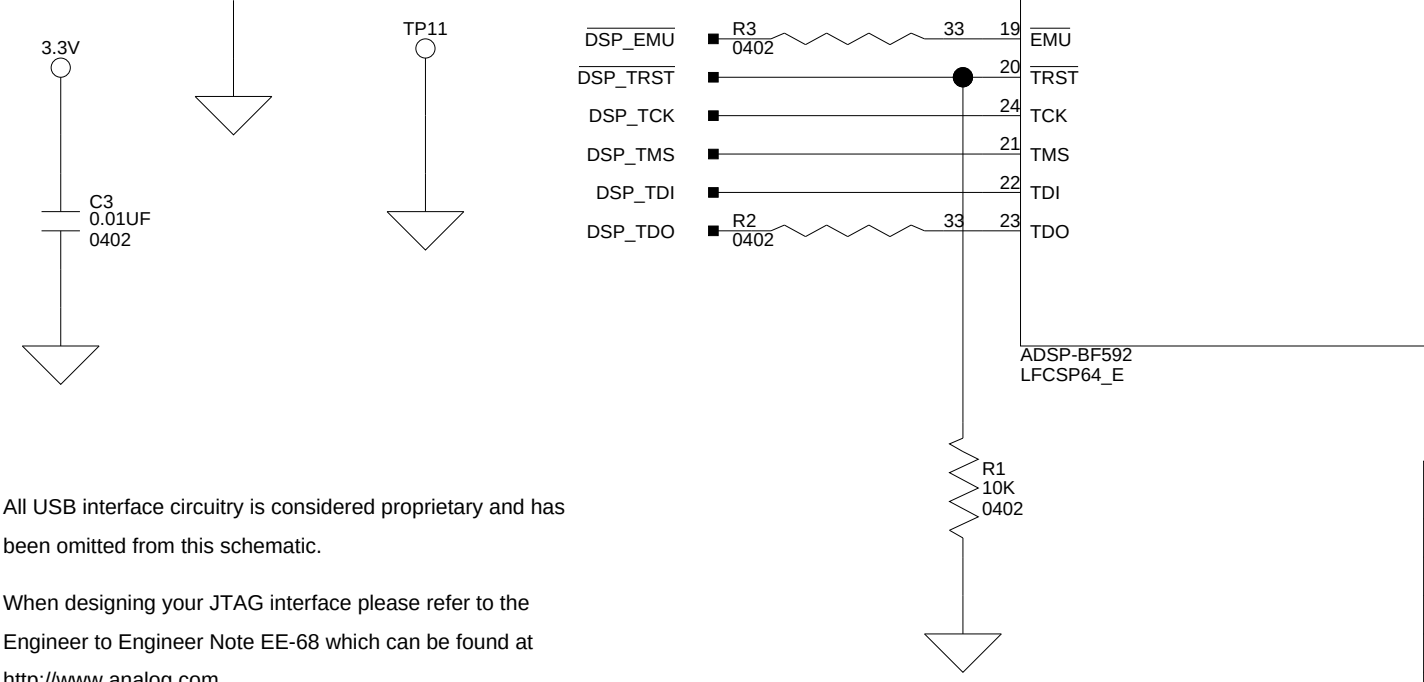
2

3

4

A

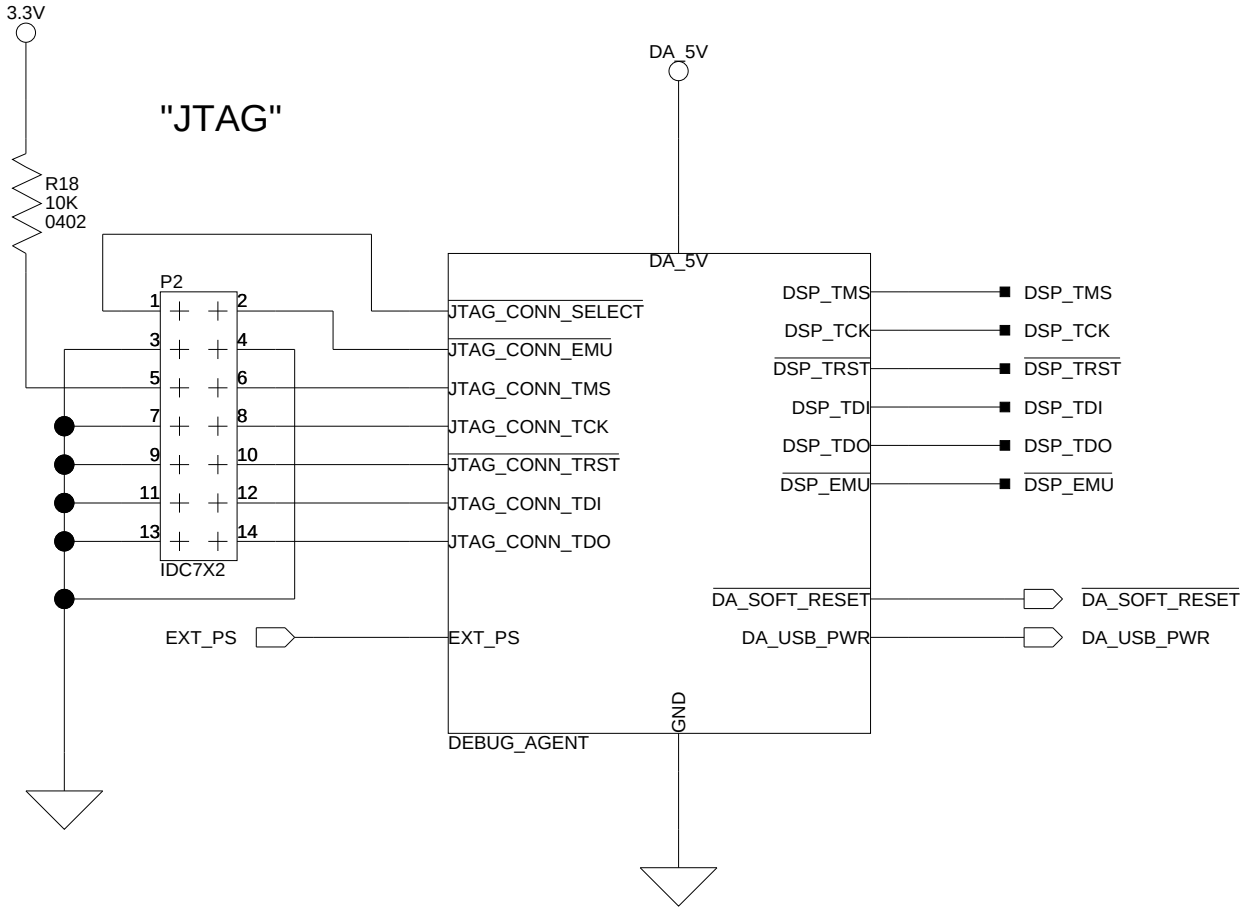
B

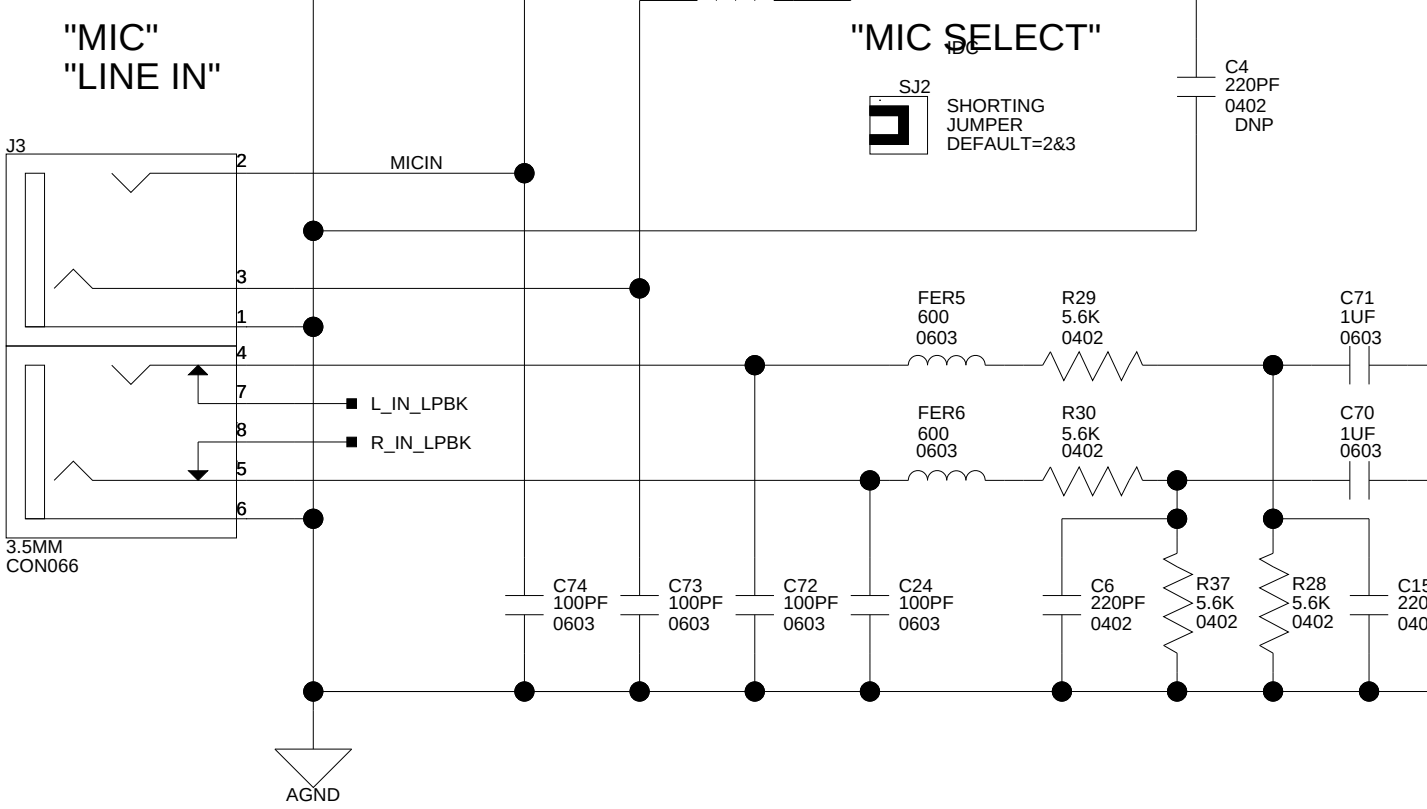


All USB interface circuitry is considered proprietary and has been omitted from this schematic.

When designing your JTAG interface please refer to the Engineer to Engineer Note EE-68 which can be found at http://www.analog.com

Default





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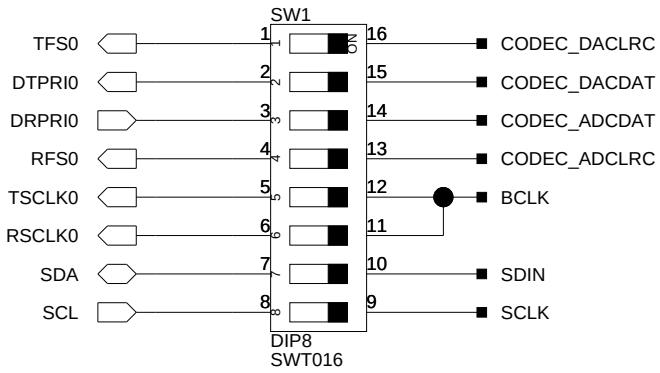
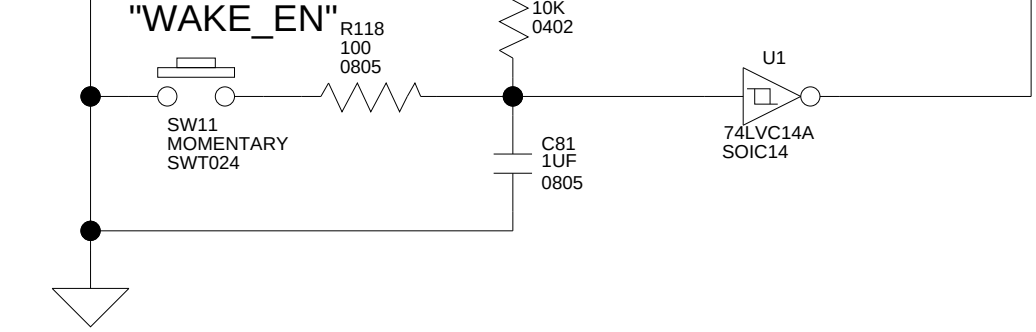
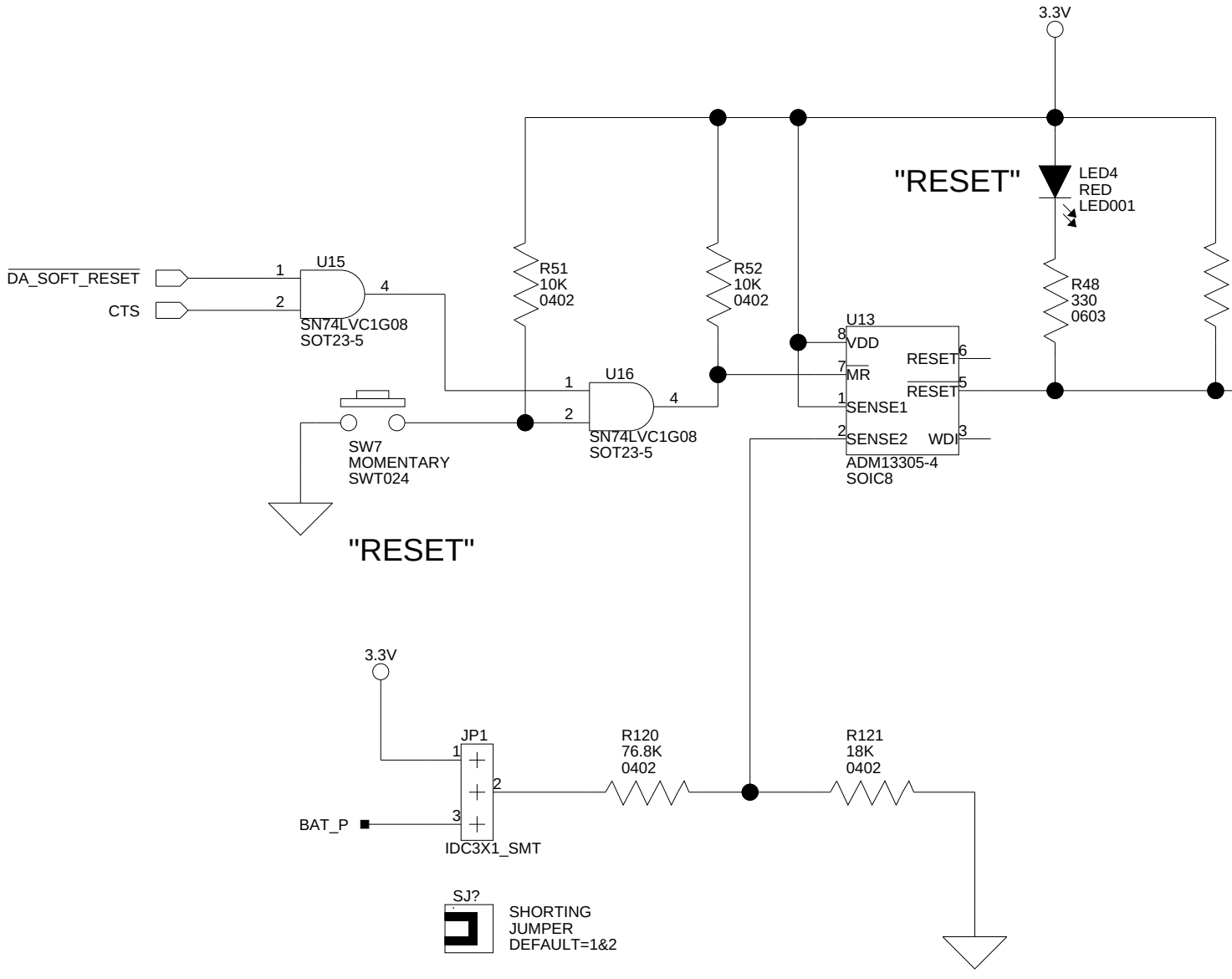
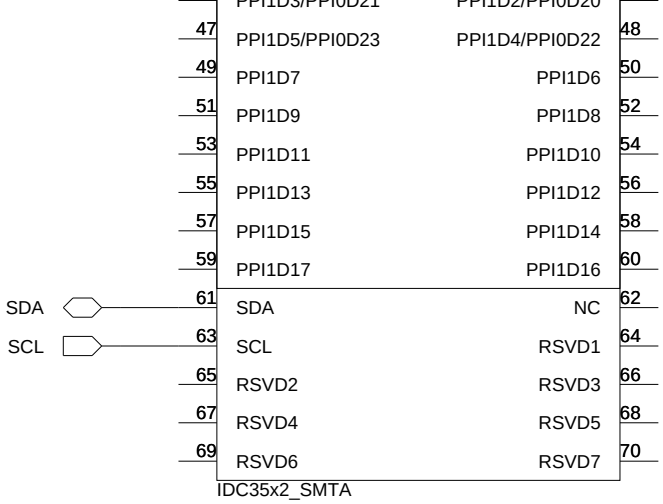


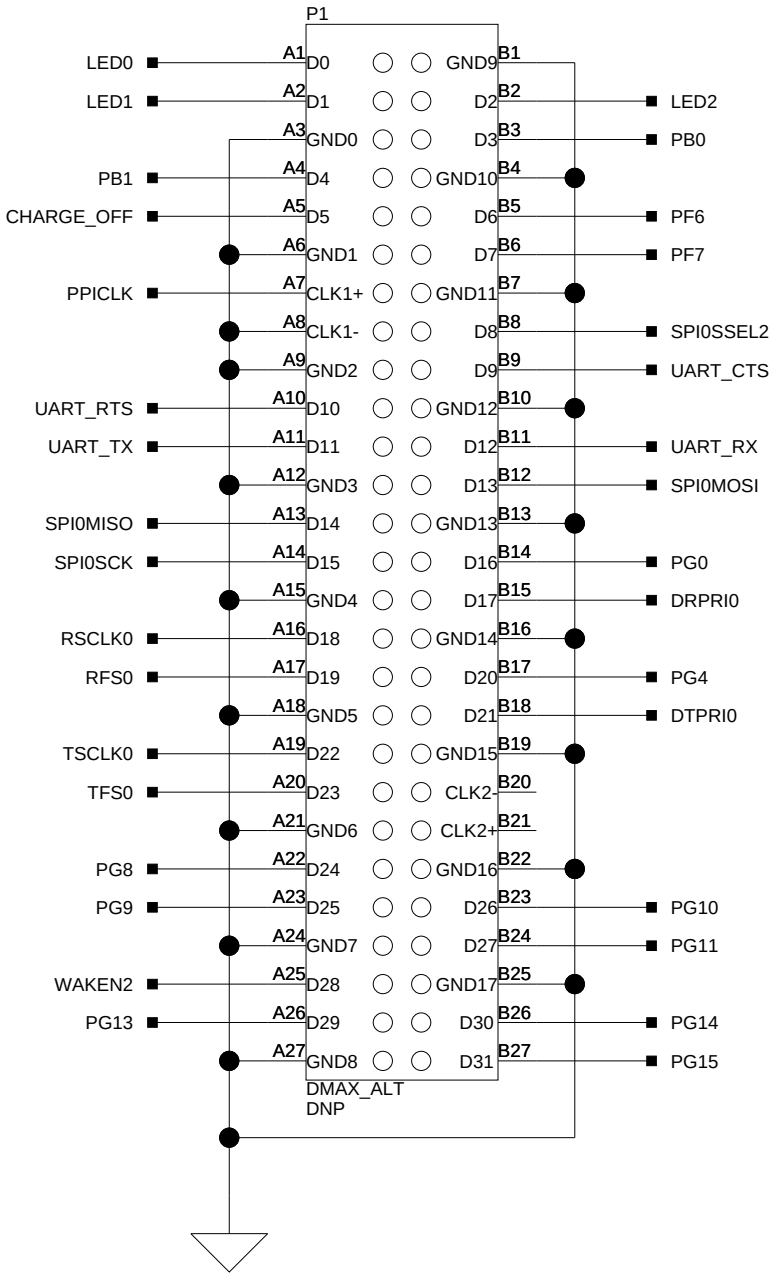
SW1 disconnects DSP from AUDIO CODEC

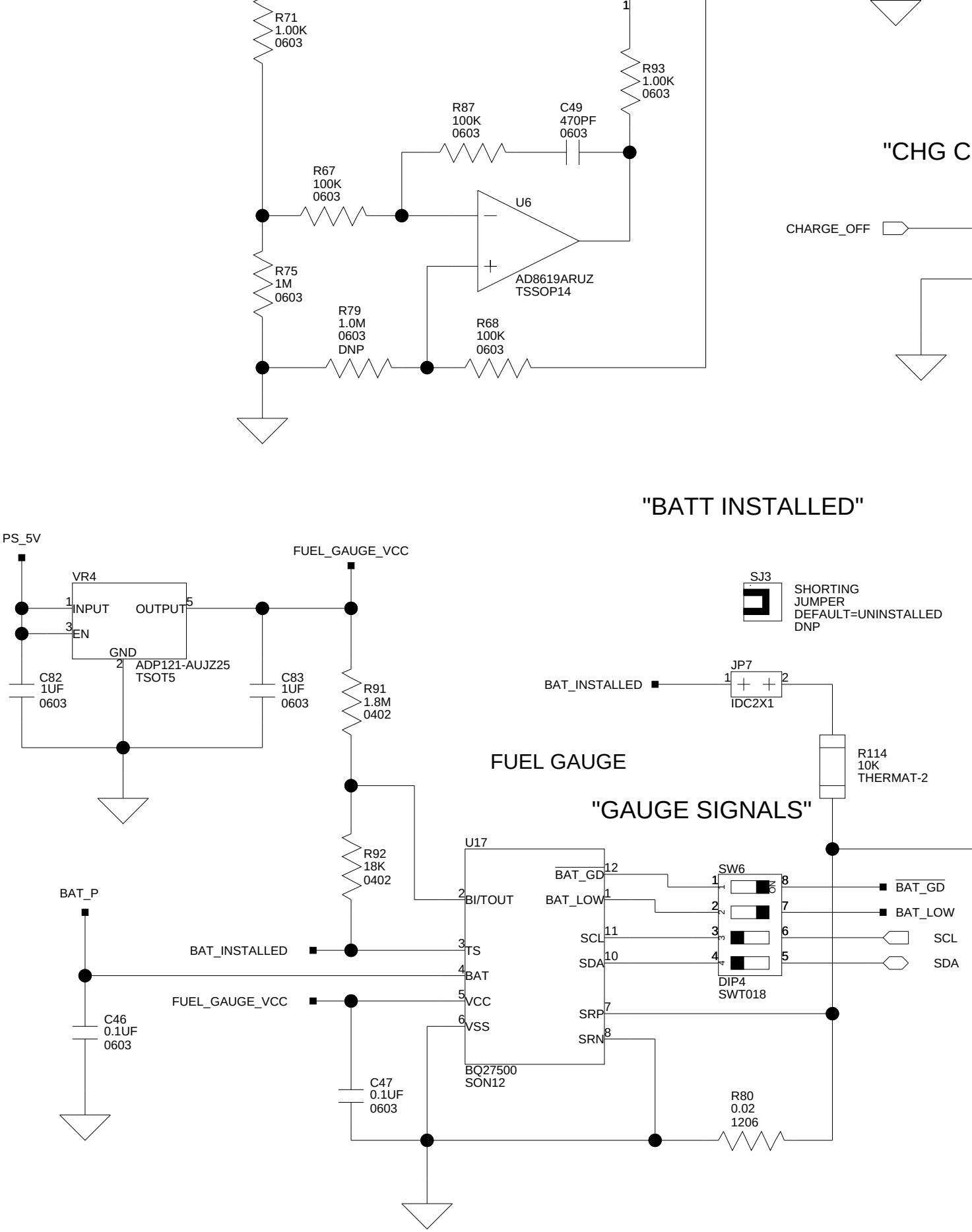

"WAKE_EN"
R118
100
0805
SW11
MOMENTARY
SWT024
10K
0402
C81
1UF
0805
U1
74LVC14A
SOIC14

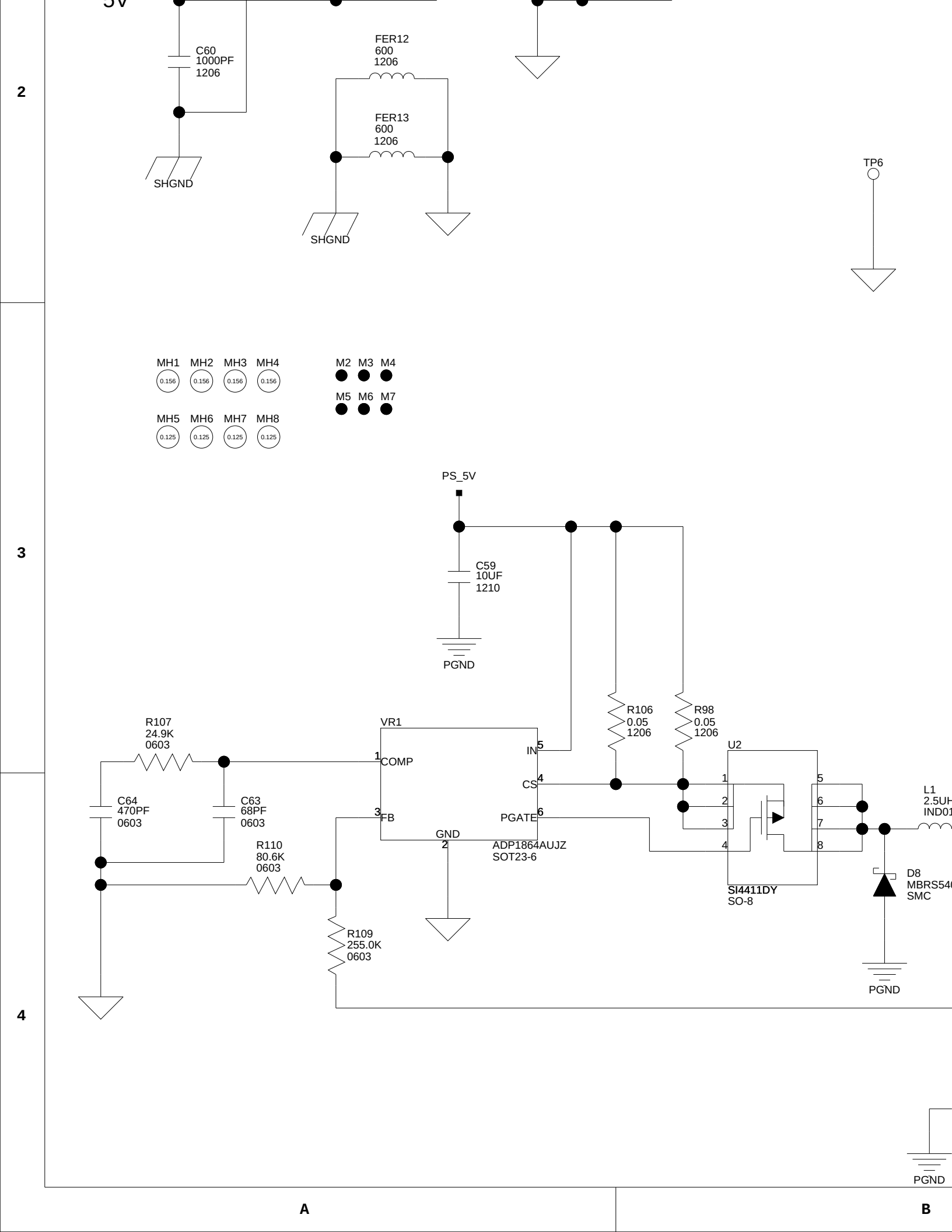

3.3V
"RESET"
LED4
RED
LED001
DA_SOFT_RESET
CTS
U15
SN74LVC1G08
SOT23-5
R51
10K
0402
R52
10K
0402
R48
330
0603
U16
SN74LVC1G08
SOT23-5
U13
VDD
MR
SENSE1
SENSE2
RESET
RESET
WDI
ADM13305-4
SOIC8
SW7
MOMENTARY
SWT024
"RESET"

3.3V
JP1
BAT_P
IDC3X1_SMT
R120
76.8K
0402
R121
18K
0402
SJ?
SHORTING
JUMPER
DEFAULT=1&2


PPI1D3/PPI0D21
PPI1D2/PPI0D20
47
PPI1D5/PPI0D23
48
PPI1D4/PPI0D22
49
PPI1D7
50
PPI1D6
51
PPI1D9
52
PPI1D8
53
PPI1D11
54
PPI1D10
55
PPI1D13
56
PPI1D12
57
PPI1D15
58
PPI1D14
59
PPI1D17
60
PPI1D16
SDA
61
SDA
62
NC
SCL
63
SCL
64
RSVD1
65
RSVD2
66
RSVD3
67
RSVD4
68
RSVD5
69
RSVD6
70
RSVD7
IDC35x2_SMTA


P1
LED0
A1
D0
GND9
B1
LED1
A2
D1
D2
B2
LED2
A3
GND0
D3
B3
PB0
PB1
A4
D4
GND10
B4
CHARGE_OFF
A5
D5
D6
B5
PF6
A6
GND1
D7
B6
PF7
PPICLK
A7
CLK1+
GND11
B7
A8
CLK1-
D8
B8
SPI0SSEL2
A9
GND2
D9
B9
UART_CTS
UART_RTS
A10
D10
GND12
B10
UART_TX
A11
D11
D12
B11
UART_RX
A12
GND3
D13
B12
SPI0MOSI
SPI0MISO
A13
D14
GND13
B13
SPI0SCK
A14
D15
D16
B14
PG0
A15
GND4
D17
B15
DRPRI0
RSCLK0
A16
D18
GND14
B16
RFS0
A17
D19
D20
B17
PG4
A18
GND5
D21
B18
DTPRI0
TSCLK0
A19
D22
GND15
B19
TFS0
A20
D23
CLK2-
B20
A21
GND6
CLK2+
B21
PG8
A22
D24
GND16
B22
PG9
A23
D25
D26
B23
PG10
A24
GND7
D27
B24
PG11
WAKEN2
A25
D28
GND17
B25
PG13
A26
D29
D30
B26
PG14
A27
GND8
D31
B27
PG15
DMAX_ALT
DNP


R71
1.00K
0603
R93
1.00K
0603
R87
100K
0603
C49
470PF
0603
R67
100K
0603
U6
R75
1M
0603
AD8619ARUZ
TSSOP14
R79
1.0M
0603
DNP
R68
100K
0603
"CHG C
CHARGE_OFF
"BATT INSTALLED"
PS_5V
FUEL_GAUGE_VCC
VR4
INPUT
OUTPUT
EN
GND
ADP121-AUJZ25
TSOT5
C82
1UF
0603
C83
1UF
0603
R91
1.8M
0402
SJ3
SHORTING
JUMPER
DEFAULT=UNINSTALLED
DNP
BAT_INSTALLED
JP7
IDC2X1
FUEL GAUGE
R114
10K
THERMAT-2
"GAUGE SIGNALS"
R92
18K
0402
U17
BAT_P
BI/TOUT
TS
BAT
VCC
VSS
BAT_GD
BAT_LOW
SCL
SDA
SRP
SRN
SW6
DIP4
SWT018
C46
0.1UF
0603
C47
0.1UF
0603
BQ27500
SON12
R80
0.02
1206
FUEL GAUGE ADDRESS 0xAA


5V
C60
1000PF
1206
SHGND
FER12
600
1206
FER13
600
1206
SHGND
TP6
MH1 MH2 MH3 MH4
0.156 0.156 0.156 0.156
MH5 MH6 MH7 MH8
0.125 0.125 0.125 0.125
M2 M3 M4
M5 M6 M7
PS_5V
C59
10UF
1210
PGND
R107
24.9K
0603
C64
470PF
0603
C63
68PF
0603
R110
80.6K
0603
R109
255.0K
0603
VR1
1 COMP
3 FB
GND 2
IN 5
CS 4
PGATE 6
ADP1864AUJZ
SOT23-6
R106
0.05
1206
R98
0.05
1206
U2
1 2 3 4
5 6 7 8
SI4411DY
SO-8
L1
2.5UH
IND01
D8
MBRS540
SMC
PGND
PGND
2
3
4
A
B

I INDEX

Index

U

V

W

Index

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