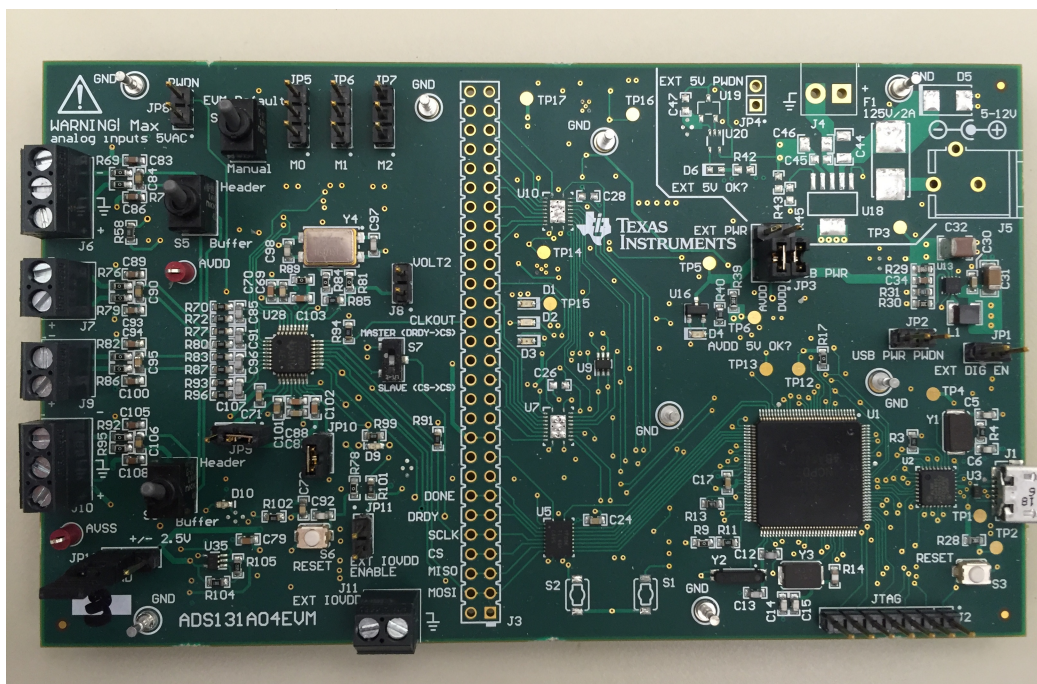


## ADS131A04 Evaluation Module User's Guide



**Figure 1. ADS131A04 Evaluation Module**

The ADS131A04EVM is an evaluation module kit that provides hardware and software support for evaluation of the ADS131A04 delta-sigma analog-to-digital converter (ADC). The kit utilizes the TM4C1294NCPDT processor to communicate with the ADC via SPI and provide communication with a PC over USB interface. The kit also includes a software application that runs on a PC allowing for register manipulation and data collection from the ADC.

**Table 1. Related Documentation**

| Device                    | Literature Number       |
|---------------------------|-------------------------|
| <a href="#">ADS131A04</a> | <a href="#">SBAS590</a> |



### **WARNING**

**This EVM is not intended for high voltage connections. Do not connect inputs of this EVM to voltages higher than 5 VAC to minimize shock hazard.**

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## 1 EVM Overview

The ADS131A04EVM is an evaluation module kit that provides hardware and software support for evaluation of the ADS131A04 delta-sigma analog-to-digital converter (ADC). The kit utilizes the TM4C1294NCPDT processor to communicate with the ADC via SPI and provide communication with a PC over USB interface. The kit also includes a software application that runs on a PC allowing for register manipulation and data collection from the ADC.

### 1.1 Software Requirements

PC with Microsoft® Windows® 7 or higher operating system.

### 1.2 Hardware Requirements

PC with available USB connection.

#### 1.2.1 Power Supply

- USB powered
- (Optional) Lab supply for AVDD and IOVDD

### 1.3 Software Reference

Refer to the *PA Delta-Sigma Evaluation Software User's Guide* ([SBAU260](#)) for the core software documentation or use the *Menu* option on the software tab.

### 1.4 Supported Functionality

#### 1.4.1 Supported Hardware Functionality

- Bipolar ( $\pm 2.5$  V) and Unipolar (3.3 V and GND) AVDD and AVSS supply operation
- Header for external IOVDD
- Fully-differential or single-ended buffers on two channels
- Digital header for external processor or controller configuration
- Configurable to all interface mode options
- On-board or external ADC clock operation
- On-board or external ADC voltage reference

#### 1.4.2 Supported Software Functionality

- Bipolar ( $\pm 2.5$  V) and unipolar (3.3 V and GND) AVDD and AVSS supply operation
- 24-bit asynchronous slave mode operation
- CRC error detection ON/OFF

## 2 Quick Start

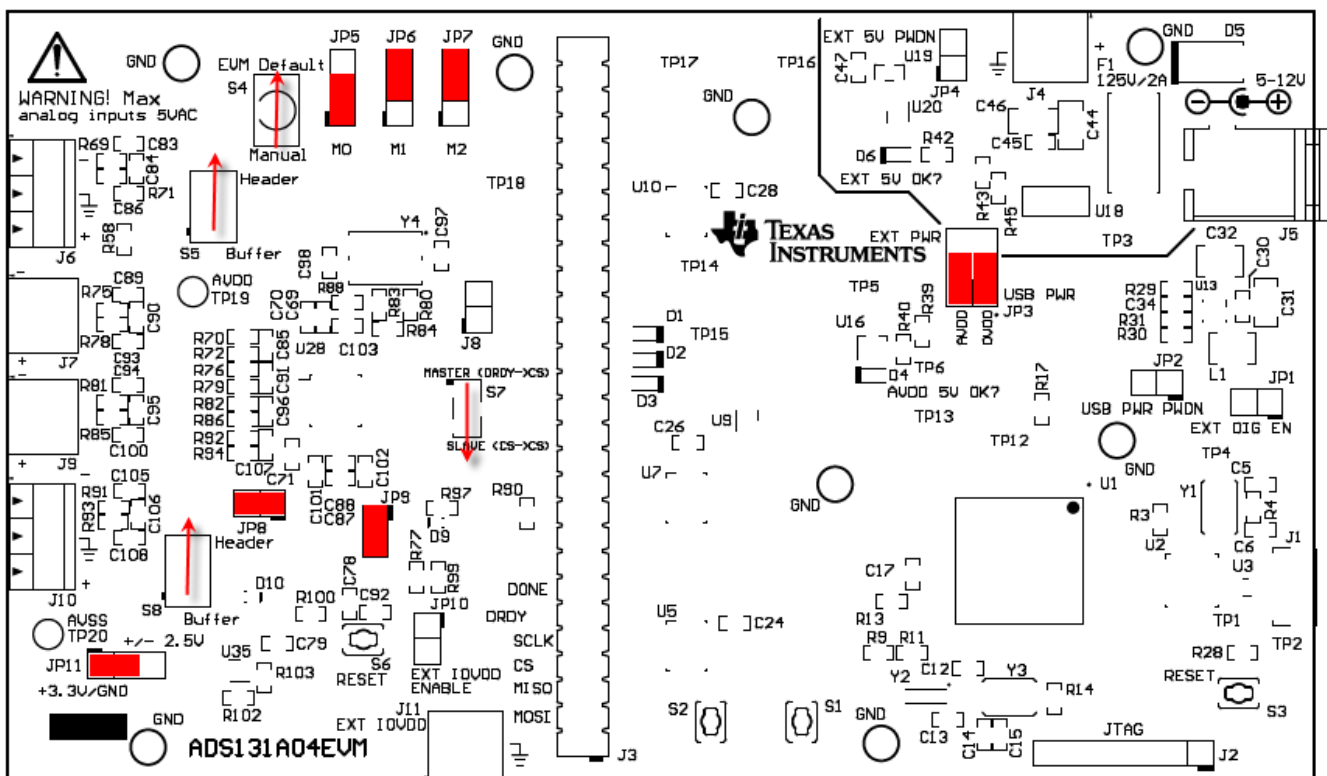
This section provides a guide to quickly begin using the EVM.

## 2.1 Default Jumper and Switch Configuration

The EVM should come configured with the settings listed in [Table 2](#) and illustrated in [Figure 2](#).

### Table 2. Default Settings

| Jumper        | Position      | Function                                                   |
|---------------|---------------|------------------------------------------------------------|
| JP1           | Not Installed | Use on-board processor                                     |
| JP2           | Not Installed | USB derived supplies ON                                    |
| JP3 - DVDD    | 1-3           | DVDD from USB supply                                       |
| JP3 - AVDD    | 2-4           | AVDD from USB supply                                       |
| JP5           | 1-2           | Sets M0 pin (valid with S4 set to <i>Manual</i> )          |
| JP6           | 2-3           | Sets M1 pin (valid with S4 set to <i>Manual</i> )          |
| JP7           | 2-3           | Sets M2 pin (valid with S4 set to <i>Manual</i> )          |
| JP8           | Installed     | Charge pump connected to AVSS                              |
| JP9           | Installed     | Use on-board external voltage reference                    |
| JP10          | Not Installed | Use on-board IOVDD supply                                  |
| JP11          | 1-2           | Select single-supply operation (3.3 V/GND)                 |
| <b>Switch</b> |               |                                                            |
| S4            | Up            | Set Mx pin for operation with software                     |
| S5            | Up            | Channel 1 connected to J1 header                           |
| S7            | Down          | Device interface connected for <i>SLAVE</i> mode operation |
| S8            | Up            | Channel 4 connected to J7 header                           |



### Figure 2. ADS131A04 EVM

## 2.2 Power Connection

The EVM is powered via the USB interface with the PC. Connect the EVM to a USB connector on your PC to power the board.

## 2.3 Startup

Use the following steps at startup:

1. Install the core application software onto your PC.
2. Install the correct device package onto your PC.
3. Ensure all jumpers and switches are configured in the default configuration per [Table 2](#) and [Figure 2](#).
4. Connect the EVM to your PC using a USB cable.
5. Install drivers (if necessary).
6. Start the software on your PC.

---

**NOTE:** The device has powered correctly if D1 and D2 are both lit green.

---

## 3 Hardware Reference

### 3.1 Jumper and Switch Configuration Reference

[Table 3](#) provides all jumper and switch configuration settings for the EVM.

**Table 3. Jumper and Switch Options**

| Jumper | Position                                                                                                                                             | Description                                                                          |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| JP1    | Operation of EVM with external digital stimulus                                                                                                      |                                                                                      |
|        | Installed (ON)                                                                                                                                       | Hold processor in reset and disables level shifter to allow external digital signals |
|        | Uninstalled (OFF)                                                                                                                                    | Normal operation with on-board processor                                             |
| JP2    | Power down USB power supplies                                                                                                                        |                                                                                      |
|        | Installed (ON)                                                                                                                                       | USB-derived power supplies powered down                                              |
|        | Uninstalled (OFF)                                                                                                                                    | USB-derived power supplies ON                                                        |
| JP3    | AVDD and DVDD supply connections:                                                                                                                    |                                                                                      |
|        | <ul style="list-style-type: none"> <li>• Pins 1, 3, and 5 control the DVDD connection</li> <li>• Pins 2, 4, and 6 control AVDD connection</li> </ul> |                                                                                      |
|        | 1-3 shorted (DVDD)                                                                                                                                   | Connect DVDD to USB power                                                            |
|        | 3-5 shorted (DVDD)                                                                                                                                   | Connect DVDD to external power                                                       |
|        | 2-4 shorted (AVDD)                                                                                                                                   | Connect AVDD to USB power                                                            |
| JP5    | M0 control                                                                                                                                           |                                                                                      |
|        | 1-2                                                                                                                                                  | M0 pin connected to IOVDD                                                            |
|        | 2-3                                                                                                                                                  | M0 pin connected to DGND                                                             |
|        | Open                                                                                                                                                 | M0 pin floating                                                                      |
| JP6    | M1 control                                                                                                                                           |                                                                                      |
|        | 1-2                                                                                                                                                  | M1 pin connected to IOVDD                                                            |
|        | 2-3                                                                                                                                                  | M1 pin connected to DGND                                                             |
|        | Open                                                                                                                                                 | M1 pin floating                                                                      |
| JP7    | M2 control                                                                                                                                           |                                                                                      |
|        | 1-2                                                                                                                                                  | M2 pin connected to IOVDD                                                            |
|        | 2-3                                                                                                                                                  | M2 pin connected to DGND                                                             |
|        | Open                                                                                                                                                 | M2 pin floating                                                                      |

**Table 3. Jumper and Switch Options (continued)**

| Jumper        | Position                                                 | Description                                                       |
|---------------|----------------------------------------------------------|-------------------------------------------------------------------|
| JP8           | Negative charge-pump connection to AVSS                  |                                                                   |
|               | Installed (ON)                                           | Charge pump is OFF (software)                                     |
|               | Uninstalled (OFF)                                        | Charge pump up is ON (software)                                   |
| J8            | N/A                                                      | External clock input                                              |
| JP9           | ADC reference connection                                 |                                                                   |
|               | Installed (ON)                                           | Use EVM reference and buffer                                      |
|               | Uninstalled (OFF)                                        | Use external reference                                            |
| JP10          | IOVDD power selection                                    |                                                                   |
|               | Installed (ON)                                           | J11 supply voltage                                                |
|               | Uninstalled (OFF)                                        | On-board generated IOVDD                                          |
| JP11          | ADC supply selector (AVDD and AVSS)                      |                                                                   |
|               | 1-2                                                      | Use 3.3-V/GND supplies                                            |
|               | 2-3                                                      | Use $\pm 2.5$ -V supplies                                         |
| <b>Switch</b> |                                                          |                                                                   |
| S3            | Processor <i>RESET</i> button (press to reset processor) |                                                                   |
| S4            | ADC Mx pin configuration                                 |                                                                   |
|               | Down                                                     | Mx manually controlled via JP5-7                                  |
|               | Up                                                       | 3 Mx pin configured for compatibility with EVM software           |
| S5            | ADC IN1 connection                                       |                                                                   |
|               | Up                                                       | Inputs connected to terminal blocks                               |
|               | Down                                                     | Inputs connected to buffers                                       |
| S6            | ADS131A04 <i>RESET</i> button (press to reset ADC)       |                                                                   |
| S7            | Master/Slave interface connection                        |                                                                   |
|               | Down                                                     | Interface configured for device is master (DRDY $\rightarrow$ CS) |
|               | Up                                                       | Interface configured for device is slave (CS $\rightarrow$ CS)    |
| S8            | ADC IN4 connection                                       |                                                                   |
|               | Up                                                       | Inputs connected to terminal blocks                               |
|               | Down                                                     | Inputs connected to buffers                                       |

## 3.2 Header and Connector Reference

This section provides the connection information and detail for all of the headers and connectors on the EVM hardware.

### 3.2.1 JTAG Header

The J2 header is provided for programming the on-board processor with firmware updates or user firmware. Exercise care when using the JTAG since it is possible to erase the EVM firmware and not be able to communicate with the EVM software application. [Table 4](#) shows the J2 header functions.

**Table 4. JTAG Header, J2**

| Function                      | Signal Name | Pin |
|-------------------------------|-------------|-----|
| Processor <i>RESET</i> Signal | RESET       | 1   |
| JTAG test data out signal     | TDO         | 2   |
| JTAG test data in signal      | TDI         | 3   |
| JTAG test mode select signal  | TMS         | 4   |
| JTAG test clock signal        | TCK         | 5   |
| Debug UART receive signal     | RX          | 6   |
| Debug UART transmit signal    | TX          | 7   |

### 3.2.2 Analog Input Headers

J6, J7, J9, and J10 provide headers to connect external analog signals to the EVM for evaluation purposes. The functions for these headers are listed in [Table 5](#) through [Table 8](#).



## WARNING

This EVM is not intended for connection to high voltage. Do not connect inputs of this EVM to voltages higher than 5 VAC to minimize shock hazard.

**Table 5. Analog Input Header, J6**

| Function                     | Signal Name | Pin |
|------------------------------|-------------|-----|
| Analog input – to ADC/op amp | IN1–        | 1   |
| Ground                       | GND         | 2   |
| Analog input + to ADC/op amp | IN1+        | 3   |

**Table 6. Analog Input Header, J7**

| Function                     | Signal Name | Pin |
|------------------------------|-------------|-----|
| Analog input – to ADC/op amp | IN2–        | 1   |
| Analog input + to ADC/op amp | IN2+        | 2   |

**Table 7. Analog Input Header, J9**

| Function                     | Signal Name | Pin |
|------------------------------|-------------|-----|
| Analog input – to ADC/op amp | IN3–        | 1   |
| Analog input + to ADC/op amp | IN3+        | 2   |

**Table 8. Analog Input Header, J10**

| Function                     | Signal Name | Pin |
|------------------------------|-------------|-----|
| Analog input – to ADC/op amp | IN4–        | 1   |
| Ground                       | GND         | 2   |
| Analog input + to ADC/op amp | IN4+        | 3   |

### 3.2.3 External IOVDD Connection

The EVM provides the capability to connect an external supply for IOVDD (see [Table 9](#)).

**Table 9. External IOVDD Header, J11**

| Function       | Signal Name | Pin |
|----------------|-------------|-----|
| External IOVDD | IOVDD       | 1   |
| Ground         | GND         | 2   |

### 3.2.4 Digital Interface Header

Table 10 lists the functions and signals for the digital interface.

**Table 10. Digital Interface, J3**

| Function                    | Signal Name       | Pin Number                    |                         |
|-----------------------------|-------------------|-------------------------------|-------------------------|
|                             |                   | Processor Side <sup>(1)</sup> | ADC Side <sup>(2)</sup> |
| No Connect                  | NA                | 1                             | 2                       |
| SPI 0                       | MISO              | 3                             | 4                       |
|                             | MOSI              | 5                             | 6                       |
|                             | $\overline{CS}$   | 7                             | 8                       |
|                             | SCLK              | 9                             | 10                      |
|                             | $\overline{DRDY}$ | 11                            | 12                      |
|                             | $\overline{DONE}$ | 13                            | 14                      |
| Bank1 level shifter voltage | IOVDD             | 19                            | 20                      |
| Bank2 level shifter voltage | IOVDD             | 37                            | 38                      |
| Bank3 level shifter voltage | IOVDD             | 55                            | 56                      |

<sup>(1)</sup> Odd numbered pins not included are connected to microprocessor inputs whose functionality is not used for this EVM. See Figure 10 for connection details.

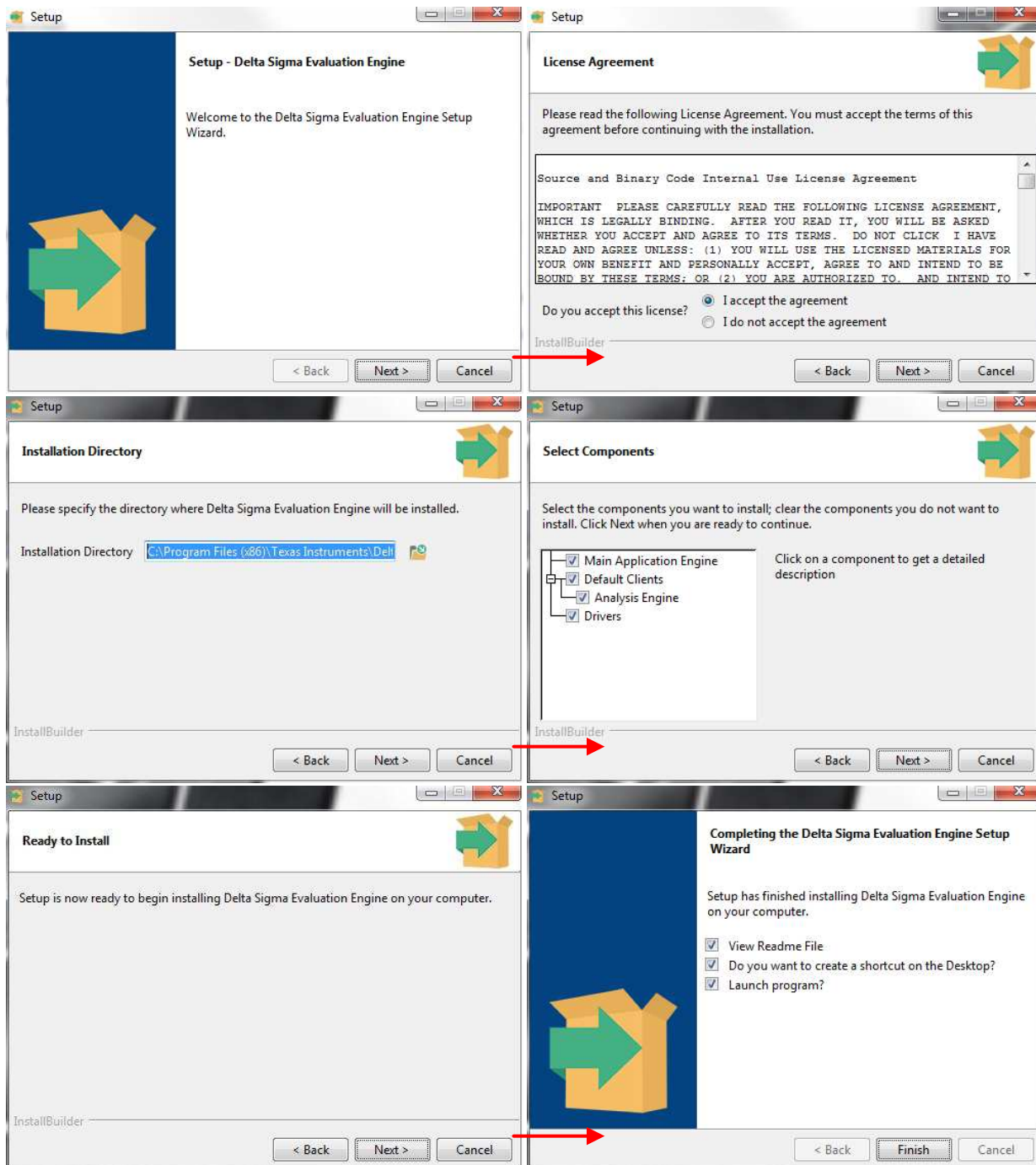
<sup>(2)</sup> Even numbered pins not included are not connected.

## 4 Software Details

### 4.1 Installing the Software

#### 4.1.1 Delta-Sigma Evaluation Engine

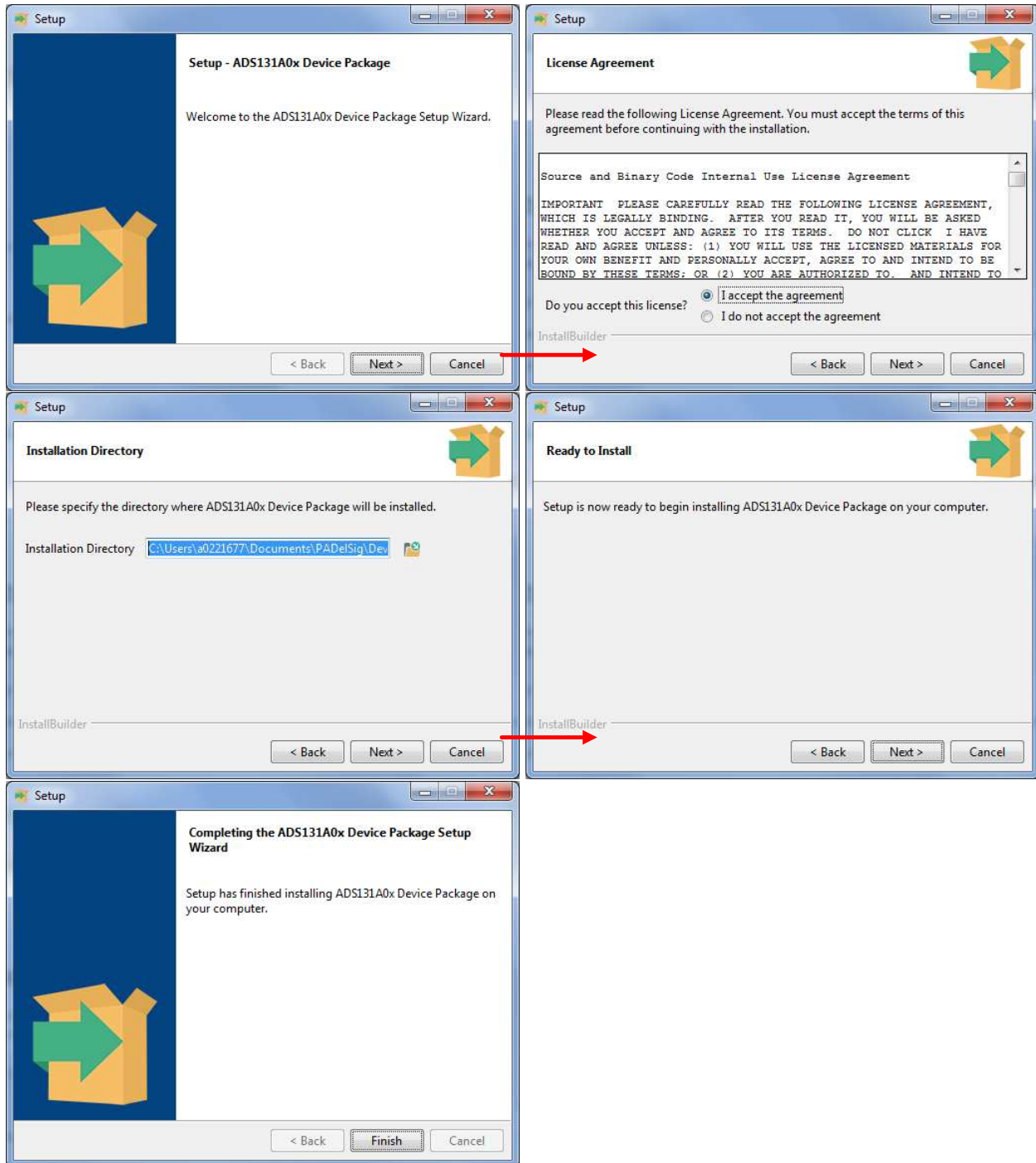
Download the *Delta-Sigma ADC Evaluation Software* installer from the [EVM tool page](#) and save to a known folder. Run the installer and follow the on-screen prompts. Note that future software versions may show slightly different screens.



**Figure 3. Delta-Sigma Evaluation Engine Installation Instructions**

### 4.1.2 ADS131A04 Device Package

Download the *ADS131A04 device package* installer from the [EVM tool page](#) and save to a known folder. Run the *ADS131A04 device package* installer and follow the on-screen prompts. Note that future software versions may show slightly different screens.



**Figure 4. ADS131A04 Device Package Installation Instructions**

## 4.2 Connecting to the EVM Hardware

After the *Delta-Sigma ADC Evaluation Software* and the ADS131A04 device package are installed, ensure that all jumpers and switches are in their default positions per [Table 2](#), and then connect the hardware with the provided USB mini cable. Start the *Delta-Sigma Evaluation Engine*. The GUI automatically detects the connected hardware and displays the device register map under the *Main* tab as shown in [Figure 5](#).

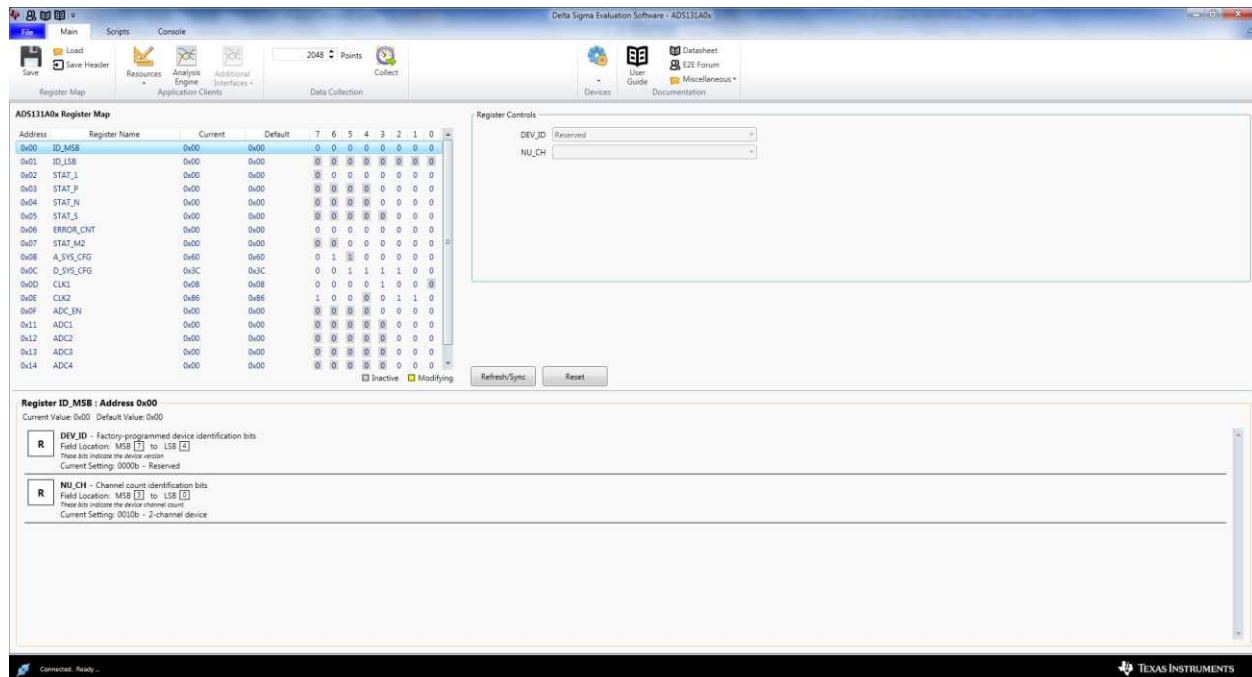


Figure 5. ADS131A04 Main Tab

## 4.3 Using the Software With the ADS131A04EVM

This section covers the functionality of the ADS127L01 device package only. For more information about the *Delta-Sigma Evaluation Engine*, refer to the *PA Delta-Sigma Evaluation Software User's Guide* ([SBAU260](#)).

Upon startup, the GUI scans for the connected hardware. Once the ADS131A04EVM is plugged in, the *Main* tab refreshes to display the ADS131A04 *Register Map* as shown in [Figure 5](#). The *Main* tab also grants user control over register settings and provides a detailed description for the current values in each register.

### 4.3.1 Data Collection

Data is collected through the analysis engine client which is accessed by clicking the corresponding icon in the upper left area in the *Main* tab. Details about data collection and saving collected data to a file are given in the *PA Delta-Sigma Software User's Guide*.

### 4.3.2 ADS131A04-Specific Commands

[Table 11](#) shows the ADS131A04-specific commands that can be used in the *Scripts* tab. For more information about scripts, refer to the *PA Delta-Sigma Evaluation Software User's Guide* ([SBAU260](#)).

**Table 11. ADS131A04 EVM Device-Specific Software Commands**

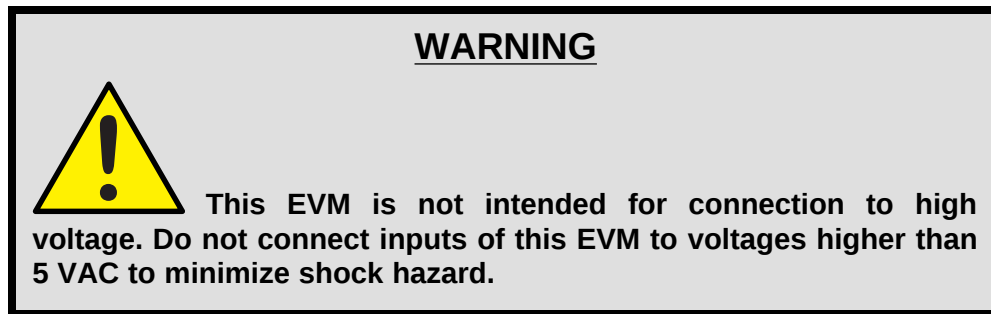
| Command | Description                                                                          | Format                            |
|---------|--------------------------------------------------------------------------------------|-----------------------------------|
| NULL    | Null command                                                                         | NULL                              |
| RESET   | Software reset - forces device in a POR state                                        | RESET                             |
| STANDBY | Enter a low power state                                                              | STANDBY                           |
| WAKEUP  | Wakeup from reset or standby mode                                                    | WAKEUP                            |
| LOCK    | Ignore all communication except UNLOCK                                               | LOCK                              |
| UNLOCK  | Bring device out of LOCK                                                             | UNLOCK                            |
| RREGS   | Read <number> registers beginning at <address>                                       | RREG <address> <number>           |
| WREG    | Write register <address> with <data>                                                 | WREG <address> <data>             |
| WREGS   | Write registers beginning with <address> with all data listed beginning with <data0> | WREG <address> <data0> <data1>... |

## 5 EVM Hardware Details

### 5.1 Analog Inputs

The analog inputs to the EVM can be connected at the terminal blocks located on the left side of the board (J6, J7, J9, and J10).

J6 (ADC IN1 channel) provides an optional fully-differential buffer that can be installed to evaluate the effects of a buffered input channel. J10 (ADC IN4 channel) provides an optional buffer that can be installed to evaluate the effects of a single-ended buffered input channel.



### 5.2 Digital Inputs

Access the digital signals of the device via J3. This header allows for the connection to a logic analyzer or when the EVM is used in a stand-alone configuration for connections to the microprocessor or microcontroller.

If controlling the ADS131A04 with an external processor is desired, power down the onboard TM4C1294NCPDT by placing a jumper on JP1.

### 5.3 Clock

By default, a clock is supplied to the ADC via an external 16.384-MHz crystal.

To connect an external clock to the device, do the following:

1. Remove R80 and R83, if they are populated.
2. Connect the external clock to JP5 pin 1.

### 5.4 Mode Pins

The ADC Mx (mode) pins are controlled via S4 and JP5-7.

For operation with the EVM software, S4 should be switched to the up position (EVM Default), which connects the mode pins to default values that work with the EVM software.

---

**NOTE:** For the software to communicate with the hardware, S4 should be used in the EVM Default position. The EVM may be removed and used separately with other modes of operation.

---

Switch S4 to the down position (Manual) for manual control of the mode pins and now JP5-7 controls the mode pins. The mode pins are tri-state pins so JP5-7 have valid configuration in 1-2 (connected to IOVDD), 2-3 (connect to DGND), and open connection (floating).

#### **5.4.1 Master and Slave Configuration**

S7 must be configured to agree with the Mx pin settings for the master or slave configuration of the hardware. By default, S7 is placed in the down position for slave mode operation. Switching S7 to up configures the hardware for master mode.

#### **5.5 ADC Reference**

The reference of the ADC can be provided via the reference and buffer on the EVM or from an external source.

To use the reference and buffer on the EVM, ensure that JP9 is installed. This is the default configuration of the hardware.

To use an external reference, remove JP9 and connect the external reference to JP9, pin 1.

#### **5.6 Reset**

Reset the ADC by pressing S6.

## **6 Power Supply Connections – EVM and ADC**

### **6.1 Powering the EVM**

The EVM is only powered by the USB connection at J1.

### **6.2 Powering the ADS131A04**

The ADS131A04 analog supply is provided by AVDD and AVSS connections. The ADC is designed to be operated by either via single or bipolar supply.

#### **6.2.1 Single-Supply Configuration**

To connect the ADC in a single-supply configuration, install a jumper on JP11, pins 1-2. This connects 3.3 V to AVDD and AGND to AVSS.

#### **6.2.2 Bipolar Supply Configuration**

To connect the ADC in a bipolar supply configuration, install a jumper on JP11, pin 2-3. This connects 2.5 V to AVDD and –2.5 V to AVSS.

#### **6.2.3 Charge Pump Operation**

To use the charge pump on the ADS131A04, the device must be configured in single-supply operation by shorting pins 1-2 on JP11. Next, remove the jumper on JP8, if it is installed. Finally, correctly set the registers in the ADS131A04 using the EVM software.

If the charge pump is unused, JP8 must be installed.

#### **CAUTION**

Do not operate the ADC in bipolar mode with the charge pump enabled. Ensure JP8 is removed before changing the JP11 connection to bipolar operation.

#### **6.2.4 IOVDD Supply**

Installing JP10 allows the use of an external IOVDD voltage for the ADS131A04 which can be connected at J11.

## 7 ADS131A04 Bill of Materials, PCB Layouts, and Schematics

### 7.1 Bill of Materials

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

**Table 12. ADS131A04 Bill of Materials**

| Designator                                                                                                                | Qty | Value  | Description                                          | Package Reference | Part Number         | Manufacturer | Alternate Part Number | Alternate Manufacturer |
|---------------------------------------------------------------------------------------------------------------------------|-----|--------|------------------------------------------------------|-------------------|---------------------|--------------|-----------------------|------------------------|
| !PCB1                                                                                                                     | 1   |        | Printed Circuit Board                                |                   | PA015               | Any          |                       |                        |
| C1, C20                                                                                                                   | 2   | 2.2uF  | CAP, CERM, 2.2 $\mu$ F, 35 V, +/- 10%, X5R, 0603     | 0603              | GRM188R6YA225KA12D  | Murata       |                       |                        |
| C2, C3, C4, C7, C9, C10, C11, C16, C17, C18, C19, C22, C23, C24, C25, C30, C35, C71, C82, C99, C104                       | 21  | 0.1uF  | CAP, CERM, 0.1 $\mu$ F, 25 V, +/- 5%, X7R, 0603      | 0603              | 06033C104JAT2A      | AVX          |                       |                        |
| C5, C6                                                                                                                    | 2   | 27pF   | CAP, CERM, 27 pF, 50 V, +/- 5%, C0G/NP0, 0603        | 0603              | 06035A270JAT2A      | AVX          |                       |                        |
| C8                                                                                                                        | 1   | 10uF   | CAP, CERM, 10 $\mu$ F, 25 V, +/- 20%, X5R, 0603      | 0603              | GRM188R61E106MA73   | Murata       |                       |                        |
| C12, C13                                                                                                                  | 2   | 6.8pF  | CAP, CERM, 6.8 pF, 50 V, +/- 4%, C0G/NP0, 0603       | 0603              | 06035A6R8CAT2A      | AVX          |                       |                        |
| C14, C15                                                                                                                  | 2   | 12pF   | CAP, CERM, 12 pF, 50 V, +/- 5%, C0G/NP0, 0603        | 0603              | C0603C120J5GACTU    | Kemet        |                       |                        |
| C21, C38, C39, C41, C42, C70, C79, C81, C87, C102, C103, C109, C110, C114, C115, C116, C118, C119, C121, C122, C124, C126 | 22  | 1uF    | CAP, CERM, 1 $\mu$ F, 25 V, +/- 10%, X7R, 0603       | 0603              | GRM188R71E105KA12D  | Murata       |                       |                        |
| C31, C33, C36                                                                                                             | 3   | 10uF   | CAP, CERM, 10 $\mu$ F, 35 V, +/- 10%, X7R, 1206      | 1206              | GMK316AB7106KL      | Taiyo Yuden  |                       |                        |
| C32                                                                                                                       | 1   | 22uF   | CAP, CERM, 22 $\mu$ F, 16 V, +/- 20%, X7R, 1210      | 1210              | C3225X7R1C226M      | TDK          |                       |                        |
| C34, C83, C86, C89, C93, C94, C100, C105, C108                                                                            | 9   | 100pF  | CAP, CERM, 100 pF, 25 V, +/- 10%, X7R, 0603          | 0603              | 06033C101KAT2A      | AVX          |                       |                        |
| C37, C40, C43, C84, C90, C95, C106, C113, C117, C120, C128                                                                | 11  | 1000pF | CAP, CERM, 1000 pF, 100 V, +/- 5%, X7R, 0603         | 0603              | 06031C102JAT2A      | AVX          |                       |                        |
| C68, C77                                                                                                                  | 2   | 1500pF | CAP, CERM, 1500 pF, 100 V, +/- 5%, X7R, 0603         | 0603              | 06031C152JAT2A      | AVX          |                       |                        |
| C69, C78, C80, C123, C125, C127                                                                                           | 6   | 0.01uF | CAP, CERM, 0.01 $\mu$ F, 100 V, +/- 10%, X7R, 0603   | 0603              | 06031C103KAT2A      | AVX          |                       |                        |
| C72                                                                                                                       | 1   | 10uF   | CAP, CERM, 10 $\mu$ F, 10 V, +/- 10%, X7R, 0805      | 0805              | GRM21BR71A106KE51L  | Murata       |                       |                        |
| C73                                                                                                                       | 1   | 0.22uF | CAP, CERM, 0.22 $\mu$ F, 16 V, +/- 10%, X7R, 0603    | 0603              | C0603C224K4RACTU    | Kemet        |                       |                        |
| C74, C75, C76, C92                                                                                                        | 4   | 10pF   | CAP, CERM, 10 pF, 50 V, +/- 5%, C0G/NP0, 0603        | 0603              | 06035A100JAT2A      | AVX          |                       |                        |
| C85, C91, C96, C107                                                                                                       | 4   | 2700pF | CAP, CERM, 2700 pF, 50 V, +/- 5%, C0G/NP0, 0603      | 0603              | GRM1885C1H272JA01D  | Murata       |                       |                        |
| C97, C98                                                                                                                  | 2   | 8.2pF  | CAP, CERM, 8.2 pF, 50 V, +/- 3%, C0G/NP0, 0603       | 0603              | 06035A8R2CAT2A      | AVX          |                       |                        |
| C101                                                                                                                      | 1   | 0.22uF | CAP, CERM, 0.22 $\mu$ F, 25 V, +/- 10%, X7R, 0603    | 0603              | GRM188R71E224KA88D  | Murata       |                       |                        |
| C111, C112                                                                                                                | 2   | 100uF  | CAP, CERM, 100 $\mu$ F, 10 V, +/- 20%, X5R, 1206_190 | 1206_190          | C3216X5R1A107M160AC | TDK          |                       |                        |
| D1, D2, D4                                                                                                                | 3   | Green  | LED, Green, SMD                                      | LED_0603          | LTST-C191TGKT       | Lite-On      |                       |                        |
| D3                                                                                                                        | 1   | Red    | LED, Red, SMD                                        | LED_0603          | LTST-C191KRKT       | Lite-On      |                       |                        |

**Table 12. ADS131A04 Bill of Materials (continued)**

| Designator                                                           | Qty | Value   | Description                                                    | Package Reference    | Part Number       | Manufacturer          | Alternate Part Number | Alternate Manufacturer |
|----------------------------------------------------------------------|-----|---------|----------------------------------------------------------------|----------------------|-------------------|-----------------------|-----------------------|------------------------|
| D9, D10                                                              | 2   | Yellow  | LED, Yellow, SMD                                               | LED, 1.3x0.65x0.8mm  | LY L29K-J1K2-26-Z | OSRAM                 |                       |                        |
| H1, H2, H3, H4                                                       | 4   |         | Bump, Cylindrical, 0.312 X 0.200, Black                        | Black Bump           | SJ61A1            | 3M                    |                       |                        |
| J1                                                                   | 1   |         | Connector, Receptacle, Micro-USB Type B, R/A, Bottom Mount SMT | 7.5x2.45x5mm         | 0473460001        | Molex                 |                       |                        |
| J2                                                                   | 1   |         | Header, 100mil, 7x1, Gold, TH                                  | 7x1 Header           | TSW-107-07-G-S    | Samtec                |                       |                        |
| J6, J10                                                              | 2   |         | Terminal Block, 6A, 3.5mm Pitch, 3-Pos, TH                     | 10.5x8.2x6.5mm       | ED555/3DS         | On-Shore Technology   |                       |                        |
| J7, J9, J11                                                          | 3   |         | Terminal Block, 6A, 3.5mm Pitch, 2-Pos, TH                     | 7.0x8.2x6.5mm        | ED555/2DS         | On-Shore Technology   |                       |                        |
| J8, JP1, JP2, JP8, JP9, JP10                                         | 6   |         | Header, 100mil, 2x1, Gold, TH                                  | 2x1 Header           | TSW-102-07-G-S    | Samtec                |                       |                        |
| JP3                                                                  | 1   |         | Header, 100mil, 3x2, Gold, TH                                  | 3x2 Header           | TSW-103-07-G-D    | Samtec                |                       |                        |
| JP5, JP6, JP7, JP11                                                  | 4   |         | Header, 100mil, 3x1, Gold, TH                                  | 3x1 Header           | TSW-103-07-G-S    | Samtec                |                       |                        |
| L1                                                                   | 1   | 1uH     | Inductor, Wirewound, Ferrite, 1 µH, 2.05 A, 0.045 ohm, SMD     | 1210                 | LQH32PN1R0NN0     | Murata                |                       |                        |
| Q1                                                                   | 1   | -20V    | MOSFET, P-CH, -20 V, -0.39 A, SOT-323                          | SOT-323              | BSS223PWH6327     | Infineon Technologies |                       | None                   |
| R1, R40, R57, R63, R67, R68, R90                                     | 7   | 1.00k   | RES, 1.00 k, 1%, 0.1 W, 0603                                   | 0603                 | CRCW06031K00FKEA  | Vishay-Dale           |                       |                        |
| R2                                                                   | 1   | 8.06k   | RES, 8.06 k, 1%, 0.1 W, 0603                                   | 0603                 | CRCW06038K06FKEA  | Vishay-Dale           |                       |                        |
| R3, R5, R7, R10, R15, R16, R19, R65, R74, R104                       | 10  | 10.0k   | RES, 10.0 k, 1%, 0.1 W, 0603                                   | 0603                 | CRCW060310K0FKEA  | Vishay-Dale           |                       |                        |
| R4, R11, R84                                                         | 3   | 1.00Meg | RES, 1.00 M, 1%, 0.1 W, 0603                                   | 0603                 | CRCW06031M00FKEA  | Vishay-Dale           |                       |                        |
| R6, R8, R12, R70, R72, R76, R79, R82, R86, R92, R94, R95, R96, R100  | 14  | 100     | RES, 100, 1%, 0.1 W, 0603                                      | 0603                 | CRCW0603100RFKEA  | Vishay-Dale           |                       |                        |
| R9, R17, R33, R36                                                    | 4   | 0       | RES, 0, 5%, 0.1 W, 0603                                        | 0603                 | CRCW06030000Z0EA  | Vishay-Dale           |                       |                        |
| R13                                                                  | 1   | 4.87k   | RES, 4.87 k, 1%, 0.1 W, 0603                                   | 0603                 | CRCW06034K87FKEA  | Vishay-Dale           |                       |                        |
| R14                                                                  | 1   | 2.00k   | RES, 2.00 k, 1%, 0.1 W, 0603                                   | 0603                 | CRCW06032K00FKEA  | Vishay-Dale           |                       |                        |
| R18                                                                  | 1   | 51      | RES, 51, 5%, 0.1 W, 0603                                       | 0603                 | CRCW060351R0JNEA  | Vishay-Dale           |                       |                        |
| R20, R24, R27, R32, R58, R73, R99, R102                              | 8   | 100k    | RES, 100 k, 1%, 0.1 W, 0603                                    | 0603                 | CRCW0603100KFKEA  | Vishay-Dale           |                       |                        |
| R22, R23, R25, R97, R101                                             | 5   | 681     | RES, 681, 1%, 0.1 W, 0603                                      | 0603                 | CRCW0603681RFKEA  | Vishay-Dale           |                       |                        |
| R28, R39, R41                                                        | 3   | 0.1     | RES, 0.1, 1%, 0.1 W, 0603                                      | 0603                 | ERJ-L03KF10CV     | Panasonic             |                       |                        |
| R29                                                                  | 1   | 768k    | RES, 768 k, 1%, 0.1 W, 0603                                    | 0603                 | RC0603FR-07768KL  | Yageo America         |                       |                        |
| R30                                                                  | 1   | 20.0k   | RES, 20.0 k, 1%, 0.1 W, 0603                                   | 0603                 | RC0603FR-0720KL   | Yageo America         |                       |                        |
| R31                                                                  | 1   | 215k    | RES, 215 k, 1%, 0.1 W, 0603                                    | 0603                 | RC0603FR-07215KL  | Yageo America         |                       |                        |
| R59, R60, R61, R62                                                   | 4   | 499     | RES, 499, 1%, 0.1 W, 0603                                      | 0603                 | CRCW0603499RFKEA  | Vishay-Dale           |                       |                        |
| R64, R66                                                             | 2   | 49.9    | RES, 49.9, 1%, 0.1 W, 0603                                     | 0603                 | CRCW060349R9FKEA  | Vishay-Dale           |                       |                        |
| R69, R71, R75, R77, R78, R80, R81, R83, R85, R87, R88, R89, R91, R93 | 14  | 0       | RES, 0, 5%, 0.1 W, 0603                                        | 0603                 | ERJ-3GEY0R00V     | Panasonic             |                       |                        |
| R98                                                                  | 1   | 1.00    | RES, 1.00, 1%, 0.1 W, 0603                                     | 0603                 | CRCW06031R00FKEA  | Vishay-Dale           |                       |                        |
| R103                                                                 | 1   | 66.5k   | RES, 66.5 k, 1%, 0.1 W, 0603                                   | 0603                 | CRCW060366K5FKEA  | Vishay-Dale           |                       |                        |
| S3, S6                                                               | 2   |         | Switch, Tactile, SPST-NO, 0.05A, 12V, SMT                      | Switch, 4.4x2x2.9 mm | TL1015AF160QG     | E-Switch              |                       |                        |
| S4                                                                   | 1   |         | Switch, Toggle, SPDT 1Pos, TH                                  | 7 X 11 X4.5 mm       | G12AP             | NKK Switches          |                       |                        |
| S5, S8                                                               | 2   |         | Switch, DPDT, On-On, 0.4 VA, 28 V, TH                          | DPDT Switch, 4.5x7mm | G22AP             | NKK Switches          |                       |                        |

**Table 12. ADS131A04 Bill of Materials (continued)**

| Designator                                                                     | Qty | Value  | Description                                                                                                                                         | Package Reference       | Part Number      | Manufacturer      | Alternate Part Number | Alternate Manufacturer |
|--------------------------------------------------------------------------------|-----|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------|-------------------|-----------------------|------------------------|
| S7                                                                             | 1   |        | Switch, Slide, SPDT 100mA, SMT                                                                                                                      | Switch, 5.4x2.5x2.5mm   | CAS-120TA        | Copal Electronics |                       |                        |
| SH-J1, SH-J2, SH-J3, SH-J4, SH-J6, SH-J7, SH-J8, SH-J9, SH-J10, SH-J11, SH-J12 | 11  | 1x2    | Shunt, 100mil, Gold plated, Black                                                                                                                   | Shunt                   | 969102-0000-DA   | 3M                | SNT-100-BK-G          | Samtec                 |
| TP7, TP8, TP9, TP10, TP11, TP21, TP22, TP23                                    | 8   | Double | Terminal, Turret, TH, Double                                                                                                                        | Keystone1573-2          | 1573-2           | Keystone          |                       |                        |
| TP19, TP20                                                                     | 2   | Red    | Test Point, Miniature, Red, TH                                                                                                                      | Red Miniature Testpoint | 5000             | Keystone          |                       |                        |
| U1                                                                             | 1   |        | Tiva C Series Microcontroller, PDT0128A                                                                                                             | PDT0128A                | TM4C1294NCPDTI3R | Texas Instruments | TM4C1294NCPDTI3       | Texas Instruments      |
| U2                                                                             | 1   |        | Highly Integrated Full Featured Hi-Speed USB 2.0 ULPI Transceiver, QFN-32                                                                           | 5x5 QFN-32              | USB3320C-EZK     | Microchip         |                       |                        |
| U3                                                                             | 1   |        | USB ESD Solution with Power Clamp, 4 Channels, -40 to +85 degC, 6-pin SON (DRY), Green (RoHS & no Sb/Br)                                            | DRY0006A                | TPD4S012DRYR     | Texas Instruments | Equivalent            | Texas Instruments      |
| U4                                                                             | 1   |        | 256K I2C™ CMOS Serial EEPROM, TSSOP-8                                                                                                               | TSSOP-8                 | 24AA256-I/ST     | Microchip         |                       |                        |
| U5                                                                             | 1   |        | 8-BIT BIDIRECTIONAL VOLTAGE-LEVEL TRANSLATOR FOR OPEN-DRAIN AND PUSH-PULL APPLICATIONS, RGY0020A                                                    | RGY0020A                | TXS0108ERGYR     | Texas Instruments |                       | Texas Instruments      |
| U6                                                                             | 1   |        | SINGLE BUFFER/DRIVER WITH OPEN-DRAIN OUTPUT, DCK0005A                                                                                               | DCK0005A                | SN74LVC1G07DCKR  | Texas Instruments | SN74LVC1G07DCKT       | Texas Instruments      |
| U9                                                                             | 1   |        | Dual Inverter Buffer/Driver With Open-Drain Outputs, DCK0006A                                                                                       | DCK0006A                | SN74LVC2G06DCKR  | Texas Instruments |                       | Texas Instruments      |
| U11                                                                            | 1   |        | Single Inverter Buffer/Driver With Open-Drain Output, DCK0005A                                                                                      | DCK0005A                | SN74LVC1G06DCKR  | Texas Instruments | SN74LVC1G06DCKT       | Texas Instruments      |
| U13                                                                            | 1   |        | TINY 1.5-A BOOST CONVERTER WITH ADJUSTABLE INPUT CURRENT LIMIT, DSG0008A                                                                            | DSG0008A                | TPS61252DSGR     | Texas Instruments | TPS61252DSGT          | Texas Instruments      |
| U14                                                                            | 1   |        | 36-V, 1-A, 4.17-µVRMS, RF LDO Voltage Regulator, RGW0020A                                                                                           | RGW0020A                | TPS7A4700RGWR    | Texas Instruments | TPS7A4700RGWT         | Texas Instruments      |
| U15                                                                            | 1   |        | Single Output High PSRR LDO, 150 mA, Fixed 1.8 V Output, 2.5 to 6.5 V Input, with Low IQ, 5-pin SC70 (DCK), -40 to 85 degC, Green (RoHS & no Sb/Br) | DCK0005A                | TPS71718DCKR     | Texas Instruments | Equivalent            | Texas Instruments      |
| U16                                                                            | 1   |        | 3-Pin Voltage Supervisors with Active-Low, Open-Drain Reset, DBZ0003A                                                                               | DBZ0003A                | TLV803MDBZR      | Texas Instruments | TLV803MDBZT           | Texas Instruments      |
| U17                                                                            | 1   |        | 1-A Low-Dropout Regulator With Reverse Current Protection, DRV0006A                                                                                 | DRV0006A                | TPS73733DRVR     | Texas Instruments | TPS73733DRVVT         | Texas Instruments      |
| U25                                                                            | 1   |        | Ultra Low Power, Rail-to-Rail Output, Fully-Differential Amplifier, DGK0008A                                                                        | DGK0008A                | THS4531AIDGK     | Texas Instruments |                       | Texas Instruments      |
| U26, U27                                                                       | 2   |        | 1-Ohm DUAL SPDT ANALOG SWITCH 5-V/3.3-V 2-CHANNEL 2:1 MULTIPLEXER/DEMULTIPLEXER, DGS0010A                                                           | DGS0010A                | TS5A23159DGSR    | Texas Instruments | TS5A23159DGST         | Texas Instruments      |
| U28                                                                            | 1   |        | Four Channel Analog Front-End for Power Monitoring, Control, and Protection, PBS0032A                                                               | PBS0032A                | ADS131A04IPBS    | Texas Instruments |                       | Texas Instruments      |
| U29                                                                            | 1   |        | 50 MHz, Low-Noise, Single-Supply Rail-to-Rail Operational Amplifier, 2.2 to 5.5 V, -40 to 125 degC, 5-pin SOT23 (DBV0005A), Green (RoHS & no Sb/Br) | DBV0005A                | OPA365AIDBVR     | Texas Instruments | Equivalent            | Texas Instruments      |
| U30, U33                                                                       | 2   |        | AUTOSWITCHING POWER MUX, DRB0008B                                                                                                                   | DRB0008B                | TPS2115ADRBR     | Texas Instruments | TPS2115ADRBT          | Texas Instruments      |
| U31                                                                            | 1   |        | Low-Noise, Very Low Drift, Precision VOLTAGE REFERENCE, DGK0008A                                                                                    | DGK0008A                | REF5025IDGKR     | Texas Instruments | REF5025IDGKT          | Texas Instruments      |

**Table 12. ADS131A04 Bill of Materials (continued)**

| Designator                                       | Qty | Value  | Description                                                                                                                                         | Package Reference              | Part Number          | Manufacturer          | Alternate Part Number | Alternate Manufacturer |
|--------------------------------------------------|-----|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------|-----------------------|-----------------------|------------------------|
| U32                                              | 1   |        | Single Output High PSRR LDO, 150 mA, Fixed 3.3 V Output, 2.5 to 6.5 V Input, with Low IQ, 5-pin SC70 (DCK), -40 to 85 degC, Green (RoHS & no Sb/Br) | DCK0005A                       | TPS71733DCKR         | Texas Instruments     | Equivalent            | Texas Instruments      |
| U34                                              | 1   |        | Single Output High PSRR LDO, 150 mA, Fixed 2.5 V Output, 2.5 to 6.5 V Input, with Low IQ, 5-pin SC70 (DCK), -40 to 85 degC, Green (RoHS & no Sb/Br) | DCK0005A                       | TPS71725DCKR         | Texas Instruments     | Equivalent            | Texas Instruments      |
| U35                                              | 1   |        | 0.9-V to 6.5-V, Nanopower Comparator, DCK0005A                                                                                                      | DCK0005A                       | TLV3691IDCKR         | Texas Instruments     | TLV3691IDCKT          | Texas Instruments      |
| U36                                              | 1   |        | UNREGULATED 60-mA CHARGE PUMP VOLTAGE INVERTER, DBV0005A                                                                                            | DBV0005A                       | TPS60403DBVR         | Texas Instruments     | TPS60403DBVT          | Texas Instruments      |
| U37                                              | 1   |        | Single Output High PSRR LDO, 200 mA, Fixed -2.5 V Output, -10 to -2.7 V Input, 5-pin SOT-23 (DBV), -40 to 125 degC, Green (RoHS & no Sb/Br)         | DBV0005A                       | TPS72325DBVT         | Texas Instruments     | Equivalent            | Texas Instruments      |
| Y1                                               | 1   |        | Crystal, 24 MHz, 18 pF, SMD                                                                                                                         | ABM3                           | ABM3-24.000MHZ-D2Y-T | Abrakon Corporation   |                       |                        |
| Y2                                               | 1   |        | CRYSTAL, 32.768KHZ, 7PF, SMD                                                                                                                        | 1.5x1.4x6.7mm                  | SSPT7F-7PF20-R       | Seiko Instruments     |                       |                        |
| Y3                                               | 1   |        | Crystal, 25 MHz, 18 pF, SMD                                                                                                                         | ABM3                           | ABM3-25.000MHZ-D2Y-T | Abrakon Corporation   |                       |                        |
| Y4                                               | 1   |        | Crystal, 16.384 MHz, 20 pF, SMD                                                                                                                     | SMD, 4-Leads, Body 7.2x5.2mm   | 407F35E016M3840      | CTS Electrocomponents |                       |                        |
| C26, C27, C28, C29, C45, C54, C56, C60, C65, C88 | 0   | 0.1uF  | CAP, CERM, 0.1 µF, 25 V, +/- 5%, X7R, 0603                                                                                                          | 0603                           | 06033C104JAT2A       | AVX                   |                       |                        |
| C44, C46, C48, C51, C52, C53, C62, C63, C64      | 0   | 10uF   | CAP, CERM, 10 µF, 35 V, +/- 10%, X7R, 1206                                                                                                          | 1206                           | GMK316AB7106KL       | Taiyo Yuden           |                       |                        |
| C47, C50, C55, C61, C66                          | 0   | 0.01uF | CAP, CERM, 0.01 µF, 25 V, +/- 10%, X7R, 0603                                                                                                        | 0603                           | GRM188R71E103KA01D   | Murata                |                       |                        |
| C49                                              | 0   | 1uF    | CAP, CERM, 1 µF, 25 V, +/- 10%, X7R, 0603                                                                                                           | 0603                           | GRM188R71E105KA12D   | Murata                |                       |                        |
| C57                                              | 0   | 1100pF | CAP, CERM, 1100 pF, 50 V, +/- 5%, COG/NP0, 0603                                                                                                     | 0603                           | GRM1885C1H112JA01D   | Murata                |                       |                        |
| C58                                              | 0   | 0.22uF | CAP, CERM, 0.22 µF, 25 V, +/- 10%, X5R, 0603                                                                                                        | 0603                           | 06033D224KAT2A       | AVX                   |                       |                        |
| C59                                              | 0   | 10pF   | CAP, CERM, 10 pF, 50 V, +/- 5%, COG/NP0, 0603                                                                                                       | 0603                           | 06035A100JAT2A       | AVX                   |                       |                        |
| C67                                              | 0   | 4700pF | CAP, CERM, 4700 pF, 100 V, +/- 10%, X7R, 0603                                                                                                       | 0603                           | 06031C472KAT2A       | AVX                   |                       |                        |
| D5                                               | 0   | 12V    | Diode, TVS, Uni, 12 V, 600 W, SMB                                                                                                                   | SMB                            | SMBJ12A-13-F         | Diodes Inc.           |                       |                        |
| D6                                               | 0   | Green  | LED, Green, SMD                                                                                                                                     | LED_0603                       | LTST-C191TGKT        | Lite-On               |                       |                        |
| D7                                               | 0   | 20V    | Diode, Schottky, 20 V, 1 A, SOD-123F                                                                                                                | SOD-123F                       | PMEG2010AEH,115      | NXP Semiconductor     |                       |                        |
| D8                                               | 0   | 20V    | Diode, Schottky, 20 V, 1.1 A, DO-219AB                                                                                                              | DO-219AB                       | SL02-GS08            | Vishay-Semiconductor  |                       |                        |
| F1                                               | 0   |        | Fuse, 2 A, 125 V, SMD                                                                                                                               | SMD, 2-Leads, Body 9.73x5.03mm | 0154002.DRT          | Littelfuse            |                       |                        |
| FID1, FID2, FID3, FID4, FID5, FID6               | 0   |        | Fiducial mark. There is nothing to buy or mount.                                                                                                    | N/A                            | N/A                  | N/A                   |                       |                        |
| H5                                               | 0   |        | CABLE USB-A TO MICRO USB-B 0.5M                                                                                                                     |                                | 102-1092-BL-00100    | CNC Tech              | -                     | -                      |
| J3                                               | 0   |        | Header, 2.54 mm, 28x2, Gold, TH                                                                                                                     | Header, 2.54 mm, 28x2, TH      | TSW-128-07-S-D       | Samtec                |                       |                        |
| J4                                               | 0   |        | Terminal Block, 6A, 3.5mm Pitch, 2-Pos, TH                                                                                                          | 7.0x8.2x6.5mm                  | ED555/2DS            | On-Shore Technology   |                       |                        |
| J5                                               | 0   |        | Connector, DC Jack 2.1X5.5 mm, TH                                                                                                                   | POWER JACK, 14.4x11x9mm        | PJ-102A              | CUI Inc.              |                       |                        |
| JP4                                              | 0   |        | Header, 100mil, 2x1, Gold, TH                                                                                                                       | 2x1 Header                     | TSW-102-07-G-S       | Samtec                |                       |                        |
| L2                                               | 0   | 3.3uH  | Inductor, Shielded Drum Core, Ferrite, 3.3 µH, 1.5 A, 0.033 ohm, SMD                                                                                | CDPH4D19F                      | CDPH4D19FNP-3R3MC    | Sumida                |                       |                        |
| L3                                               | 0   | 10uH   | Inductor, Shielded Drum Core, Ferrite, 10 µH, 1.2 A, 0.124 ohm, SMD                                                                                 | CDRH5D18                       | CDRH5D18NP-100NC     | Sumida                |                       |                        |

Table 12. ADS131A04 Bill of Materials (continued)

| Designator                                                                                                                                   | Qty | Value   | Description                                                                                                                                                                | Package Reference    | Part Number       | Manufacturer      | Alternate Part Number | Alternate Manufacturer |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------|-------------------|-----------------------|------------------------|
| R21, R26, R44, R56                                                                                                                           | 0   | 10.0k   | RES, 10.0 k, 1%, 0.1 W, 0603                                                                                                                                               | 0603                 | CRCW060310K0FKEA  | Vishay-Dale       |                       |                        |
| R34, R35, R37, R38                                                                                                                           | 0   | 0       | RES, 0, 5%, 0.1 W, 0603                                                                                                                                                    | 0603                 | CRCW06030000Z0EA  | Vishay-Dale       |                       |                        |
| R42                                                                                                                                          | 0   | 681     | RES, 681, 1%, 0.1 W, 0603                                                                                                                                                  | 0603                 | CRCW0603681RFKEA  | Vishay-Dale       |                       |                        |
| R43                                                                                                                                          | 0   | 9.31k   | RES, 9.31 k, 1%, 0.1 W, 0603                                                                                                                                               | 0603                 | CRCW06039K31FKEA  | Vishay-Dale       |                       |                        |
| R45                                                                                                                                          | 0   | 3.01k   | RES, 3.01 k, 1%, 0.1 W, 0603                                                                                                                                               | 0603                 | CRCW06033K01FKEA  | Vishay-Dale       |                       |                        |
| R46                                                                                                                                          | 0   | 158k    | RES, 158 k, 1%, 0.1 W, 0603                                                                                                                                                | 0603                 | CRCW0603158KFKEA  | Vishay-Dale       |                       |                        |
| R47                                                                                                                                          | 0   | 453k    | RES, 453 k, 1%, 0.1 W, 0603                                                                                                                                                | 0603                 | CRCW0603453KFKEA  | Vishay-Dale       |                       |                        |
| R48                                                                                                                                          | 0   | 51.1k   | RES, 51.1 k, 1%, 0.1 W, 0603                                                                                                                                               | 0603                 | CRCW060351K1FKEA  | Vishay-Dale       |                       |                        |
| R49                                                                                                                                          | 0   | 49.9k   | RES, 49.9 k, 1%, 0.1 W, 0603                                                                                                                                               | 0603                 | CRCW060349K9FKEA  | Vishay-Dale       |                       |                        |
| R50                                                                                                                                          | 0   | 15.0k   | RES, 15.0 k, 1%, 0.1 W, 0603                                                                                                                                               | 0603                 | CRCW060315K0FKEA  | Vishay-Dale       |                       |                        |
| R51                                                                                                                                          | 0   | 121k    | RES, 121 k, 1%, 0.1 W, 0603                                                                                                                                                | 0603                 | CRCW0603121KFKEA  | Vishay-Dale       |                       |                        |
| R52                                                                                                                                          | 0   | 10.0    | RES, 10.0, 1%, 0.1 W, 0603                                                                                                                                                 | 0603                 | CRCW060310R0FKEA  | Vishay-Dale       |                       |                        |
| R53                                                                                                                                          | 0   | 100k    | RES, 100 k, 1%, 0.1 W, 0603                                                                                                                                                | 0603                 | CRCW0603100KFKEA  | Vishay-Dale       |                       |                        |
| R54                                                                                                                                          | 0   | 1.30Meg | RES, 1.30 M, 1%, 0.1 W, 0603                                                                                                                                               | 0603                 | CRCW06031M30FKEA  | Vishay-Dale       |                       |                        |
| R55                                                                                                                                          | 0   | 93.1k   | RES, 93.1 k, 1%, 0.1 W, 0603                                                                                                                                               | 0603                 | CRCW060393K1FKEA  | Vishay-Dale       |                       |                        |
| S1, S2                                                                                                                                       | 0   |         | Switch, Tactile, SPST-NO, 0.05A, 12V, SMT                                                                                                                                  | Switch, 4.4x2x2.9 mm | TL1015AF160QG     | E-Switch          |                       |                        |
| SH-J5                                                                                                                                        | 0   | 1x2     | Shunt, 100mil, Gold plated, Black                                                                                                                                          | Shunt                | 969102-0000-DA    | 3M                | SNT-100-BK-G          | Samtec                 |
| U7, U10                                                                                                                                      | 0   |         | 8-BIT BIDIRECTIONAL VOLTAGE-LEVEL TRANSLATOR FOR OPEN-DRAIN AND PUSH-PULL APPLICATIONS, RGY0020A                                                                           | RGY0020A             | TXS0108BERGYR     | Texas Instruments |                       | Texas Instruments      |
| U8, U12                                                                                                                                      | 0   |         | SINGLE BUFFER/DRIVER WITH OPEN-DRAIN OUTPUT, DCK0005A                                                                                                                      | DCK0005A             | SN74LVC1G07DCKR   | Texas Instruments | SN74LVC1G07DCKT       | Texas Instruments      |
| U18                                                                                                                                          | 0   |         | 1.5-A LOW-NOISE FAST-TRANSIENT-RESPONSE LOW-DROPOUT REGULATOR, DCQ0006A                                                                                                    | DCQ0006A             | TL1963ADCQR       | Texas Instruments | TL1963ADCQT           | Texas Instruments      |
| U19                                                                                                                                          | 0   |         | 3-PIN VOLTAGE SUPERVISORS, DBV0003A                                                                                                                                        | DBV0003A             | TPS3809I50QDBVRQ1 | Texas Instruments |                       | Texas Instruments      |
| U20                                                                                                                                          | 0   |         | Single Inverter Buffer/Driver With Open-Drain Output, DCK0005A                                                                                                             | DCK0005A             | SN74LVC1G06DCKR   | Texas Instruments | SN74LVC1G06DCKT       | Texas Instruments      |
| U21                                                                                                                                          | 0   |         | Step-Up DC-DC Converter with Forced PWM Mode, 2.3 to 6 V, -40 to 105 degC, 8-pin SOP (PW8), Green (RoHS & no Sb/Br)                                                        | PW0008A              | TPS61085TPWR      | Texas Instruments | Equivalent            | Texas Instruments      |
| U22                                                                                                                                          | 0   |         | Single Output High PSRR LDO, 150 mA, Adjustable 1.2 to 33 V Output, 3 to 36 V Input, with Ultra-Low Noise, 8-pin MSOP (DGN), -40 to 125 degC, Green (RoHS & no Sb/Br)      | DGN0008D             | TPS7A4901DGNR     | Texas Instruments | Equivalent            | Texas Instruments      |
| U23                                                                                                                                          | 0   |         | DC-DC INVERTER, DRC0010J                                                                                                                                                   | DRC0010J             | TPS63700DRCR      | Texas Instruments | TPS63700DRCT          | Texas Instruments      |
| U24                                                                                                                                          | 0   |         | Single Output High PSRR LDO, 200 mA, Adjustable -1.18 to -33 V Output, -3 to -36 V Input, with Ultra-Low Noise, 8-pin MSOP (DGN), -40 to 125 degC, Green (RoHS & no Sb/Br) | DGN0008D             | TPS7A3001DGNR     | Texas Instruments | Equivalent            | Texas Instruments      |
| Notes: Unless otherwise noted in the Alternate Part Number or Alternate Manufacturer columns, all parts may be substituted with equivalents. |     |         |                                                                                                                                                                            |                      |                   |                   |                       |                        |

## 7.2 PCB Layouts

Figure 6 and Figure 7 illustrate the PCB layouts.

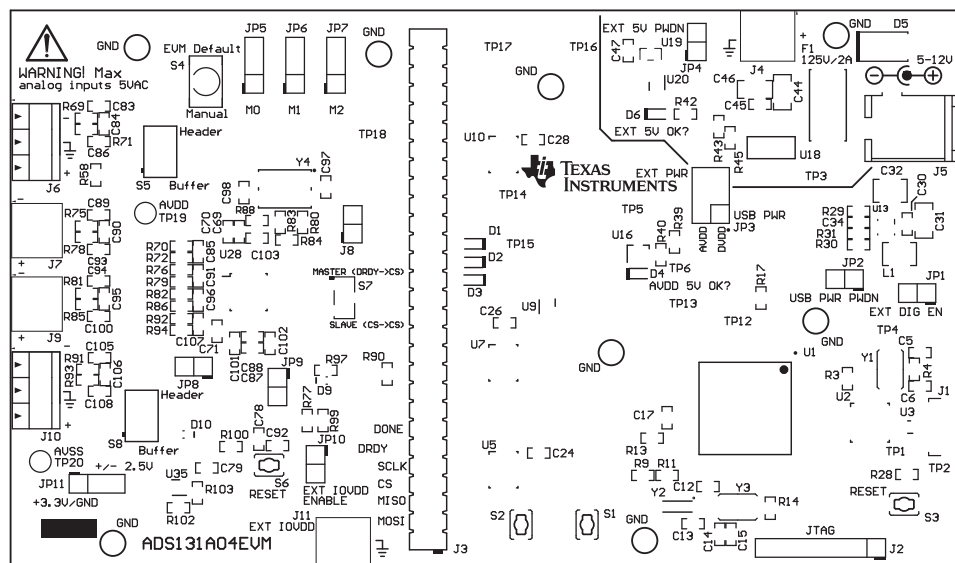


Figure 6. Top Soldermask

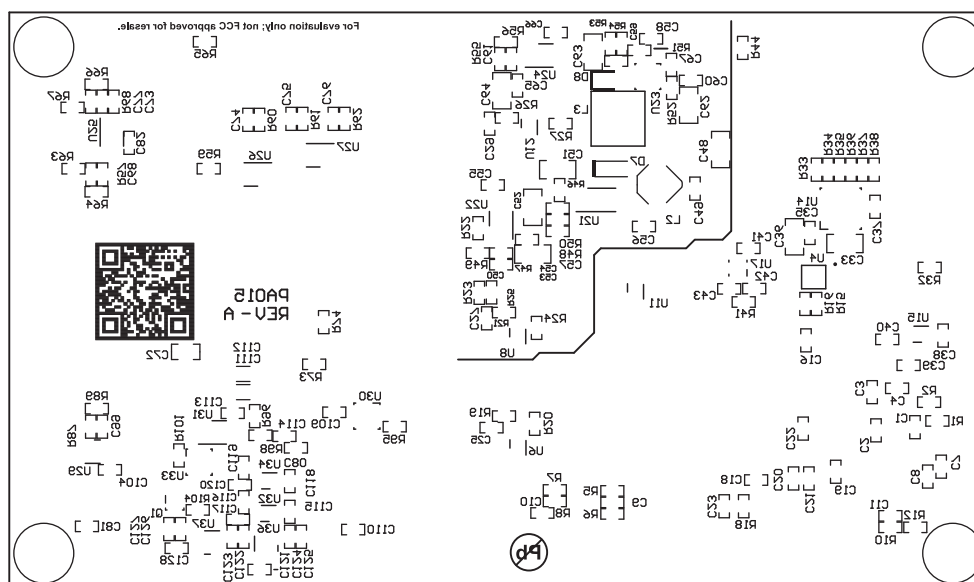


Figure 7. Bottom Soldermask

## 7.3 Schematic

Figure 8 through Figure 14 illustrate the EVM schematics.

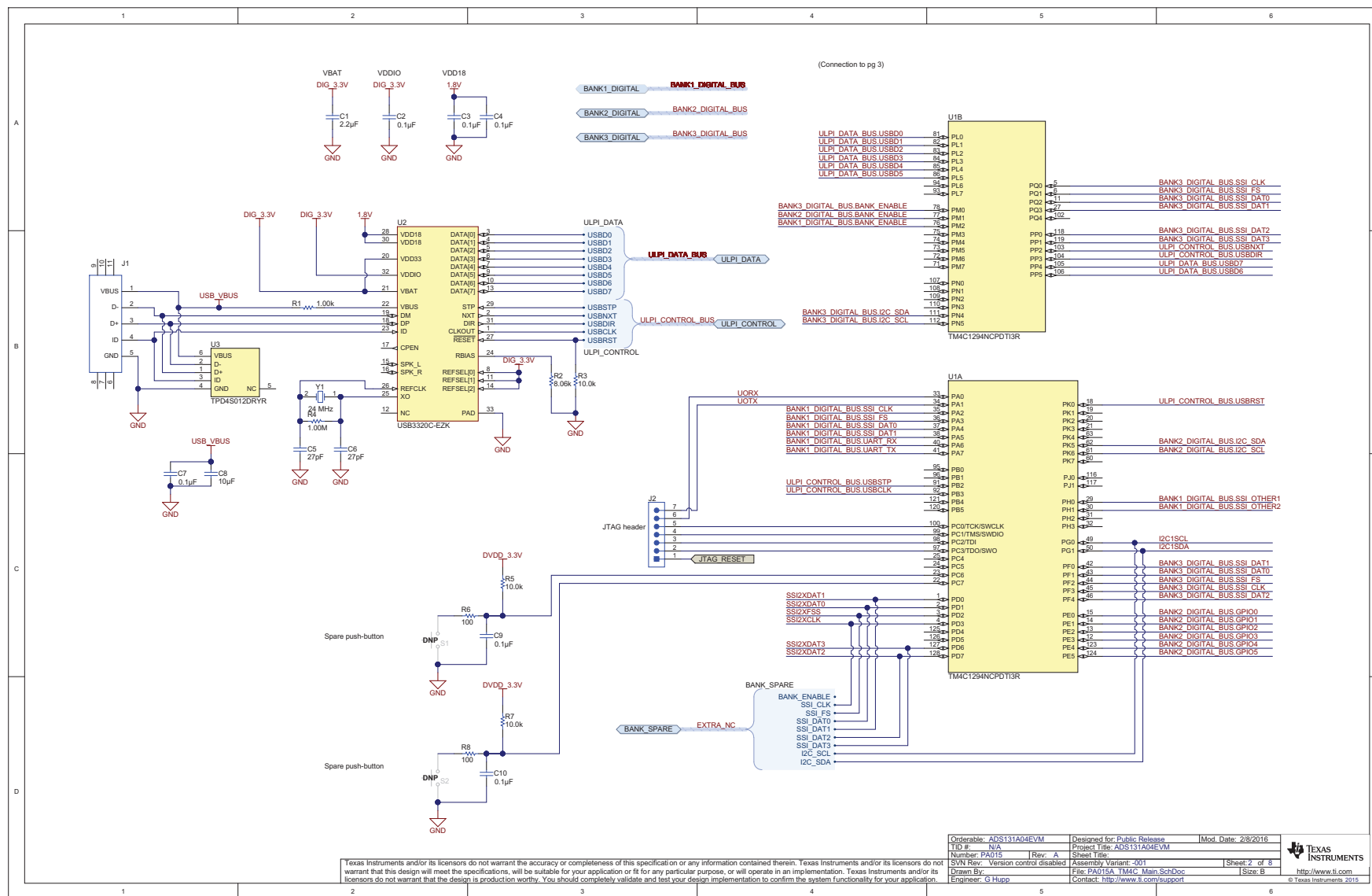


Figure 8. ADS131A04EVM Schematic

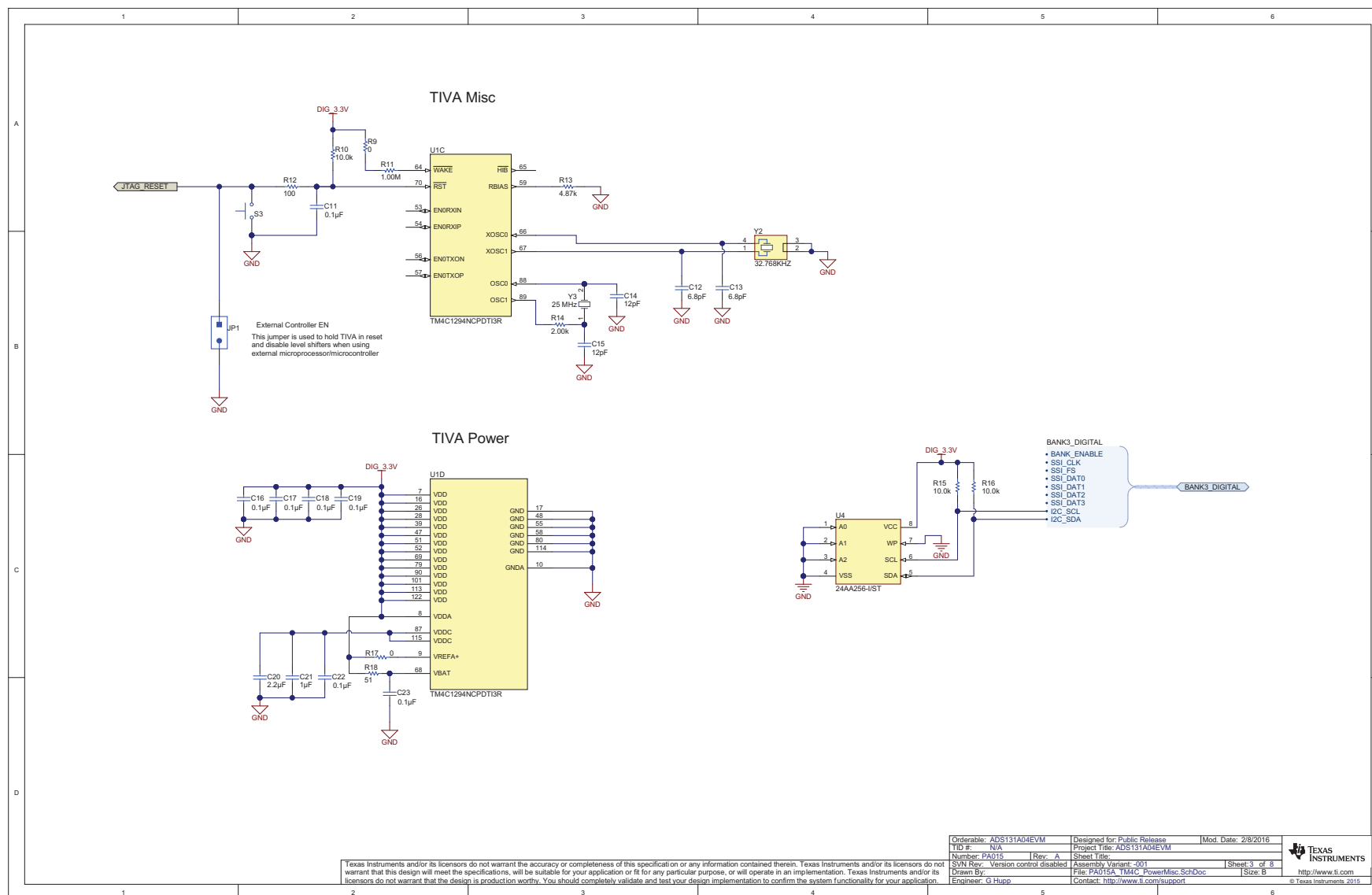


Figure 9. ADS131A04EVM Power Schematic

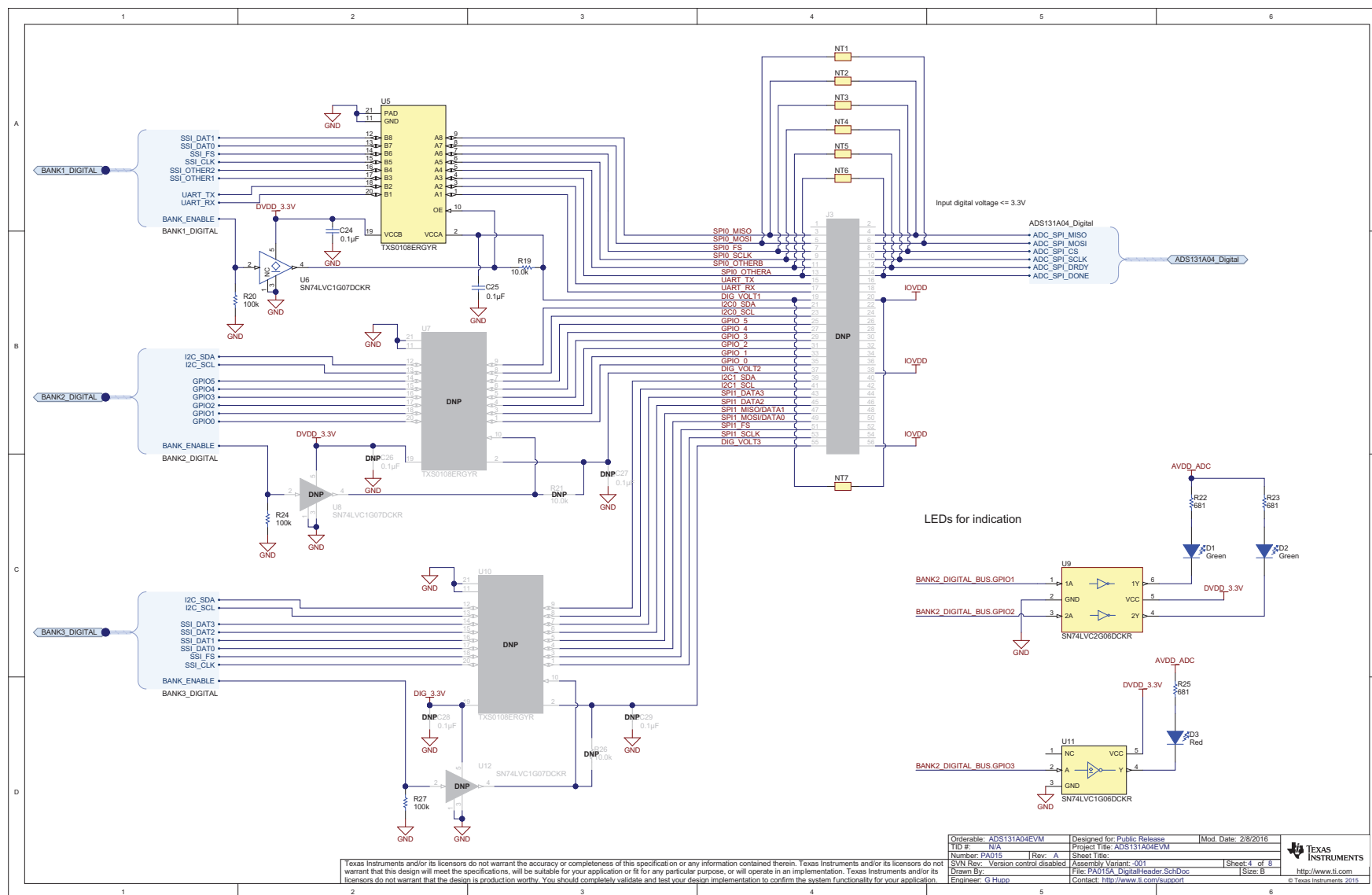


Figure 10. ADS131A04EVM Digital Header Schematic

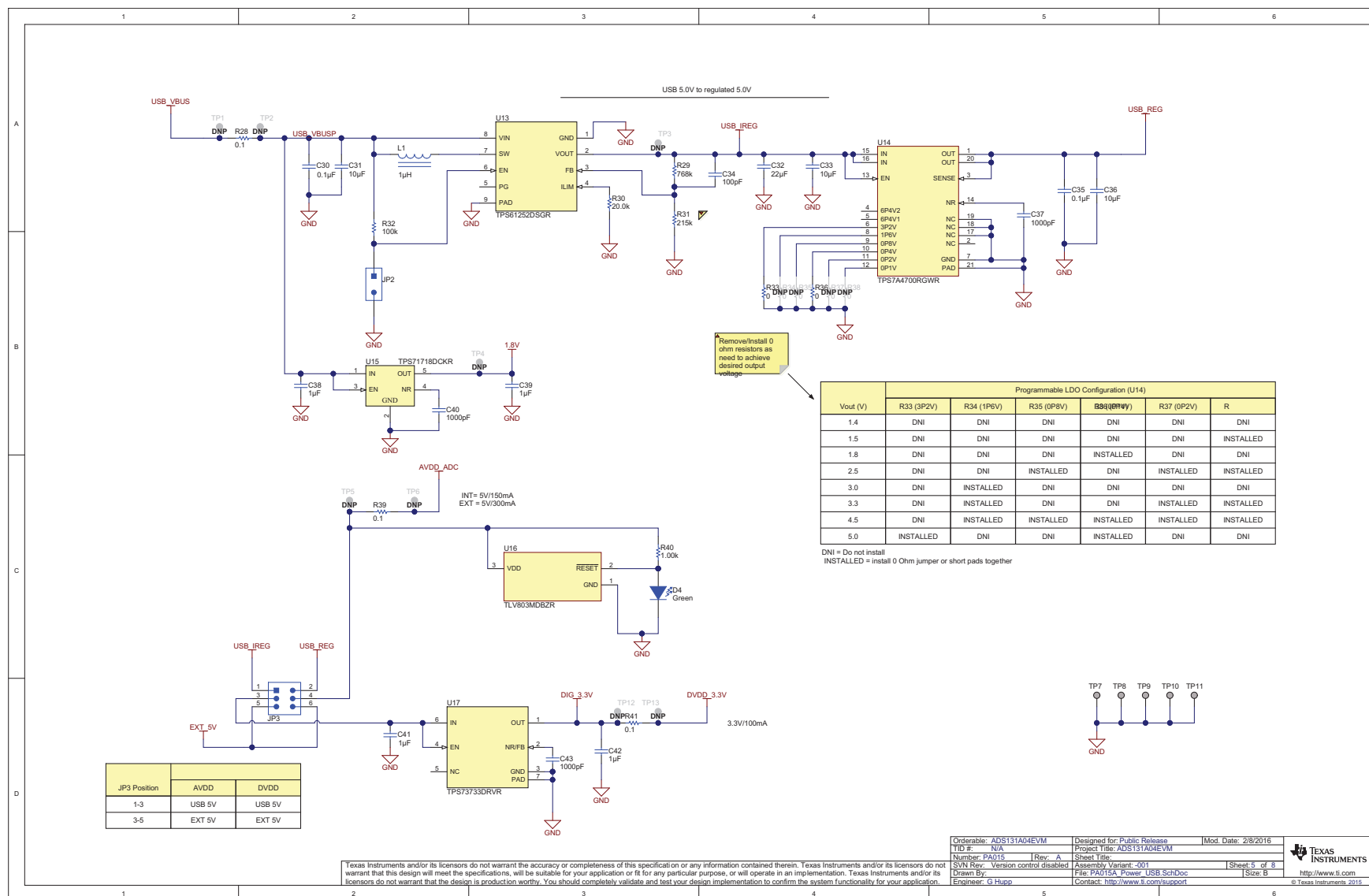


Figure 11. ADS131A04EVM Power USB Schematic

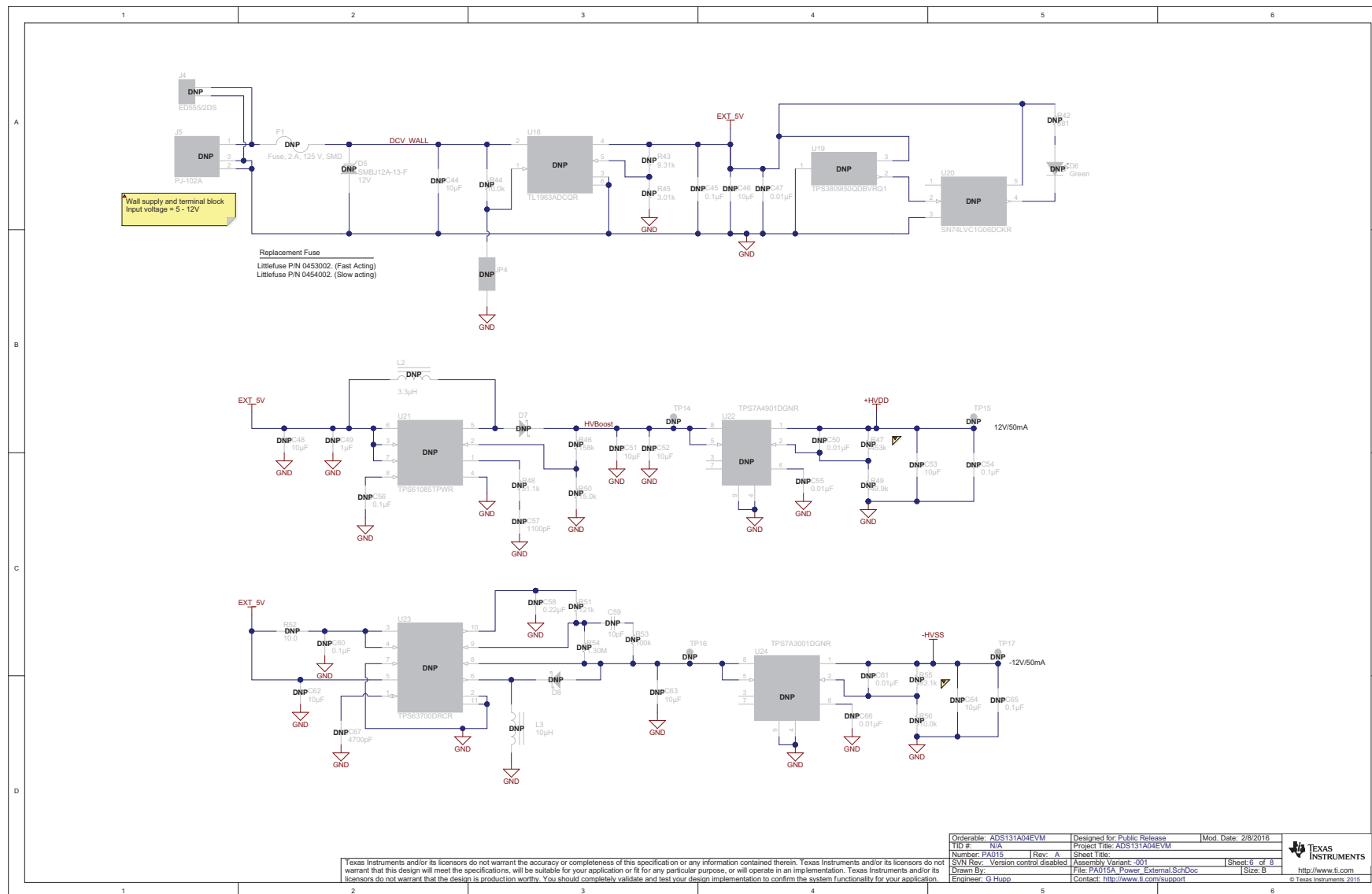


Figure 12. ADS131A04EVM Power External Schematic

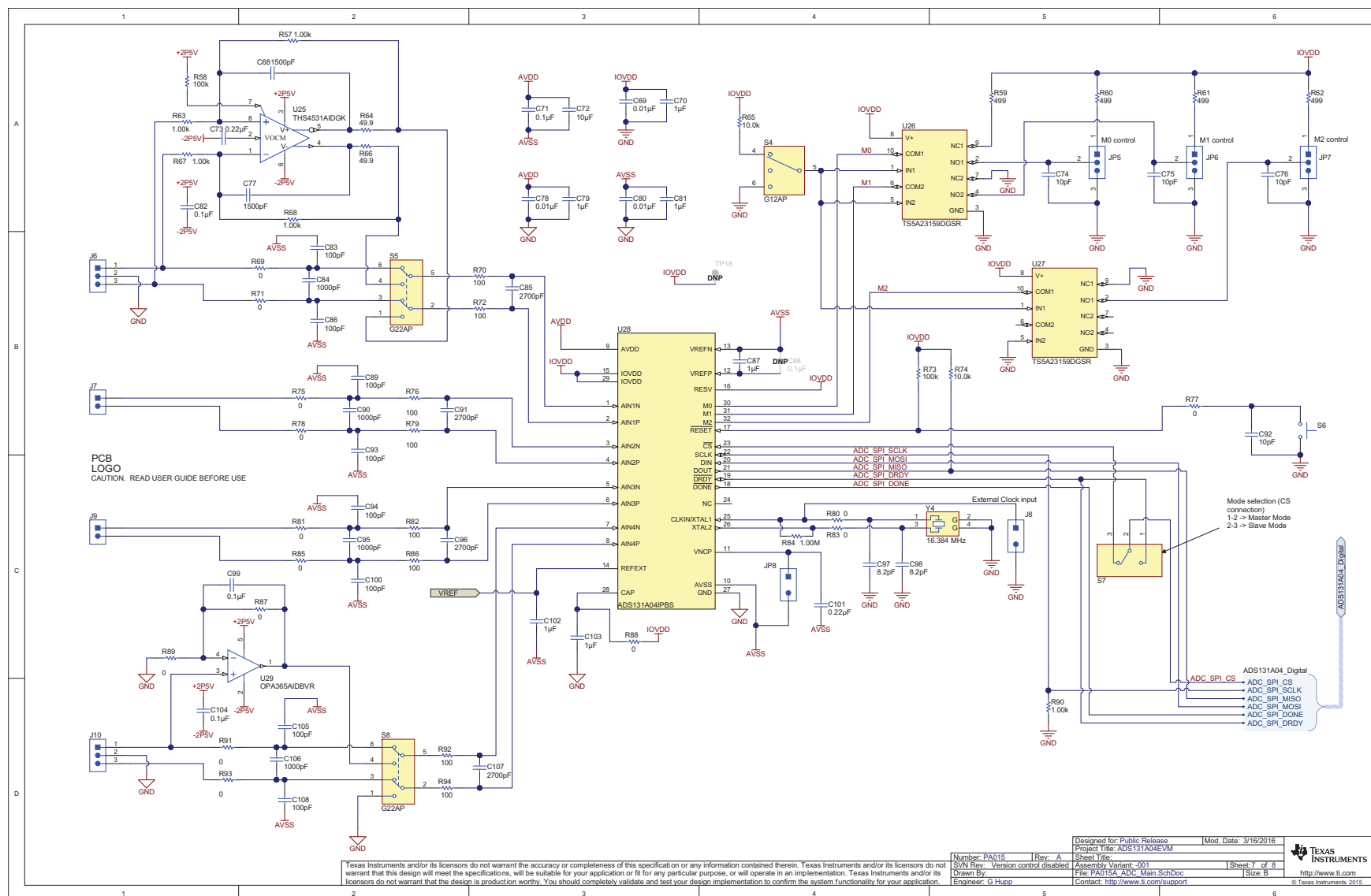
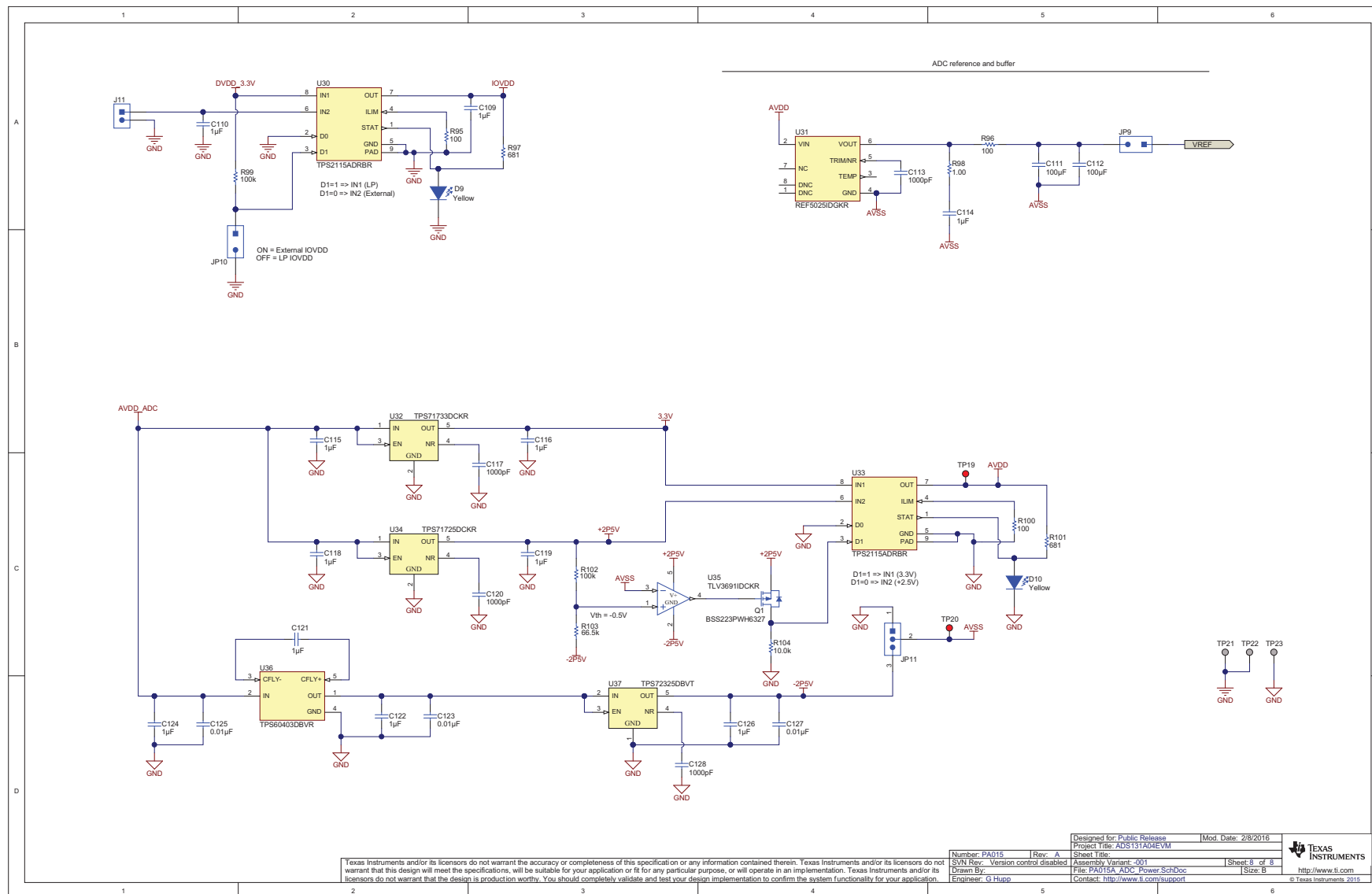


Figure 13. ADS131A04EVm ADC Schematic



**Figure 14. ADS131A04EVM ADC Power Schematic**

## Revision History

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

| Changes from Original (Month Year) to A Revision                                                                           | Page               |
|----------------------------------------------------------------------------------------------------------------------------|--------------------|
| • Updated <i>ADS131A04</i> EVM image to match <a href="#">Table 2</a> and reflect correct positions, changed caption. .... | <a href="#">4</a>  |
| • Removed incorrect statement regarding digital signal header in the <i>Digital Inputs</i> section. ....                   | <a href="#">14</a> |
| • Changed S4 switch statement from <i>left position</i> to <i>down position</i> in the <i>Mode Pins</i> section. ....      | <a href="#">14</a> |

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

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

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

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|                               |                                                                                          |
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