

## **ADS5295, 8-Channel, Analog-to-Digital Converter Evaluation Module**

This user's guide gives a general overview of the evaluation module (EVM) and provides a general description of the features and functions to be considered while using this module. This manual is applicable to the ADS5295 analog-to-digital converters (ADC), which, with the ADS5292 and ADS5294, are collectively referred to as ADS529x. Use this document in combination with the respective ADC data sheet. The ADS529xEVM provides a platform for evaluating the ADC under various signal, clock, reference, and power supply conditions.

### **Contents**

|     |                                                        |    |
|-----|--------------------------------------------------------|----|
| 1   | Quick View of Evaluation Setup .....                   | 3  |
| 2   | Default Configuration .....                            | 4  |
| 3   | Software Installation and Operation .....              | 5  |
| 3.1 | GUI Installation – Mandatory .....                     | 5  |
| 4   | Test Setup .....                                       | 12 |
| 5   | Power Up ADS5295 .....                                 | 13 |
| 6   | Launch TSW1400 High Speed Data Converter Pro GUI ..... | 14 |
| 7   | ADS5295 GUI Plug-In Tab .....                          | 17 |
| 8   | Test ADS5295 .....                                     | 20 |
| 8.1 | Step 1: Time Domain .....                              | 20 |
| 8.2 | Step 2: Single Tone FFT .....                          | 26 |
| 9   | Board Configuration .....                              | 29 |
| 9.1 | Input/Output, Power Supply, and USB .....              | 29 |
| 9.2 | ADC Clock .....                                        | 31 |
| 9.3 | Light-Emitting Diodes (LEDs) .....                     | 33 |
| 9.4 | Miscellaneous Test Points .....                        | 34 |
| 10  | EVM Schematics .....                                   | 36 |
| 11  | ADS5295EVM Bill of Materials .....                     | 45 |
| 12  | ADS5295EVM Printed-Circuit Board Layout .....          | 47 |

### **List of Figures**

|    |                                                   |    |
|----|---------------------------------------------------|----|
| 1  | Evaluation Setup .....                            | 3  |
| 2  | ADS5295EVM Basic Configuration .....              | 4  |
| 3  | Hardware Setup of TSW1400EVM and ADS5295EVM ..... | 12 |
| 4  | Power-Up Indications .....                        | 13 |
| 5  | High Speed Data Converter Pro GUI Launch .....    | 14 |
| 6  | ADS5295 GUI .....                                 | 16 |
| 7  | ADS5295 GUI Plug-In Tab .....                     | 17 |
| 8  | Top Level Tab .....                               | 18 |
| 9  | ADS5295 Time Domain Setup .....                   | 20 |
| 10 | Time Domain Test .....                            | 21 |
| 11 | ADS5295 RAMP Test Pattern Capture .....           | 22 |
| 12 | Graph Zoom Functions .....                        | 23 |
| 13 | ADS5295 RAMP Verification .....                   | 24 |
| 14 | ADC Channel Selection .....                       | 25 |

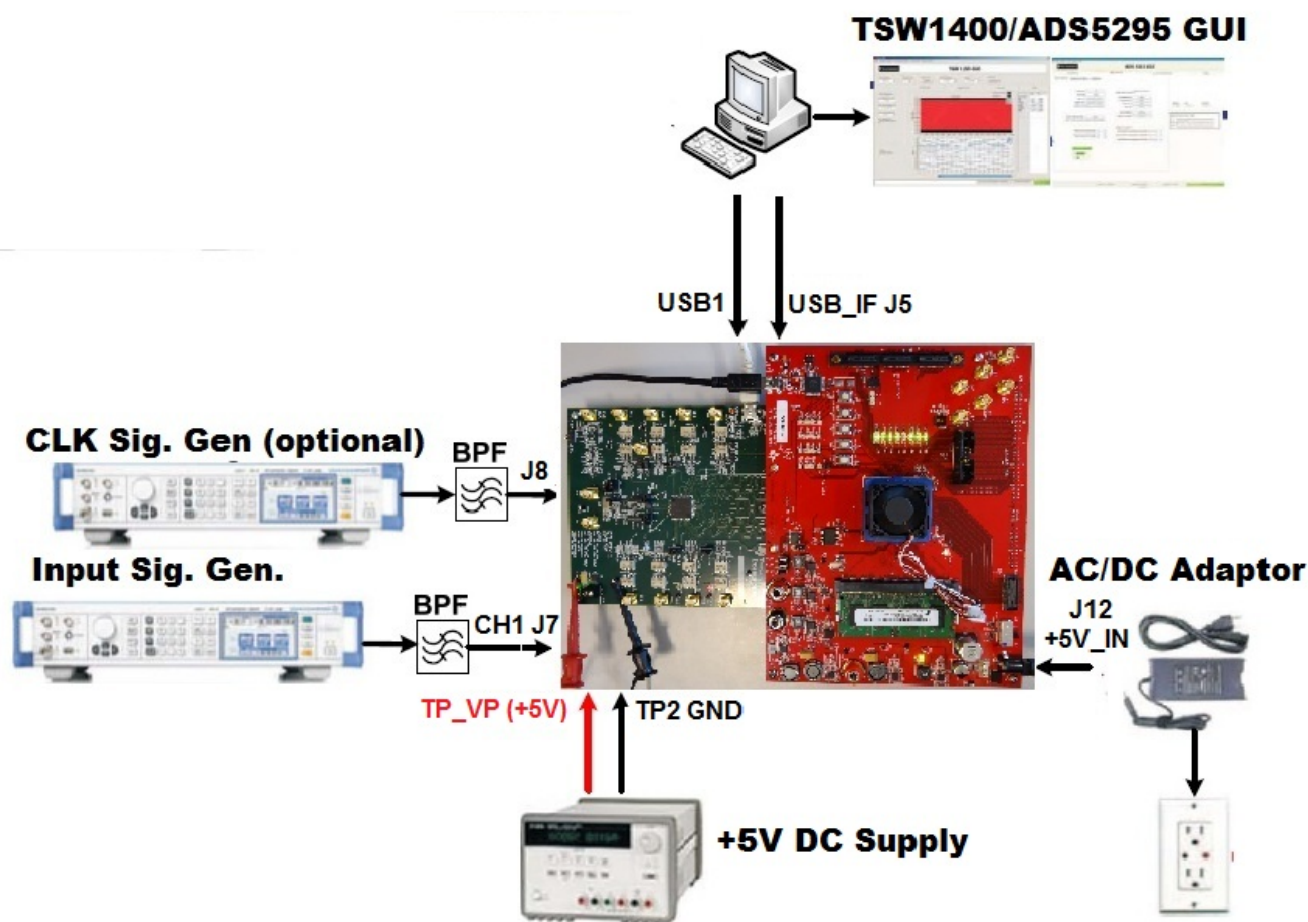
|    |                                                              |    |
|----|--------------------------------------------------------------|----|
| 15 | Disable RAMP PATTERN .....                                   | 26 |
| 16 | Single Tone Test .....                                       | 27 |
| 17 | Single Tone Capture .....                                    | 28 |
| 18 | I/O, PWR, and USB Connector .....                            | 29 |
| 19 | ADS5295EVM Default Clock Jumper Locations .....              | 31 |
| 20 | ADS5295EVM LED Location .....                                | 33 |
| 21 | ADS5295EVM Test Point Locations .....                        | 34 |
| 22 | Schematic, Sheet 1 of 9 .....                                | 36 |
| 23 | Schematic, Sheet 2 of 9 .....                                | 37 |
| 24 | Schematic, Sheet 3 of 9 .....                                | 38 |
| 25 | Schematic, Sheet 4 of 9 .....                                | 39 |
| 26 | Schematic, Sheet 5 of 9 .....                                | 40 |
| 27 | Schematic, Sheet 6 of 9 .....                                | 41 |
| 28 | Schematic, Sheet 7 of 9 .....                                | 42 |
| 29 | Schematic, Sheet 8 of 9 .....                                | 43 |
| 30 | Schematic, Sheet 9 of 9 .....                                | 44 |
| 31 | ADS5295EVM Top Layer Assembly Drawing – Top View .....       | 47 |
| 32 | ADS5295EVM Bottom Layer Assembly Drawing – Bottom View ..... | 48 |
| 33 | ADS5295EVM Solder Paste Top .....                            | 49 |
| 34 | ADS5295EVM Solder Paste Bottom .....                         | 50 |
| 35 | ADS5295EVM Soldermask Top .....                              | 51 |
| 36 | ADS5295EVM Soldermask Bottom .....                           | 52 |
| 37 | ADS5295EVM Bottom Layer Copper – Bottom View .....           | 53 |
| 38 | ADS5295EVM Layer 5 Ground Plane .....                        | 54 |
| 39 | ADS5295EVM Layer 4 Split Power Planes .....                  | 55 |
| 40 | ADS5295EVM Layer 3 Split Power Planes .....                  | 56 |
| 41 | ADS5295EVM Layer 2 Ground Plane .....                        | 57 |
| 42 | ADS5295EVM Top Layer Copper – Top View .....                 | 58 |

### List of Tables

|   |                                              |    |
|---|----------------------------------------------|----|
| 1 | Input/Output, Power, and USB .....           | 29 |
| 2 | Channel 8 Configuration .....                | 30 |
| 3 | ADC Clock Various Mode Jumper Settings ..... | 32 |
| 4 | LED Indicators .....                         | 33 |
| 5 | Miscellaneous Test Points .....              | 34 |
| 6 | Bill of Materials .....                      | 45 |

## 1 Quick View of Evaluation Setup

**Figure 1** shows an overview of the evaluation setup that includes the ADS5295EVM evaluation module (EVM), TSW1400EVM, external equipment, personal computer (PC), and software requirements.



**Figure 1. Evaluation Setup**

**TSW1400EVM/GUI:** The high-speed LVDS deserializer board, TSW1400EVM, is required for capturing data from the EVM. The capture analysis uses the TSW1400 *High Speed Data Converter Pro* graphical user interface (GUI). For more information pertaining to the TSW1400EVM, see: <http://focus.ti.com/docs/toolsw/folders/print/tsw1400evm.html>

**Equipment:** Signal generators (with low-phase noise) must be used as the source of input signal and clock (optional) in order to get the desired performance. Additionally, band-pass filters (BPF) are required in signal and clock (optional) paths to attenuate the harmonics and noise from the generators.

**Power Supply:** A single +5-V supply powers the EVM. The supplies for the ADS5295 device are derived from the +5-V supply. The power supply must be able to source up to 1.5 A. A +5-V wall adapter supply powers the TSW1400EVM.

**USB Interface to PC:** The USB connection from the EVM and TSW1400EVM to the personal computer (PC) must be set up.

**ADS5295GUI:** [Section 3.1](#) explains the GUI installation procedure and its operation.



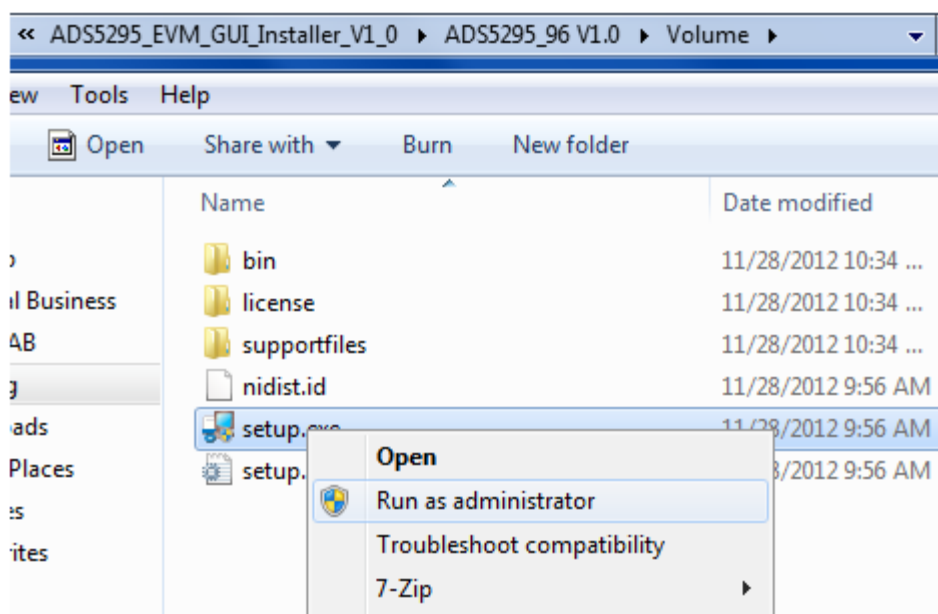


### 3 Software Installation and Operation

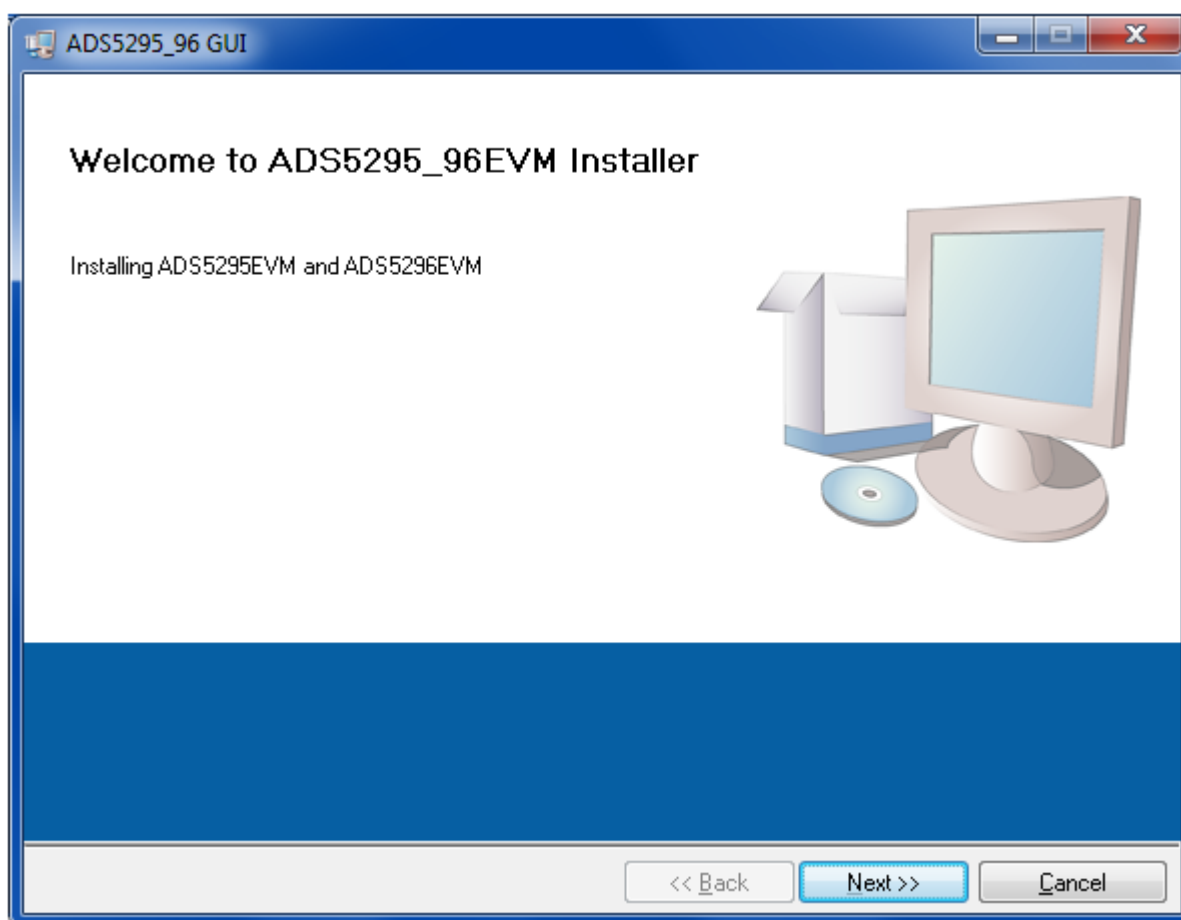
The EVM requires a software installation to invoke the GUI. In addition, the TSW1400 *High Speed Data Converter Pro* GUI (version 2.0 or higher) must be installed. The following section describes the installation procedure for the ADS5295 GUI. For instructions on installing the TSW1400 *High Speed Data Converter Pro* GUI, please visit the TI website.

#### 3.1 GUI Installation – Mandatory

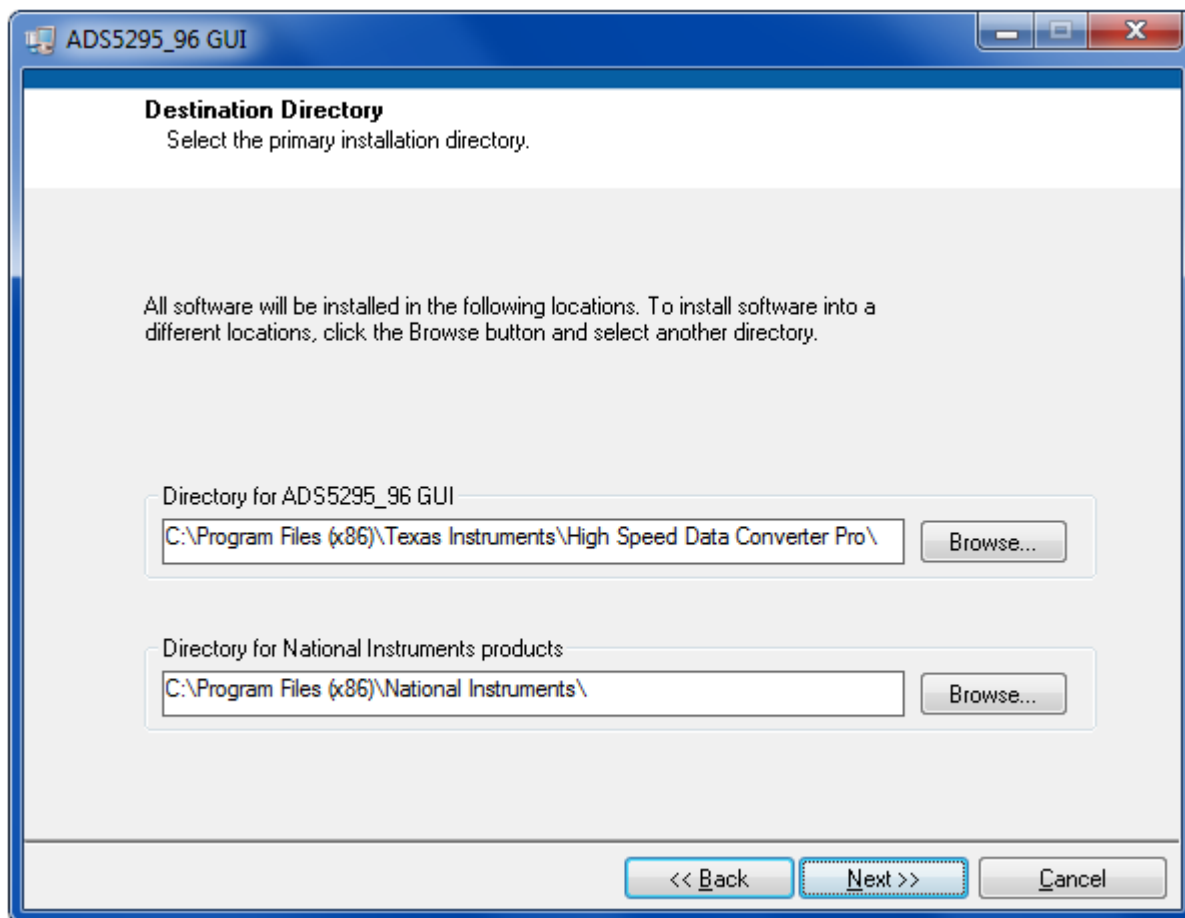
- Unzip the installer file found on the TI website. Install the GUI by running **setup.exe** as administrator.



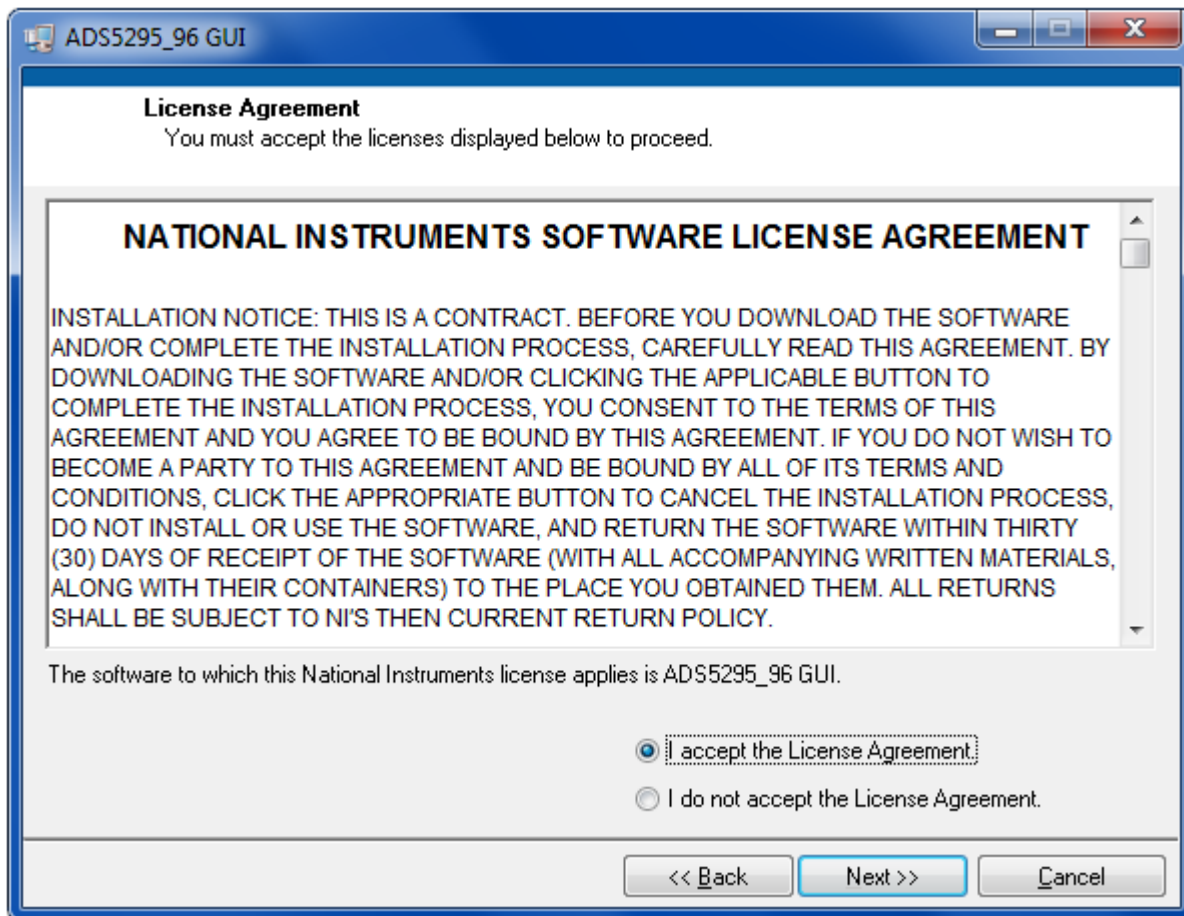
- Click *Next*.



- Click *Next* to proceed with the default install paths or *Browse* to desired paths and then click *Next*.

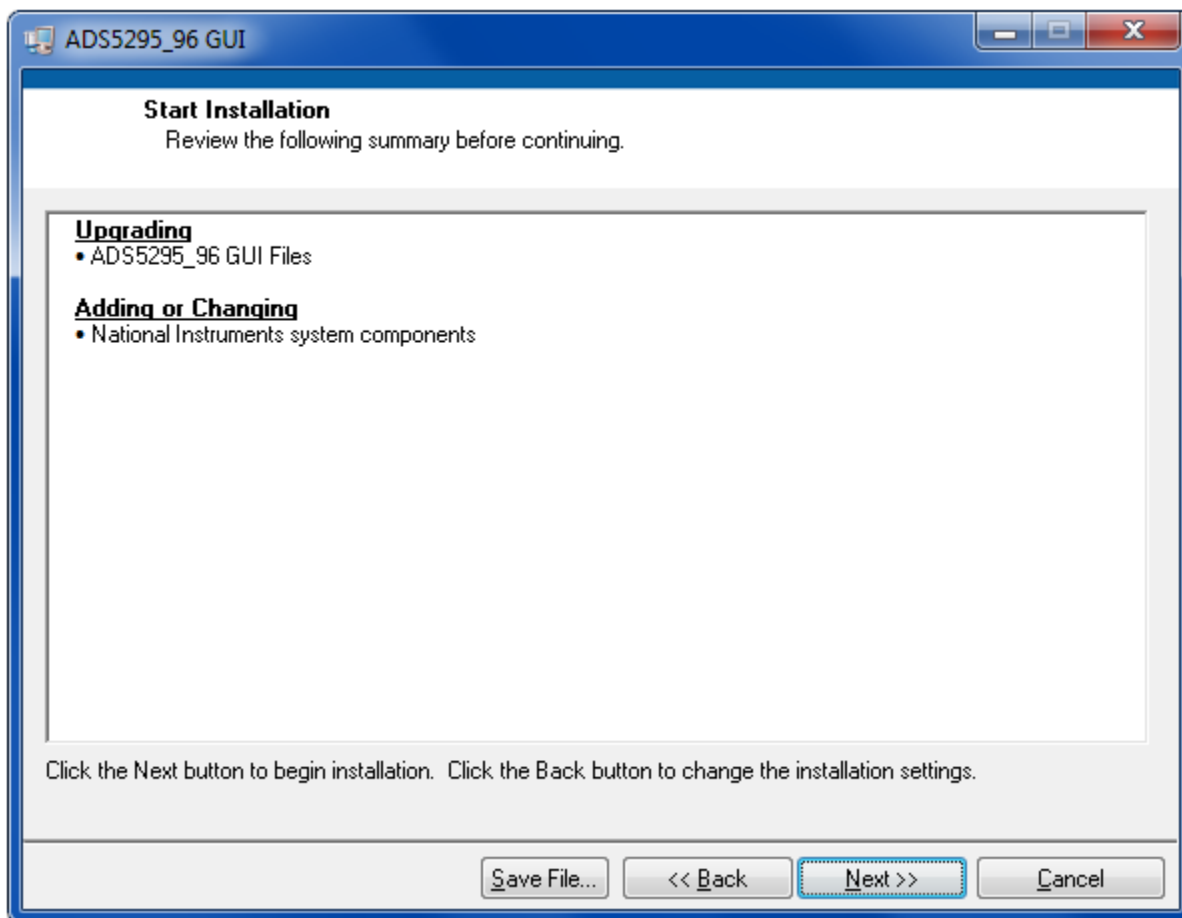


- Read the Software License Agreement and click *I accept...* and then click *Next*.

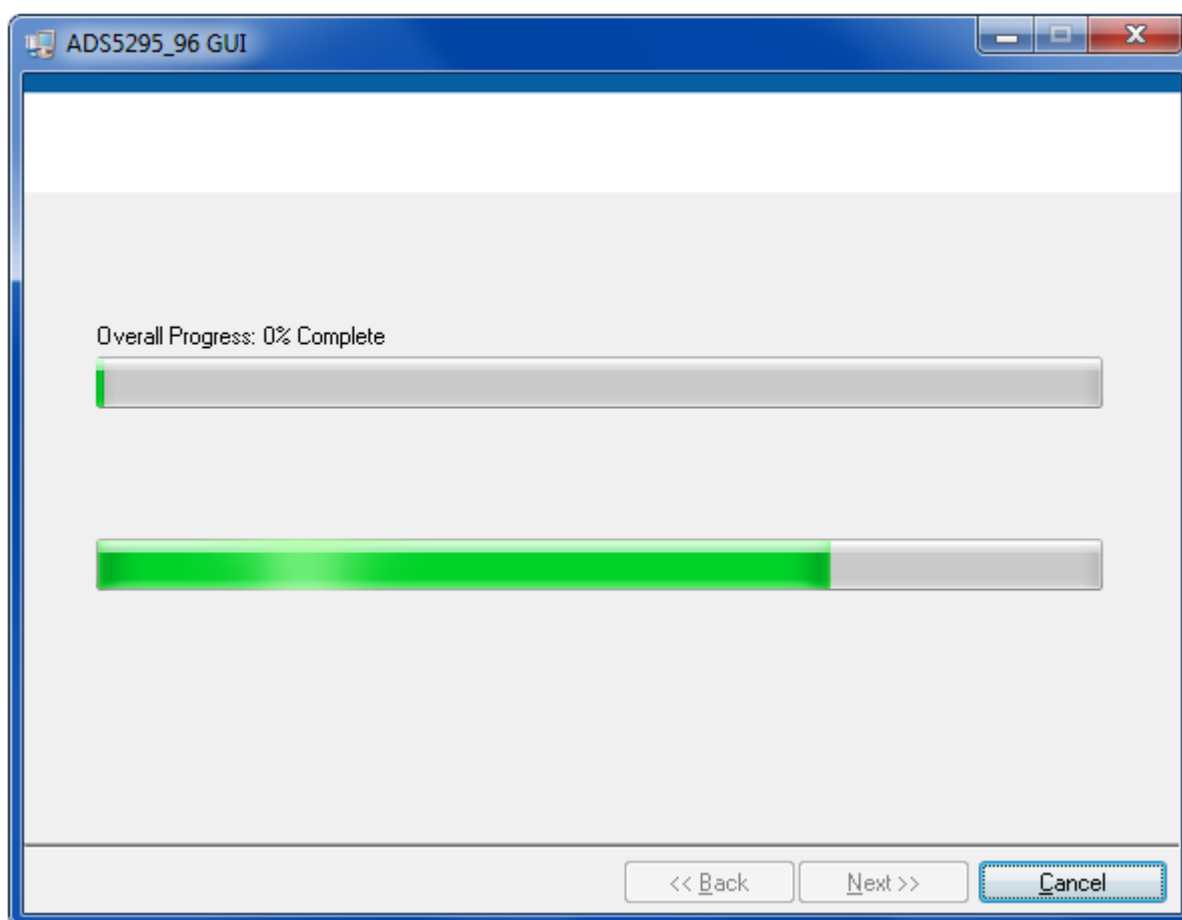




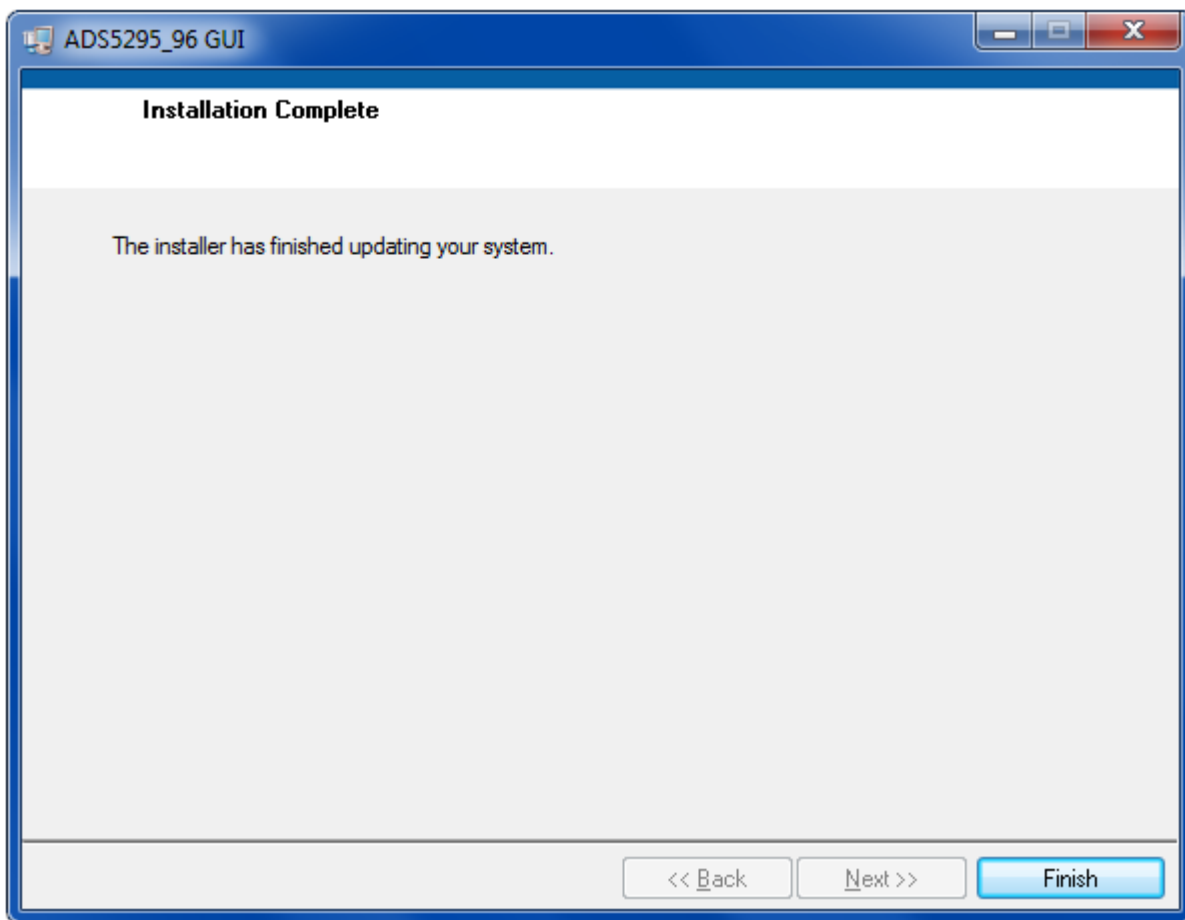
- Click *Next* to begin installation of listed components.



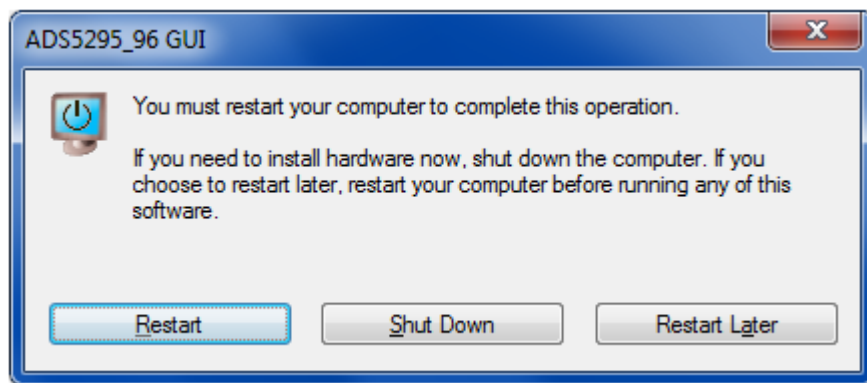
- The following window shows the installation progress:



- Clicking *Finish* completes the installation.



- The PC must be restarted to complete the installation.



## 4 Test Setup

To evaluate the ADS5295 device, a TSW1400EVM is required. Figure 3 shows the exact setup of these two boards and external connectors.

- Connect the **P10** connector of the ADS5295EVM to the **J3** connector of the TSW1400EVM.
- Connect a +5-V supply at the **P1** connector or across the **TP\_VP** (+5 V) and **TP2** (GND).
- Connect a +5-V wall adapter to the TSW1400EVM at the **J12** connector.
- Connect a USB cable from the PC to **USB1** on the ADS5295EVM.
- Connect a USB cable from the PC to USB port **J5** of the TSW1400EVM.
- An external sampling clock is not required as the onboard 80-MHz CMOS clock oscillator is used in the default configuration.

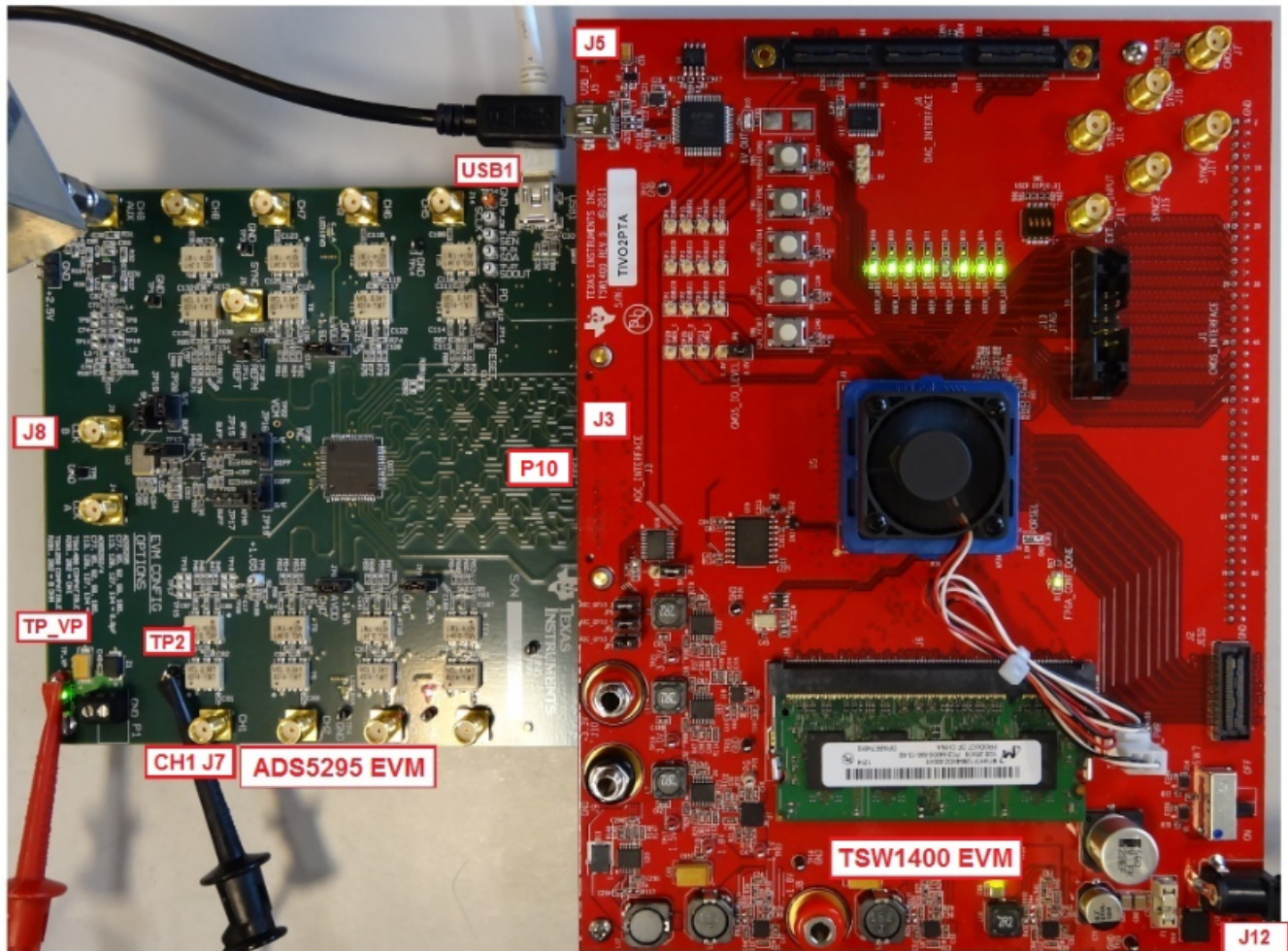


Figure 3. Hardware Setup of TSW1400EVM and ADS5295EVM

## 5 Power Up ADS5295

After connecting the EVM to the TSW1400 using the **P10** connector, the +5-V adapter to TSW1400EVM, and the +5-V supply (from the external power supply) across **TP\_VP** and **TP2**, power up is complete. One green LED (LED\_+5V) and one orange LED (LED33VA) should turn on as shown in Figure 4 (also see Figure 20).

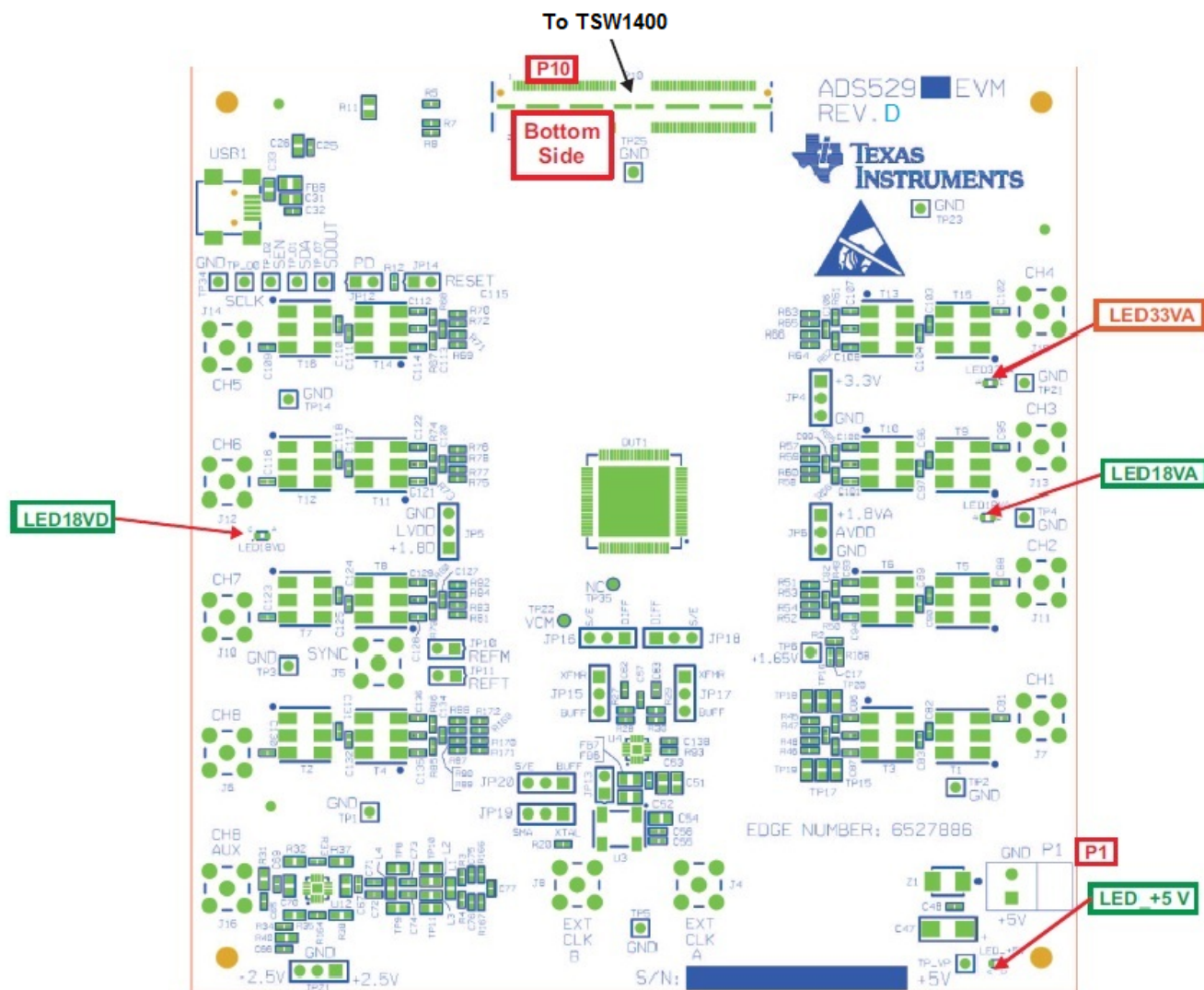


Figure 4. Power-Up Indications

## 6 Launch TSW1400 High Speed Data Converter Pro GUI

Upon launching the *High Speed Data Converter Pro* software, the GUI automatically detects the TSW1400EVM that is connected and reports its serial number as shown in [Figure 5](#).

- Clicking **OK** connects to the board.

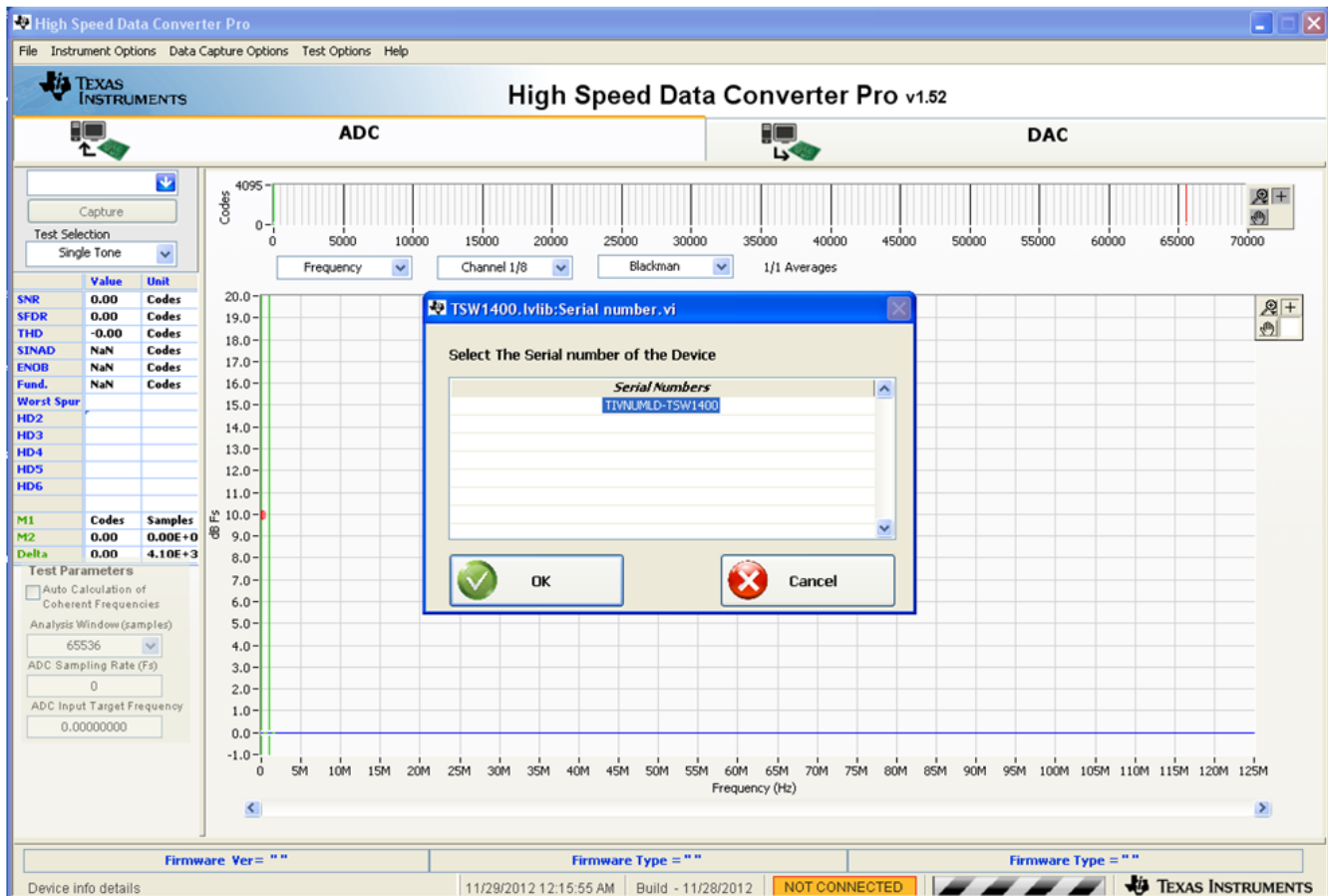
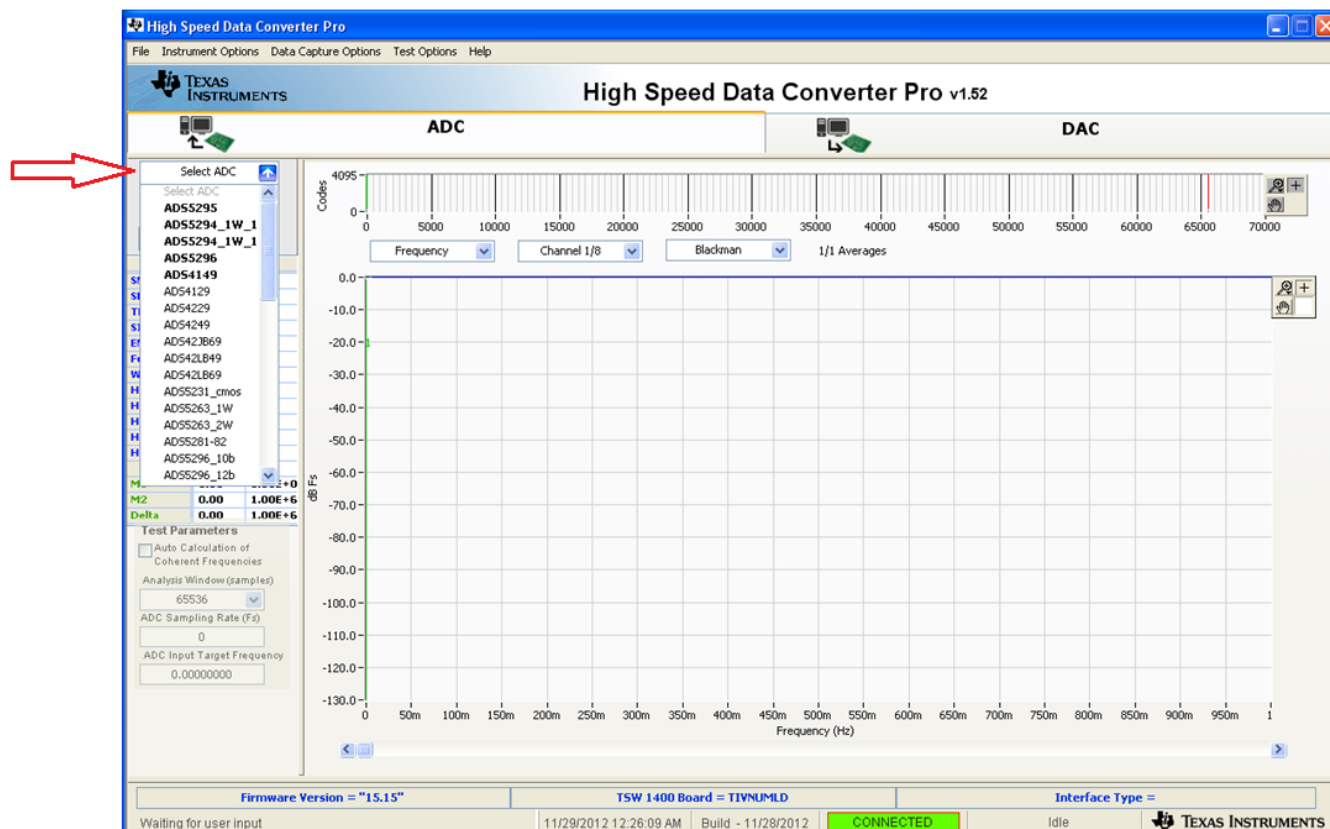


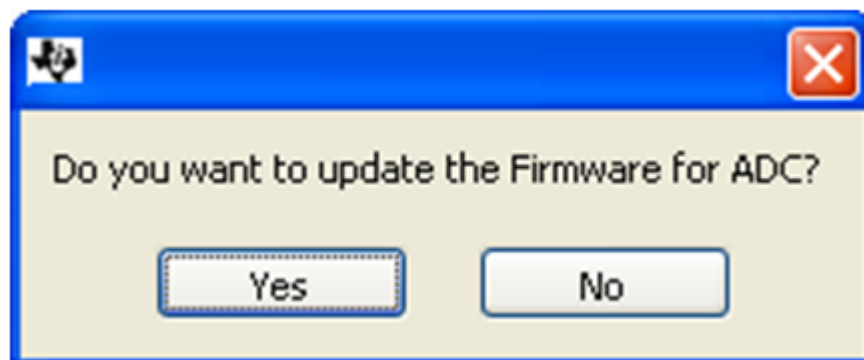
Figure 5. High Speed Data Converter Pro GUI Launch



- In the upper left corner of the GUI, select **ADS5295** in the drop down menu of **Select ADC**.

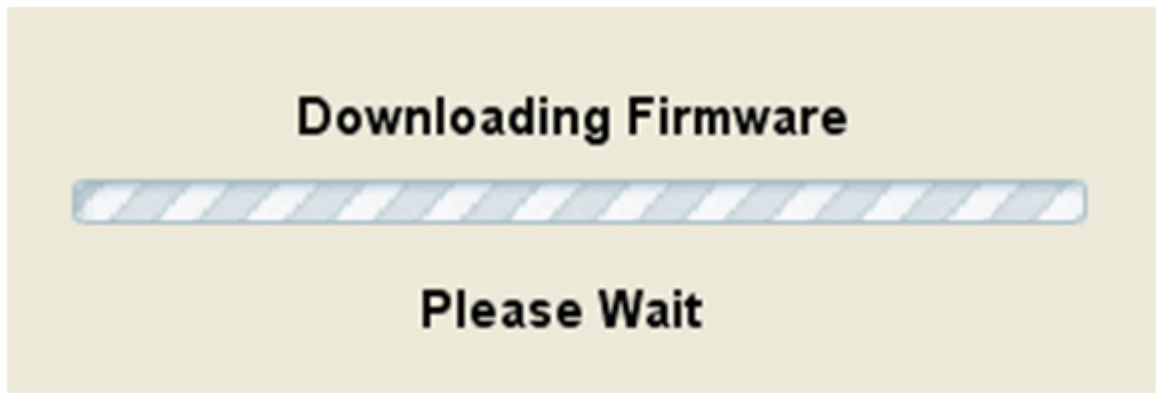


- Click **Yes** to update the Firmware for the ADC.





- The following window appears while the firmware is loading.



- A new tab labeled **ADS5295 GUI** appears in the *High Speed Data Converter Pro* GUI as shown in Figure 6. This tab allows control of the ADS5295 device.

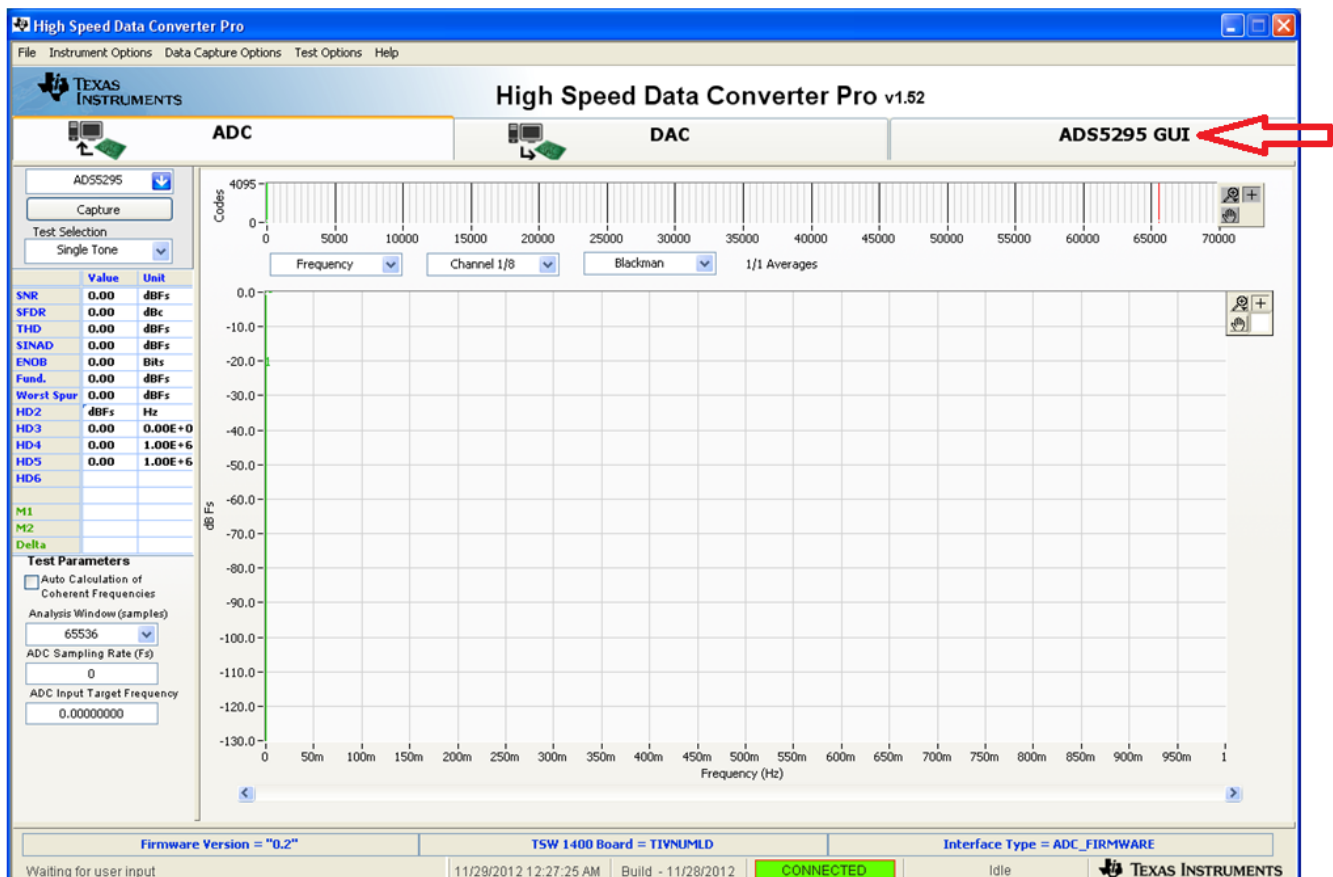


Figure 6. ADS5295 GUI

## 7 ADS5295 GUI Plug-In Tab

The third tab of the *High Speed Data Converter Pro* GUI labeled **ADS5295 GUI** contains all the serial register programming of the ADS5295 device.

- The **ADS5295 GUI** tab contains two sub-tabs called *Read Me First* and *High Level Test*. The default tab displayed is the *Read Me First* tab as shown in Figure 7
- A table of all operating modes that the device supports is shown in this tab. The device can be quickly configured to any of the operating modes listed by selecting the appropriate **Saved Sequence** file name once the **Playback Sequence** button is pushed. This button is located in the right side of the GUI in the *RECORD/PLAYBACK COMMAND SEQUENCE* section. (Note: The FPGA firmware of the TSW1400 capture card is automatically updated to match the operating mode selected.)
- Clicking the *High Level Test* tab accesses all serial registers.

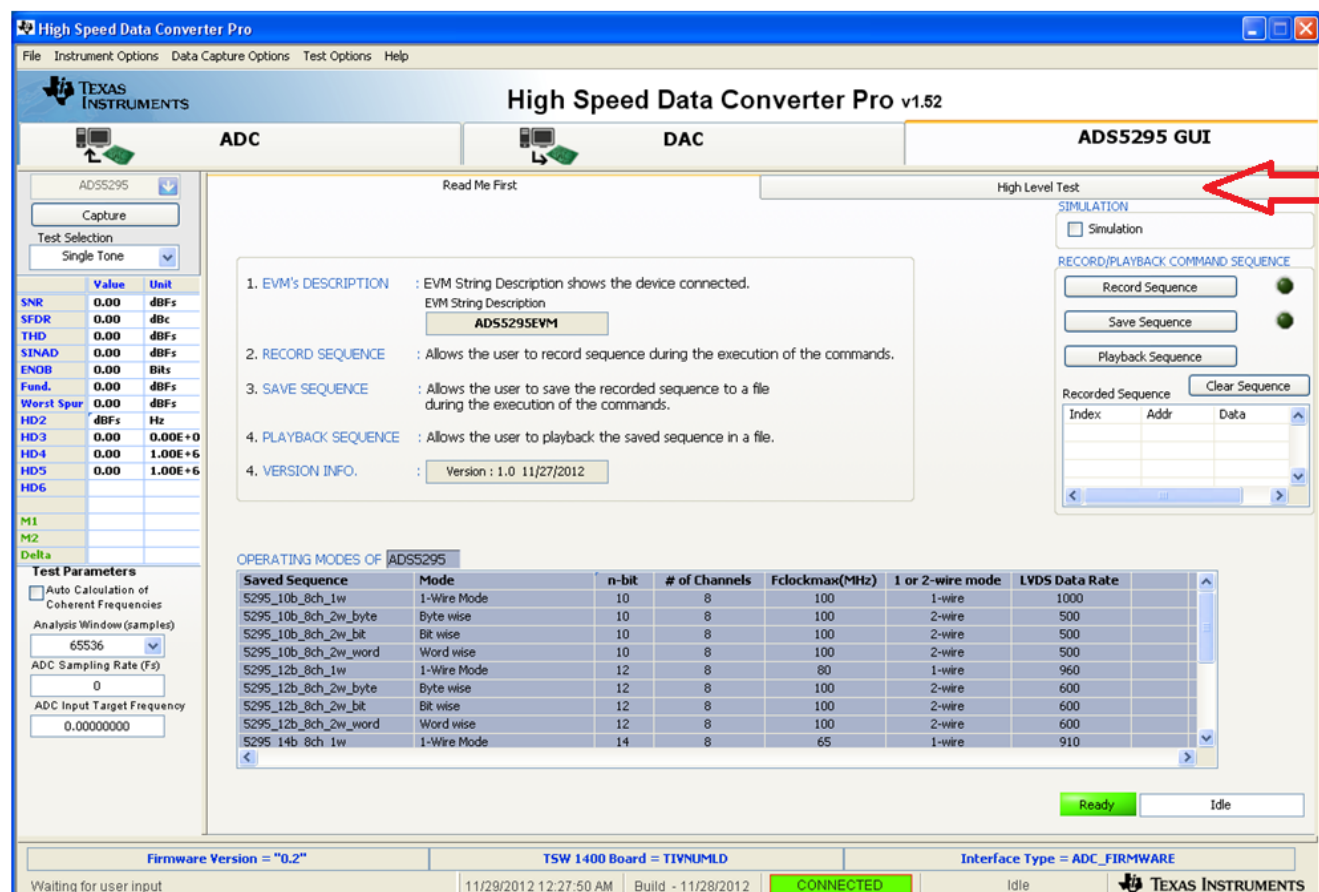


Figure 7. ADS5295 GUI Plug-In Tab

- The *High Level Test* tab contains five sub-tabs: *Top Level*, *Test Pattern*, *Dig Sig Proc*, *Channel Filter*, *IN/OUTP Map*. The default tab is the *Top Level* tab as shown in Figure 8.
- The *Top Level* tab contains four sections: *OUTPUT INTERFACE MODES*, *GENERAL SETUP*, *POWERDOWN MODES*, *CUSTOM READ/ WRITE*.
- To verify that communication with the ADS5295 is functioning properly, inside the *POWERDOWN MODES* section, click the checkbox labeled **PDN\_COMPLETE**. The DC current from the power supply should drop to approximately 140 mA when this box is checked. Uncheck this box before continuing.

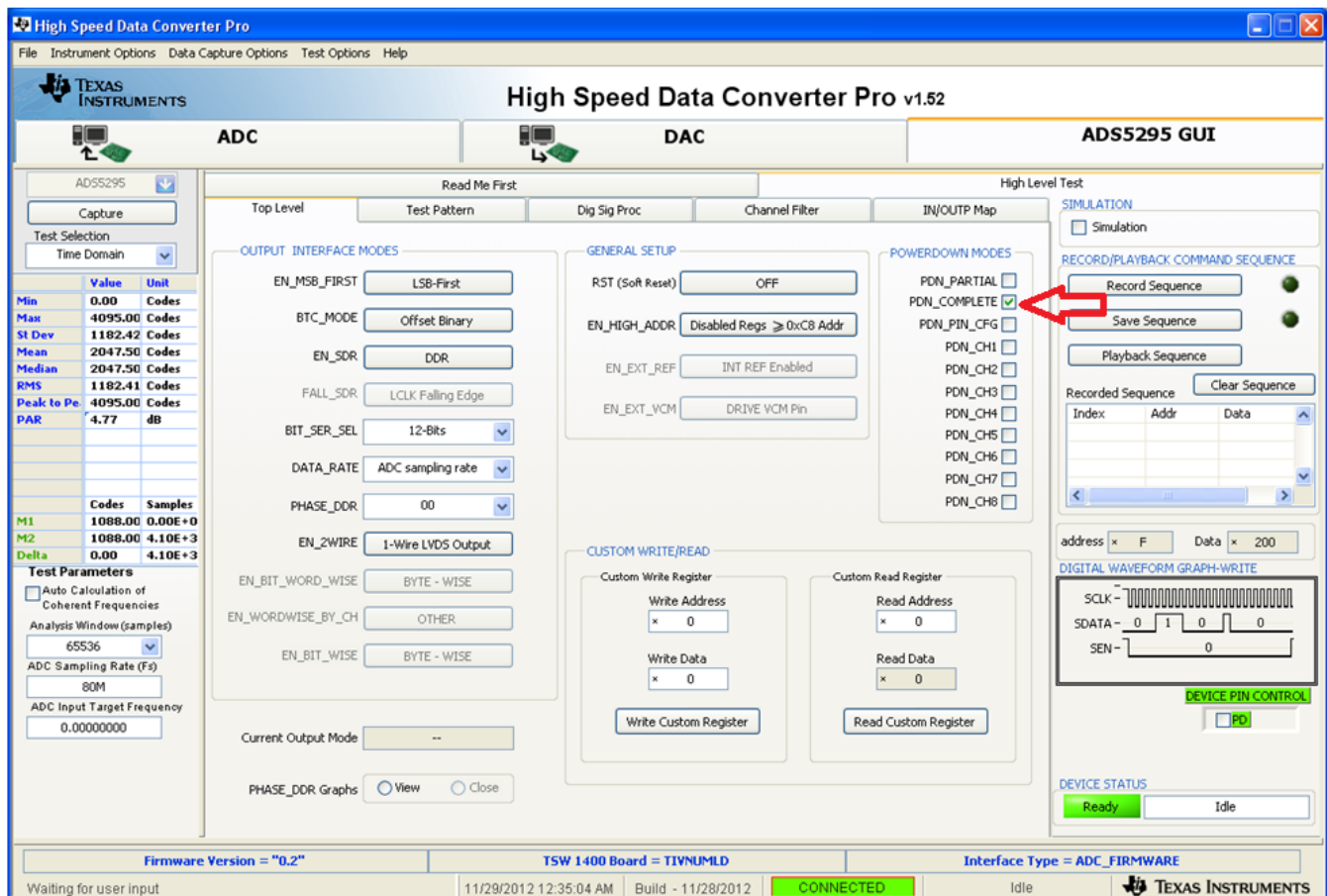


Figure 8. Top Level Tab

- The *OUTPUT INTERFACE MODES* section contains all serial registers associated with the LVDS data output format. The FPGA firmware of the TSW1400 capture card is automatically updated when one of these registers, such as **DATA\_RATE**, is updated.
- The *CUSTOM WRITE/READ* section allows manual programming of a serial register's data value given it's address. In addition, the current data value of any serial register can be read from the device by inputting it's address.

High Speed Data Converter Pro v1.52

File Instrument Options Data Capture Options Test Options Help

ADC DAC ADS5295 GUI

ADS5295

Capture

Test Selection  
Single Tone

|            | Value | Unit    |
|------------|-------|---------|
| SNR        | 0.00  | dBFS    |
| SFDR       | 0.00  | dBc     |
| THD        | 0.00  | dBFS    |
| SINAD      | 0.00  | dBFS    |
| ENOB       | 0.00  | Bits    |
| Fund.      | 0.00  | dBFS    |
| Worst Spur | 0.00  | dBFS    |
| HD2        | 0.00  | dBFS    |
| HD3        | 0.00  | 0.00E+0 |
| HD4        | 0.00  | 1.00E+6 |
| HD5        | 0.00  | 1.00E+6 |
| HD6        |       |         |
| M1         |       |         |
| M2         |       |         |
| Delta      |       |         |

Test Parameters

☐ Auto Calculation of Coherent Frequencies

Analysis Window (samples)  
65536

ADC Sampling Rate (Fs)  
0

ADC Input Target Frequency  
0.00000000

Top Level Test Pattern Dig Sig Proc Channel Filter IN/OUT Map

Read Me First High Level Test

OUTPUT INTERFACE MODES

EN\_MSB\_FIRST

BTC\_MODE

EN\_SDR

FALL\_SDR

BIT\_SER\_SEL

DATA\_RATE

PHASE\_DDR

EN\_2WIRE

EN\_BIT\_WORD\_WISE

EN\_WORDWISE\_BY\_CH

EN\_BIT\_WISE

Current Output Mode

PHASE\_DDR Graphs

GENERAL SETUP

RST (Soft Reset)

EN\_HIGH\_ADDR

EN\_EXT\_REF

EN\_EXT\_VCM

POWERDOWN MODES

PDN\_PARTIAL ☐

PDN\_COMPLETE ☐

PDN\_PIN\_CFG ☐

PDN\_CH1 ☐

PDN\_CH2 ☐

PDN\_CH3 ☐

PDN\_CH4 ☐

PDN\_CH5 ☐

PDN\_CH6 ☐

PDN\_CH7 ☐

PDN\_CH8 ☐

CUSTOM WRITE/READ

Custom Write Register

Write Address

Write Data

Custom Read Register

Read Address

Read Data

SIMULATION

☐ Simulation

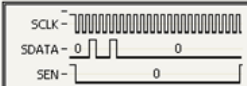
RECORD/PLAYBACK COMMAND SEQUENCE

Recorded Sequence

| Index | Addr | Data |
|-------|------|------|
|       |      |      |
|       |      |      |
|       |      |      |
|       |      |      |
|       |      |      |
|       |      |      |
|       |      |      |
|       |      |      |
|       |      |      |

address  Data

DIGITAL WAVEFORM GRAPH-WRITE

SCLK - 

SDATA -

SEN -

DEVICE PIN CONTROL

☐ PD

DEVICE STATUS

Firmware Version = "0.2"

TSW 1400 Board = TIVNUMLD

Interface Type = ADC\_FIRMWARE

Waiting for user input

11/29/2012 12:28:22 AM Build - 11/28/2012  Idle

TEXAS INSTRUMENTS

## 8 Test ADS5295

This section describes how to test the ADS5295 device in two ways: *Time Domain* and *Single Tone*.

### 8.1 Step 1: Time Domain

*Time Domain* test consists of applying a RAMP function to the ADC inputs, capturing, and verifying that every ADC code is generated incrementally.

- Select *Test Pattern* tab.
- In the **TEST PATTERN MODES** section, select **RAMP PATTERN** in the **Enable Pattern Mode** drop down menu. (Note: the **RAMP PATTERN** is applied internal to the device to all ADC channels simultaneously.)

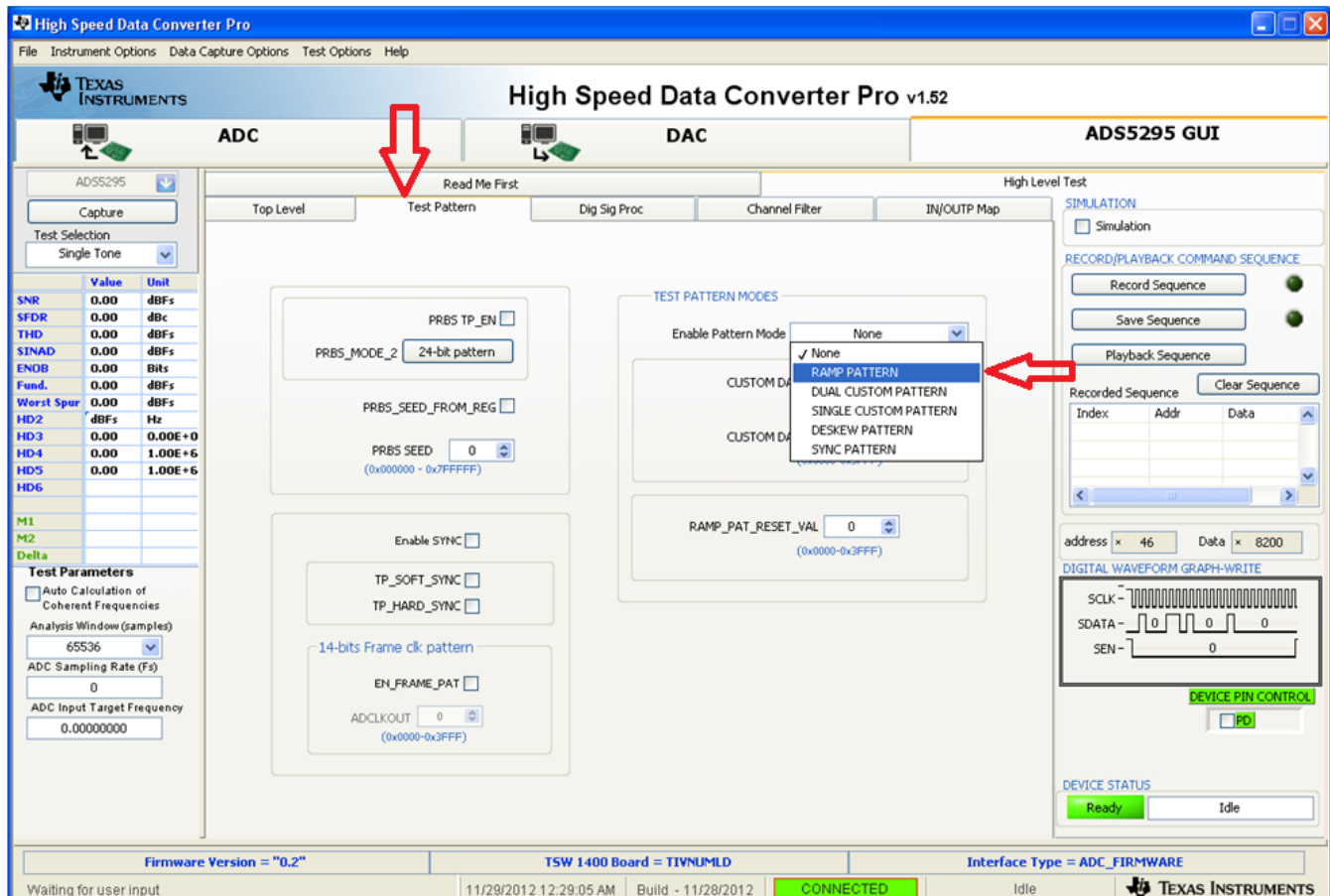


Figure 9. ADS5295 Time Domain Setup

- On the ADC tab of the *High Speed Data Converter Pro* GUI, select **Time Domain** from the **Test Selection** drop down menu as shown in Figure 10.

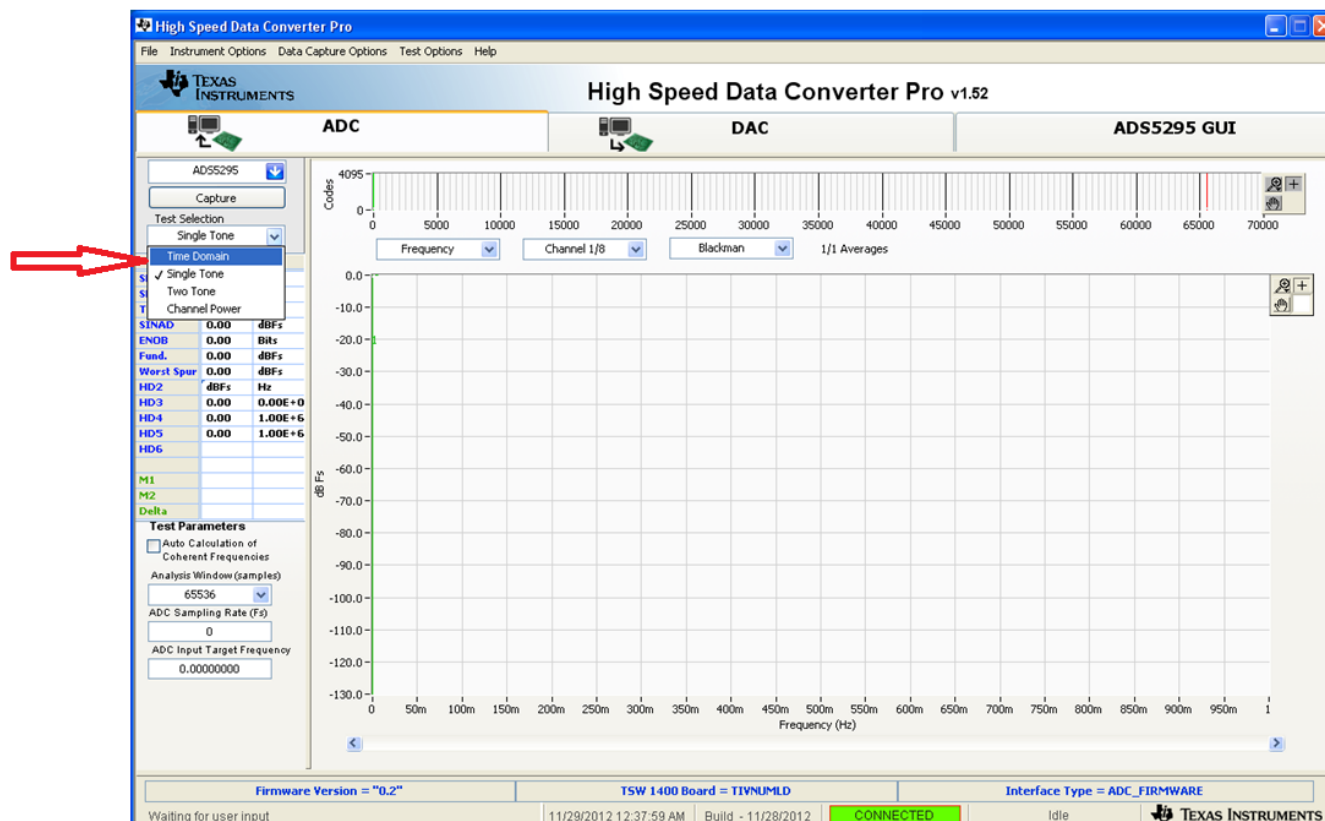


Figure 10. Time Domain Test

- Input the appropriate **ADC Sampling Rate** (80 MHz in the default configuration of ADS5295 EVM) .
- Press the **Capture** button.



- A saw tooth ramp should be captured as shown below.

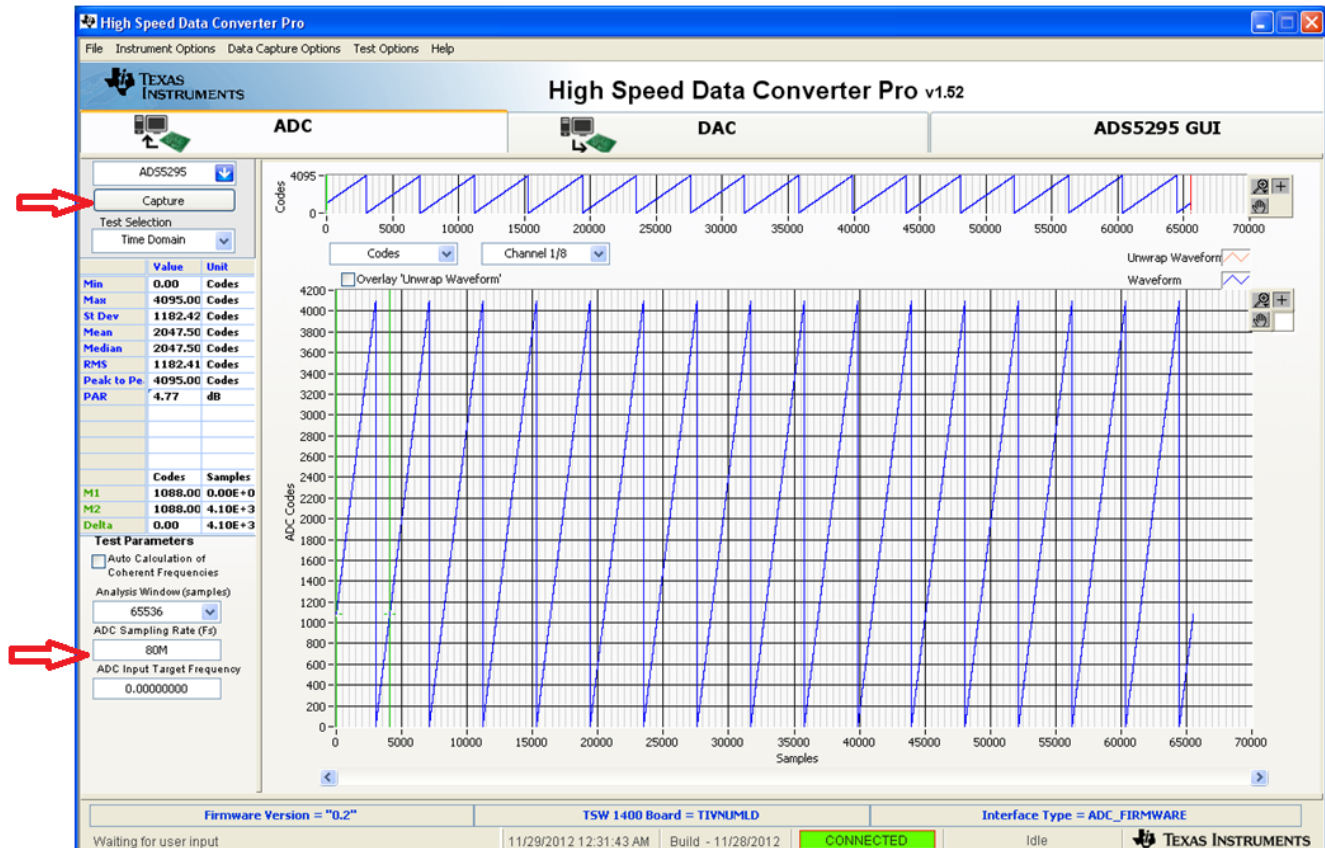


Figure 11. ADS5295 RAMP Test Pattern Capture

- Use the zoom functions provided in the *High Speed Data Converter Pro* GUI to verify that the captured RAMP is correct.

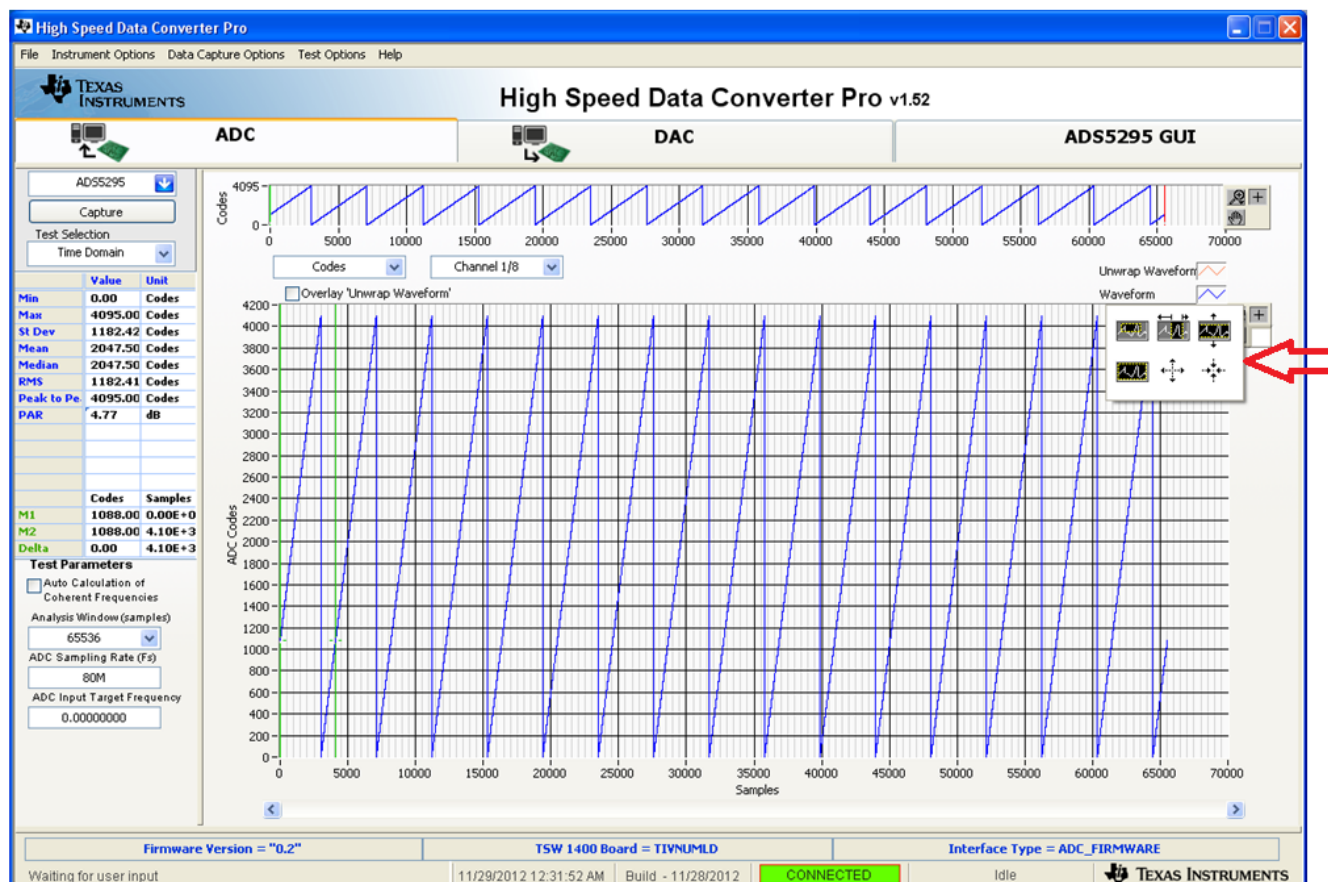


Figure 12. Graph Zoom Functions

- Zoom in on the RAMP until it is clear that every subsequent sample is an increment in ADC code as shown below.

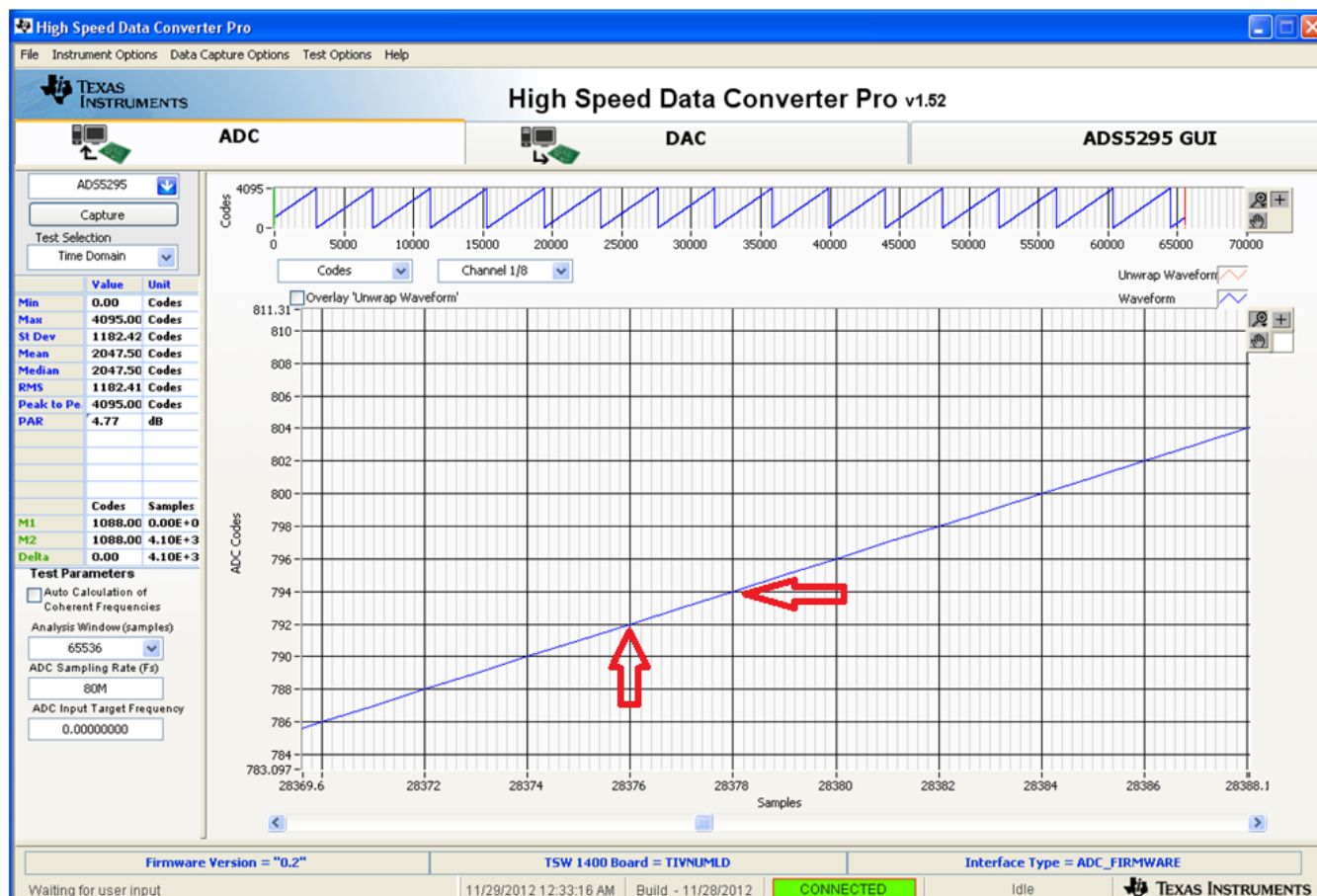


Figure 13. ADS5295 RAMP Verification

- Repeat the above procedure for all eight ADC channels using the selection box shown in Figure 14.

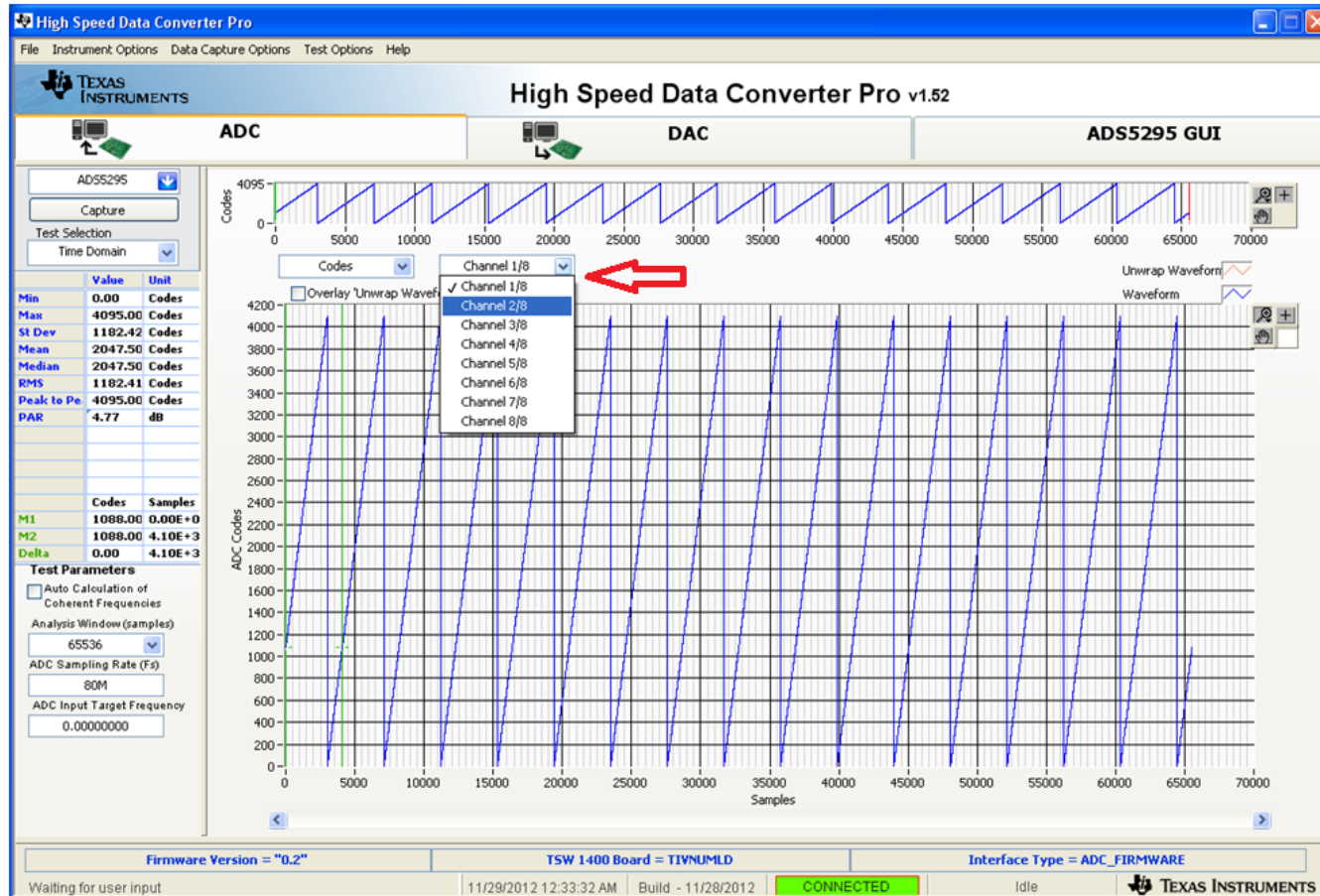


Figure 14. ADC Channel Selection

## 8.2 Step 2: Single Tone FFT

The *Single Tone* test consists of applying a sine wave from an external signal generator to an ADC input, capturing, and analyzing performance.

- Disable the **RAMP PATTERN** by setting the **Enable Pattern Mode** to **None**.

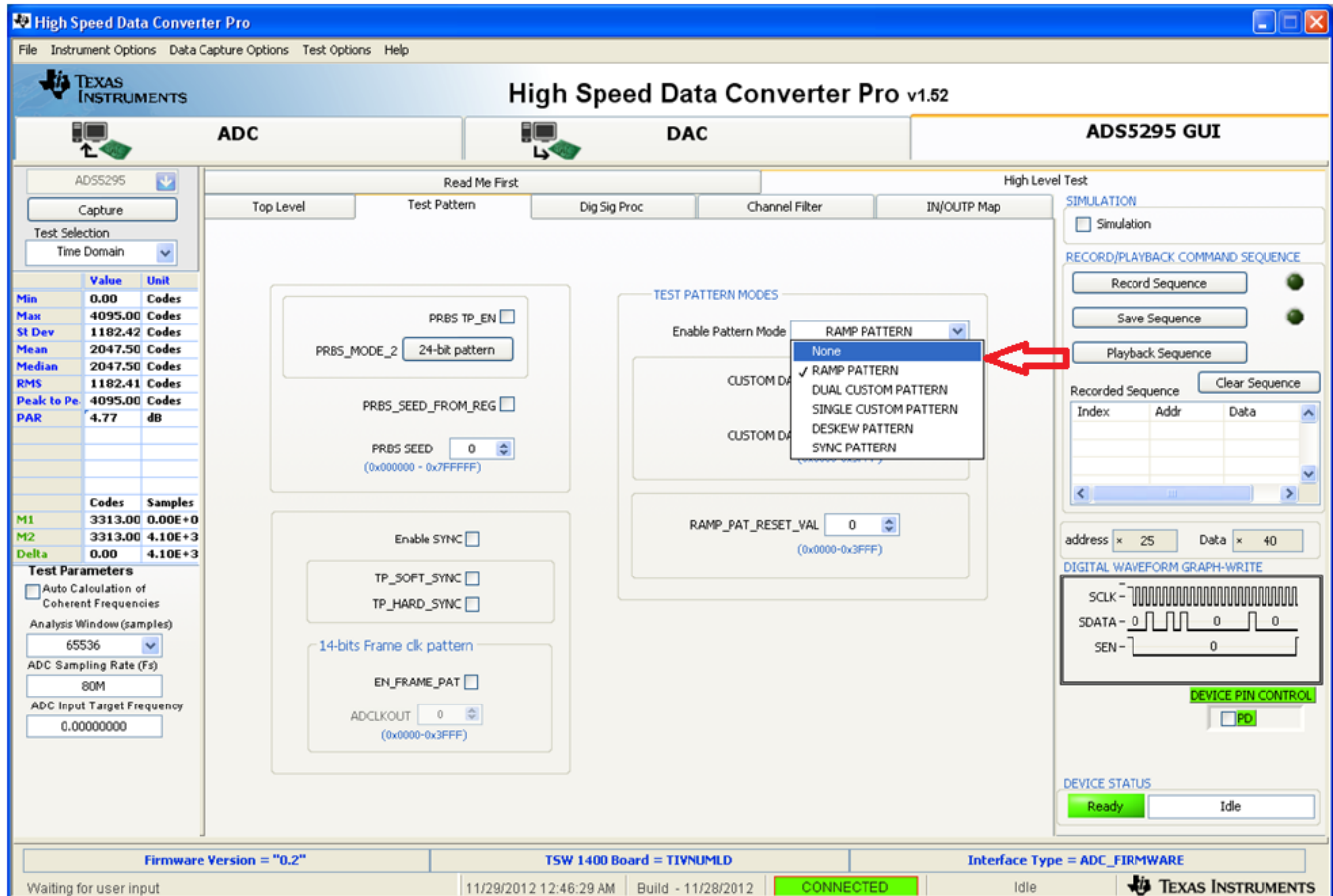


Figure 15. Disable RAMP PATTERN

- Set the **Test Selection** to **Single Tone**.
- Set the **ADC Input Target Frequency** to **1M** (Note: the value automatically changes to the exact coherent frequency once the Auto Calculation box is checked).
- Check the box labeled **Auto Calculation of Coherent Frequencies**.

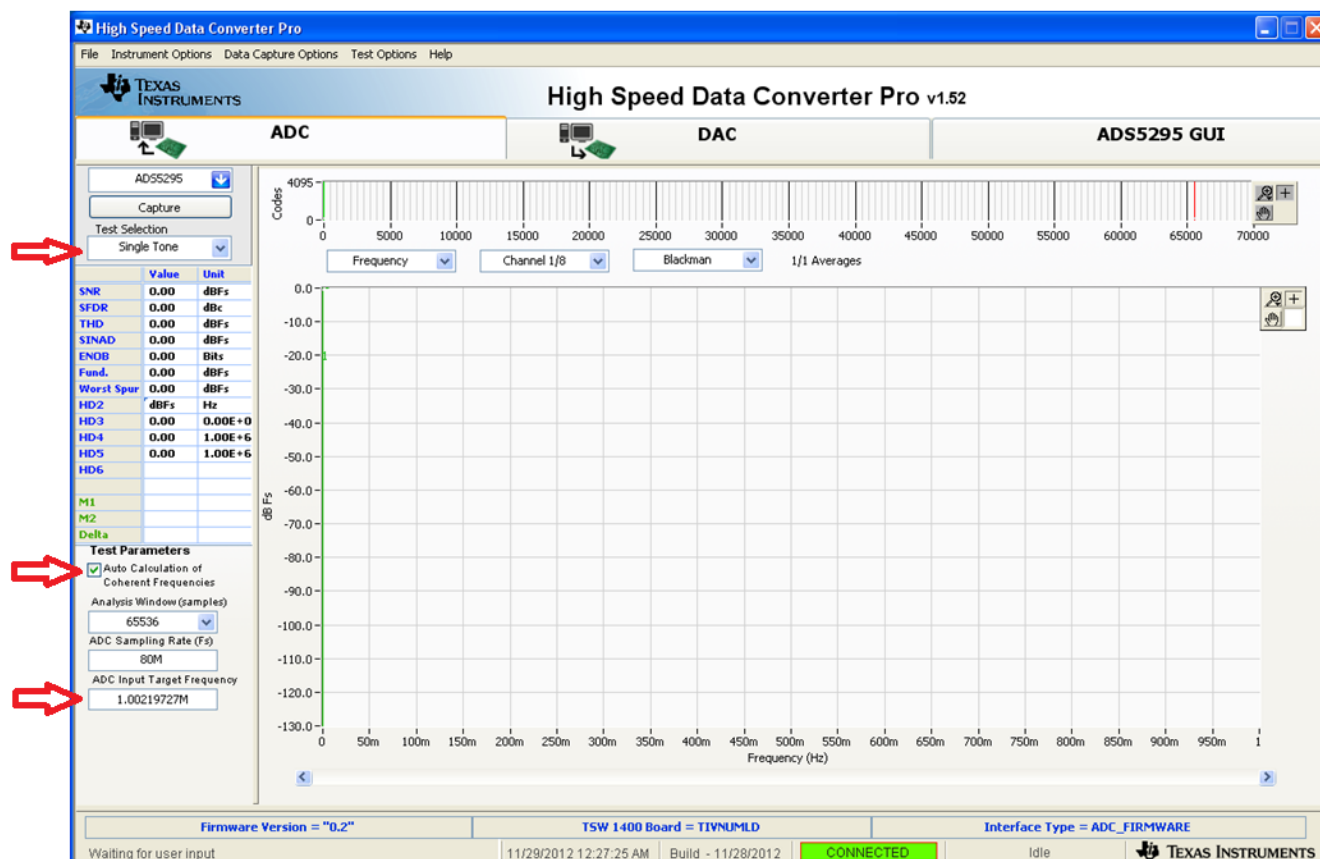


Figure 16. Single Tone Test



- Connect Channel 1 of the ADS5295EVM to a signal generator through a band-pass filter (BPF). If no **BPF** is present, the results are not good.
- The **amplitude** of the input signal is dependent on the insertion loss of the filter and cables used as well as the desired backoff from full-scale. An iterative approach is used to determine the amplitude setting required to operate at approximately -1.0 dBFS. In this test setup, the amplitude was set to **+18.4 dBm**.
- Set the **frequency** of the signal generator to that shown in the **ADC Input Target Frequency** box (**1.00219727M**).
- Change the window option to **Hanning**, due to the fact that input signal and onboard CMOS clock are non-coherent.
- Pressing the **Capture** button returns the test result.
- Repeat for Channels 2 through 8.

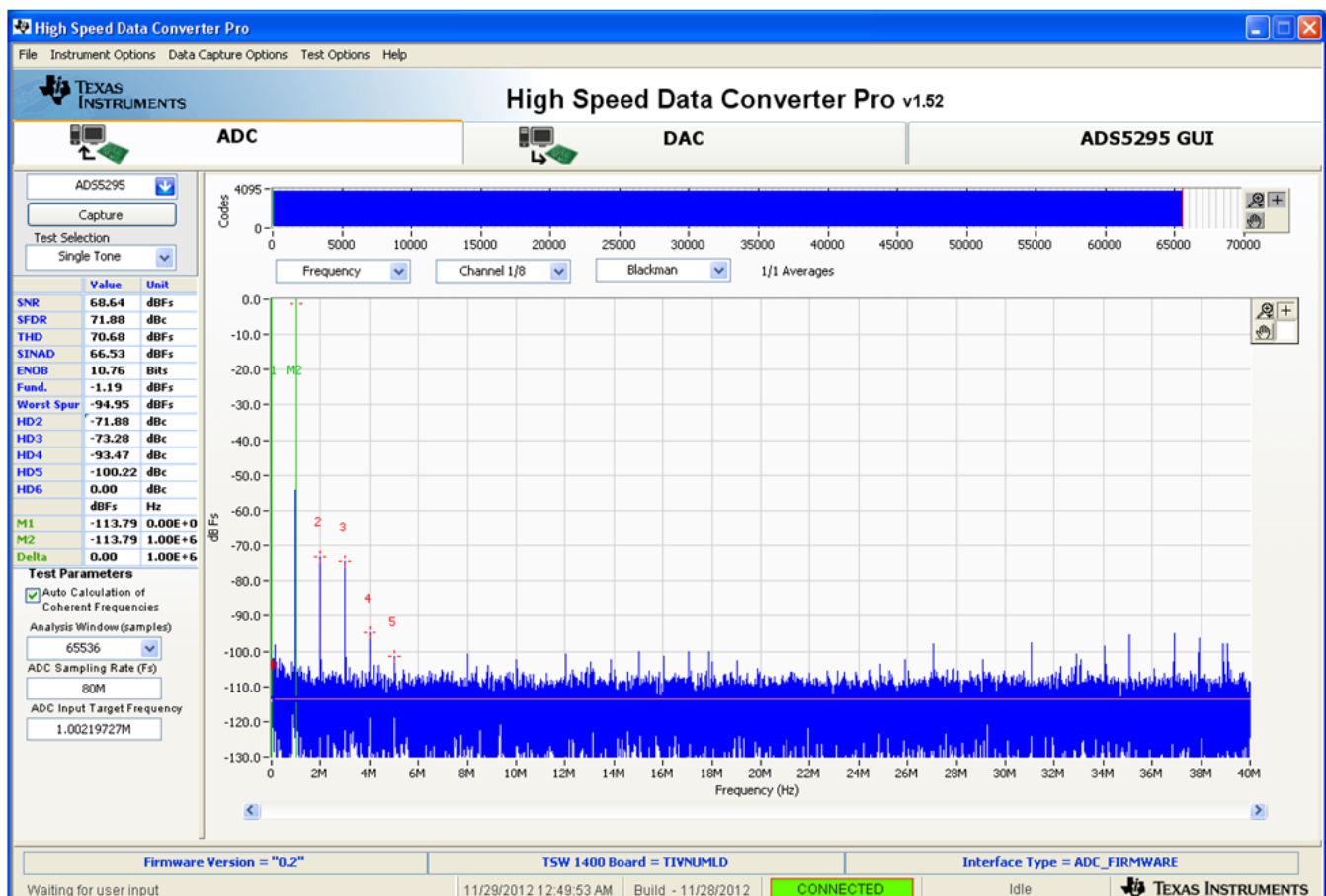


Figure 17. Single Tone Capture

## 9 Board Configuration

### 9.1 Input/Output, Power Supply, and USB

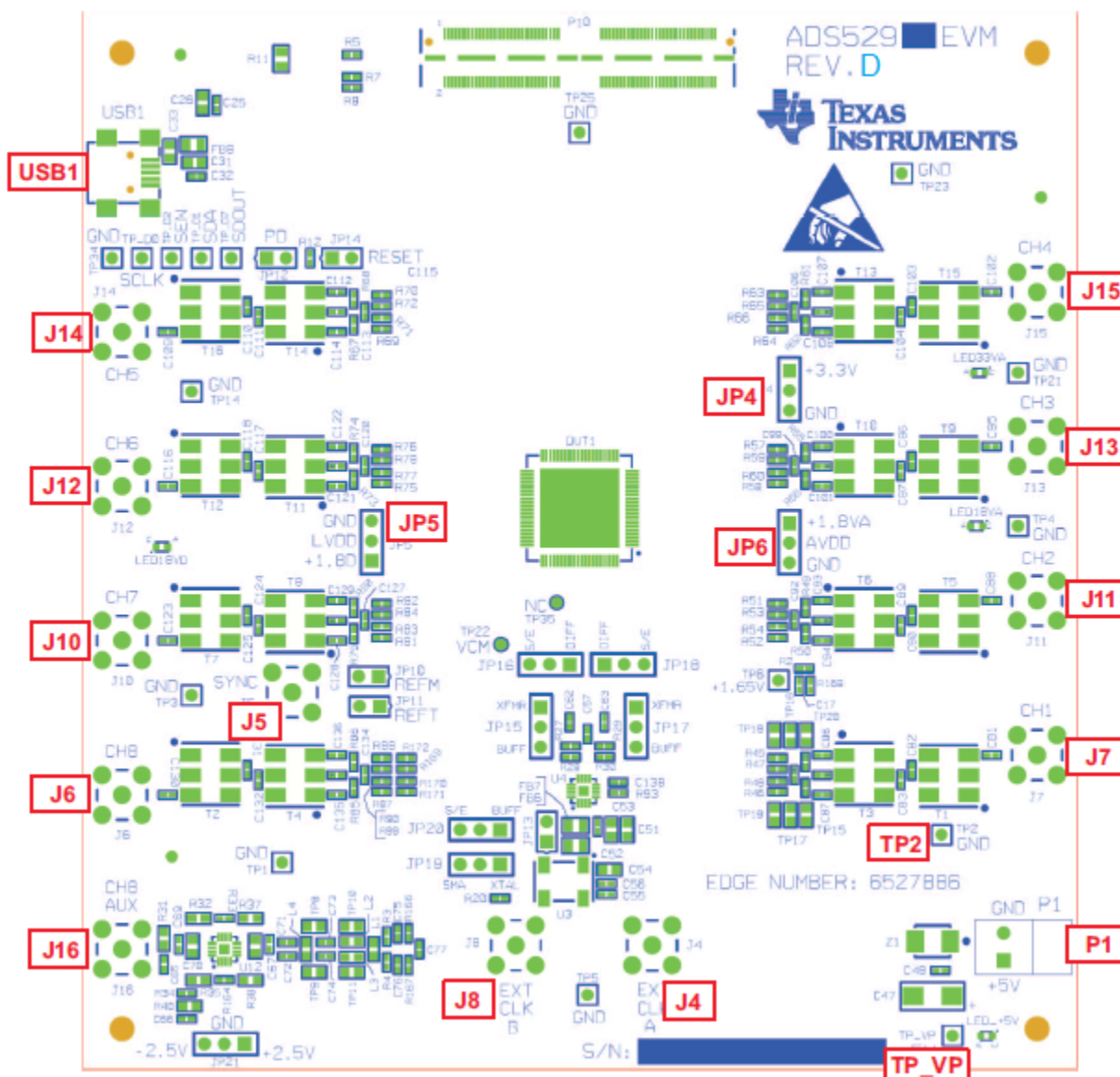


Figure 18. I/O, PWR, and USB Connector

Table 1. Input/Output, Power, and USB

| Connector         | Description                                                                                                                                                   |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| J6,J7,J10.....J15 | Analog Input signals for Ch1-Ch8. Connect to a signal generator. A band-pass filter must be applied between the generator and the SMA to get a better result. |
| J16               | An alternative input for channel 8. Install two resistors (R169 and R170) and remove two resistors (R171 and R172) from J6.                                   |
| P1/TP_VP          | P1 is the +5-V power supply connector. TP_VP is the test point for +5-V power supply.                                                                         |
| JP4               | Onboard 3.3-V Analog enables. Set up as shown in <a href="#">Figure 2</a> is required to use onboard 3.3 V.                                                   |
| JP5               | Onboard 1.8-V Digital enables. Set up as shown in <a href="#">Figure 2</a> is required to use onboard 1.8 V.                                                  |
| JP6               | Onboard 1.8-V Analog enables. Set up as shown in <a href="#">Figure 2</a> is required to use onboard 1.8 V.                                                   |

**Table 1. Input/Output, Power, and USB (continued)**

| Connector                                                       | Description             |
|-----------------------------------------------------------------|-------------------------|
| TP1, TP2, TP3,<br>TP4, TP5, TP14,<br>TP21, TP23,<br>TP25, TP34, | Ground test points.     |
| USB1                                                            | USB interface connector |

**Table 2. Channel 8 Configuration**

| Input Interface Type               | Connector | Description                                                                                                                                                                                        |
|------------------------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Through Transformer<br>(Default)   | J6        | In default configuration, R171 and R172 are already populated                                                                                                                                      |
| Through Amplifier (Not<br>Default) | J16       | It is an alternative input for channel 8. Need to install two resistors (R169 and R170) and remove two resistors(R171 and R172) from J6.It uses TI THS4509 single-ended to differential amplifier. |

## 9.2 ADC Clock

Five options are available for the source of the ADC clocks. Refer to Table 3 for details. In Figure 19, the EVM uses an onboard, single-ended clock as the default option.

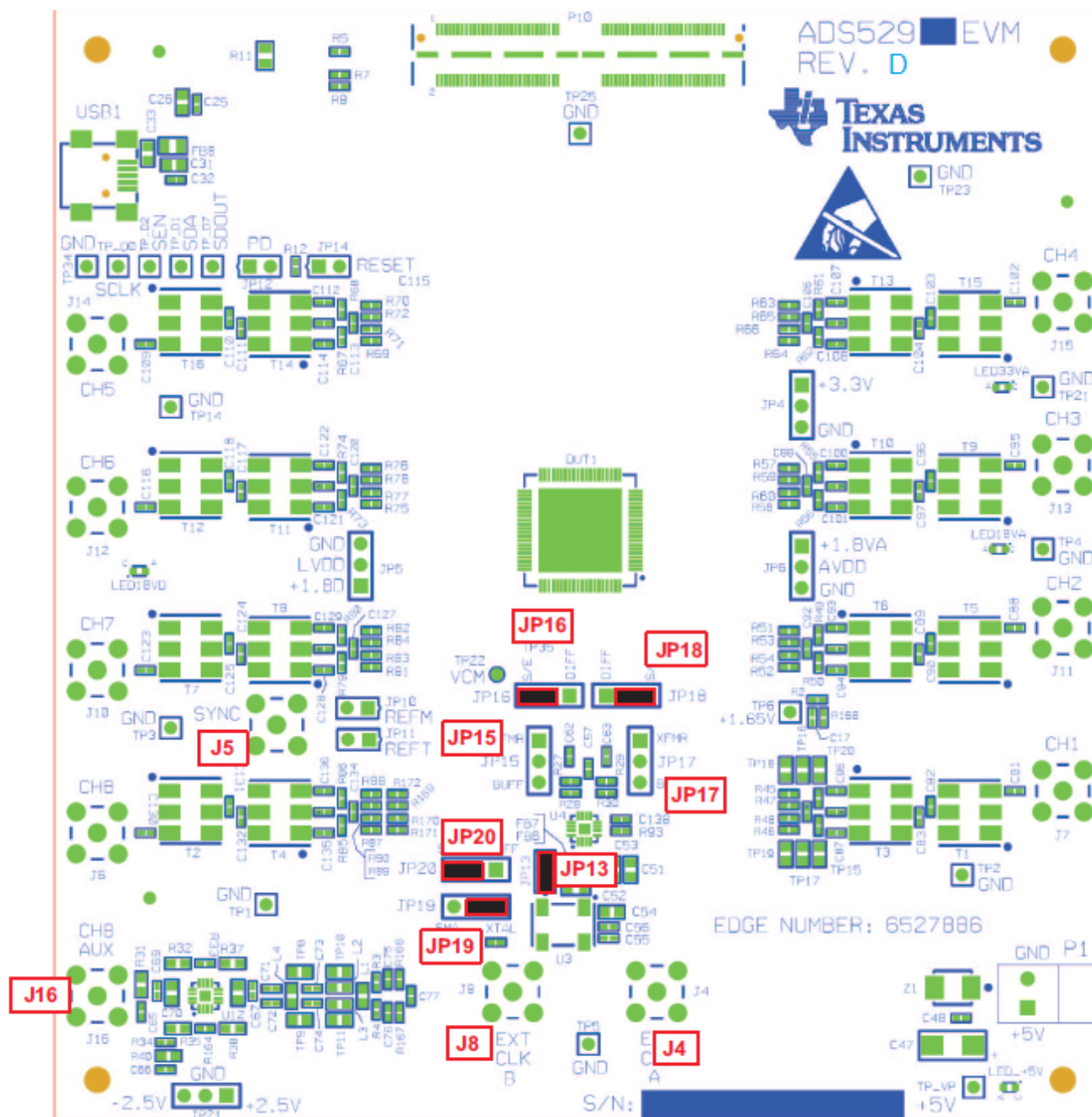
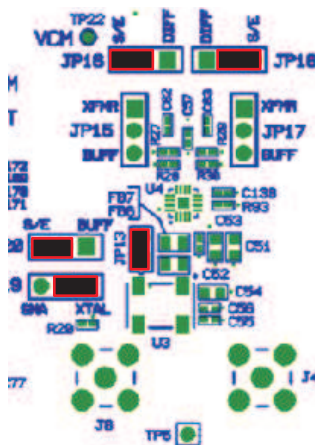


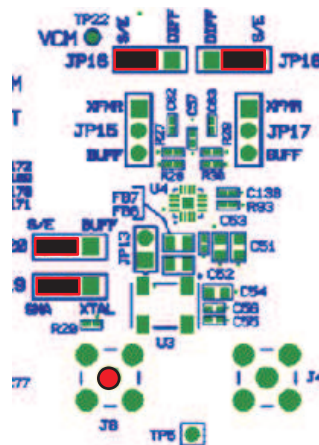
Figure 19. ADS5295EVM Default Clock Jumper Locations

**Table 3. ADC Clock Various Mode Jumper Settings**

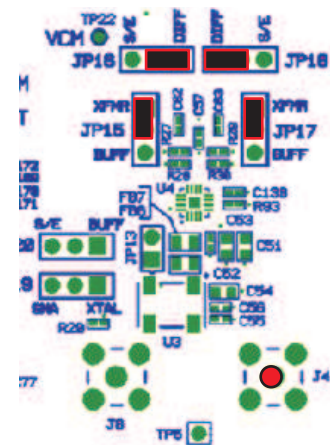
| Clock Type                |                                      | Reference Designator                     | Jumper Setting                                                                                                                                                                                                   | Diagram                 |
|---------------------------|--------------------------------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Single Ended              | Onboard CMOS Oscillator              | JP13, JP19, JP20, JP16, JP18             | JP13 (1-2), JP20 (2-3), JP19 (1-2), JP16 (2-3), JP18 (2-3)                                                                                                                                                       | Dia. 1 (Default Option) |
|                           | External CMOS Clock Generator        | J8, JP19, JP20, JP16, JP18               | JP20 (2-3), JP19 (2-3), JP16 (2-3), JP18 (2-3) and Connect CMOS clock generator output at SMA connector J8.                                                                                                      | Dia. 2                  |
| Differential Clock Signal | Transformer Based External           | JP15, JP17, JP16, JP18, J4               | JP15 (1-2), JP16 (1-2), JP17 (1-2), JP18 (1-2), and Connect external Clock source at SMA connector J4                                                                                                            | Dia. 3                  |
|                           | Onboard Clock Buffer (CDCLVP1102,U4) | JP13, JP19, JP20, JP15, JP17, JP16, JP18 | JP13 (1-2), JP20 (1-2), JP19 (1-2), JP15 (2-3), JP17 (2-3), JP16 (1-2), JP18 (1-2).<br><br>This configures the onboard CMOS oscillator as clock input to buffer.                                                 | Dia. 4                  |
|                           |                                      | J8, JP19, JP20, JP15, JP17, JP16, JP18   | JP19 (2-3), JP20 (1-2), JP15 (2-3), JP17 (2-3), JP16 (1-2), JP18 (1-2) and Connect External CMOS generator output at SMA connector J8.<br><br>This configures the external CMOS source as clock input to buffer. | Dia. 5                  |



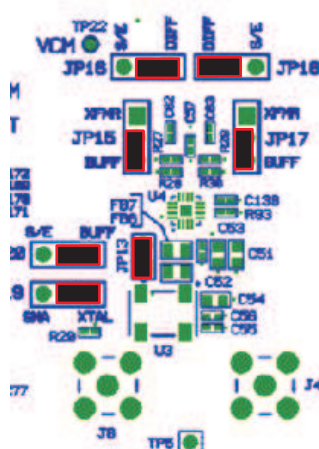
Dia.1



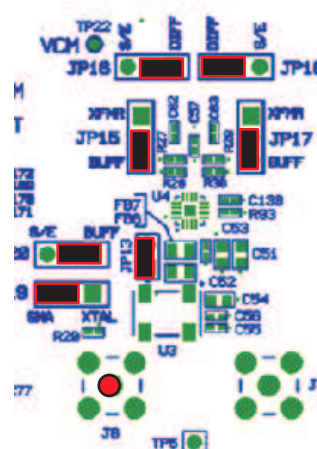
Dia.2



Dia.3



Dia.4



Dia.5



### 9.3 Light-Emitting Diodes (LEDs)

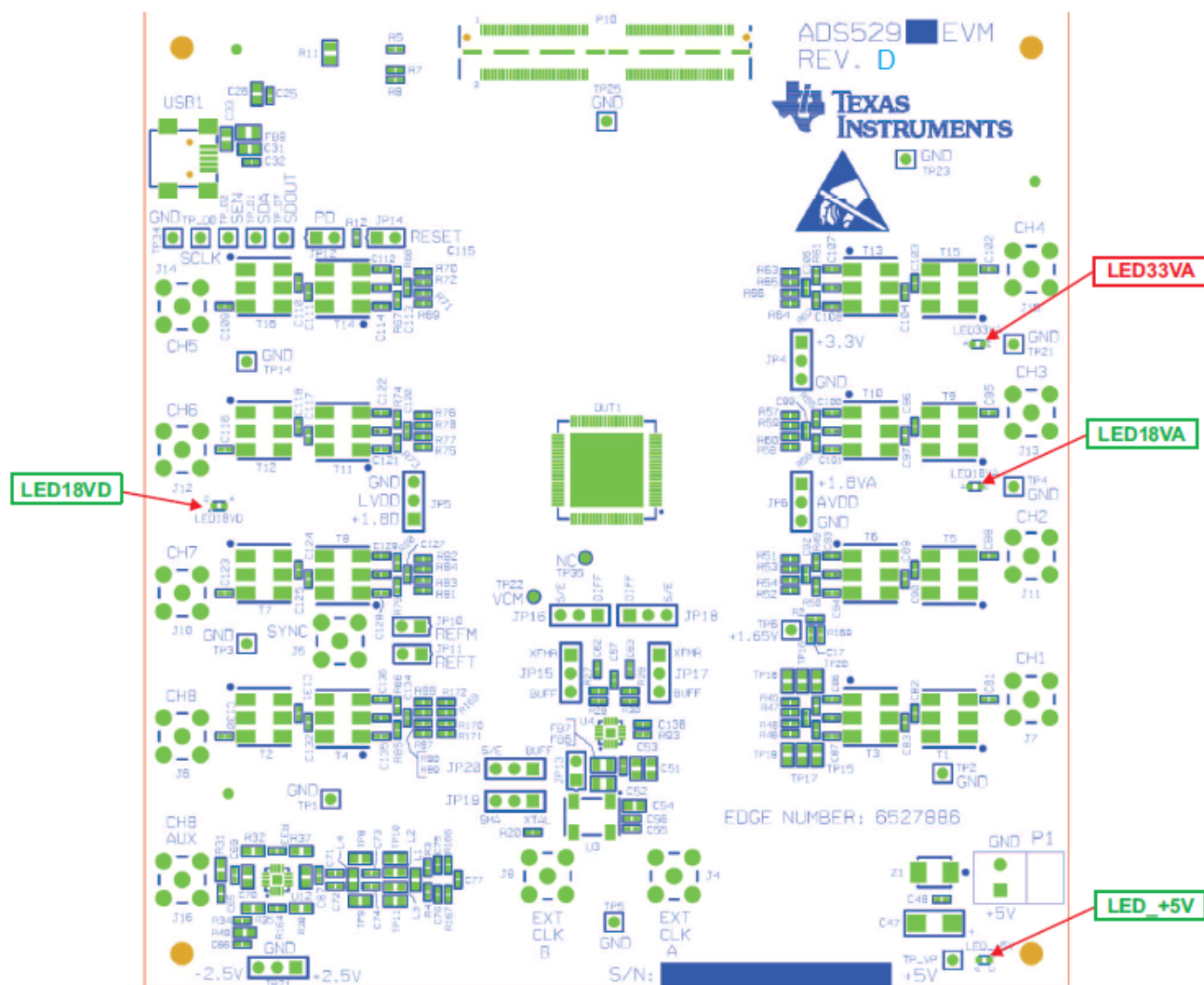


Figure 20. ADS5295EVM LED Location

Table 4. LED Indicators

| Reference Designator | Power Supply | Color  |
|----------------------|--------------|--------|
| LED_+5V              | +5 V         | Green  |
| LED1.8VA             | +1.8 VA      | Off    |
| LED1.8VD             | +1.8 VD      | Off    |
| LED3.3VA             | +3.3 VA      | Orange |



## 9.4 Miscellaneous Test Points

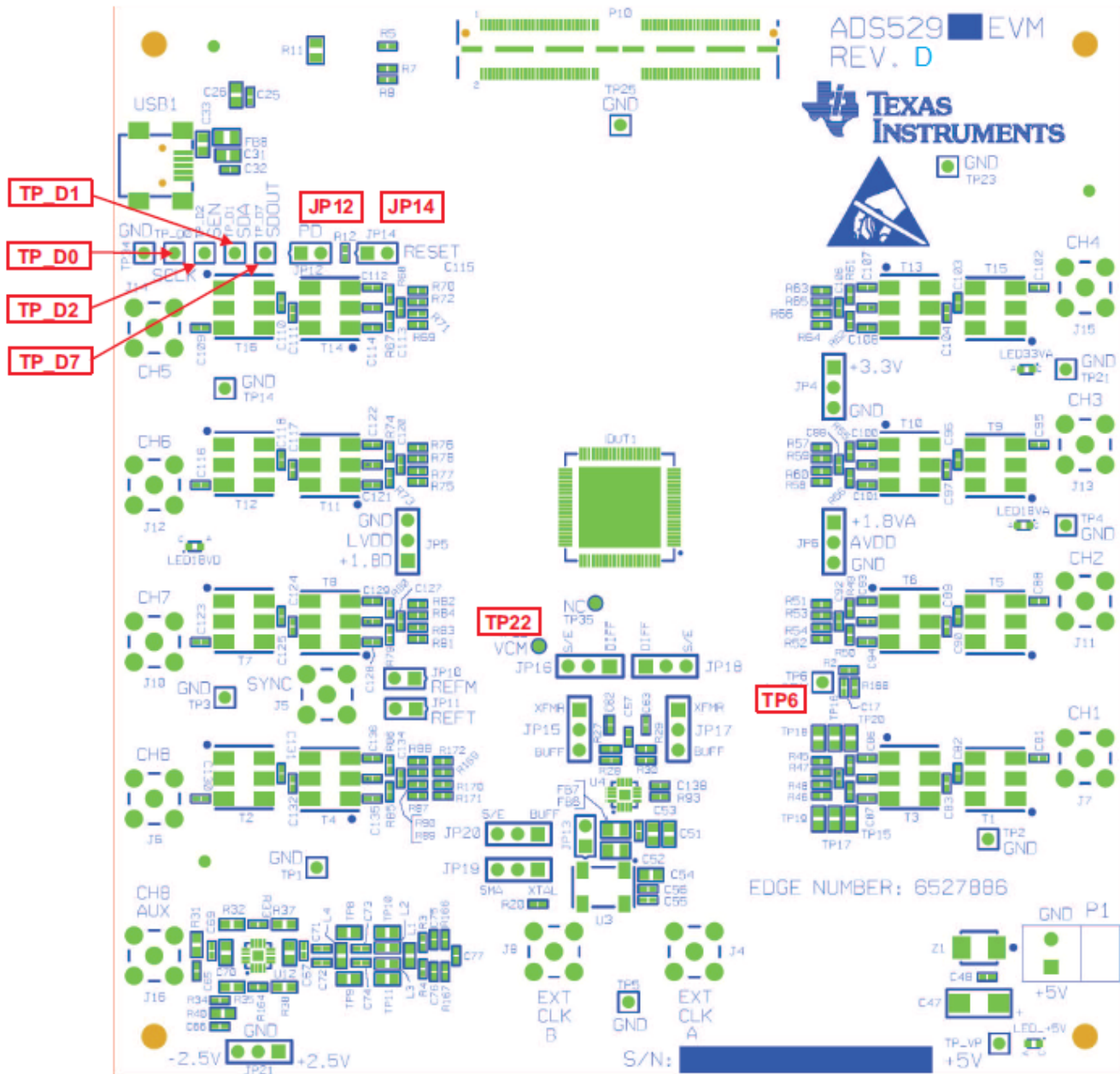


Figure 21. ADS5295EVM Test Point Locations

Table 5. Miscellaneous Test Points

| Reference Designator | Description                                |
|----------------------|--------------------------------------------|
| TP22                 | VCM: Common-mode output pin, 0.95-V output |
| TP6                  | CDC_VTH: Fixed voltage level (1.65 V)      |
| TP_D0                | SCLK: Serial clock input                   |
| TP_D1                | SDA: Serial data input                     |
| TP_D2                | SEN: Serial enable chip select             |
| TP_D7                | SDOUT: Serial data output                  |

**Table 5. Miscellaneous Test Points (continued)**

| Reference Designator | Description                                          |
|----------------------|------------------------------------------------------|
| JP14                 | RESET: Install to reset the device (DUT1) manually   |
| JP12                 | PD: Install to power down the device (DUT1) manually |

## 10 EVM Schematics

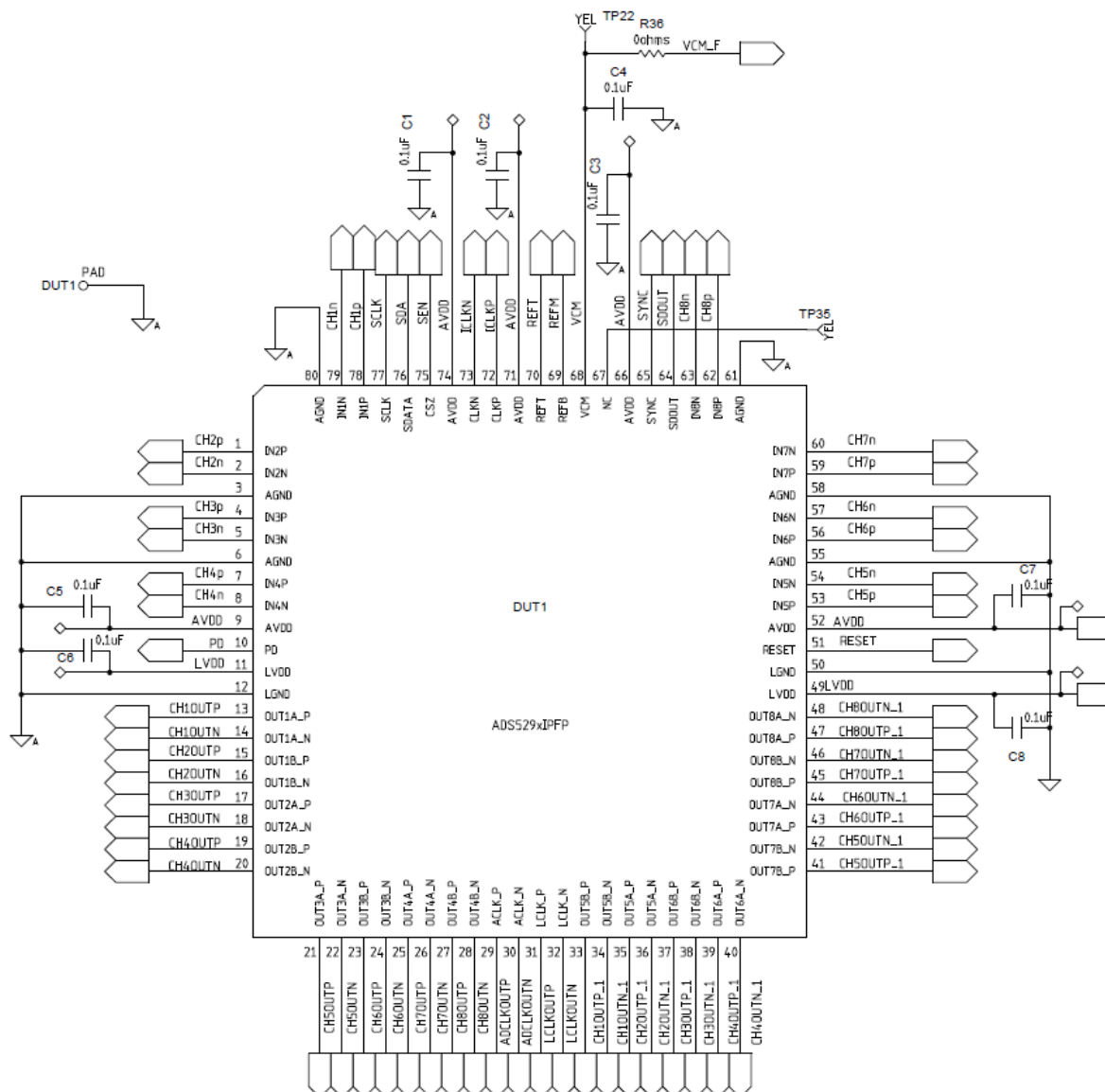


Figure 22. Schematic, Sheet 1 of 9

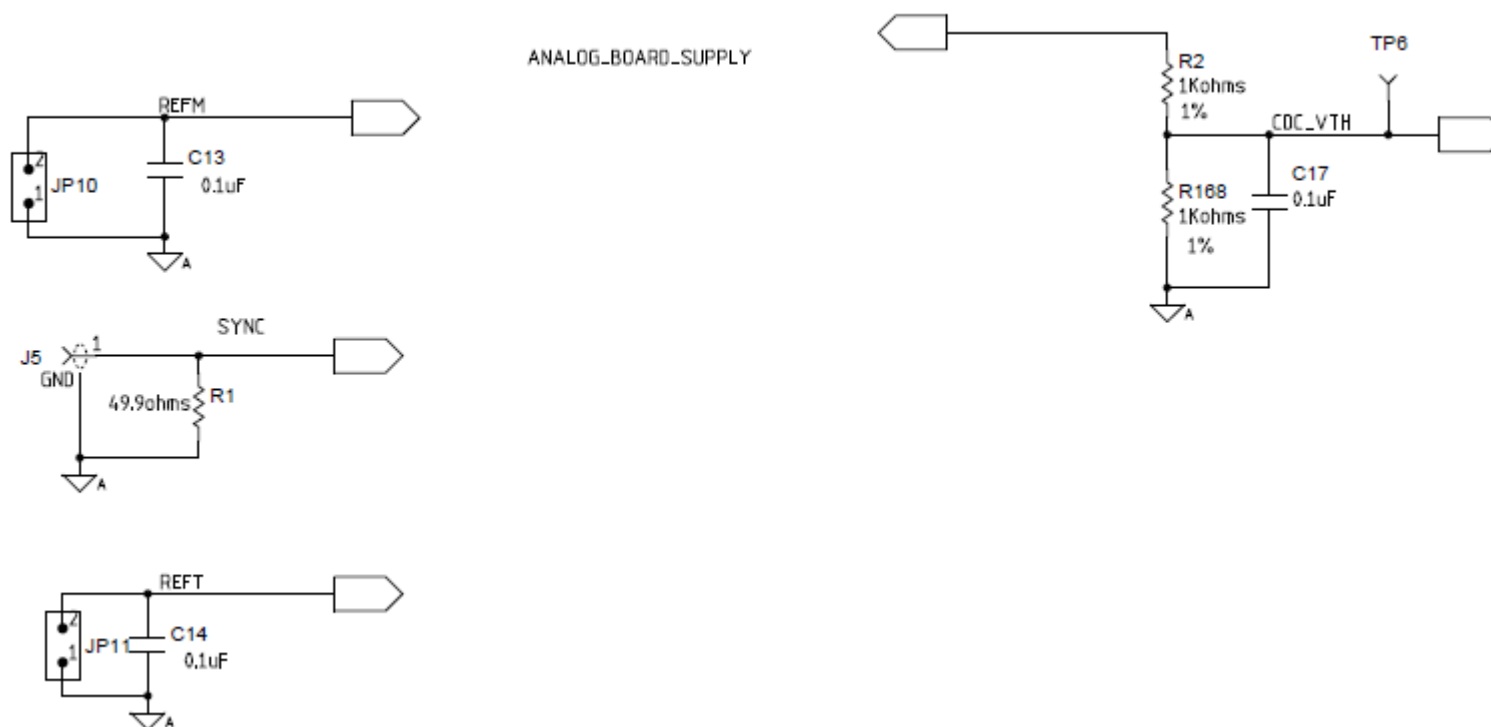


Figure 23. Schematic, Sheet 2 of 9



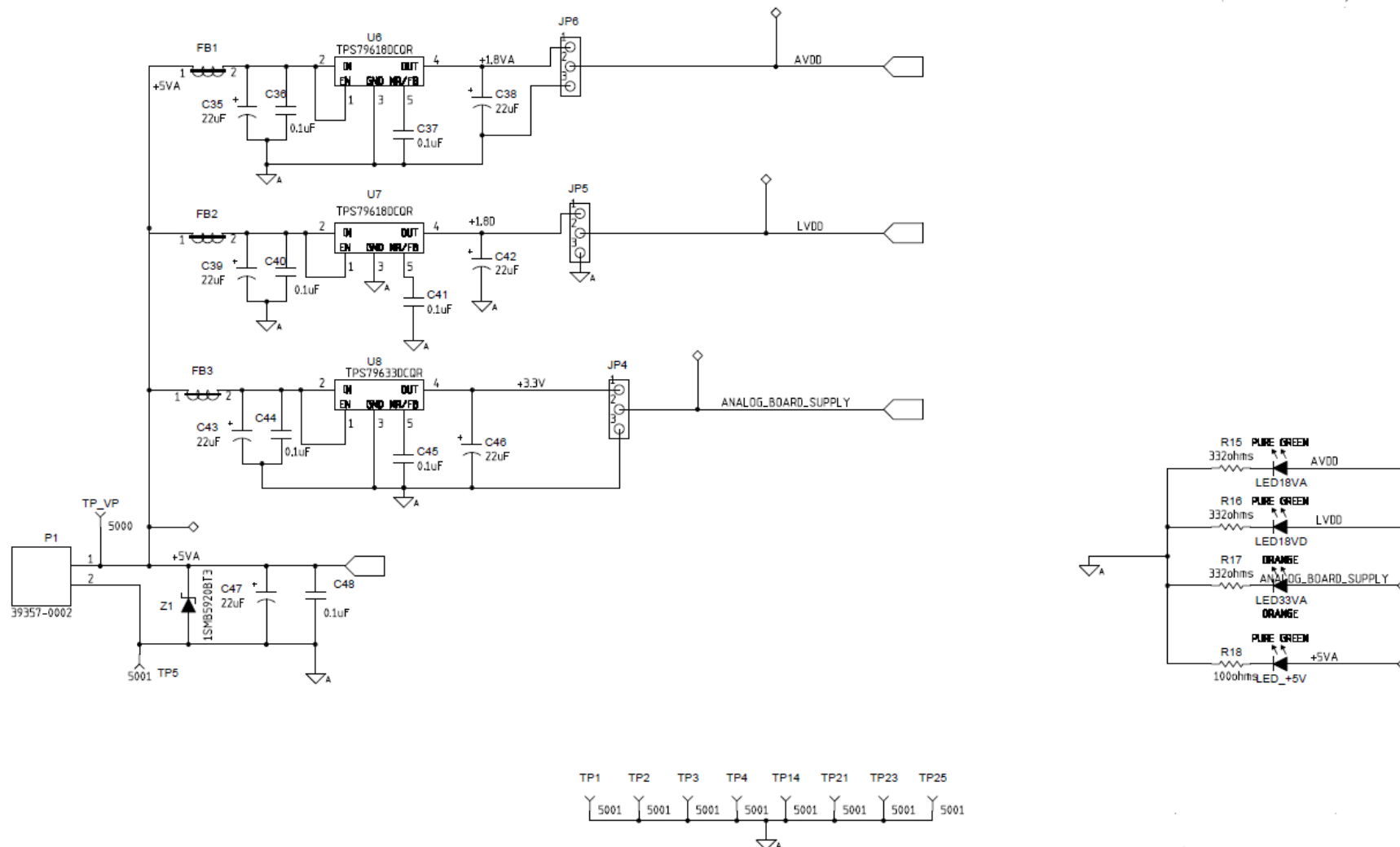


Figure 25. Schematic, Sheet 4 of 9



# ADC CLOCK

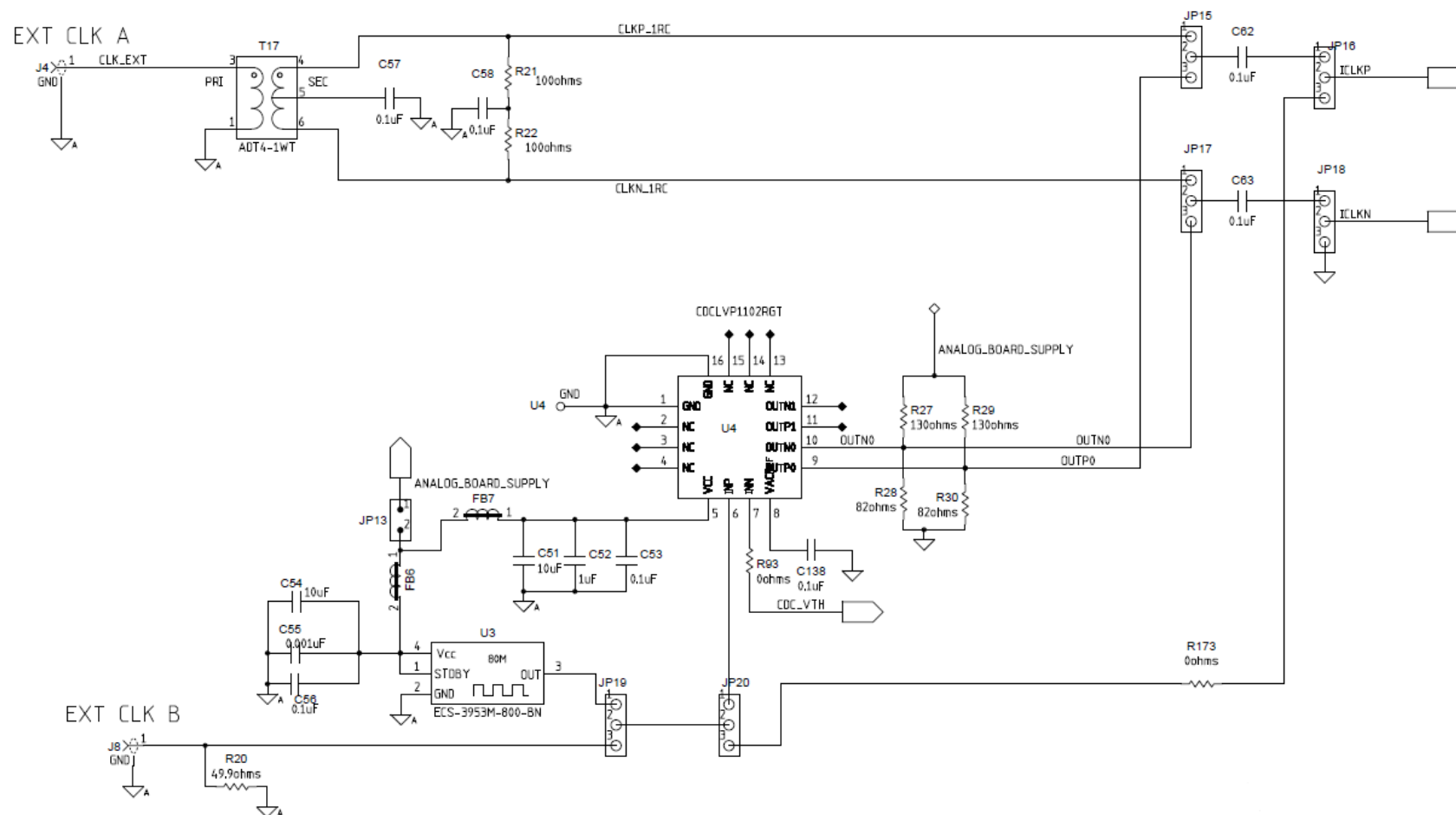


Figure 26. Schematic, Sheet 5 of 9

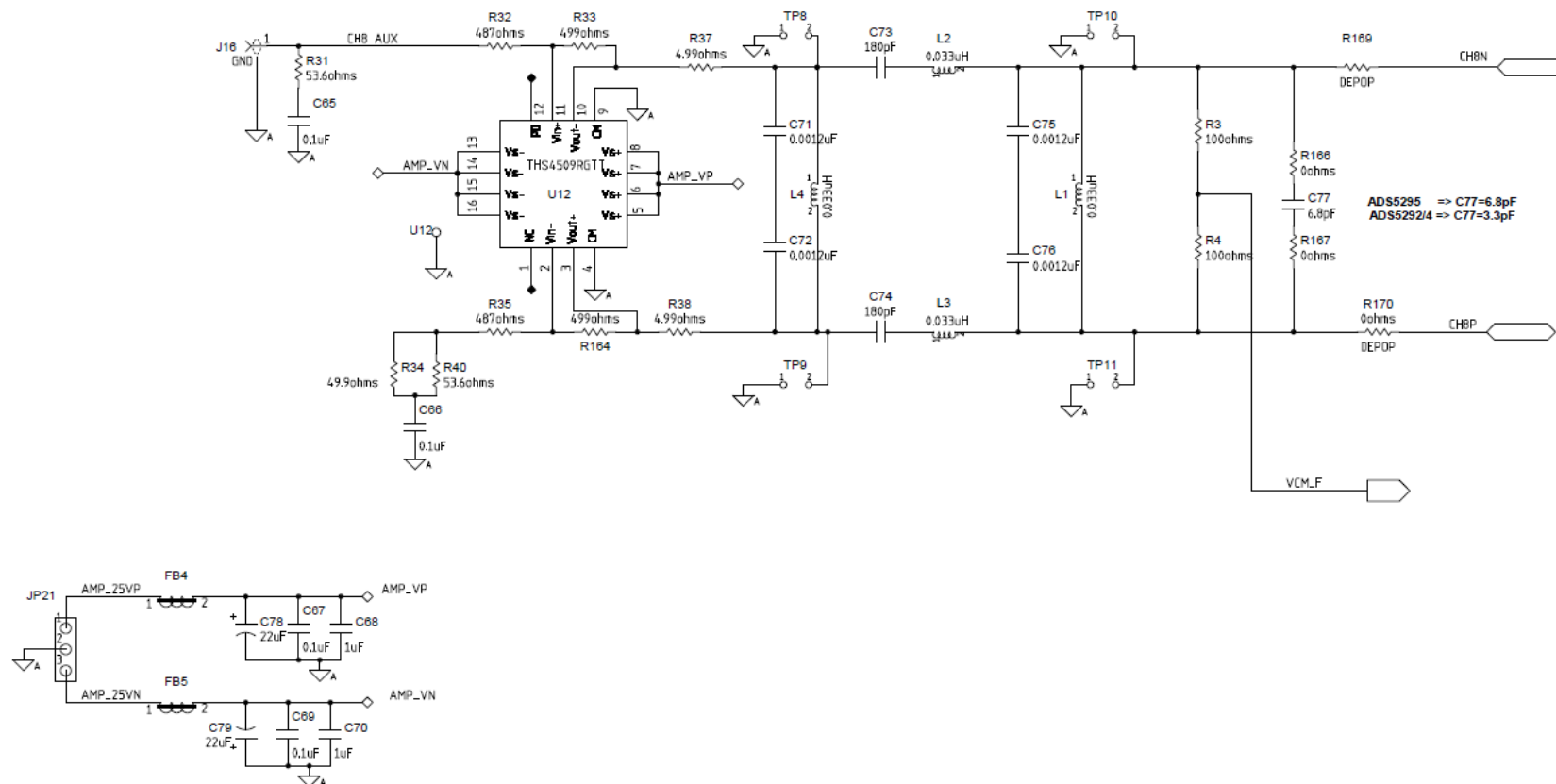


Figure 27. Schematic, Sheet 6 of 9

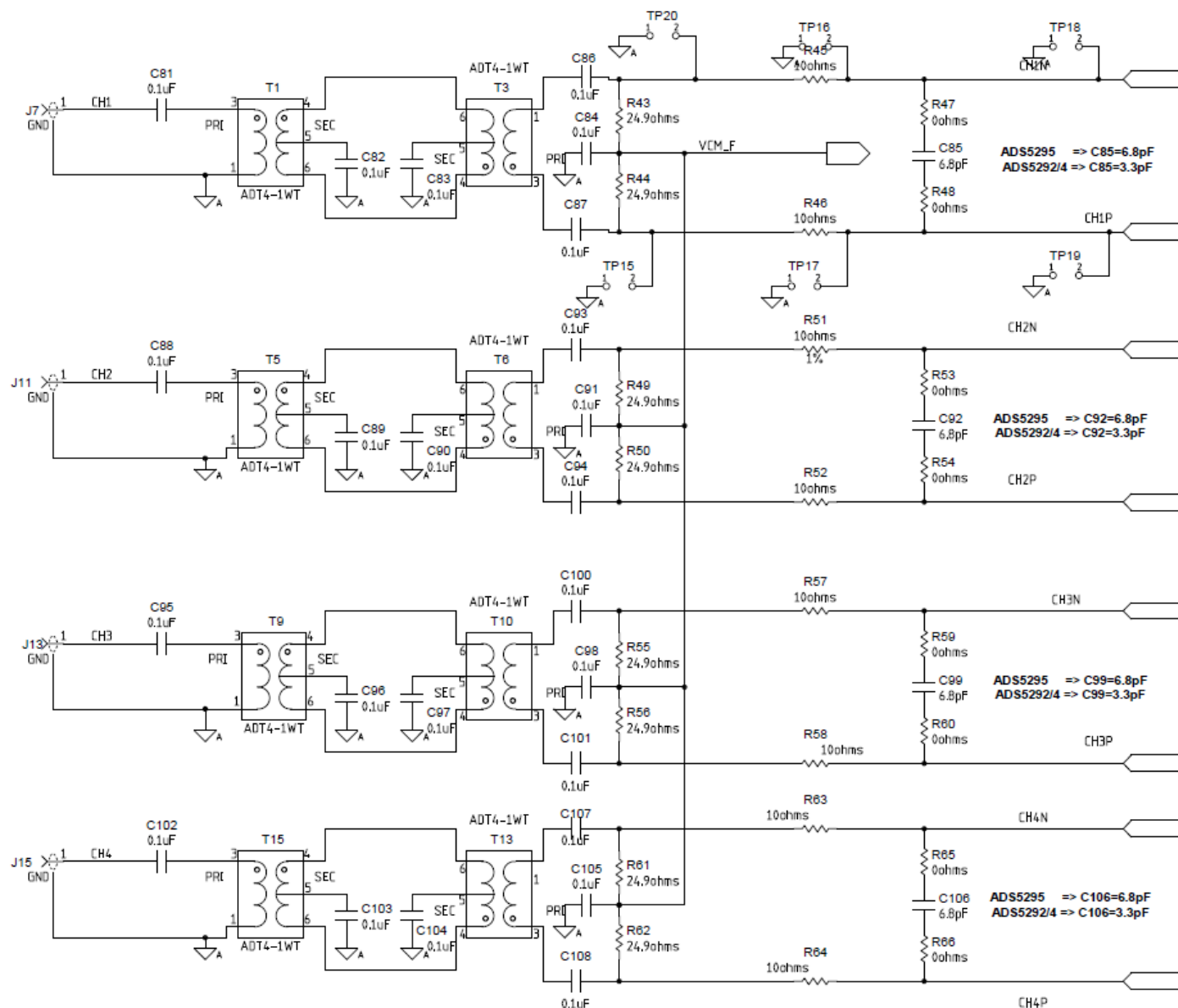
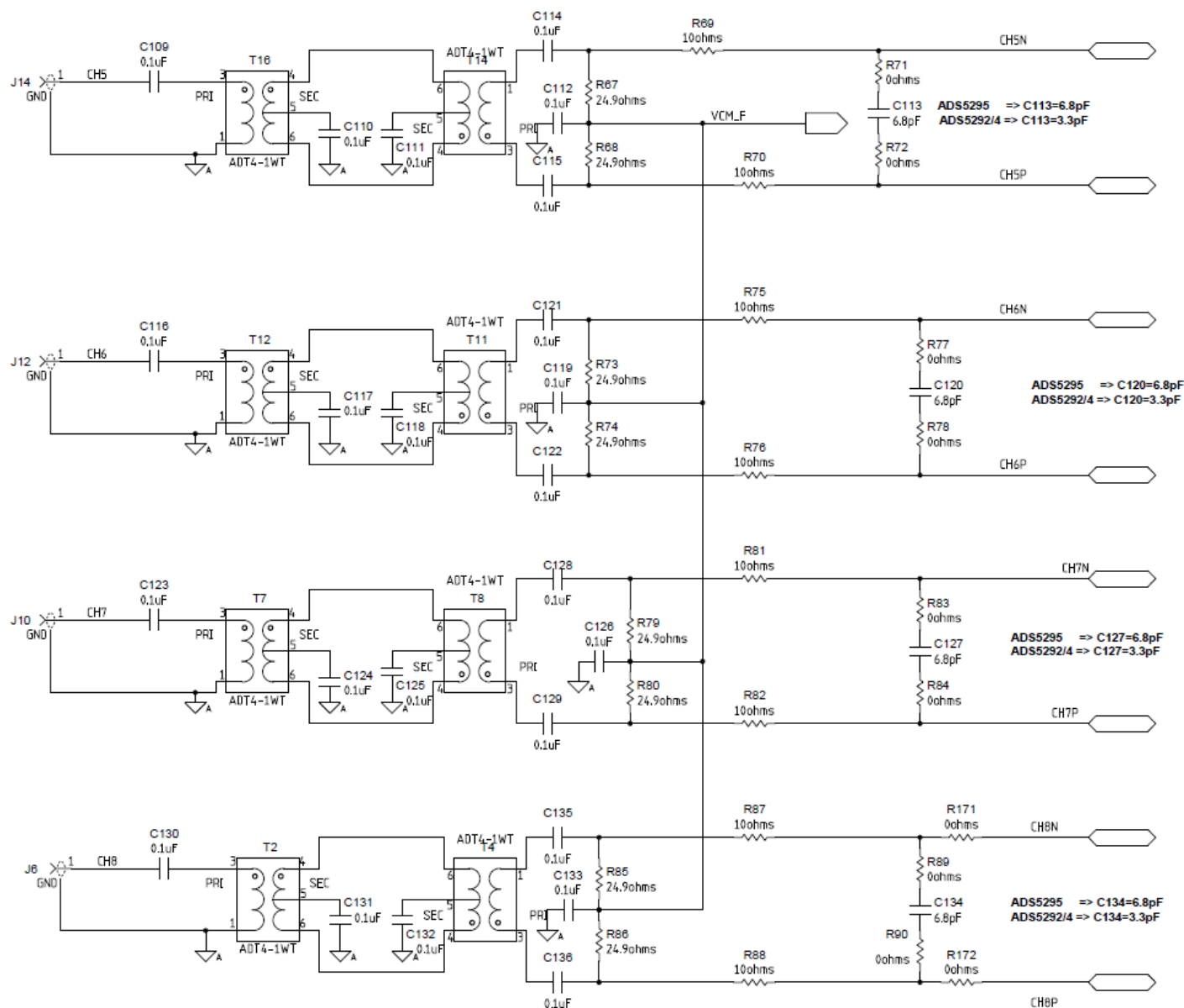


Figure 28. Schematic, Sheet 7 of 9



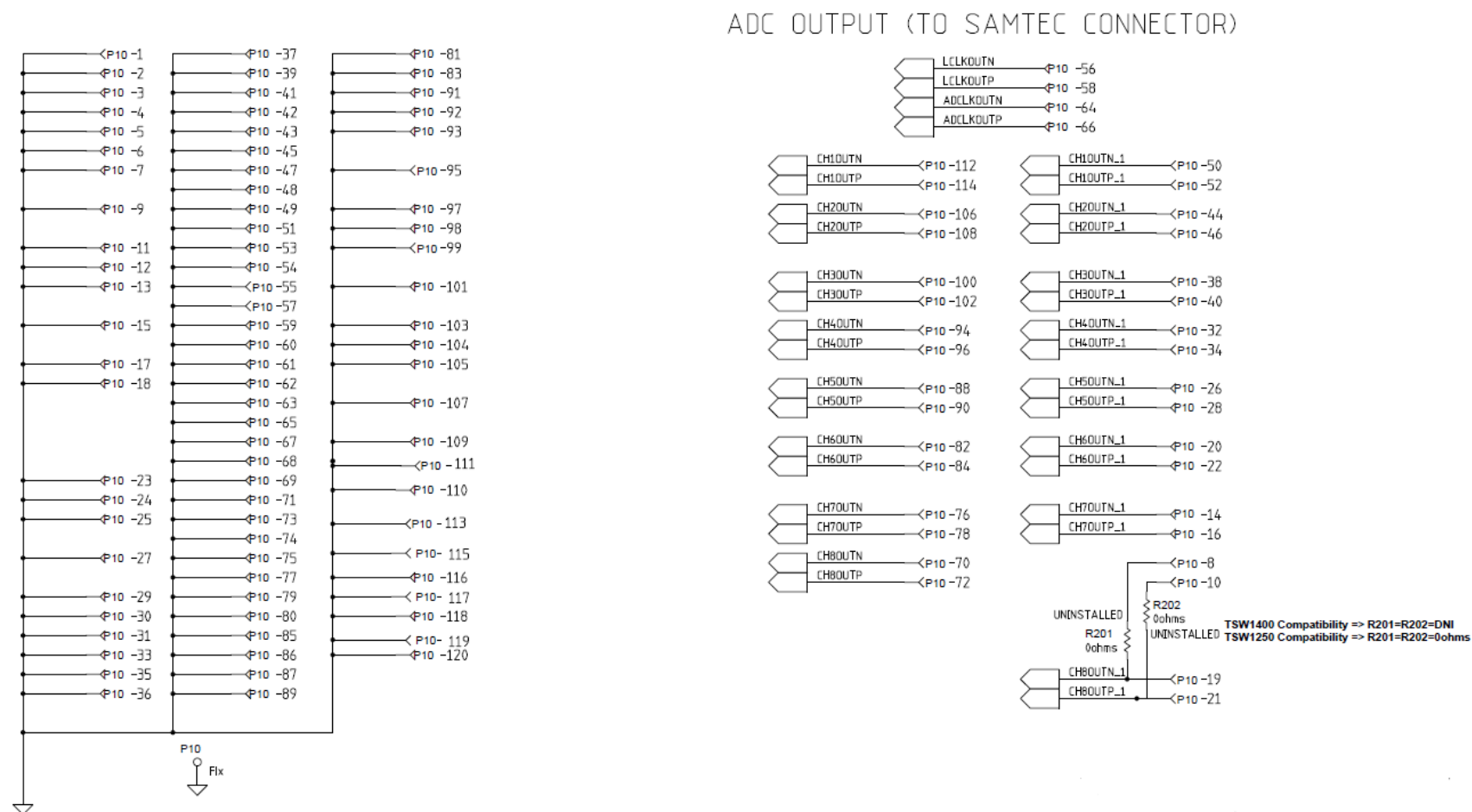


Figure 30. Schematic, Sheet 9 of 9

## 11 ADS5295EVM Bill of Materials

Table 6. Bill of Materials

| ITEM | QTY | MFR P/N            | Description                                        | Value          | MFR               | RoH S | REF DES                                                                                                              | Digi-Key P/N      |
|------|-----|--------------------|----------------------------------------------------|----------------|-------------------|-------|----------------------------------------------------------------------------------------------------------------------|-------------------|
| 1    | 1   | ADS5295IPFP        | 12-Bit 8-Channel ADC                               | ADS5295        | Texas Instruments | Yes   | DUT1                                                                                                                 | Texas Instruments |
| 2    | 0   | ADS5294IPFP        | 14-Bit 8-Channel ADC                               | ADS5294        | Texas Instruments | Yes   | DUT1                                                                                                                 | Texas Instruments |
| 3    | 0   | ADS5292IPFP        | 12-Bit 8-Channel ADC                               | ADS5292        | Texas Instruments | Yes   | DUT1                                                                                                                 | Texas Instruments |
| 4    | 17  | ADT4-1WT+          | RF TRANSFORMER WIDEBAND, 2-775 MHz, 50 OHM         | ADT4-1WT+      | Mini-Circuits     | Yes   | T1-T17                                                                                                               | Mini-Circuits     |
| 5    | 1   | CDCLVP1102RGT      | TWO LVPECL OUTPUT CLOCK BUFFER                     | CDCLVP1102     | Texas Instruments | Yes   | U4                                                                                                                   | 296-25283-1-ND    |
| 6    | 2   | CRCW06034R99FKEA   | RES 4.99 OHM 1/10W 1% 0603 SMD                     | 4.99 $\Omega$  | Vishay/Dale       | Yes   | R37,R38                                                                                                              | 541-4.99HHCT-ND   |
| 7    | 16  | CRCW040210R0FKED   | RES 10.0 OHM 1/16W 1% 0402 SMD                     | 10.0 $\Omega$  | Vishay/Dale       | Yes   | R45,R46,R51,R52,R57,R58,R63,R64,R69,R70,<br>R75,R76,R81,R82, R87,R88                                                 | 541-10.0LCT-ND    |
| 8    | 1   | CRCW040249R9FKED   | RES 49.9 OHM 1/16W 1% 0402 SMD                     | 49.9 $\Omega$  | Vishay/Dale       | Yes   | R34                                                                                                                  | 541-49.9LCT-ND    |
| 9    | 2   | CRCW060353R6FKEA   | RES 53.6 OHM 1/10W 1% 0603 SMD                     | 53.6 $\Omega$  | Vishay/Dale       | Yes   | R31,R40                                                                                                              | 541-53.6HCT-ND    |
| 10   | 1   | CRCW06030000Z0EA   | RES 0.0 OHM 1/10W 0603 SMD                         | 0.0 $\Omega$   | Vishay/Dale       | Yes   | R36                                                                                                                  | 541-0.0GCT-ND     |
| 11   | 2   | CRCW0603487RFKEA   | RES 487 OHM 1/10W 1% 0603 SMD                      | 487 $\Omega$   | Vishay/Dale       | Yes   | R32,R35                                                                                                              | 541-487HCT-ND     |
| 12   | 4   | CRCW0402100RFKED   | RES 100 OHM 1/16W 1% 0402 SMD                      | 100 $\Omega$   | Vishay/Dale       | Yes   | R3,R4,R21,R22                                                                                                        | 541-100LCT-ND     |
| 13   | 3   | CRCW04021K00FKED   | RES 1.00K OHM 1/16W 1% 0402 SMD                    | 1.00K $\Omega$ | Vishay/Dale       | Yes   | R2,R12,R168                                                                                                          | 541-1.00KLCT-ND   |
| 14   | 2   | CRCW0402499RFKED   | RES 499 OHM 1/16W 1% 0402 SMD                      | 499 $\Omega$   | Vishay/Dale       | Yes   | R33,R164                                                                                                             | 541-499LCT-ND     |
| 15   | 3   | CRCW080510K0FKEA   | RES 10.0K OHM 1/8W 1% 0805 SMD                     | 10.0K $\Omega$ | Vishay/Dale       | Yes   | R11,R13,R14                                                                                                          | 541-10.0KCCT-ND   |
| 16   | 7   | C0402C104K8PACTU   | CAP .10UF 10V CERAMIC X5R 0402                     | 0.1uF          | Kemet             | Yes   | C36,C37,C40,C41,C44,C45,C48                                                                                          | 399-3027-1-ND     |
| 17   | 1   | ECJ-0EB1H102K      | CAPACITOR,SMT,0402,CER,1000pF,50V,10%,X7R          | 1000pF         | Panasonic         | Yes   | C55                                                                                                                  | PCC1721CT-ND      |
| 18   | 4   | ECJ-0EB1H122K      | CAPACITOR,SMT,0402,CER,1200pF,50V,10%,X7R          | 1200pF         | Panasonic         | Yes   | C71,C72,C75,C76                                                                                                      | PCC1722CT-ND      |
| 19   | 2   | ECJ-0EB1E181K      | CAP 180PF 25V CERAMIC X7R 0402                     | 180pF          | Panasonic         | Yes   | C73,C74                                                                                                              | PCC1705CT-ND      |
| 20   | 2   | ECJ-0EC1H390J      | CAP 39PF 50V CERAMIC 0402 SMD                      | 39pF           | Panasonic         | Yes   | C29,C30                                                                                                              | PCC390CQCT-ND     |
| 21   | 5   | ECJ-1V41E105M      | CAP 1UF 25V CERAMIC 0603 X5S                       | 1uF            | Panasonic - ECG   | Yes   | C26,C31,C52,C68,C70                                                                                                  | PCC2354CT-ND      |
| 22   | 1   | ECS-3953M-800-BN   | OSC,SMT,3.3V,50ppm,-40-85C,5nS,80.000 MHz          | OSC 80 MHZ     | ECS Inc           | Yes   | U3                                                                                                                   | XC344CT-ND        |
| 23   | 4   | ELJ-RE33NGFA       | INDUCTOR 33NH 2% 0603 SMD                          | 33nH           | Panasonic         | Yes   | L1,L4                                                                                                                | PCD2008CT-ND      |
| 24   | 2   | ERJ-2GEJ131        | RESISTOR,SMT,0402,THICK FILM,5%,1/16W,130          | 130 $\Omega$   | Panasonic         | Yes   | R27,R29                                                                                                              | P130JCT-ND        |
| 25   | 2   | ERJ-2GEJ820        | RESISTOR,SMT,0402,THICK FILM,5%,1/16W,82           | 82 $\Omega$    | Panasonic         | Yes   | R28,R30                                                                                                              | P82JCT-ND         |
| 26   | 27  | ERJ-2GEOR00X       | RESISTOR/JUMPER,SMT,0402,0 OHM,5%,1/16W            | 0 $\Omega$     | Panasonic         | Yes   | R5,R6,R7,R8,R10,R47,R48,R53,R54,R59,R60,<br>R65,R66,R71,R72,R77,R78,R83,R84,R89,R90,<br>R93,R166,R167,R171,R172,R173 | P0.0JCT-ND        |
| 27   | 16  | ERJ-2RKF24R9X      | RESISTOR,SMT,0402,24.9 OHM,1%,1/16W                | 24.9 $\Omega$  | Panasonic         | Yes   | R43,R44,R49,R50,R55,R56,R61,R62,R67,R68,<br>R73,R74,R79,R80,R85,R86                                                  | P24.9LCT-ND       |
| 28   | 2   | ERJ-2RKF49R9X      | RESISTOR,SMT,0402,49.9 OHM,1%,1/16W                | 49.9 $\Omega$  | Panasonic         | Yes   | R1,R20                                                                                                               | P49.9LCT-ND       |
| 29   | 3   | ERJ-2RKF1000X      | RESISTOR,SMT,0402,100 OHM,1%,1/10W                 | 100 $\Omega$   | Panasonic         | Yes   | R15,R16, R18                                                                                                         | P100LCT-ND        |
| 30   | 1   | ERJ-2RKF3320X      | RESISTOR,SMT,0402,332 OHM,1%,1/16W                 | 332 $\Omega$   | Panasonic         | Yes   | R17                                                                                                                  | P332LCT-ND        |
| 31   | 1   | FT245RL            | USB FIFO IC INCORPORATE FTDICHP-ID SECURITY DONGLE | USB            | FTDI              | Yes   | U10                                                                                                                  | 768-1011-1-ND     |
| 32   | 0   | GRM1555C1H3R3C201D | CAP CER 3.3PF 50V COG 0402                         | 3.3pF          | Murata            | Yes   | C77,C85,C92,C99,C106,C113,C120,C127,C134                                                                             | 490-1270-1-ND     |
| 33   | 9   | GRM1555C1H6R8D201D | CAP CER 6.8PF 50V COG 0402                         | 6.8pF          | Murata            | Yes   | C77,C85,C92,C99,C106,C113,C120,C127,C134                                                                             | 490-1276-1-ND     |



**Table 6. Bill of Materials (continued)**

| ITEM | QTY | MFR P/N              | Description                                                  | Value             | MFR                             | RoH S | REF DES                                                                                                                                                                                                                                                                                                                                   | Digi-Key P/N        |
|------|-----|----------------------|--------------------------------------------------------------|-------------------|---------------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 34   | 8   | HI0805R800R-10       | FERRITE CHIP POWER 80 OHM SMD                                | FERRITE           | Laird-Signal Integrity Products | Yes   | FB1,FB2,FB3,FB4,FB5,FB6,FB7,FB8                                                                                                                                                                                                                                                                                                           | 240-2395-1-ND       |
| 35   | 2   | ISO7240MDW           | QUAD DIGITAL ISOLATORS                                       | IC DGTL ISOL      | Texas Instruments               | Yes   | U9,U11                                                                                                                                                                                                                                                                                                                                    | 296-22629-5-ND      |
| 36   | 3   | JMK107BJ106MA-T      | CAPACITOR,SMT,0603,CERAMIC,10uF,6.3V,20%,X5R                 | 10uF              | Taiyo Yuden                     | Yes   | C33,C51,C54                                                                                                                                                                                                                                                                                                                               | 587-1256-1-ND       |
| 37   | 10  | JUMPER-0603(UN)      | UNINSTALLED JUMPER,SMT0603                                   | DNI               |                                 |       | TP8,TP9,TP10,TP11,TP15,TP16,TP17,TP18,TP19,TP20                                                                                                                                                                                                                                                                                           | DNI                 |
| 38   | 3   | LNJ308G8PRA          | LED,SMT,0603,PURE GREEN,2.03V                                | LED               | Panasonic                       | Yes   | LED18VA,LED18VD,LED_+5V                                                                                                                                                                                                                                                                                                                   | P11485CT-ND         |
| 39   | 1   | LNJ808R8ERA          | LED,SMT,0603,ORANGE,1.8V                                     | LED               | Panasonic                       | Yes   | LED33VA                                                                                                                                                                                                                                                                                                                                   | P523CT-ND           |
| 40   | 1   | 897-43-005-00-100001 | CONN RECEPT MINI-USB TYPE B SMT                              | USB Mini B        | Mill-Max                        | Yes   | USB1                                                                                                                                                                                                                                                                                                                                      | ED90341CT-ND        |
| 41   | 1   | QTH-060-01-L-D-A     | HEADER,SMT,120P,0.5mm,FEM,2BANK,RECEPTACLE,168/19 8H         | CONN              | Samtec Inc                      | Yes   | P10                                                                                                                                                                                                                                                                                                                                       | SAM8189-ND          |
| 42   | 2   | TEST POINT YELLOW    | NOT INSTALLED                                                | DNI               |                                 |       | TP22, TP35                                                                                                                                                                                                                                                                                                                                | DNI                 |
| 43   | 1   | THS4509QRGTRQ1       | WIDEBAND,LOW NOISE,LOW DISTORTION FULLY DIFF AMP,1900 MHz    | IC OPAMP          | Texas Instruments               | Yes   | U12                                                                                                                                                                                                                                                                                                                                       | 296-24104-1-ND      |
| 44   | 9   | TPSC226K016R0375     | 10%, 16V, 22uF                                               | 22uF              | AVX                             | Yes   | C35,C38,C39,C42,C43,C46,C47,C78,C79                                                                                                                                                                                                                                                                                                       | 478-1762-1-ND       |
| 45   | 2   | TPS79618DCQR         | ULTRALOW-NOISE HI PSRR FAST RF 1-A LDO LINEAR REGULATOR,1.8V | LDO REG 1.8V      | Texas Instruments               | Yes   | U6,U7                                                                                                                                                                                                                                                                                                                                     | 296-13762-1-ND      |
| 46   | 1   | TPS79633DCQR         | ULTRALOW-NOISE HI PSRR FAST RF 1-A LDO LINEAR REGULATOR,3.3V | LDO REG 3.3V      | Texas Instruments               | Yes   | U8                                                                                                                                                                                                                                                                                                                                        | 296-13766-1-ND      |
| 47   | 1   | 1SMB5921BT3G         | DIODE ZENER 6.8V 3W SMB                                      | DIODE Zener       | ON Semiconductor                | Yes   | Z1                                                                                                                                                                                                                                                                                                                                        | 1SMB5921BT3GOSCT-ND |
| 48   | 5   | 9-146285-0-02        | CONN HEADR BRKWAY .100 02POS STR                             | CONN Header       | TE Connectivity                 | Yes   | JP10,JP11,JP12,JP13,JP14                                                                                                                                                                                                                                                                                                                  | A32700-02-ND        |
| 49   | 10  | 9-146285-0-03        | CONN HEADR BRKWAY .100 03POS STR                             | CONN Header       | TE Connectivity                 | Yes   | JP4,JP5,JP6,JP15,JP16,JP17,JP18,JP19,JP20,JP21                                                                                                                                                                                                                                                                                            | A32700-03-ND        |
| 50   | 12  | 901-144-8            | SMA COAX STRAIGHT PCB CURRENT P/N IS 901-144-8RFX            | SMA               | Amphenol                        | Yes   | J4,J5,J6,J7,J8,J10,J11,J12,J13,J14,J15,J16                                                                                                                                                                                                                                                                                                | ARFX1231-ND         |
| 51   | 76  | 0402YD104KAT2A       | CAP CERM .1uF 10% 16V X5R 0402                               | 0.1uF             | AVX                             | Yes   | C1,C2,C3,C4,C5,C6,C7,C8,C13,C14,C17,C25,C27,C28,C32,C34,C53,C56,C57,C58,C62,C63,C65,C66,C67,C69,C81,C82,C83,C84,C86,C87,C88,C89,C90,C91,C93,C94,C95,C96,C97,C98,C100,C101,C102,C103,C104,C105,C107,C108,C109,C110,C111,C112,C114,C115,C116,C117,C118,C119,C121,C122,C123,C124,C125,C126,C128,C129,C130,C131,C132,C133,C135,C136,C137,C138 | 478-1126-1-ND       |
| 52   | 1   | 5000                 | TESTPOINT,THU,MINIATURE,0.1LS,120TL, RED                     | Test Point,Red    | Keystone Electronics            | Yes   | TP_VP                                                                                                                                                                                                                                                                                                                                     | 5000K-ND            |
| 53   | 9   | 5001                 | TESTPOINT,THU,MINIATURE,0.1LS,120TL, BLACK                   | Test Point,Black  | Keystone Electronics            | Yes   | TP1,TP2,TP3,TP4,TP5,TP14,TP21,TP23,TP25                                                                                                                                                                                                                                                                                                   | 5001K-ND            |
| 54   | 5   | 5002                 | TESTPOINT,THU,MINIATURE,0.1LS,120TL, WHITE                   | Test Point,White  | Keystone Electronics            | Yes   | TP6,TP_D0, TP_D1,TP_D2,TP_D7                                                                                                                                                                                                                                                                                                              | 5002K-ND            |
| 55   | 1   | 5003                 | TESTPOINT,THU,MINIATURE,0.1LS,120TL, ORANGE                  | Test Point,Orange | Keystone Electronics            | Yes   | TP34                                                                                                                                                                                                                                                                                                                                      | 5003K-ND            |
| 56   | 1   | 39357-0002           | HEADER, THRU, POWER, 2P,3.5MM, EUROSTYLE                     | CONN TERMINAL     | Molex Connector Corp            | Yes   | P1                                                                                                                                                                                                                                                                                                                                        | WM7877-ND           |
| 57   | 0   | CRCW06030000Z0EA     | RES 0.0 OHM 1/10W 0603 SMD                                   | 0.0 Ω             | Vishay/Dale                     | Yes   | R169, R170,R201, R202                                                                                                                                                                                                                                                                                                                     | 541-0.0GCT-ND (DNI) |
| 58   | 4   | 24436                | STANDOFF HEX M3 THR ALUM 18MM                                | STANDOFF          | Keystone                        | Yes   | STANDOFF HEX M3 THR ALUM 18MM                                                                                                                                                                                                                                                                                                             | 24436K-ND           |
| 59   | 4   | 29311                | SCREW STEEL M3 THR 6MM                                       | SCREW             | Keystone                        | Yes   | SCREW STEEL M3 THR 6MM                                                                                                                                                                                                                                                                                                                    | 29311K-ND           |

Figure 31 through Figure 42 illustrate the PCB layouts for the EVM.



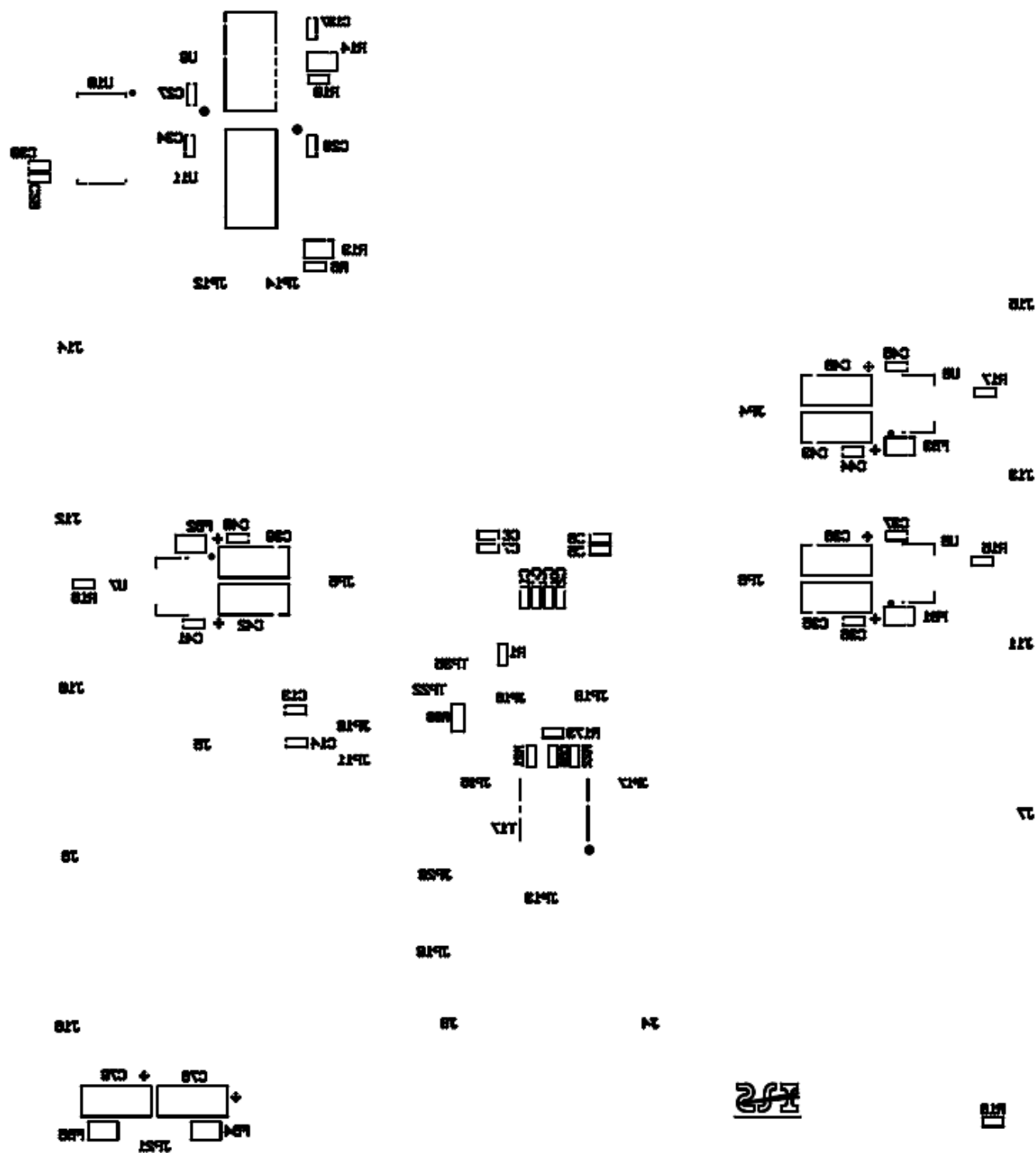


Figure 32. ADS5295EVM Bottom Layer Assembly Drawing – Bottom View

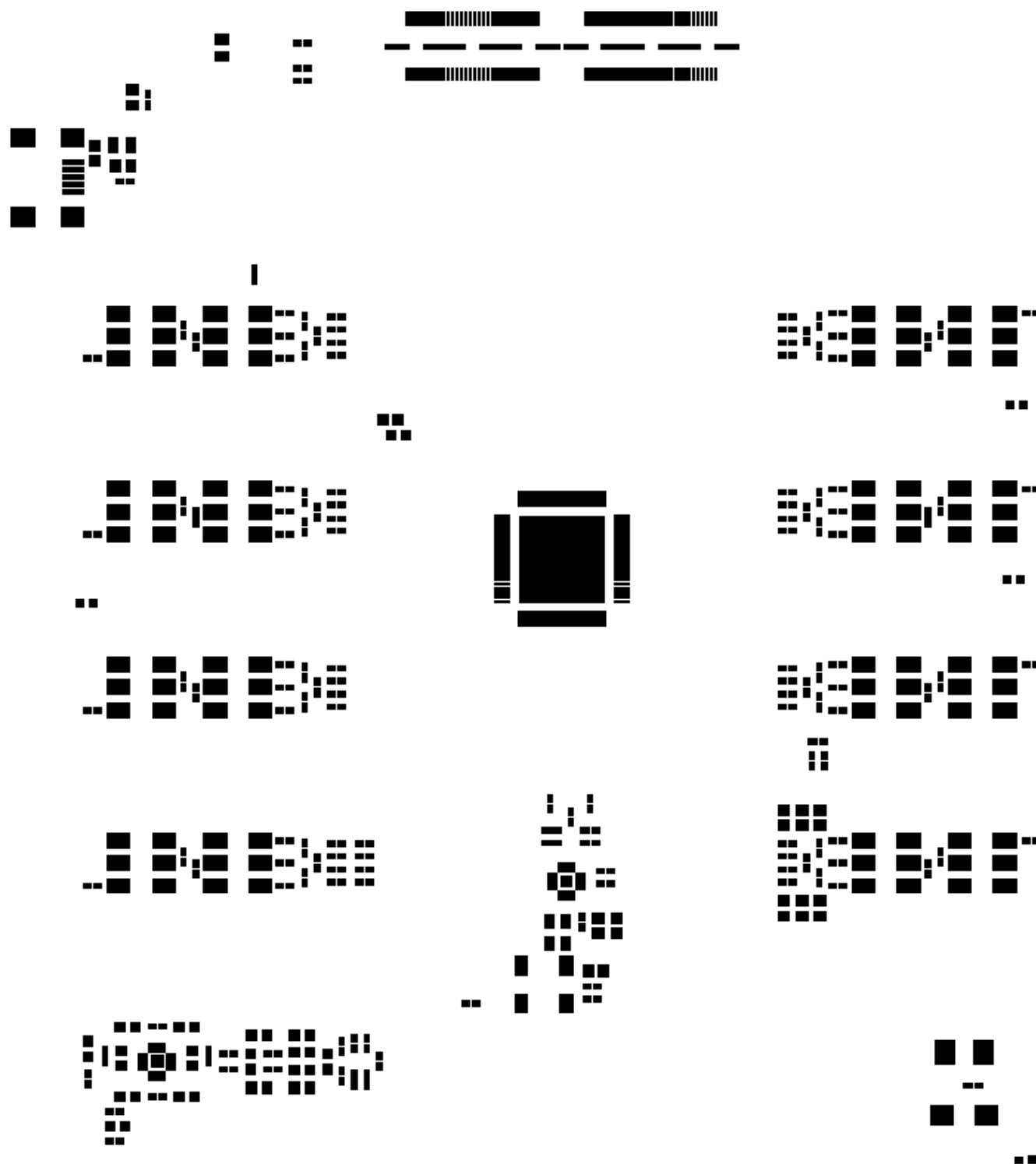


Figure 33. ADS5295EVM Solder Paste Top

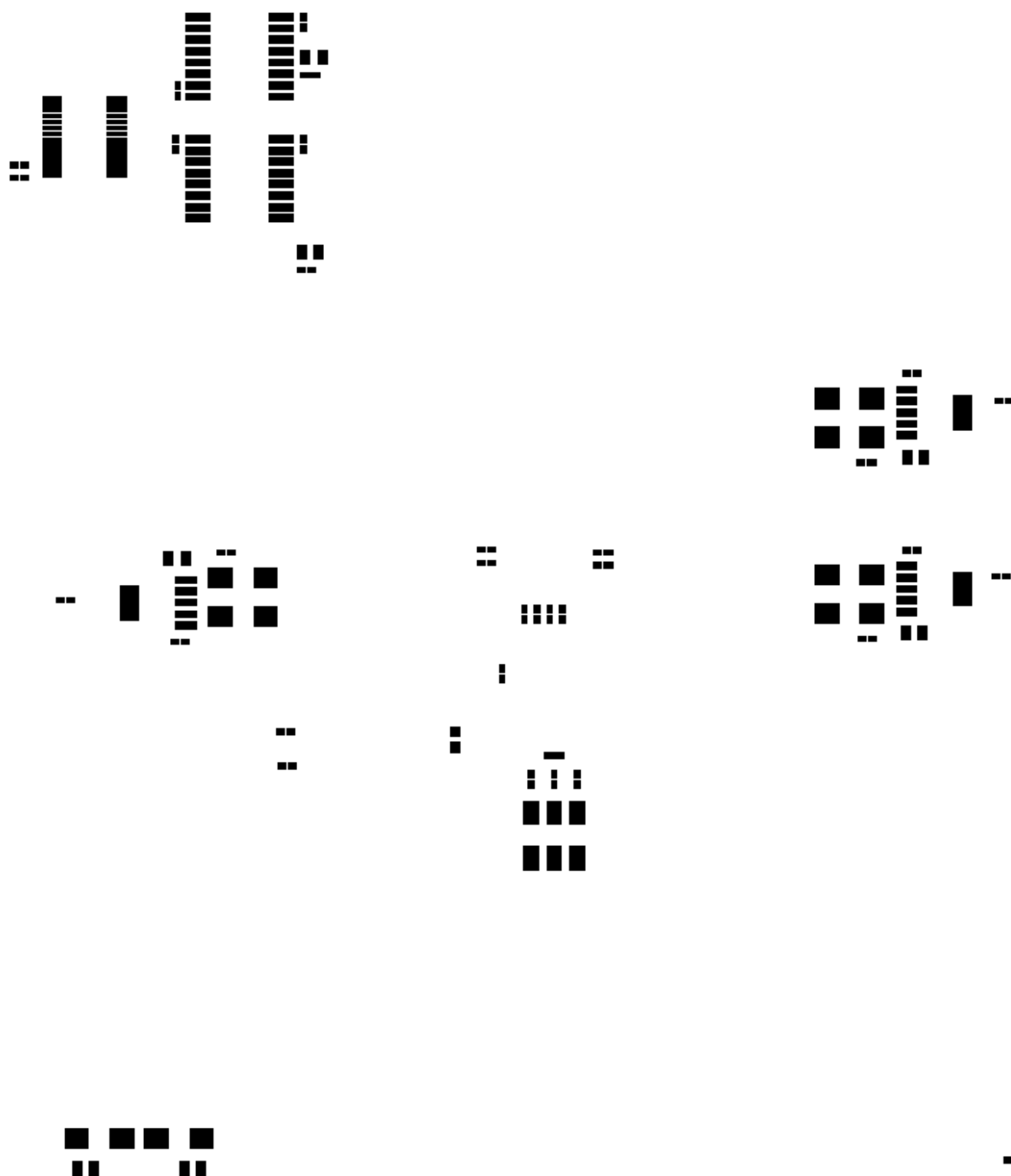


Figure 34. ADS5295EVM Solder Paste Bottom

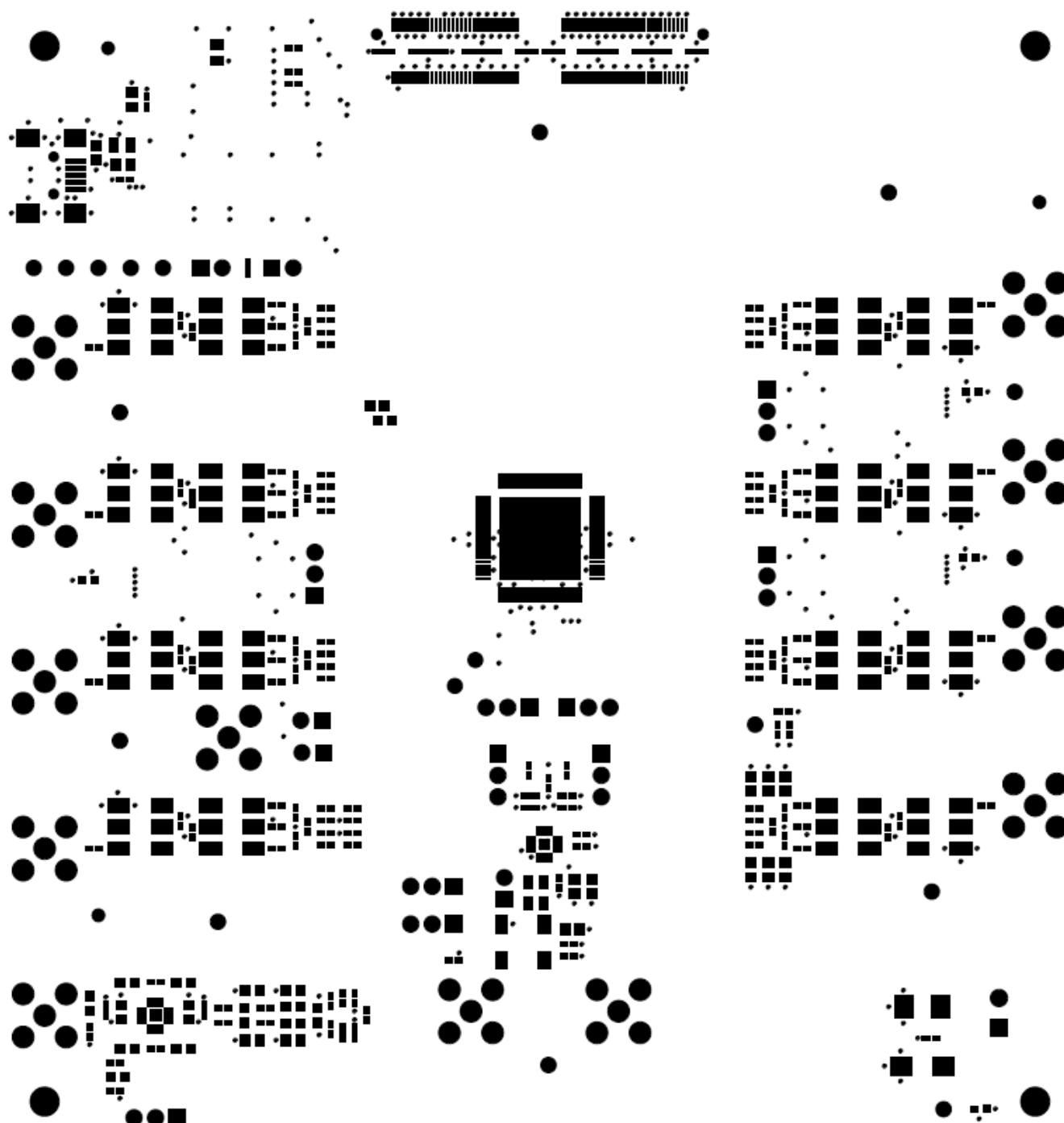


Figure 35. ADS5295EVM Soldermask Top

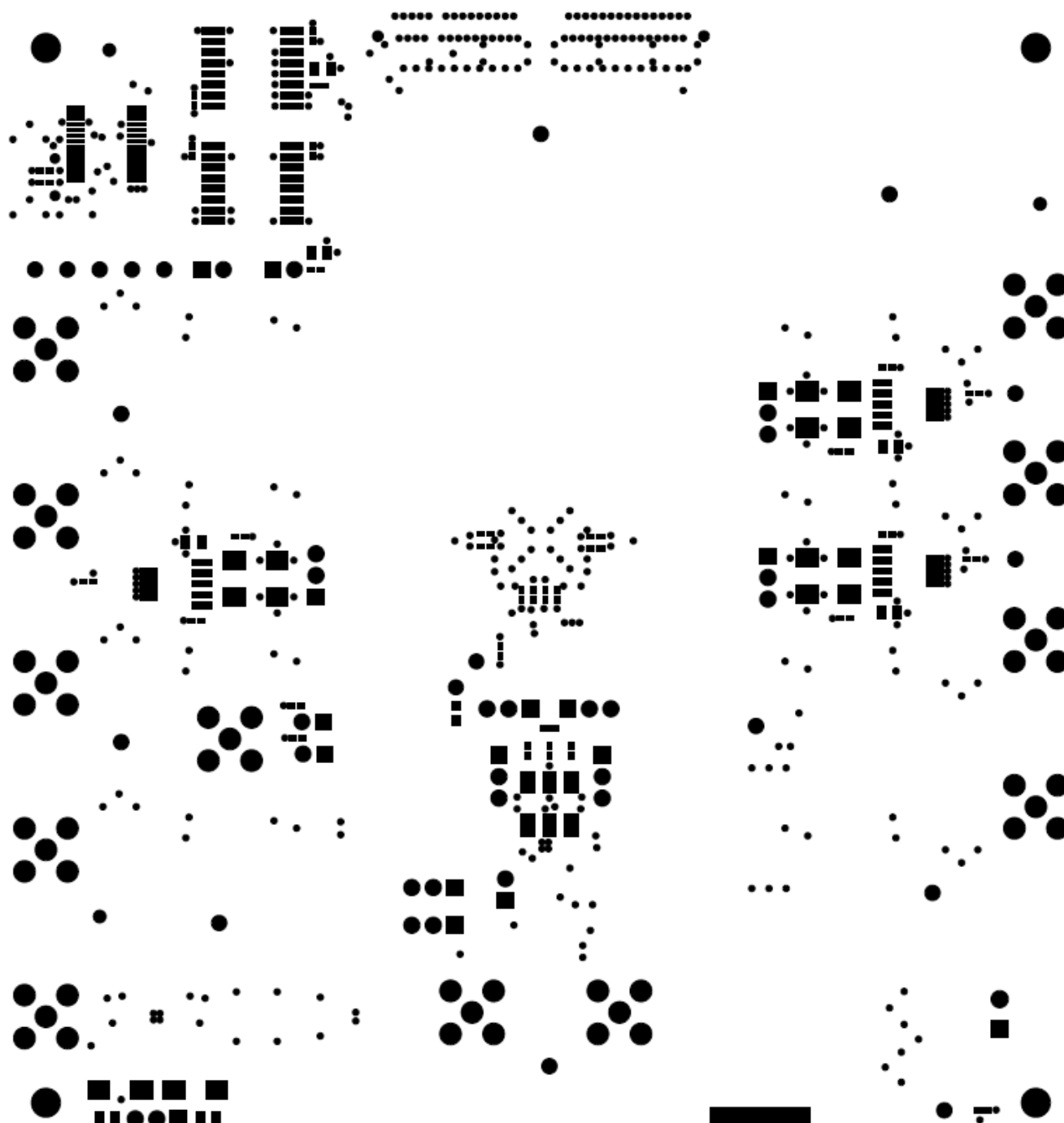


Figure 36. ADS5295EVM Soldermask Bottom



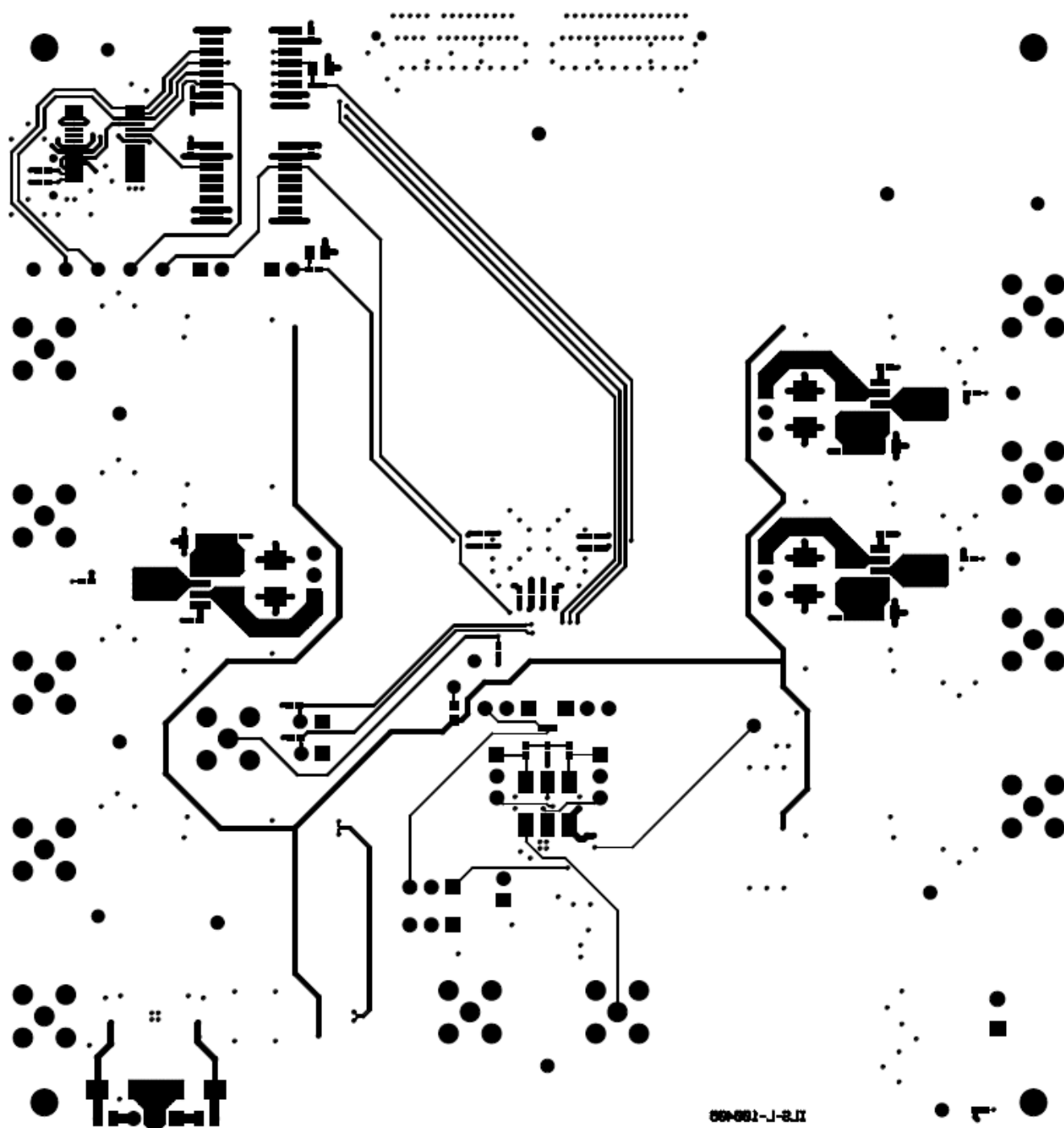


Figure 37. ADS5295EVM Bottom Layer Copper – Bottom View

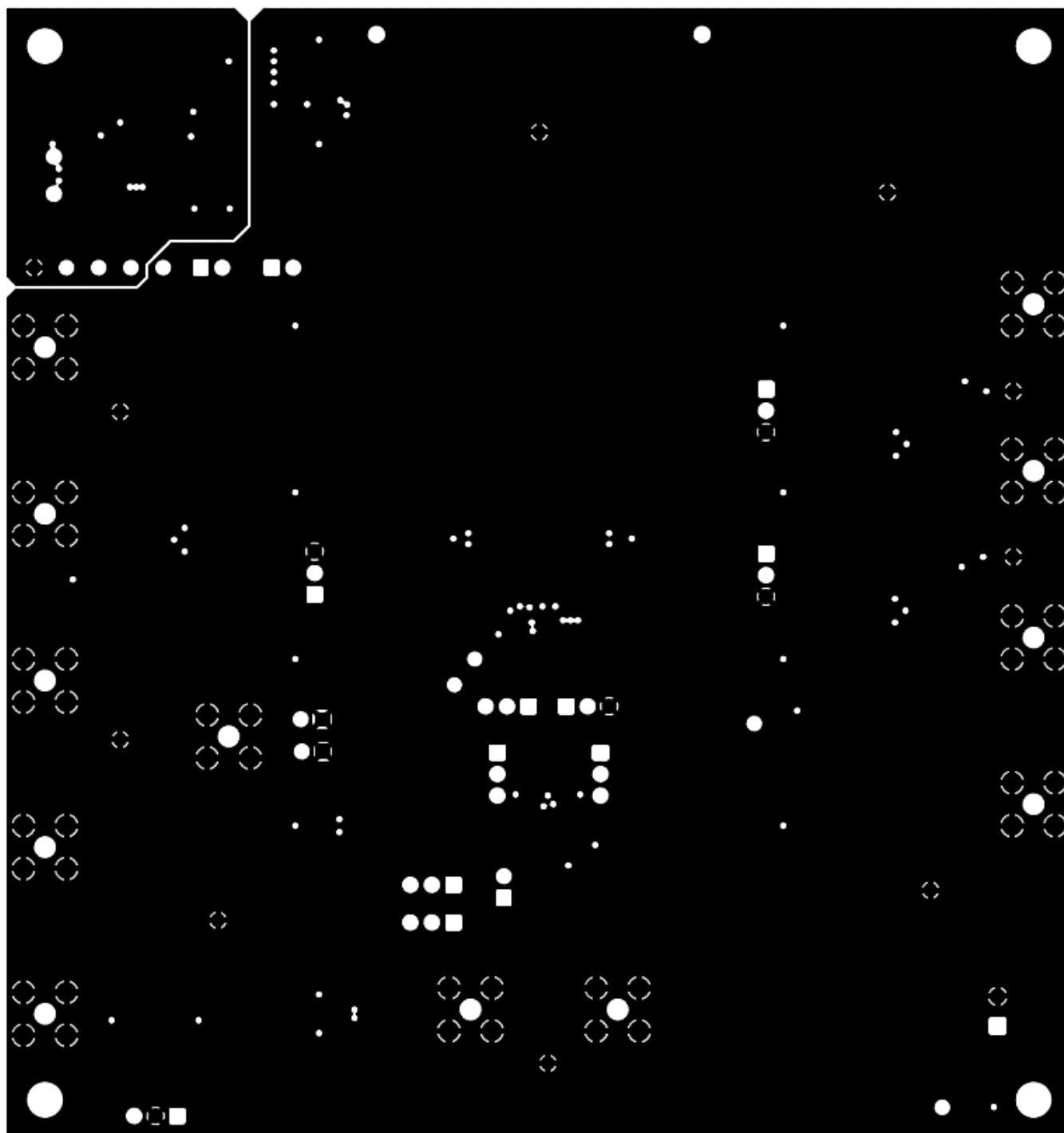
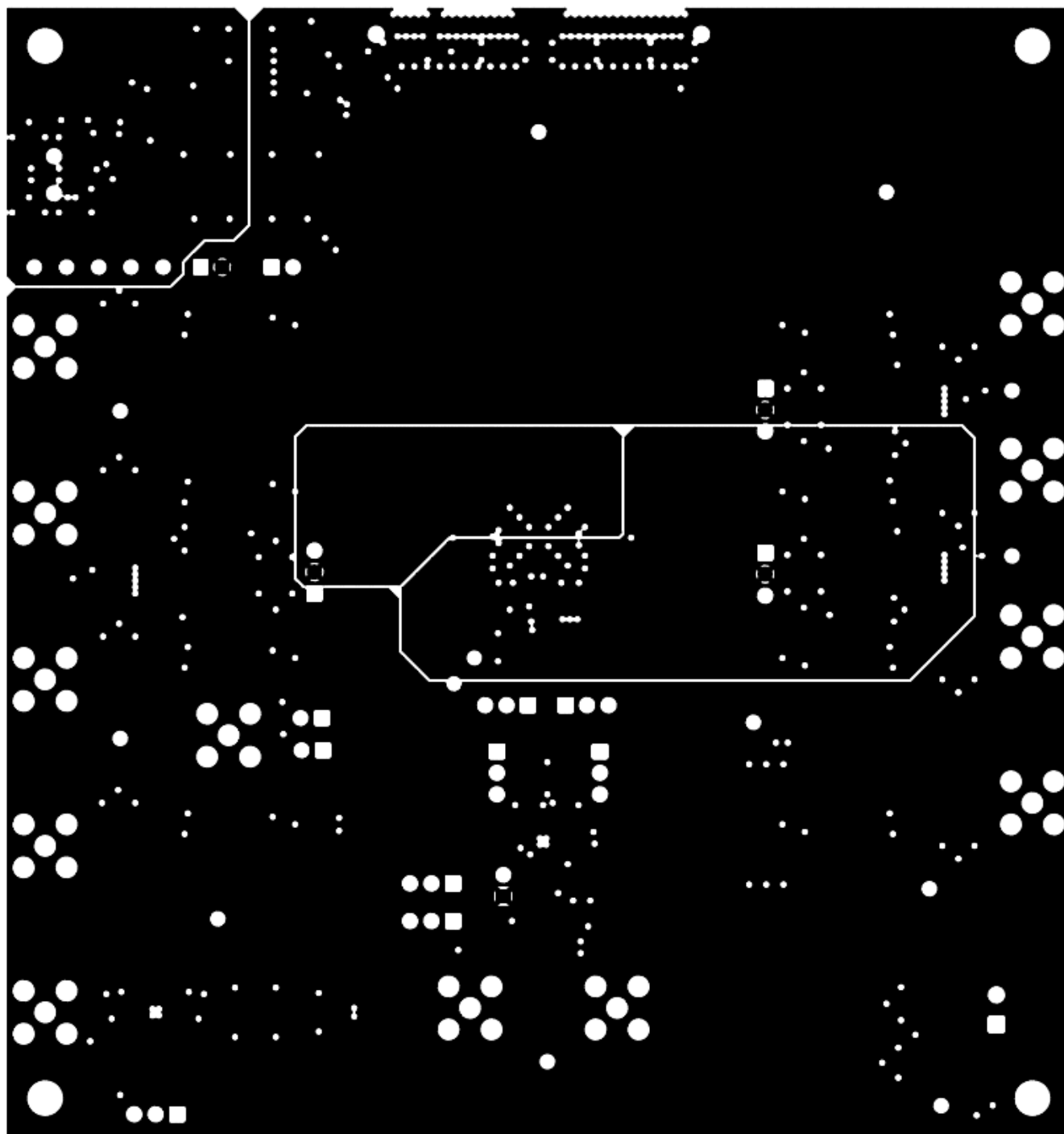
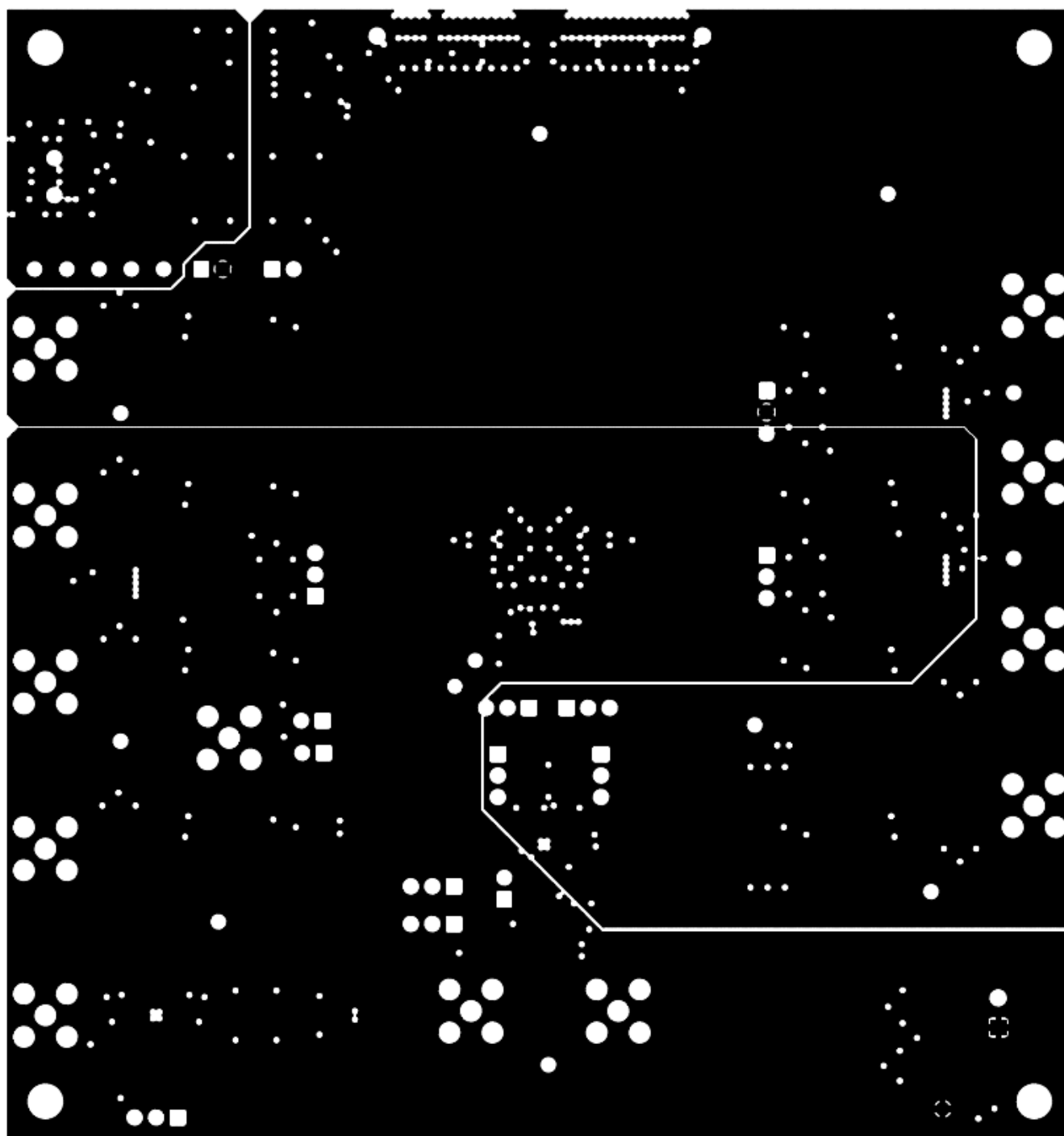


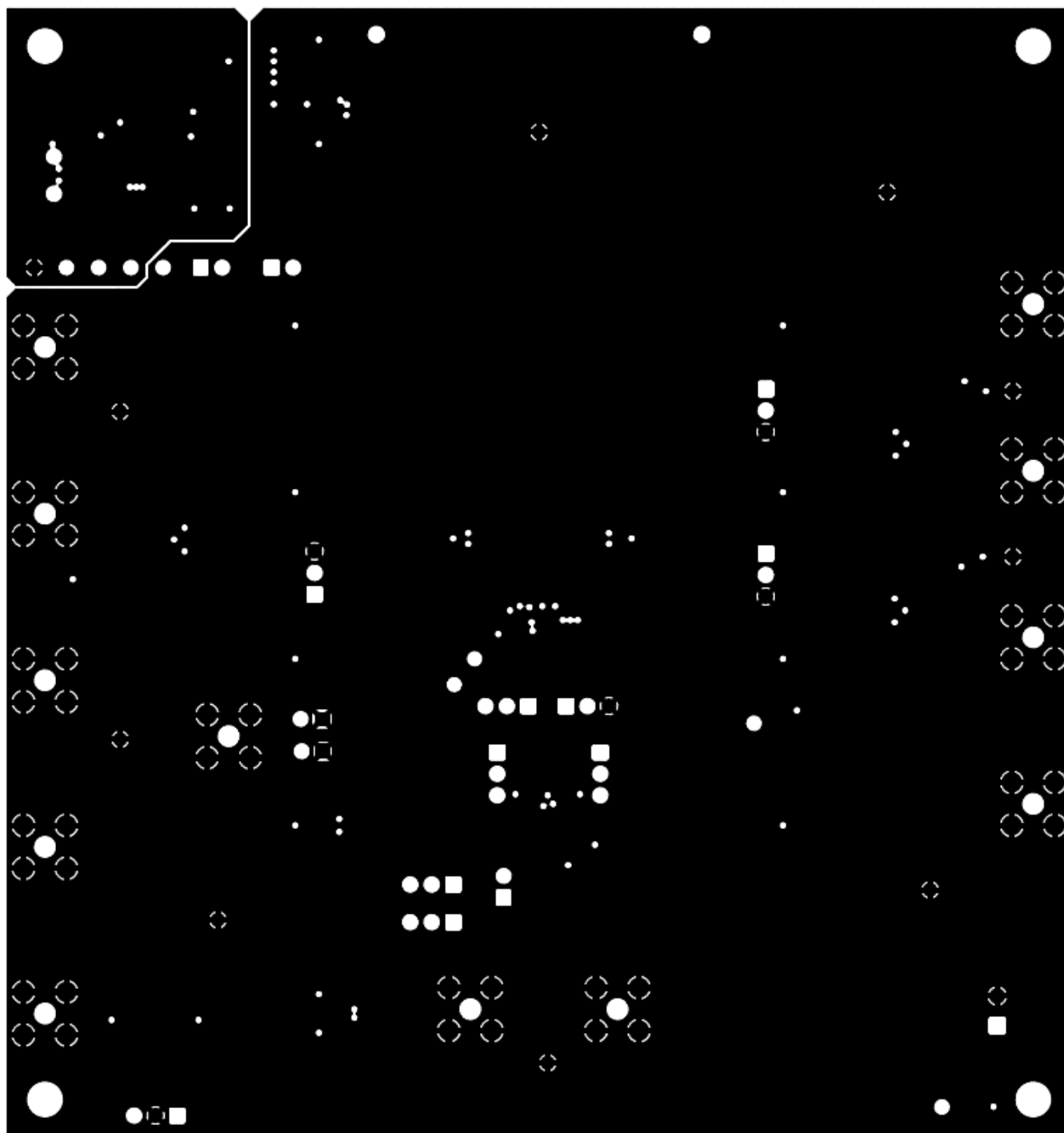
Figure 38. ADS5295EVM Layer 5 Ground Plane



**Figure 39. ADS5295EVM Layer 4 Split Power Planes**



**Figure 40. ADS5295EVM Layer 3 Split Power Planes**



**Figure 41. ADS5295EVM Layer 2 Ground Plane**

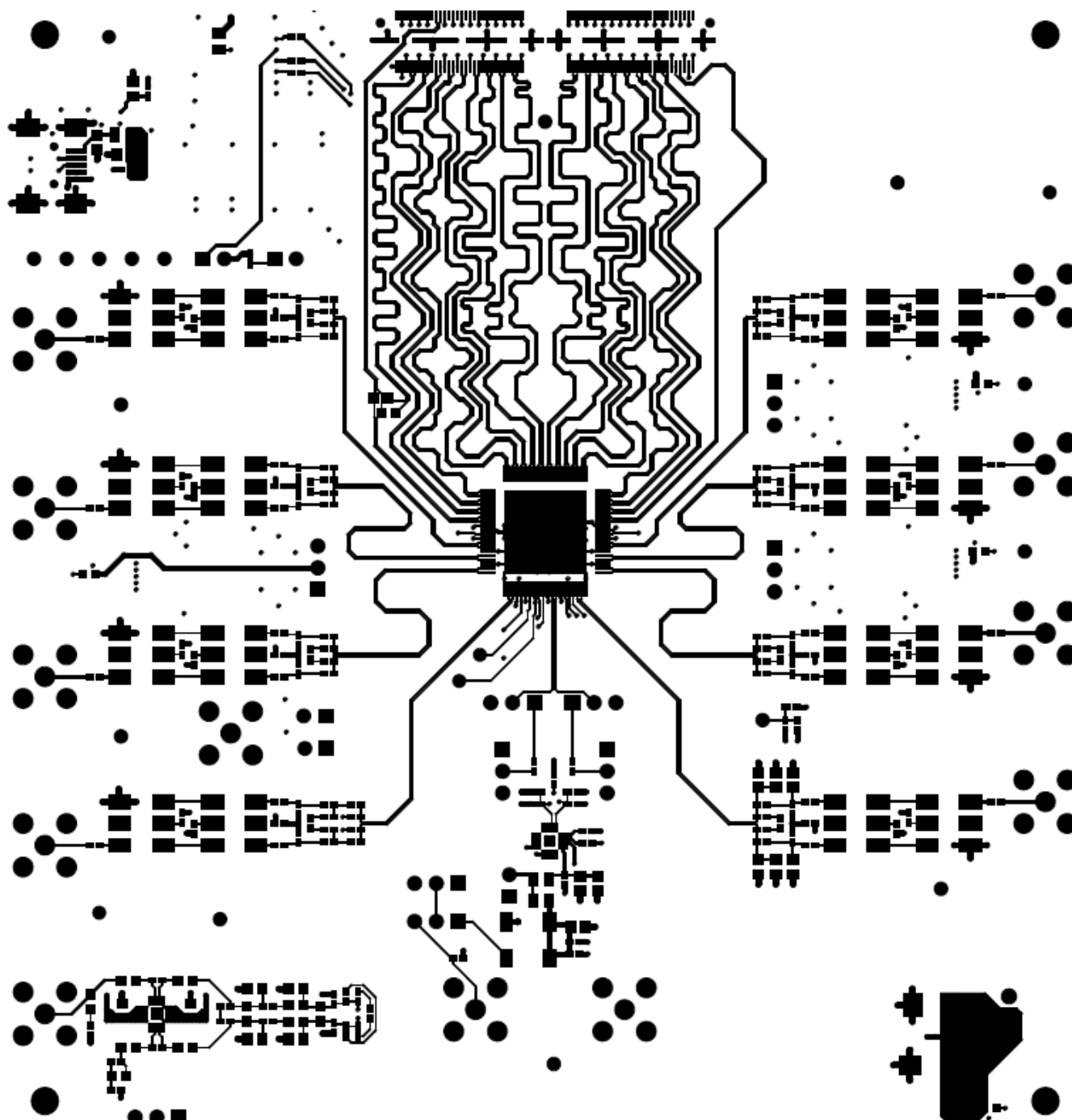


Figure 42. ADS5295EVM Top Layer Copper – Top View

## EVALUATION BOARD/KIT/MODULE (EVM) ADDITIONAL TERMS

Texas Instruments (TI) provides the enclosed Evaluation Board/Kit/Module (EVM) under the following conditions:

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies TI from all claims arising from the handling or use of the goods.

Should this evaluation board/kit not meet the specifications indicated in the User's Guide, the board/kit may be returned within 30 days from the date of delivery for a full refund. THE FOREGOING LIMITED WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

Please read the User's Guide and, specifically, the Warnings and Restrictions notice in the User's Guide prior to handling the product. This notice contains important safety information about temperatures and voltages. For additional information on TI's environmental and/or safety programs, please visit [www.ti.com/esh](http://www.ti.com/esh) or contact TI.

No license is granted under any patent right or other intellectual property right of TI covering or relating to any machine, process, or combination in which such TI products or services might be or are used. TI currently deals with a variety of customers for products, and therefore our arrangement with the user is not exclusive. TI assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein.

## REGULATORY COMPLIANCE INFORMATION

As noted in the EVM User's Guide and/or EVM itself, this EVM and/or accompanying hardware may or may not be subject to the Federal Communications Commission (FCC) and Industry Canada (IC) rules.

For EVMs **not** subject to the above rules, this evaluation board/kit/module is intended for use for ENGINEERING DEVELOPMENT, DEMONSTRATION OR EVALUATION PURPOSES ONLY and is not considered by TI to be a finished end product fit for general consumer use. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC or ICES-003 rules, which are designed to provide reasonable protection against radio frequency interference. Operation of the equipment may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

### General Statement for EVMs including a radio

*User Power/Frequency Use Obligations:* This radio is intended for development/professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability of this EVM and its development application(s) must comply with local laws governing radio spectrum allocation and power limits for this evaluation module. It is the user's sole responsibility to only operate this radio in legally acceptable frequency space and within legally mandated power limitations. Any exceptions to this are strictly prohibited and unauthorized by Texas Instruments unless user has obtained appropriate experimental/development licenses from local regulatory authorities, which is responsibility of user including its acceptable authorization.

### For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant

#### Caution

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

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

### FCC Interference Statement for Class A EVM devices

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



### **FCC Interference Statement for Class B EVM devices**

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

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

### **For EVMs annotated as IC – INDUSTRY CANADA Compliant**

This Class A or B digital apparatus complies with Canadian ICES-003.

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

### **Concerning EVMs including radio transmitters**

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

### **Concerning EVMs including detachable antennas**

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Cet appareil numérique de la classe A ou B est conforme à la norme NMB-003 du Canada.

Les changements ou les modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actionner l'équipement.

### **Concernant les EVMs avec appareils radio**

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

### **Concernant les EVMs avec antennes détachables**

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

## **【Important Notice for Users of this Product in Japan】**

**This development kit is NOT certified as Confirming to Technical Regulations of Radio Law of Japan**

If you use this product in Japan, you are required by Radio Law of Japan to follow the instructions below with respect to this product:

1. Use this product in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or
3. Use of this product only after you obtained the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to this product. Also, please do not transfer this product, unless you give the same notice above to the transferee. Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

**Texas Instruments Japan Limited**  
**(address) 24-1, Nishi-Shinjuku 6 chome, Shinjuku-ku, Tokyo, Japan**

<http://www.tij.co.jp>

### **【ご使用にあたっての注】**

本開発キットは技術基準適合証明を受けておりません。

本製品のご使用に際しては、電波法遵守のため、以下のいずれかの措置を取っていただく必要がありますのでご注意ください。

1. 電波法施行規則第6条第1項第1号に基づく平成18年3月28日総務省告示第173号で定められた電波暗室等の試験設備でご使用いただく。
2. 実験局の免許を取得後ご使用いただく。
3. 技術基準適合証明を取得後ご使用いただく。

なお、本製品は、上記の「ご使用にあたっての注意」を譲渡先、移転先に通知しない限り、譲渡、移転できないものとします。

上記を遵守頂けない場合は、電波法の罰則が適用される可能性があることをご留意ください。

日本テキサス・インスツルメンツ株式会社

東京都新宿区西新宿 6 丁目 2 4 番 1 号

西新宿三井ビル

<http://www.tij.co.jp>

## EVALUATION BOARD/KIT/MODULE (EVM) WARNINGS, RESTRICTIONS AND DISCLAIMERS

**For Feasibility Evaluation Only, in Laboratory/Development Environments.** Unless otherwise indicated, this EVM is not a finished electrical equipment and not intended for consumer use. It is intended solely for use for preliminary feasibility evaluation in laboratory/development environments by technically qualified electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems and subsystems. It should not be used as all or part of a finished end product.

Your Sole Responsibility and Risk. You acknowledge, represent and agree that:

1. You have unique knowledge concerning Federal, State and local regulatory requirements (including but not limited to Food and Drug Administration regulations, if applicable) which relate to your products and which relate to your use (and/or that of your employees, affiliates, contractors or designees) of the EVM for evaluation, testing and other purposes.
2. You have full and exclusive responsibility to assure the safety and compliance of your products with all such laws and other applicable regulatory requirements, and also to assure the safety of any activities to be conducted by you and/or your employees, affiliates, contractors or designees, using the EVM. Further, you are responsible to assure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard.
3. You will employ reasonable safeguards to ensure that your use of the EVM will not result in any property damage, injury or death, even if the EVM should fail to perform as described or expected.
4. You will take care of proper disposal and recycling of the EVM's electronic components and packing materials.

**Certain Instructions.** It is important to operate this EVM within TI's recommended specifications and environmental considerations per the user guidelines. Exceeding the specified EVM ratings (including but not limited to input and output voltage, current, power, and environmental ranges) may cause property damage, personal injury or death. If there are questions concerning these ratings please contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, some circuit components may have case temperatures greater than 60°C as long as the input and output are maintained at a normal ambient operating temperature. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors which can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during normal operation, please be aware that these devices may be very warm to the touch. As with all electronic evaluation tools, only qualified personnel knowledgeable in electronic measurement and diagnostics normally found in development environments should use these EVMs.

**Agreement to Defend, Indemnify and Hold Harmless.** You agree to defend, indemnify and hold TI, its licensors and their representatives harmless from and against any and all claims, damages, losses, expenses, costs and liabilities (collectively, "Claims") arising out of or in connection with any use of the EVM that is not in accordance with the terms of the agreement. This obligation shall apply whether Claims arise under law of tort or contract or any other legal theory, and even if the EVM fails to perform as described or expected.

**Safety-Critical or Life-Critical Applications.** If you intend to evaluate the components for possible use in safety critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, such as devices which are classified as FDA Class III or similar classification, then you must specifically notify TI of such intent and enter into a separate Assurance and Indemnity Agreement.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2012, Texas Instruments Incorporated

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

### Products

|                              |                                                                                      |
|------------------------------|--------------------------------------------------------------------------------------|
| Audio                        | <a href="http://www.ti.com/audio">www.ti.com/audio</a>                               |
| Amplifiers                   | <a href="http://amplifier.ti.com">amplifier.ti.com</a>                               |
| Data Converters              | <a href="http://dataconverter.ti.com">dataconverter.ti.com</a>                       |
| DLP® Products                | <a href="http://www.dlp.com">www.dlp.com</a>                                         |
| DSP                          | <a href="http://dsp.ti.com">dsp.ti.com</a>                                           |
| Clocks and Timers            | <a href="http://www.ti.com/clocks">www.ti.com/clocks</a>                             |
| Interface                    | <a href="http://interface.ti.com">interface.ti.com</a>                               |
| Logic                        | <a href="http://logic.ti.com">logic.ti.com</a>                                       |
| Power Mgmt                   | <a href="http://power.ti.com">power.ti.com</a>                                       |
| Microcontrollers             | <a href="http://microcontroller.ti.com">microcontroller.ti.com</a>                   |
| RFID                         | <a href="http://www.ti-rfid.com">www.ti-rfid.com</a>                                 |
| OMAP Applications Processors | <a href="http://www.ti.com/omap">www.ti.com/omap</a>                                 |
| Wireless Connectivity        | <a href="http://www.ti.com/wirelessconnectivity">www.ti.com/wirelessconnectivity</a> |

### Applications

|                               |                                                                                          |
|-------------------------------|------------------------------------------------------------------------------------------|
| Automotive and Transportation | <a href="http://www.ti.com/automotive">www.ti.com/automotive</a>                         |
| Communications and Telecom    | <a href="http://www.ti.com/communications">www.ti.com/communications</a>                 |
| Computers and Peripherals     | <a href="http://www.ti.com/computers">www.ti.com/computers</a>                           |
| Consumer Electronics          | <a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>                   |
| Energy and Lighting           | <a href="http://www.ti.com/energy">www.ti.com/energy</a>                                 |
| Industrial                    | <a href="http://www.ti.com/industrial">www.ti.com/industrial</a>                         |
| Medical                       | <a href="http://www.ti.com/medical">www.ti.com/medical</a>                               |
| Security                      | <a href="http://www.ti.com/security">www.ti.com/security</a>                             |
| Space, Avionics and Defense   | <a href="http://www.ti.com/space-avionics-defense">www.ti.com/space-avionics-defense</a> |
| Video and Imaging             | <a href="http://www.ti.com/video">www.ti.com/video</a>                                   |

### TI E2E Community

[e2e.ti.com](http://e2e.ti.com)

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)

Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)

[www.lifeelectronics.ru](http://www.lifeelectronics.ru)