EVM User's Guide: BOOSTXL-ADS8688W

ADS8688W BoosterPack™ Plug-In Evaluation Module

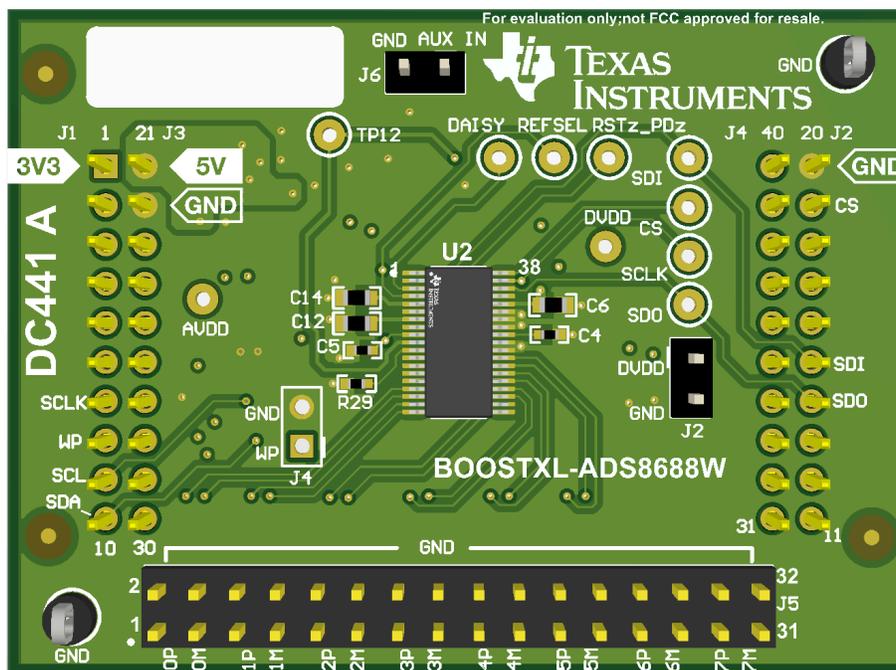**TEXAS INSTRUMENTS**

Description

The ADS8688W BoosterPack™ Plug-in Module (BOOSTXL-ADS8688W) provides a cost effective and accessible platform for developing applications using the ADS8688W. This module is compatible with the LP-MSPM0G3507 LaunchPad™ evaluation kit, and includes headers to support use with other controllers. Example code demonstrating basic device functionality is provided to serve as an open starting point for application development.

Get Started

1. Order the BOOSTXL-ADS8688W.
2. Download the software example for ADS8688W (ADS8688W-MSPM0-EXAMPLE-CODE).
   a. For evaluation with LaunchPad, order the LP-MSPM0G3507. See Hardware and Software sections for evaluation with LaunchPad.
   b. For evaluation with an existing controller, use Figure 1-1 as a guide to connect to the BoosterPack and, if applicable, use the example code as reference.

Features

- 8-Channel, 16-bit ADC with integrated analog front-end
- Channel-independent programmable inputs: ±12.288, ±6.144, ±3.072, from 0V to 12.288, and from 0V to 6.144V
- Input overvoltage protection up to ±20V
- LaunchPad-compatible header pins
- Flexible controller interfacing capability
- Compatible with other ADS8688W family devices, ADS868x, as well as 4 channel variants of both

1 Evaluation Module Overview

1.1 Introduction

The ADS8688W BoosterPack Plug-in Module enables the evaluation of Texas Instruments ADS8688W, a 16-bit, 500kSPS, 8-channel ADC with up to ±12.288V. This BoosterPack provides a hardware platform to quickly begin evaluation and application development using the ADS8688W.

This document describes the module design and includes the schematic, printed circuit board (PCB) layout, and bill of materials (BOM)

The BOOSTXL-ADS8688W BoosterPack can be evaluated with the LP-MSPM0G3507 LaunchPad. The MSPM0G3507 LaunchPad Development Kit User's Guide provides additional details regarding the LaunchPad platform.

The ADS8688W-MSPM0-EXAMPLE-CODE demonstrates basic ADC register read, register write, and conversion data read operations and is intended to serve as a starting point for full application development.

1.2 Kit Contents

The ADS8688W BoosterPack plug-in module is equipped with two LaunchPad-compatible headers (J1 and J2) for ease of integration with the TI Launchpad development kits, as well as an additional header that provides direct access to the eight input channels. This configuration enables flexible interfacing with a wider range of controllers and user-designed signal chains.

Table 1-1 details the contents of the EVM kit. Contact the TI Product Information Center if a component is missing. TI highly recommends that the user verify latest versions of the related software at the TI website, www.ti.com.
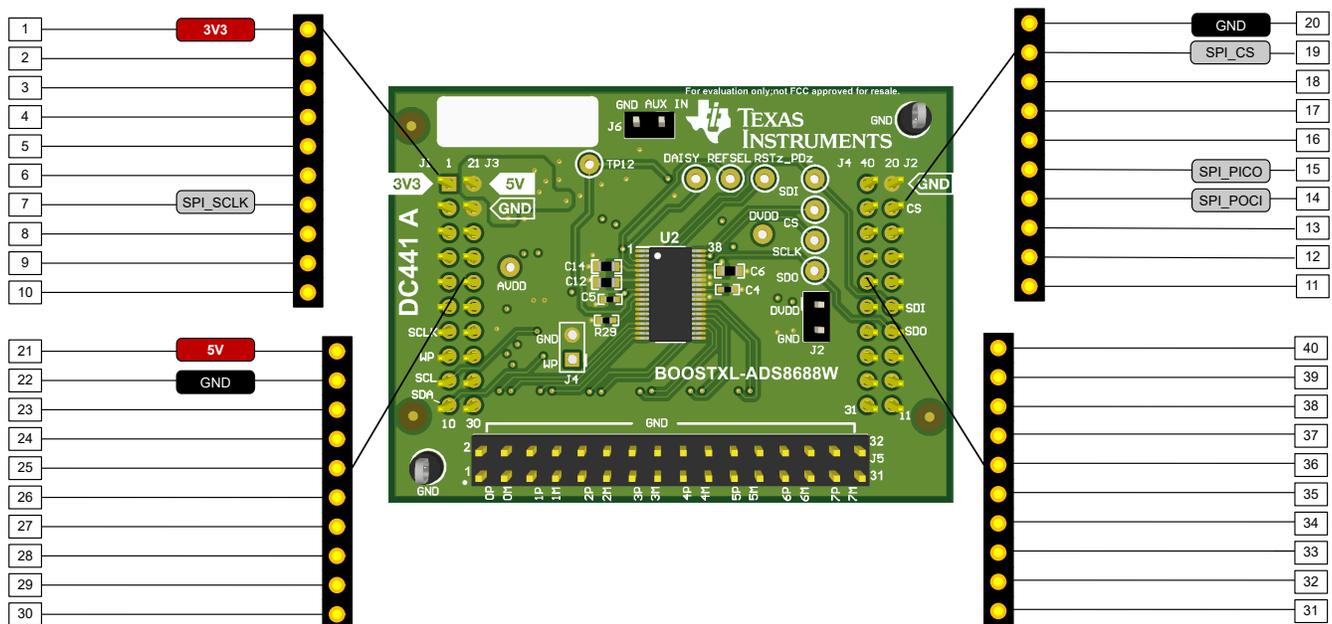

Figure 1-1. Interface Pinout

Table 1-1. Kit Contents

Item	Quantity
BOOSTXL-ADS8688W BoosterPack	1

Table 1-2. Components Not Included With Kit

Item	Quantity
LP-MSPM0G3507 LaunchPad	1

Purchase the LP-MSPM0G3507 LaunchPad from www.ti.com.

1.3 Specification

This module provides direct hardware access to the ADS8688W device to support user-defined signal conditioning, control, and system integration. The board includes the ADS8688W with supporting power-supply decoupling and routing to LaunchPad-compatible headers. No fixed signal-conditioning circuitry is implemented, enabling application-specific front-end design. Integrated test points and configurable component footprints facilitate evaluation, modification, and debugging within a compact form factor.

1.4 Device Information

The ADS8688W is a 16-bit, 500kSPS, and 8-channel ADC with up to ±12.288V analog inputs. The device features integrated analog front-end circuitry for each input channel, including overvoltage protection up to ±20V and an on-chip 4.096V reference with low temperature drift, all while operating from a single 5V supply.

The ADS8688W provides a serial interface that supports daisy-chaining of multiple devices, and operates with a digital supply voltages from 1.65V to 5.25V, enabling direct interfacing to a range of host controllers.

2 Hardware

2.1 Power Requirements and Jumper Settings

The BOOSTXL-ADS8688W BoosterPack provides electrical connections to the device supply pins. BP-ADS8688W Power Supply Inputs shows the connectors and optional configurations. BP-ADS8688W Jumper Settings shows the EVM jumper settings.

Table 2-1. BP-ADS8688W Power Supply Inputs

BP-ADS8688W Connector	Supply Name	Voltage Range	Test Point	Description
J1.21	AVDD	4.75V - 5.25V	TP1	R1 & R7 populated R4 not populated
J1.1	DVDD	1.65V - AVDD	TP2	R6 populated
J2	DVDD	1.65V - AVDD	TP2	External DVDD supply Option Remove R6

Table 2-2. BP-ADS8688W Jumper Settings

Jumper	Description	Default Position	Alternative Position
J5 odd numbers	AIN P&M inputs for channel 0-7	**Differential**: AINP : Positive Input signal AINM: Negative Input signal	**Single Ended**: AINP : Input signal AINM: GND
J5 even numbers	Ground	None	Optional: can be used to short AIN input pins
J6	Input for AUX channel driver	None	Externally source the input for AUX_in
J4	EEPROM communication	None	None Do not use

2.2 Setup

- Align the BoosterPack with the LaunchPad headers J1, J3 and J4, J2. Visually align the silkscreen for 3V3, 5V and GND on the BoosterPack with the LaunchPad as shown in Figure 2-1.
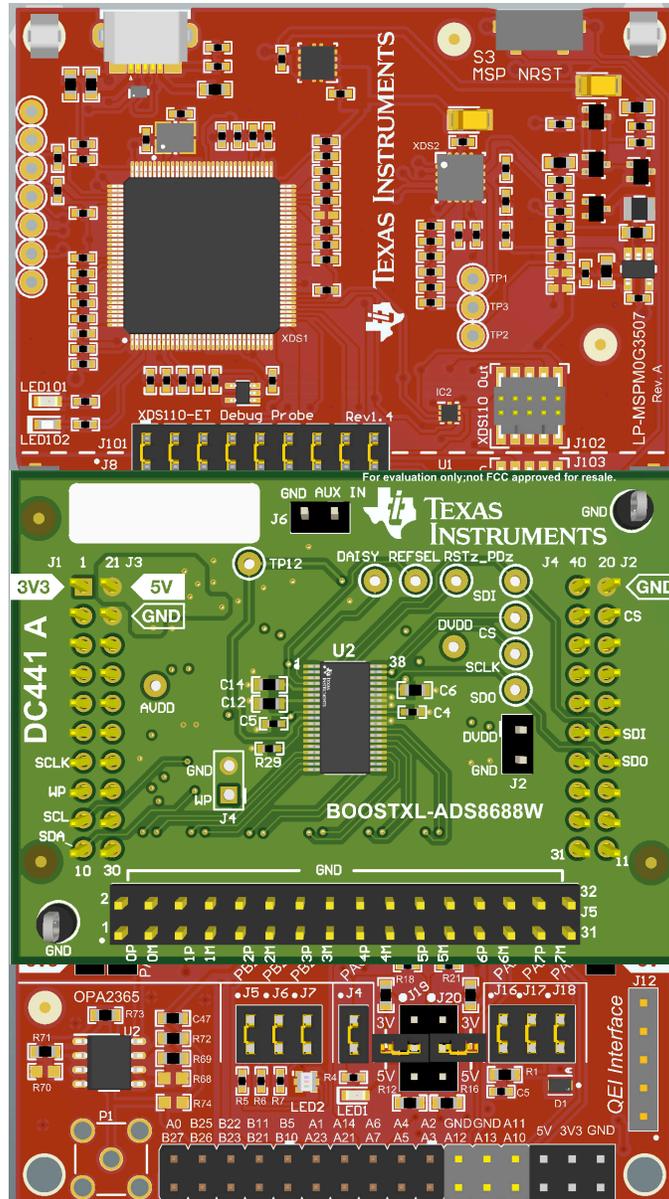
- Power-up the LaunchPad by connecting a USB cable.

Figure 2-1. Hardware Setup

3 Software

3.1 Software Installation

- Program the LaunchPad with the ADS8688W-MSPM0-EXAMPLE-CODE as a starting point, using the Code Composer Studio™ integrated development environment.
- The example code is configured to periodically read ADC conversion result and transmit it over UART as shown in Figure 3-1. Read the data by connecting to the virtual COM port enumerated as *MSP Application UART* in the Windows device manager (Figure 3-2).
  - UART configuration: 115200 baud, 8 data bits, 1 stop bit, no parity, and no flow control.
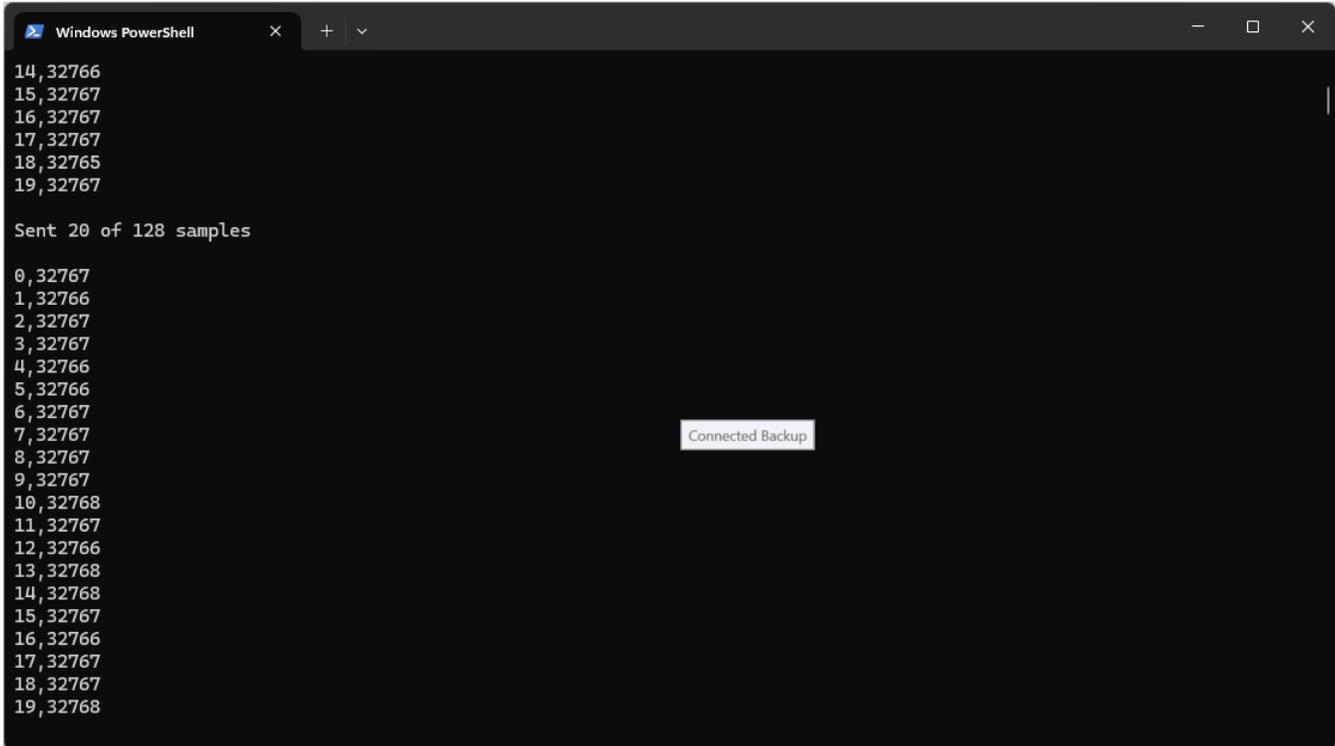
Figure 3-1. ADC Data Received on COM Port
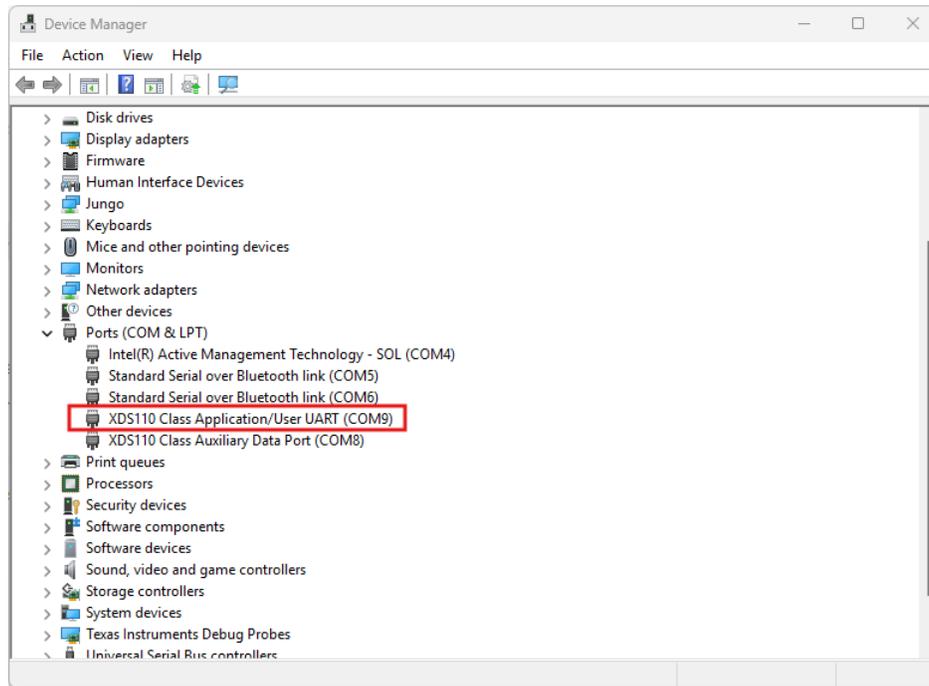
Figure 3-2. Select COM Port

• For further evaluation, use the basic functions in the example code to continue evaluating the ADS8688W.

Note

For help using the Code Composer Studio or using the LaunchPad, find available resources in the MSPM0 software development kit (SDK), visit the TI Cloud Developer Zone. MSPM0 MCUs are also supported by extensive online collateral, training with MSP Academy, and online support through the TI E2E™ support forums.

Note

For help with ADS8688W configuration or debugging help, find online support through the TI E2E support forums.

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4 Hardware Design Files

4.1 Schematics

Figure 4-1. Schematic
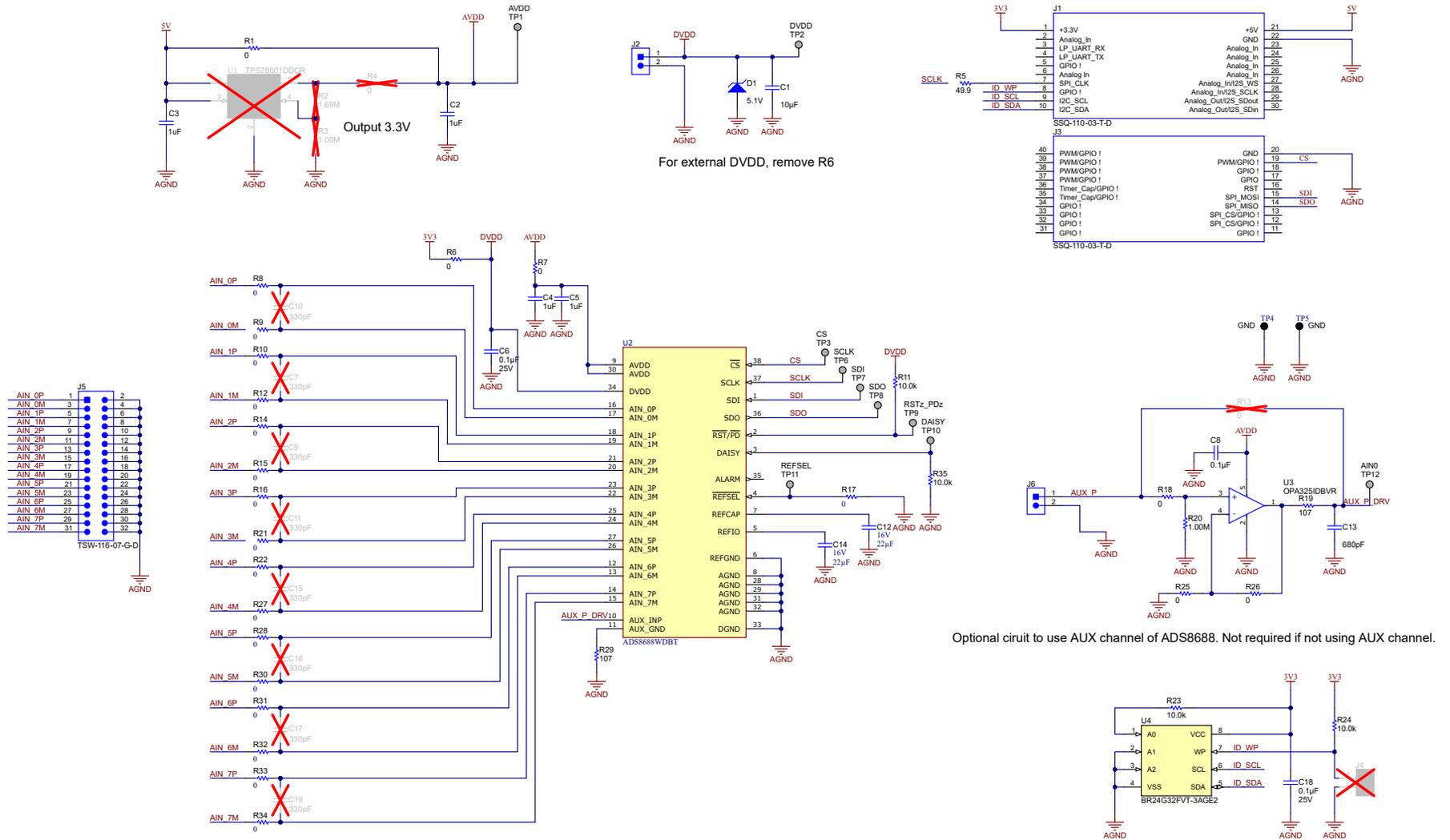
4.2 PCB Layouts
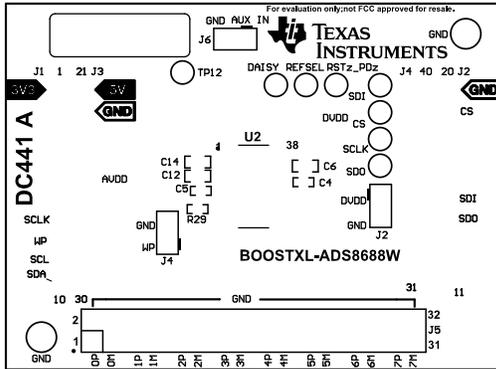
Figure 4-2. PCB Top Layer Overlay
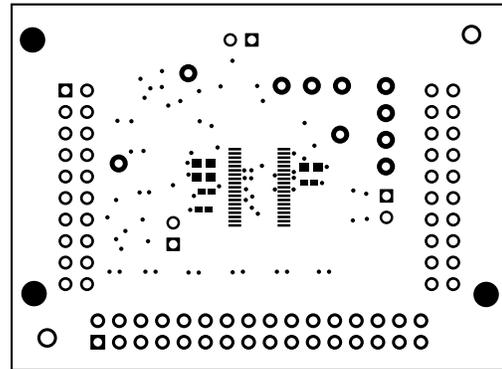
Figure 4-3. PCB Top Layer Solder
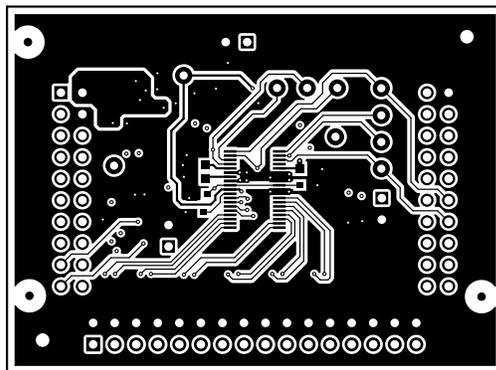
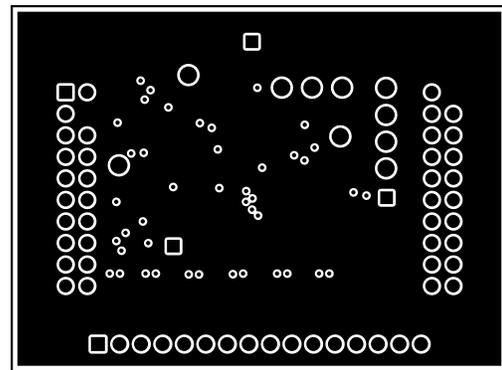
Figure 4-4. PCB Top Layer

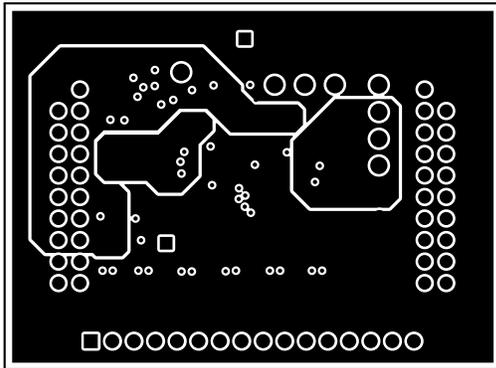Figure 4-5. PCB Signal Layer 1
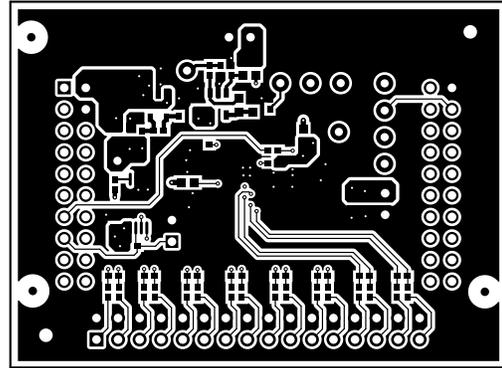

Figure 4-6. PCB Signal Layer 2
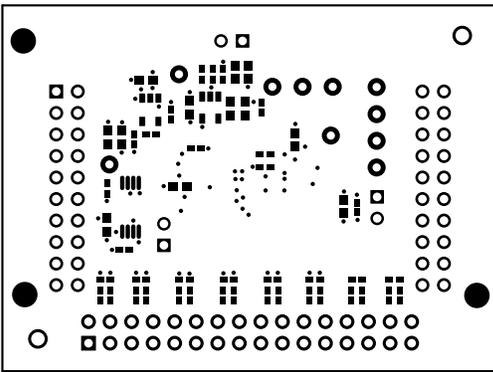

Figure 4-7. PCB Bottom Layer

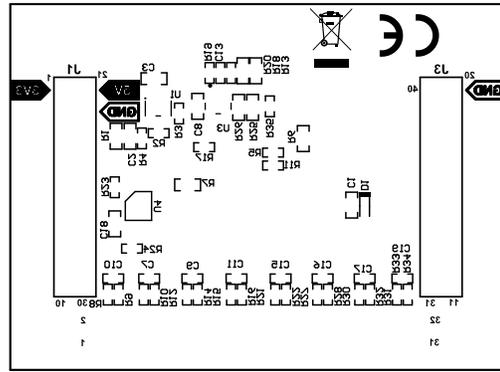Figure 4-8. PCB Bottom Layer Solder

Figure 4-9. PCB Bottom Layer Overlay

4.3 Bill of Materials (BOM)

Designator	Quantity	Value	Description	PackageReference	PartNumber	Manufacturer
C1	1	10uF	CAP, CERM, 10 µF, 16 V,+/-10%, X5R, 0603	0603	GRM188R61C106KAALD	MuRata
C2, C3	2	1uF	CAP, CERM, 1 uF, 25 V, +/-10%, X7R, 0603	0603	C0603C105K3RACTU	Kemet
C4, C5	2	1uF	CAP, CERM, 1 uF, 6.3 V, +/-20%, X7R, 0402	0402	GRM155R70J105MA12D	MuRata
C6, C8, C18	3	0.1uF	CAP, CERM, 0.1 µF, 25 V,+/-10%, X5R, 0603	0603	CL10A104KA8NNNC	Samsung Electro-Mechanics
C12, C14	2	22uF	CAP, CERM, 22 µF, 16 V,+/-20%, X5R, 0603	0603	CL10A226MO7JZNC	Samsung
C13	1	680pF	CAP, CERM, 680 pF, 25 V, +/- 5%, C0G/NP0, 0402	0402	GRM1555C1E681JA01D	MuRata
D1	1	5.1V	Diode, Zener, 5.1 V, 300 mW, SOD-523	SOD-523	BZT52C5V1T-7	Diodes Inc.
J1, J3	2		Receptacle, 2.54mm, 10x2, Tin, TH	10x2 Receptacle	SSQ-110-03-T-D	Samtec
J2, J6	2		Header, 100mil, 2x1, Tin, TH	Header, 2 PIN, 100mil, Tin	PEC02SAAN	Sullins Connector Solutions
J5	1		Header, 100mil, 16x2, Gold, TH	16x2 Header	TSW-116-07-G-D	Samtec
R1, R6, R7	3	0	RES, 0, 5%, 0.1 W, 0603	0603	RC0603JR-070RL	Yageo
R5	1	49.9	RES, 49.9, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040249R9FKED	Vishay-Dale
R8, R9, R10, R12, R14, R15, R16, R17, R21, R22, R27, R28, R30, R31, R32, R33, R34	17	0	RES, 0, 5%, 0.063 W, 0402	0402	RC0402JR-070RL	Yageo America
R11, R23, R24, R35	4	10.0k	RES, 10.0 k, 1%, 0.063 W, 0402	0402	RC0402FR-0710KL	Yageo America
R18, R25, R26	3	0	RES, 0, 1%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	RMCF0603ZT0R00	Stackpole Electronics Inc
R19, R29	2	107	RES, 107, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW0402107RFKED	Vishay-Dale

Designator	Quantity	Value	Description	PackageReference	PartNumber	Manufacturer
R20	1	1.00Meg	RES, 1.00 M, 1%, 0.1 W, 0402	0402	ERJ-2RKF1004X	Panasonic
TP4, TP5	2		Test Point, Multipurpose, Black, TH	Black Multipurpose Testpoint	5011	Keystone
U2	1		16-Bit, 500kSPS, 8-Channel, Single-Supply, SAR ADCs With Bipolar Input Ranges	TSSOP38	ADS8688WDBT	Texas Instruments
U3	1		CMOS Amplifier 1 Circuit Rail-to-Rail SOT-23-5	SOT-23-5	OPA325IDBVR	Texas Instruments
U4	1		I2C BUS EEPROM (2-Wire), TSSOP-B8	TSSOP-8	BR24G32FVT-3AGE2	Rohm
C7, C9, C10, C11, C15, C16, C17, C19	0	330pF	CAP, CERM, 330 pF, 50 V, +/- 1%, C0G/NP0, 0402	0402	GRM1555C1H331FA01J	MuRata
J4	0		Header, 100mil, 2x1, Tin, TH	Header, 2 PIN, 100mil, Tin	PEC02SAAN	Sullins Connector Solutions
R2	0	1.69Meg	RES, 1.69 M, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW04021M69FKED	Vishay-Dale
R3	0	1.00Meg	RES, 1.00 M, 1%, 0.1 W, 0402	0402	ERJ-2RKF1004X	Panasonic
R4	0	0	RES, 0, 5%, 0.063 W, 0402	0402	RC0402JR-070RL	Yageo America
R13	0	0	RES, 0, 1%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	RMCF0603ZT0R00	Stackpole Electronics Inc
U1	0		Single Output LDO, 150 mA, Adjustable 1.22 to 5.25 V Output, 2.2 to 5.5 V Input, with 500 nA Quiescent Current, 5-pin SOT (DDC), -40 to 125 degC, Green (RoHS & no Sb/Br)	DDC0005A	TPS78001DDCR	Texas Instruments

5 Additional Information

5.1 Trademarks

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