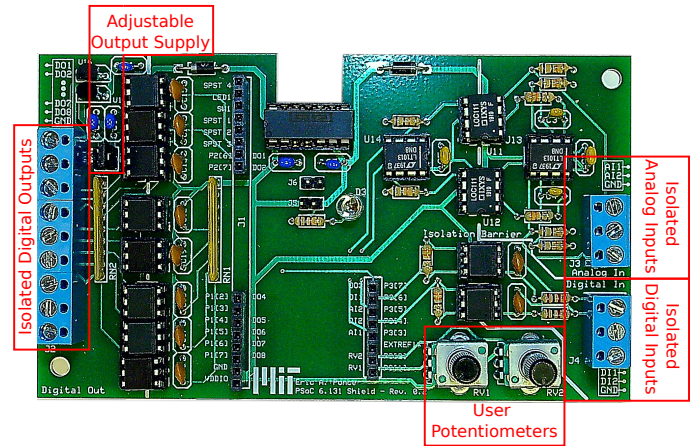




# PSoC 6.131 Shield v1.0

## 1 Overview

- 8  $5\text{ kV}_{\text{rms}}$  Isolated Digital Outputs (DO1-8) with Adjustable Output Supply: 3.3V or 5V
- 2  $5\text{ kV}_{\text{rms}}$  Isolated Digital Inputs (DI1 and DI2)
- 2  $3.75\text{ kV}_{\text{rms}}$  Isolated Analog Inputs (AI1 and AI2)
- 2 User Potentiometers (RV1 and RV2)
- Isolated Power Indication LED (D3)



## 2 Description

- The PSoC 6.131 Shield is designed to fit over a breadboard-mounted PSoC Board and features a DCP020507 isolated DC-DC converter for powering the isolated side of the inputs, and two user-selectable voltage regulators for controlling isolated digital output voltage levels.
- Requires 5V Input from PSoC Board.
- The PSoC Pin connections for the Isolated IOs can be found on the silkscreen and are shown on the right. Each connector features an isolated ground connection.

Shield Pin	PSoC Pin
DO1	P2[6]
DO2	P2[7]
DO3	P3[7]
DO4	P1[2]
DO5	P1[4]
DO6	P1[5]
DO7	P1[6]
DO8	P1[7]
DI1	P3[6]
DI2	P3[4]
AI1	P3[3]
AI2	P3[5]
RV1	P3[0]
RV2	P3[1]

### 2.1 Digital Output Isolation

The 8 Digital Output (DO) Isolation circuits each feature a VOH1016AD or H11L1M High-Speed Optocoupler. They all share a user-selectable output voltage rail which may be configured by using a SINGLE jumper on the 3V3 of 5V header pins.

### 2.2 Digital Input Isolation

Both digital input (DI) isolation circuits also feature a VOH1016AD or H11L1M High-Speed Optocoupler. The current limiting resistor has been chosen so that an input HIGH voltage range of 5-24V is allowable, but speed performance will degrade at higher voltages. Due to the configuration of the optocoupler, the input isolation circuit inverts the input logic (i.e. a logic low input produces a logic high input to the PSoC).

### 2.3 Analog Input Isolation

Both analog input (AI) isolation circuits feature a LOC110 Linearized Optocoupler and two opamps for linear analog isolation. The input voltage range is restricted to that of the isolated power supply voltage, 7V. The output voltage range is restricted to that of the PSoC, or 0-5V. For low-frequency operation, remaining within this 0-5V range is sufficient for 1-1 analog input isolation. For higher-frequency operation (> 10kHz), input voltages should be restricted to the opamp's linear working regime of 1-4V.

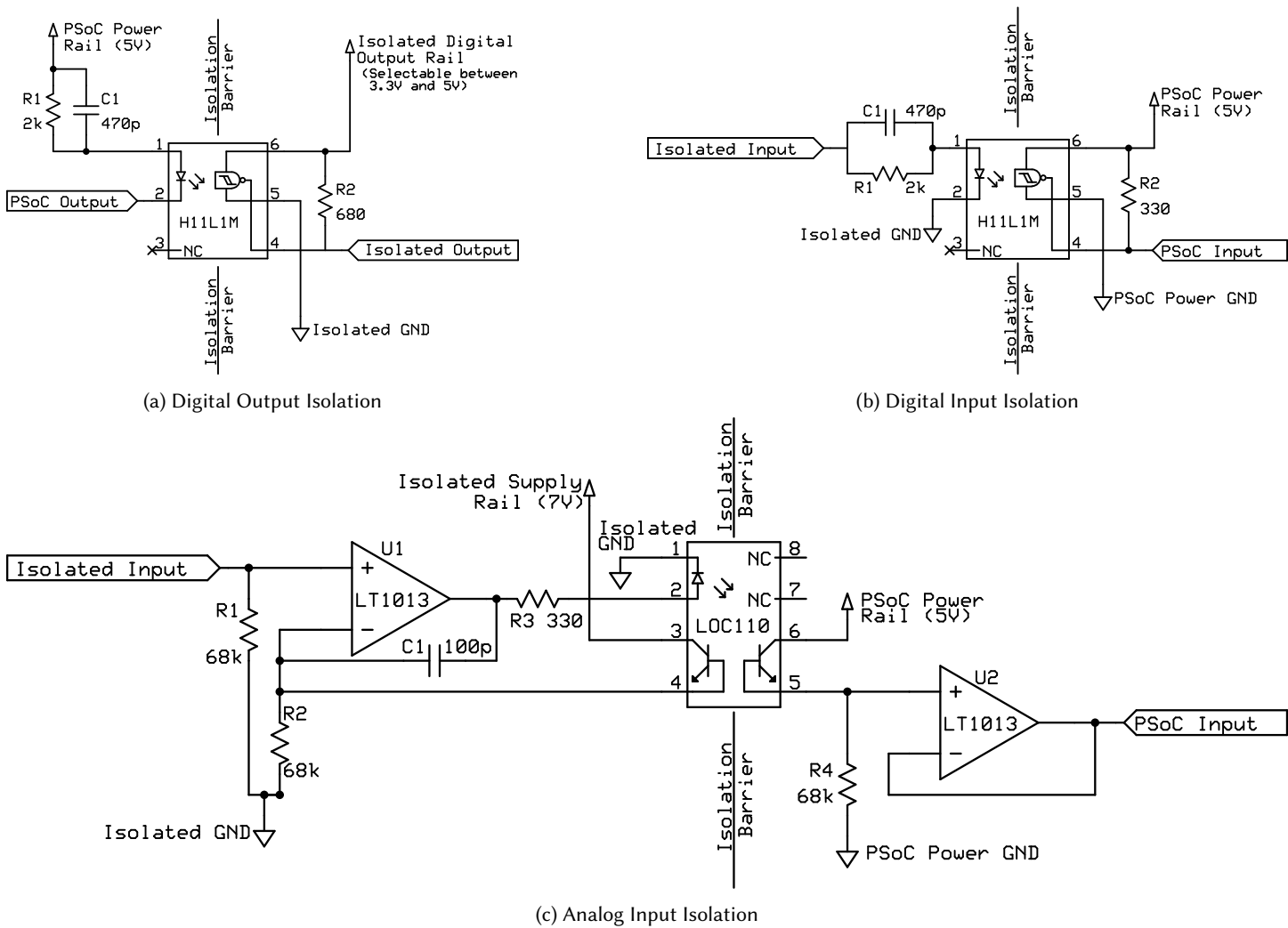
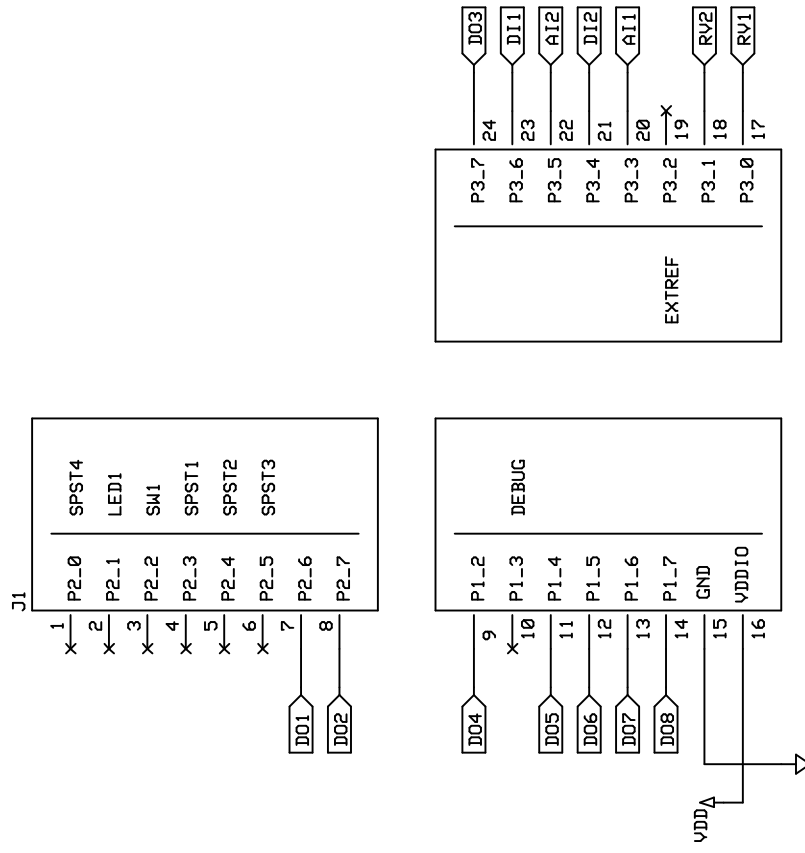
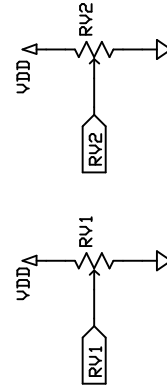


Figure 1: Isolation Circuitry

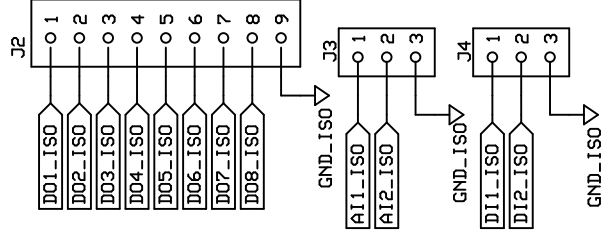
## PSoC Carrier Board Breakout



## Onboard Potentiometers



## Isolated IO Breakout



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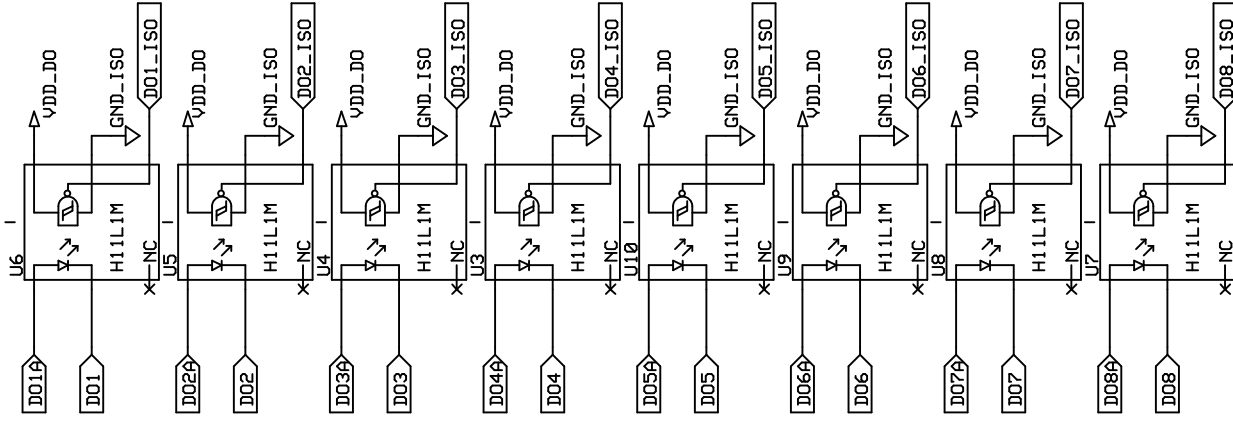
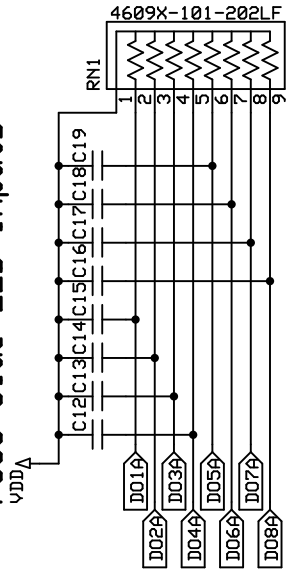
PSoC Carrier Board

Eric A. Ponce

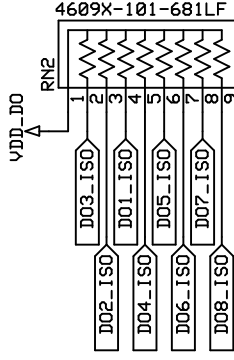
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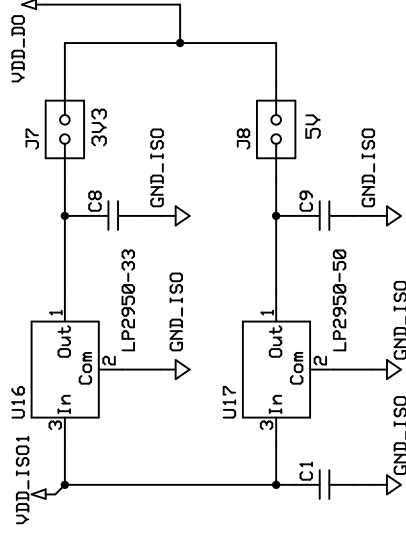
### PSoc-Side LED Inputs



### Output Load (Pull-up) Resistors



### Selectable Output Voltage Regulators



Unprotected Side

Protected Side

### Notes:

- Nominal LED Current @ 5V Input: 2mA
- Overall: 16mA
- Nominal Output Load Current: 7.5mA
- Overall: 60mA

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PSoc 6131 Carrier Board

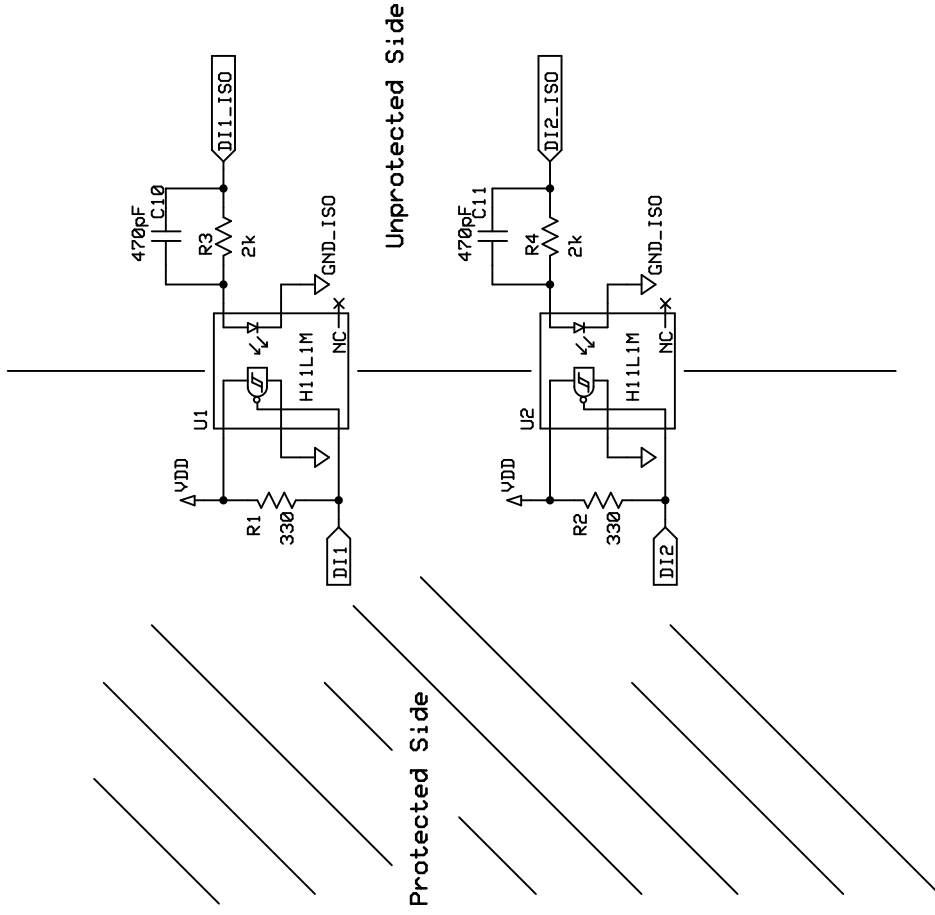
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Dig. Out. Prot

**Notes:**

- This Circuit Reverses Signal Polarity
- Max LED Current: 80 mA
- Nominal LED Current @ 5V Input:  $(5 - 1.4) / R = 1.85\text{mA}$
- Load Resistance for 5V operation:  $R1 = 5 / 0.015 = 330\ \text{Ohms}$



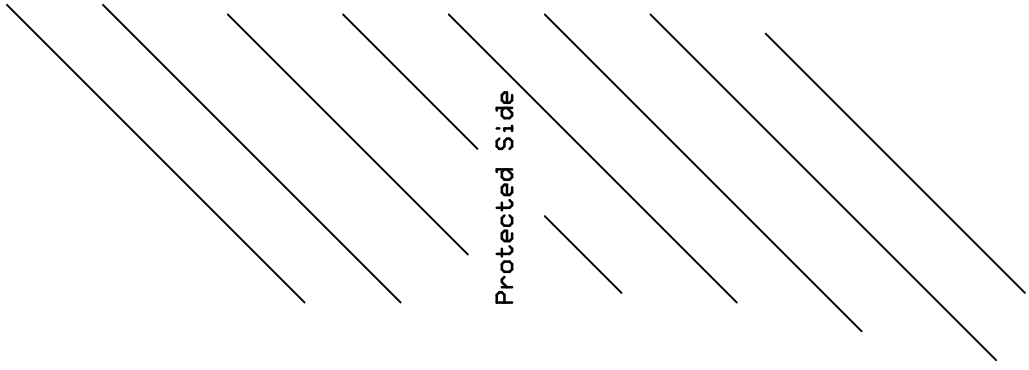
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PSoc 6131 Shield

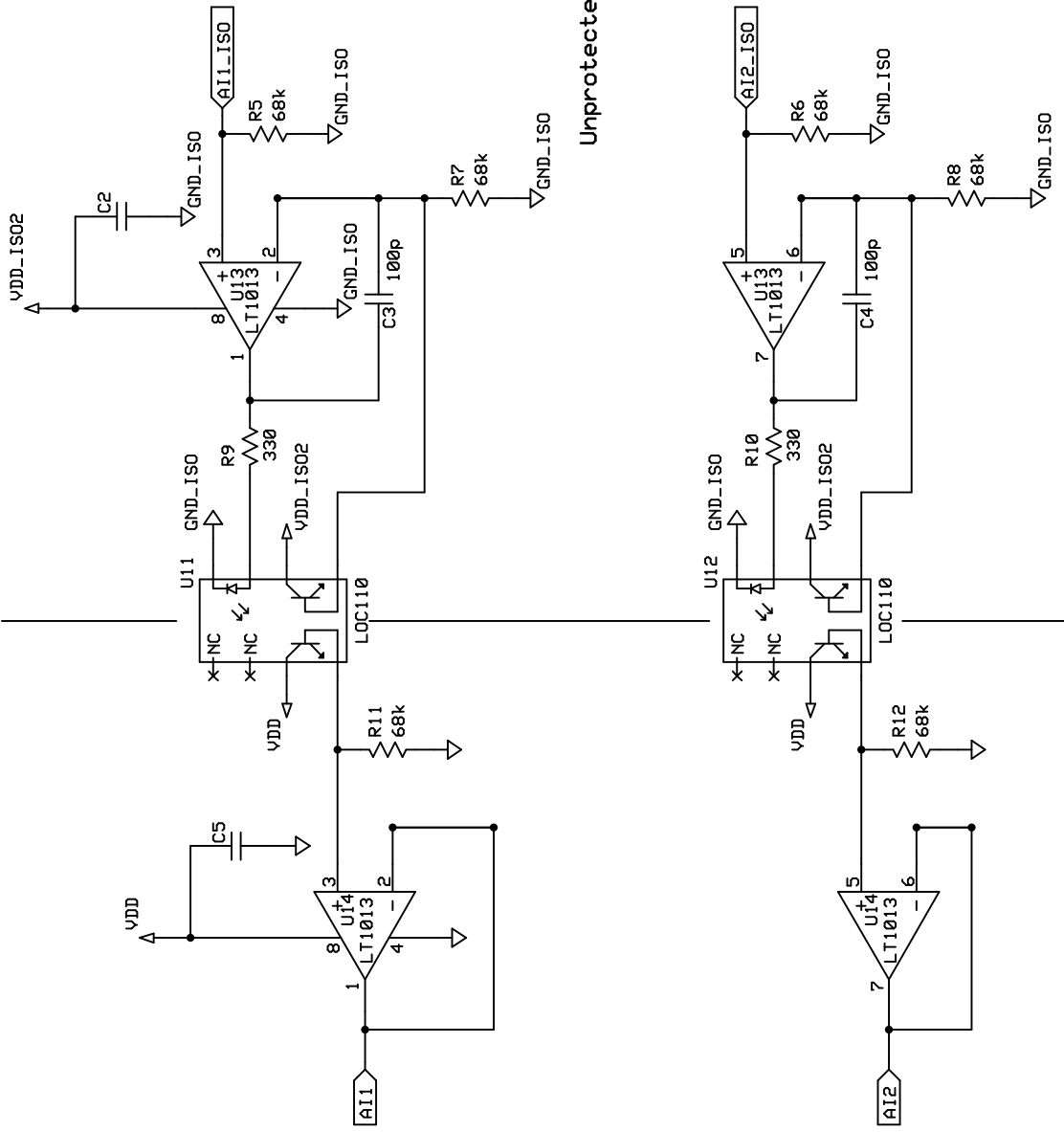
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Dig Input Prot.



Protected Side



Unprotected Side

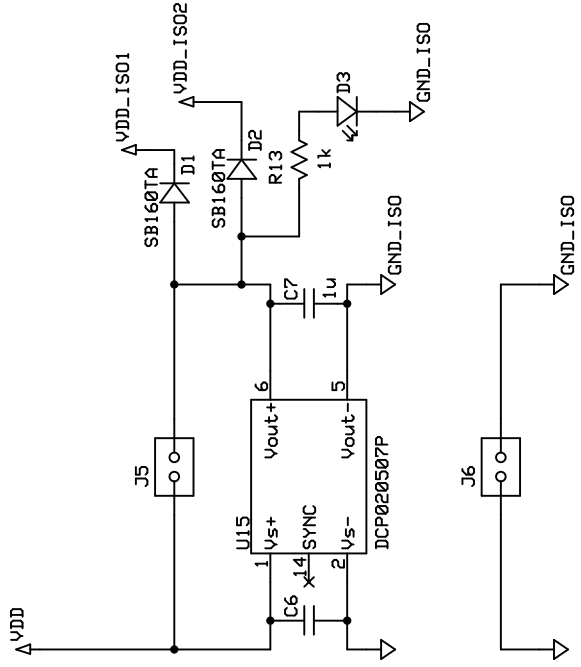
**Notes:**

- R9/R10 set max diode current:  $(5-1.2)/R = 11\text{mA}$
- R7/R8 set range,  $R = V_{\text{max}} / (K1 * If)$
- $R = 5 / (.008 * .011) = 56\text{k}$
- R5/R6 match input impedance

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**PSoc 6131 Carrier Board**

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 Rev 1.0  
 6/15/2020  
 Ana Inp Prot.



Company Name

Schematic Name

Designer's name	Rev 1.0	Page # or name
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