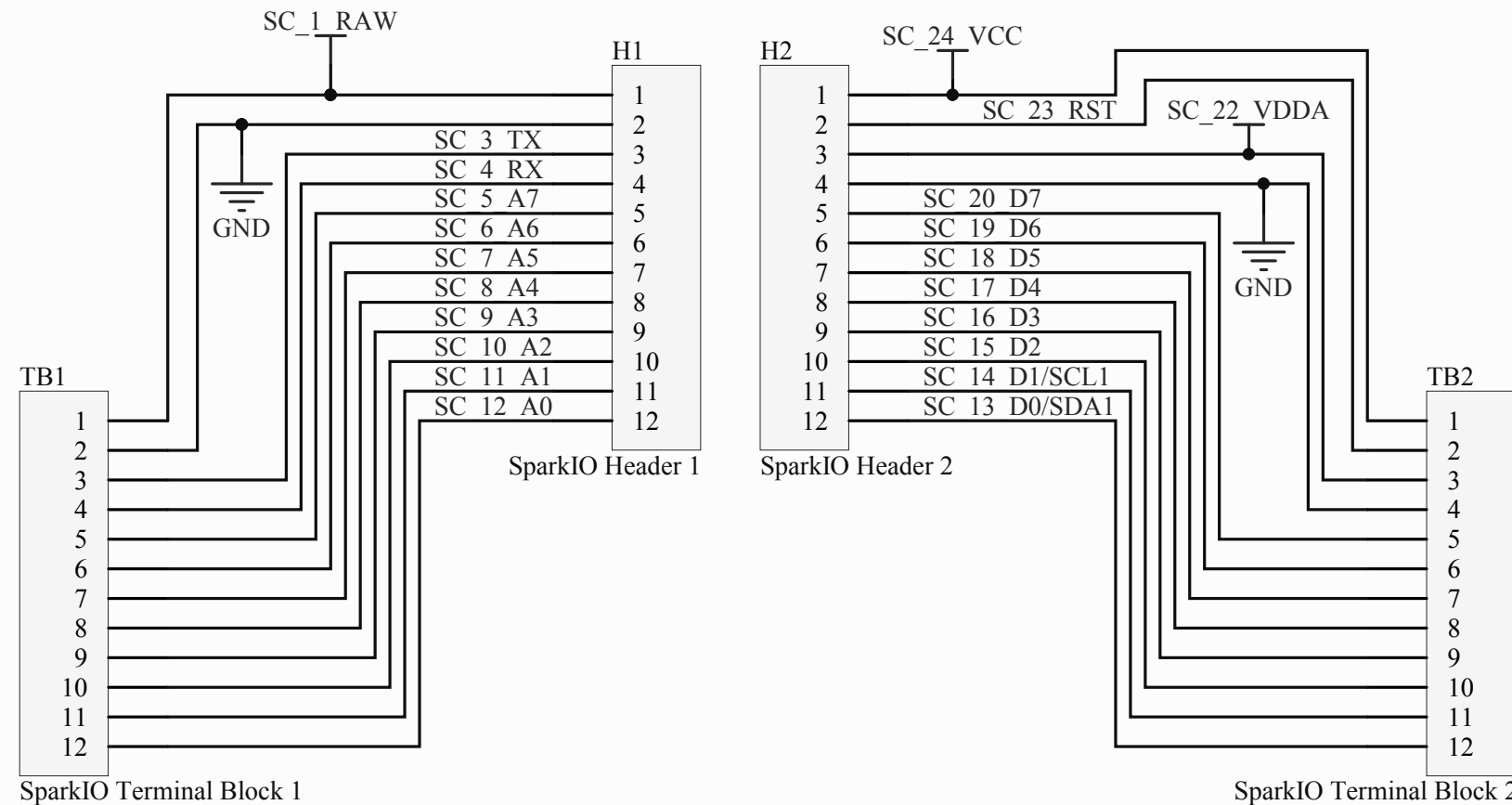
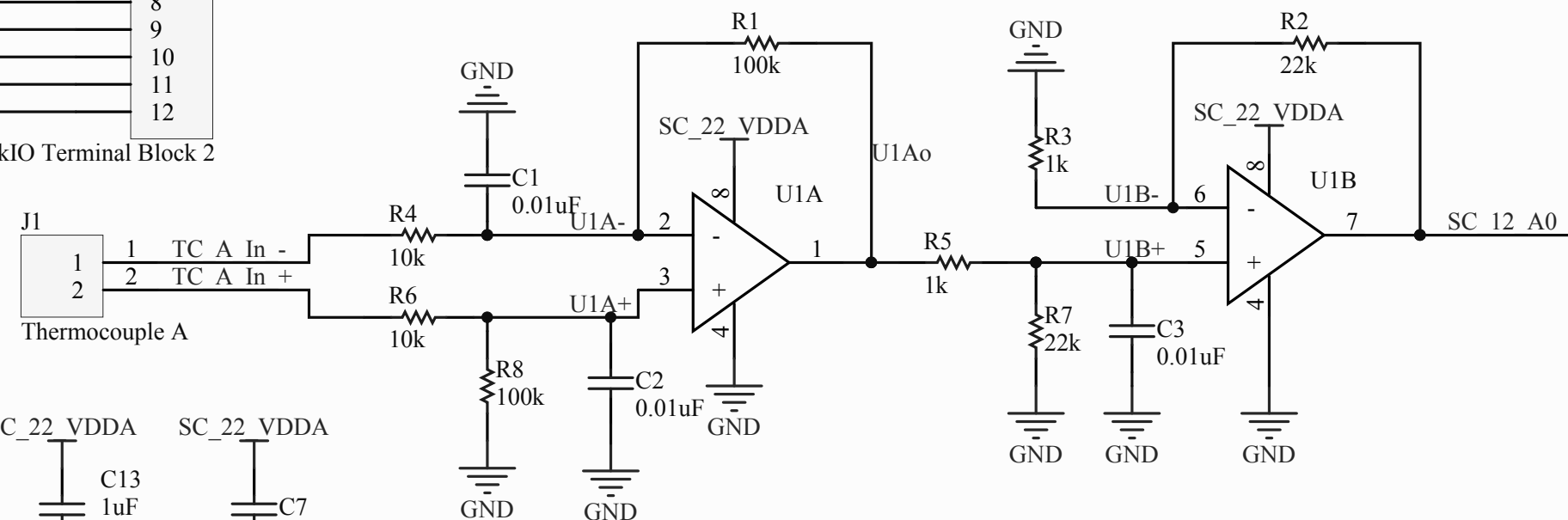


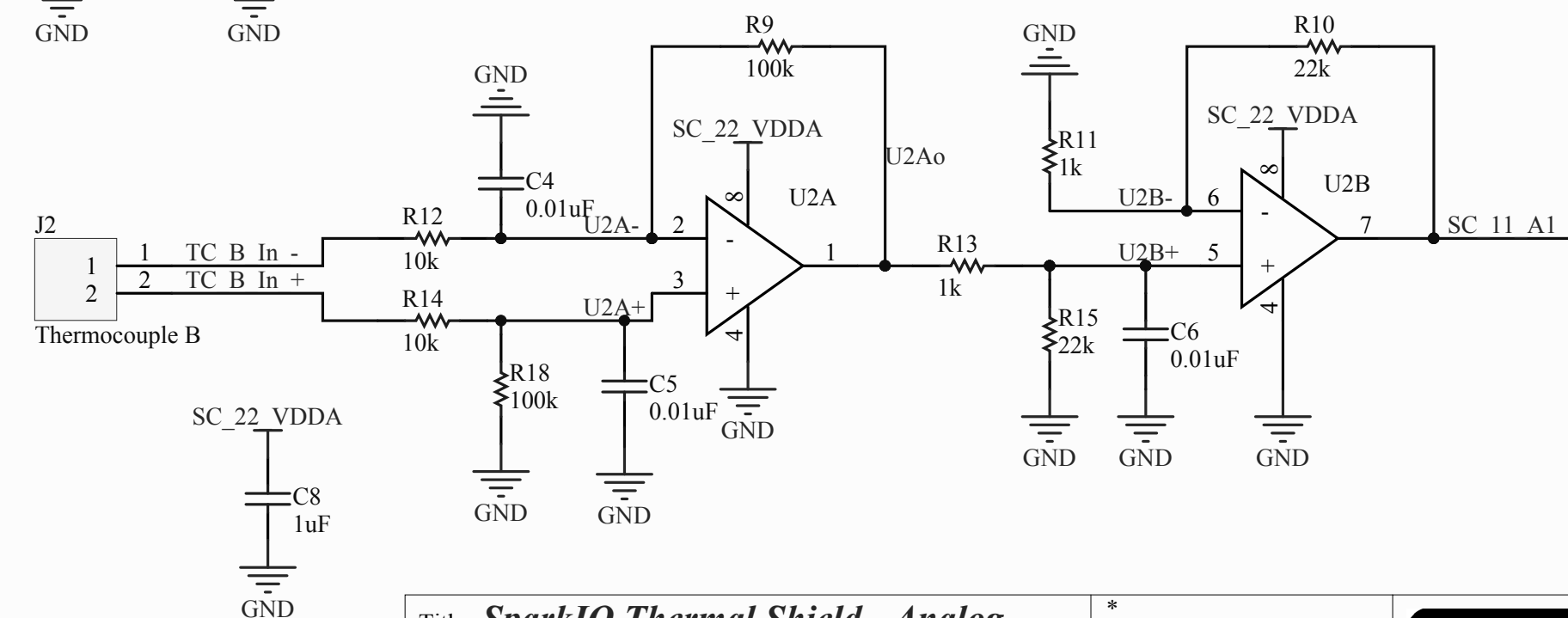
A



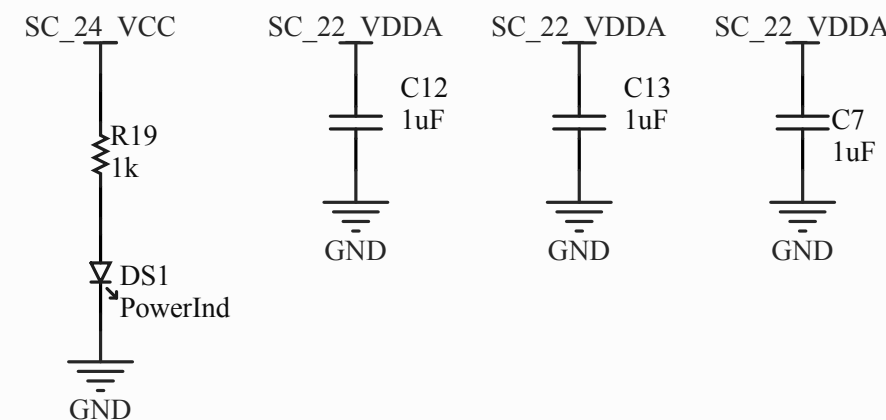
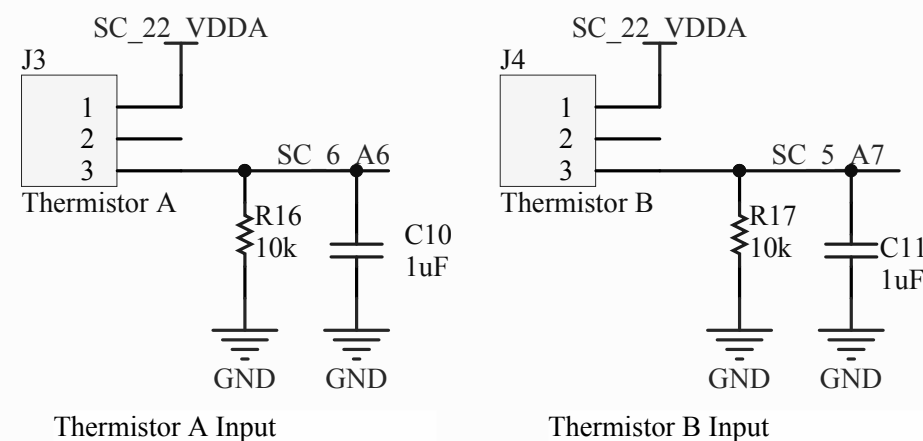
B



C



D



Cold Junction Temperature
Compensation Thermistor
*Must be located very close to
thermocouple connectors
U3 is analog thermistor IC

*SparkIO Module
RAW = Diode drop down from
+5VUSB
VCC = 3.3V, 500mA Max
VDDA = 3.3V through 500mA
ferrite, analog VDD
RST = Reset switch on Spark.io
Module
Spark Core has male headers - need
female headers here

▲ Op Amp Circuits are a cascaded
two stage amplifier:
A Gain = 10 stage followed by a
Gain = 22 stage to accomplish
overall gain of 220

▲ Linear approximation of a K-type
thermocouple is about 40.8uV per degree
C from -200C to +1350C
At 25C: V=1020uV = 1.02mV
At 100C, V=4008uV = 4.008mV
At 1000C, V=40.8mV
At 1350C, V=55.08mV

Desired range is roughly up to 600F or
0C to 350C
At 0C: V=0V
At 350C: V=14.28mV

To scale this voltage to 3.2V, gain
needed is
 $A = 3.2V / 14.28mV = 224$

A

B

C

D

Title **SparkIO Thermal Shield - Analog**

Size: A4

Number:*

Revision:A

Date: 7/17/2014

Time: 5:30:54 PM

Sheet 1 of 1

File: C:\Users\Jim Griezabacher\Documents\GitHub\probe\SparkIO Thermal Shield\SparkIO Thermal Shield - No Aux ADC\SchD



Item #	Designator	Quantity	Manufacturer	Manufacturer Part Number	Name	Supplier	Supplier Part Number
1	C1, C2, C3, C4, C5, C6	6	TDK Corporation	C1608X7R1E103K080AA	CAP CER 10000PF 25V 10% X7R 0603	Digikey	445-5100-1-ND
2	C7, C8, C9, C10, C11, C12, C13	7	TDK Corporation	C1608X7R1C105K080AC	CAP CER 1UF 16V 10% X7R 0603	Digikey	445-1604-1-ND
3	DS1	1	LiteOn	LTST-C190KGKT	Green LED 20mA 2V Vf	Digikey	160-1435-1-ND
4	H1, H2	2	Sullins Interconnect	PPTC121LFBN-RC	CONN HEADER FEM 12POS .1" SGL TIN	Digikey	S6100-ND
5	J1, J2	2	Omega	PCC-SMP-K	K Type Thermocouple Mini Horizontal TH Connector	Newark	01H0905
6	J3, J4	2	CUI Inc	MJ-2509N	3/32" Mono Audio Jack Right Angle TH	Digikey	CP-M2509N-ND
7	R1, R8, R9, R18	4	Vishay	CRCW0603100KFKEA	RES 100K OHM 1/10W 1% 0603 SMD	Digikey	541-100KHCT-ND
8	R2, R7, R10, R15	4	Vishay	CRCW060322K0FKEA	RES 22.0K OHM 1/10W 1% 0603 SMD	Digikey	541-22.0KHCT-ND
9	R3, R5, R11, R13, R19	5	Vishay	CRCW06031K00FKEA	RES 1.00K OHM 1/10W 1% 0603 SMD	Digikey	541-1.00KHCT-ND
10	R4, R6, R12, R14, R16, R17	6	Vishay	CRCW060310K0FKEA	RES 10.0K OHM 1/10W 1% 0603 SMD	Digikey	541-10.0KHCT-ND
11	TB1, TB2	2	On Shore Technology	OSTTE120104	TERMINAL BLOCK 3.5MM 12POS PCB	Digikey	ED2737-ND
12	U1, U2	2	Texas Instruments	OPA2376AIDR	IC Op Amp Dual GBP 5.5MHz 8SOIC	Digikey	296-22564-1-ND
13	U3	1	Microchip	TC1046VNBTR	Precision Temperature Sensing IC	Digikey	TC1046VNBTRCT-ND