

Zenith Headers
Zenith_Headers.SchDoc

SPI_Zenith

SPI_CLK
SPL_MISO
SPL_MOSI
SPL_nCS_Z

SPI_CLK
SPL_MISO
SPL_MOSI
SPL_nCS

U_AD7298 12-Bit SPI ADC

nPD/nRST

TSB

VIN[0..7]

VIN[0..7]

VIN0

VIN1

VIN2

VIN3

VIN4

VIN5

VIN6

VIN7

TP101

TP102

TP103

TP104

TP105

T1

Temp_Sensor.SchDoc

V_Temp

T2

Temp_Sensor.SchDoc

V_Temp

T3

Temp_Sensor.SchDoc

V_Temp

PD1

Photodiode_Sun_Sensor.SchDoc

V_Photo

PD2

Photodiode_Sun_Sensor.SchDoc

V_Photo

PD3

Photodiode_Sun_Sensor.SchDoc

V_Photo

Current and Voltage Sensors

Current_Voltage_Sensor.SchDoc

V_buffer_out

I_buffer_out

V_out

V_ref

V_in

Photovoltaic Array
XTJ-Prime_2S1P.SchDoc

V_PV-

V_PV+

Mechanical Interfacing
Mech_Interface_Zenith.SchDoc

Deployment_Zenith

Deployment_Zenith

Copyright 2019 Nicholas J. Sorensen, and Erik F. Halliwell

This file and the information within it are licensed under the terms of the Apache License, Version 2.0 (the "License"); you may not use or redistribute this file except in compliance with the License. You may obtain a copy of the License at: <http://www.apache.org/licenses/LICENSE-2.0>
Unless required by applicable law or agreed to in writing, content distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

Title **Zenith**

University of Alberta
Department of Electrical
and Computer Engineering
Edmonton AB, Canada
T6G 1H9



Size: Letter

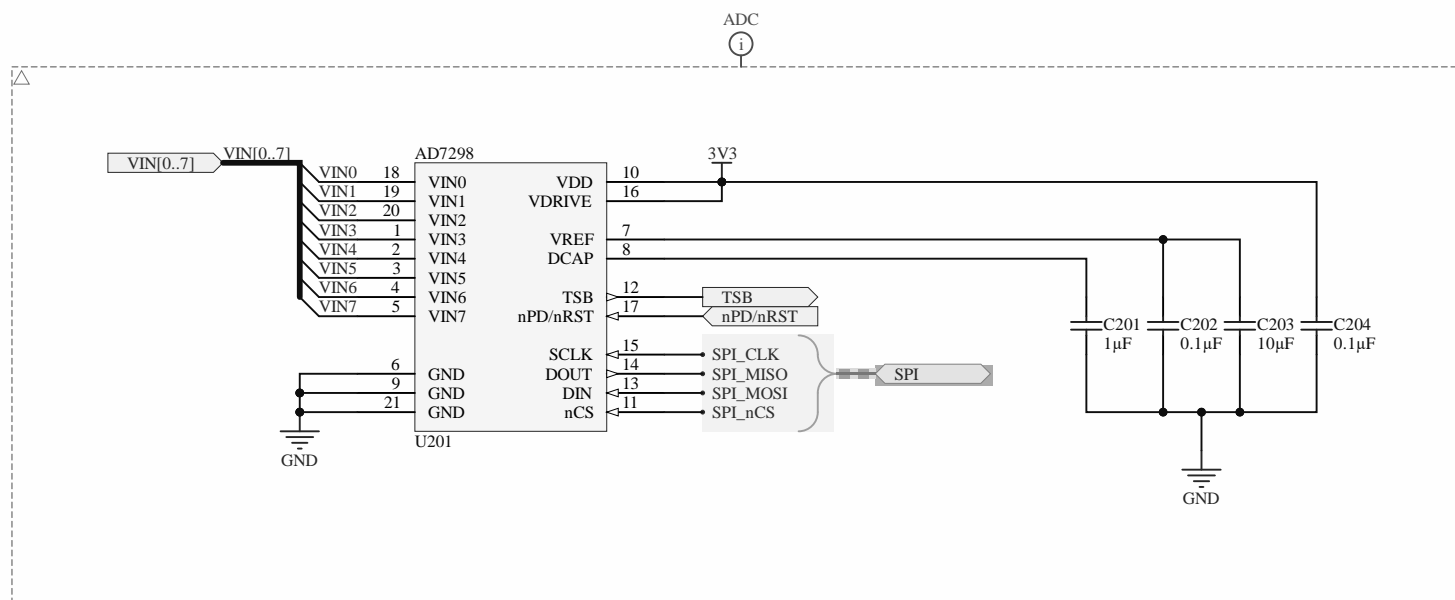
Number: 1

Revision:*

Date: 5/31/2020

Time: 10:01:30 PM Sheet 1 of 8

File: C:\Users\nicho\AlbertaSat\projects\Hyperion Solar Panels\Zenith\Zenith.SchDoc



Copyright 2019 Nicholas J. Sorensen, and Erik F. Halliwell

This file and the information within it are licensed under the terms of the Apache License, Version 2.0 (the "License"); you may not use or redistribute this file except in compliance with the License. You may obtain a copy of the License at: <http://www.apache.org/licenses/LICENSE-2.0>
 Unless required by applicable law or agreed to in writing, content distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

Title **AD7298 12-Bit SPI ADC**

University of Alberta
 Department of Electrical
 and Computer Engineering
 Edmonton AB, Canada
 T6G 1H9



Size: Letter

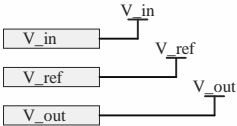
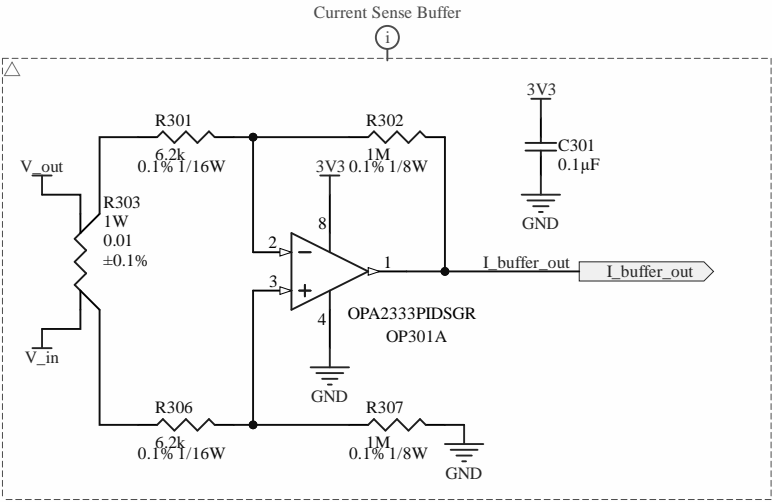
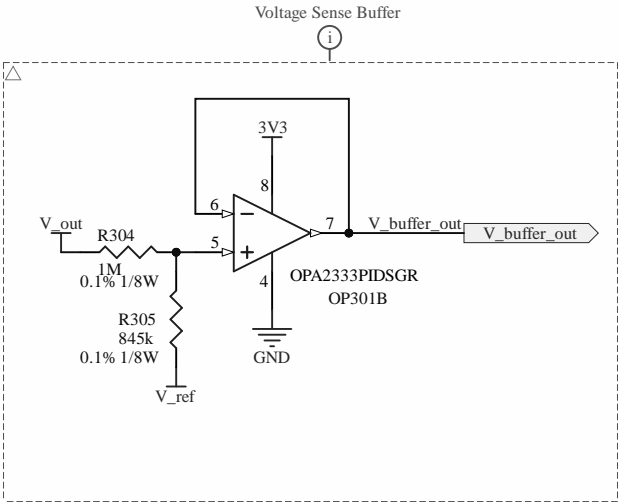
Number: 2

Revision: *

Date: 5/31/2020

Time: 10:01:30 PM Sheet 2 of 8

File: C:\Users\nicho\AlbertaSat\libraries\Schematic Sheets\AD7298 12-Bit SPI ADC.SchDoc



Voltage Sense Buffer:

$$\begin{aligned} V_{\text{buffer_out}} &= V_{\text{out}} * (R305 / (R305 + R304)) \\ &= 0.458 V_{\text{out}} \\ &\leq 2.49 \text{ V} \end{aligned}$$

Current Sense Buffer:

$$\begin{aligned} V_{\text{sense}} &= V_{\text{in}} - V_{\text{out}} \\ &= I * R303 \\ &\leq 1.5 \text{ A} * 0.01 \text{ Ohm} \\ &\leq 0.015 \text{ V} \\ G_{\text{diff}} &= R304 / R301 \\ &= 1 \text{ M} / 6.2 \text{ k} = 161 \\ G_{\text{cm}} &= 0 \\ I_{\text{buffer_out}} &\leq 2.415 \text{ V} \end{aligned}$$

Copyright Nicholas J. Sorensen, and Erik F. Halliwell

This file and the information within it are licensed under the terms of the Apache License, Version 2.0 (the "License"); you may not use or redistribute this file except in compliance with the License. You may obtain a copy of the License at: <http://www.apache.org/licenses/LICENSE-2.0> Unless required by applicable law or agreed to in writing, content distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

Title **Current_Voltage_Sensor**

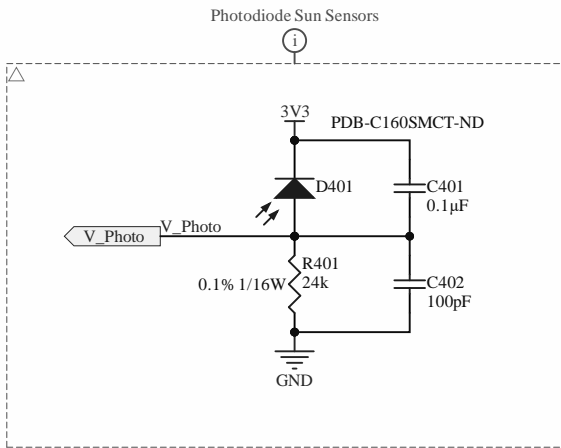
University of Alberta
Department of Electrical
and Computer Engineering
Edmonton AB, Canada
T6G 1H9



Size: Letter Number: 3 Revision: *

Date: 5/31/2020 Time: 10:01:30 PM Sheet 3 of 8

File: C:\Users\nicho\AlbertaSat\projects\Hyperion Solar Panels\Common Schematics\Current_Voltage_Sensor.SchDoc




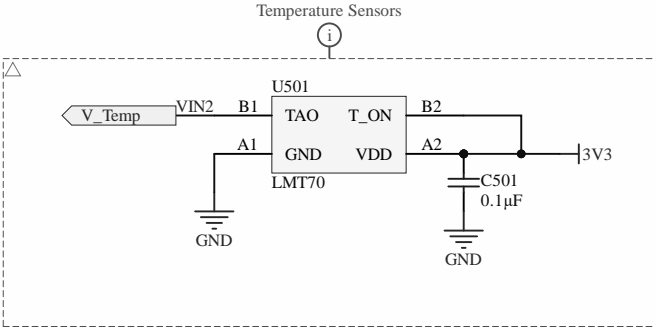
Copyright

Nicholas J. Sorensen, and Erik F. Halliwell

This file and the information within it are licensed under the terms of the Apache License, Version 2.0 (the "License"); you may not use or redistribute this file except in compliance with the License. You may obtain a copy of the License at: <http://www.apache.org/licenses/LICENSE-2.0>

Unless required by applicable law or agreed to in writing, content distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

Title <i>Photodiode_Sun_Sensor</i>			University of Alberta Department of Electrical and Computer Engineering Edmonton AB, Canada T6G 1H9	 UNIVERSITY OF ALBERTA EDMONTON · ALBERTA · CANADA
Size: Letter	Number: 4	Revision: *		
Date: 5/31/2020	Time: 10:01:30 PM	Sheet 4 of 8		
File: C:\Users\nicho\AlbertaSat\projects\Hyperion Solar Panels\Common Schematics\Photodiode_Sun_Sensor.SchDoc				

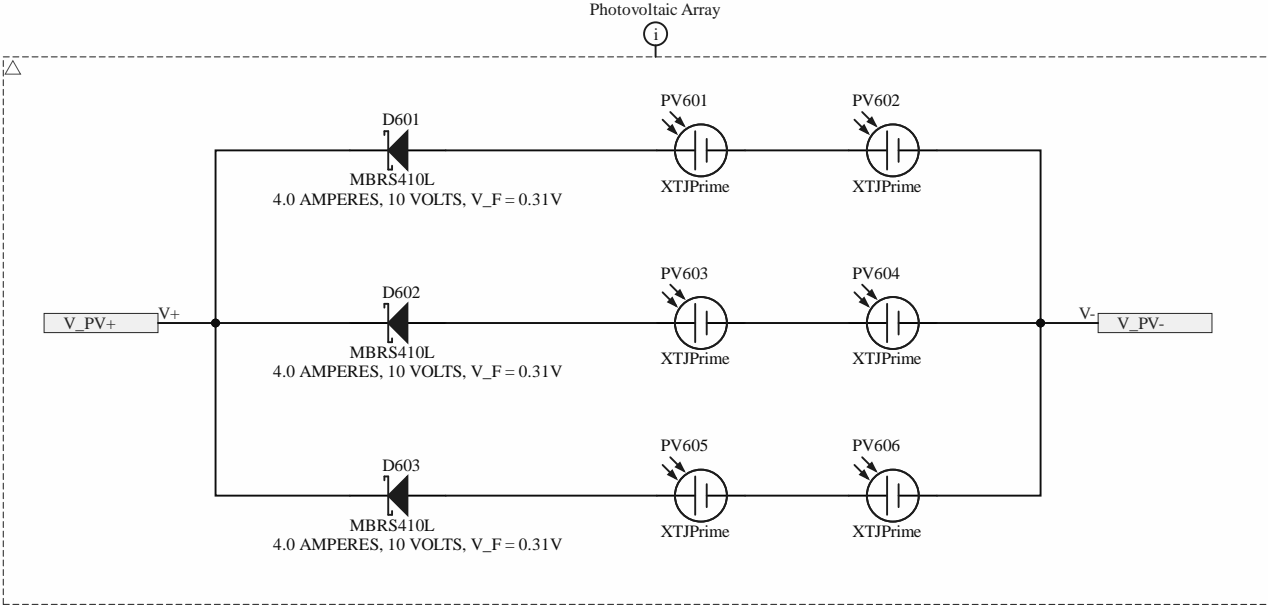


Copyright

Nicholas J. Sorensen, and Erik F. Halliwell


This file and the information within it are licensed under the terms of the Apache License, Version 2.0 (the "License"); you may not use or redistribute this file except in compliance with the License. You may obtain a copy of the License at: <http://www.apache.org/licenses/LICENSE-2.0>
Unless required by applicable law or agreed to in writing, content distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

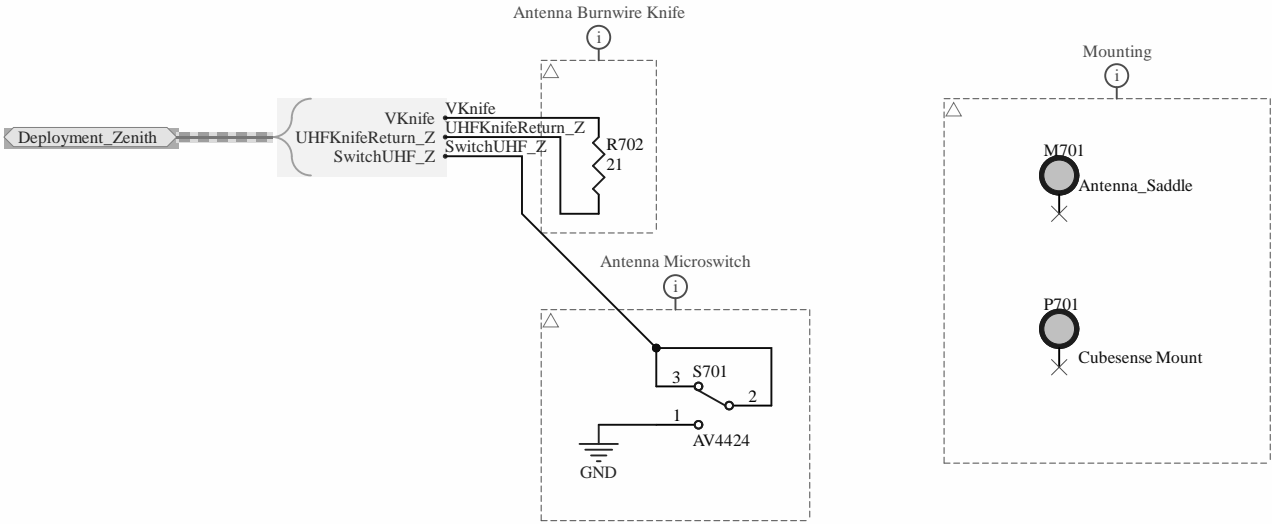
Title <i>Temp_Sensor</i>			<div>University of Alberta Department of Electrical and Computer Engineering Edmonton AB, Canada T6G 1H9</div> <div> UNIVERSITY OF ALBERTA EDMONTON · ALBERTA · CANADA</div>
Size: Letter	Number: 5	Revision: *	
Date: 5/31/2020	Time: 10:01:30 PM	Sheet 5 of 8	
File: C:\Users\nicho\AlbertaSat\projects\Hyperion Solar Panels\Common Schematics\Temp_Sensor.SchDoc			



Copyright Nicholas J. Sorensen, and Erik F. Halliwell

This file and the information within it are licensed under the terms of the Apache License, Version 2.0 (the "License"); you may not use or redistribute this file except in compliance with the License. You may obtain a copy of the License at: <http://www.apache.org/licenses/LICENSE-2.0>
Unless required by applicable law or agreed to in writing, content distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

Title <i>XTJ-Prime_2S2P</i>			University of Alberta Department of Electrical and Computer Engineering Edmonton AB, Canada T6G 1H9	 UNIVERSITY OF ALBERTA EDMONTON · ALBERTA · CANADA
Size: Letter	Number: 6	Revision: *		
Date: 5/31/2020	Time: 10:01:31 PM Sheet 6 of 8			
File: C:\Users\nicho\AlbertaSat\projects\Hyperion Solar Panels\Common Schematics\XTJ-Prime_2S1P.SchDoc				




Copyright

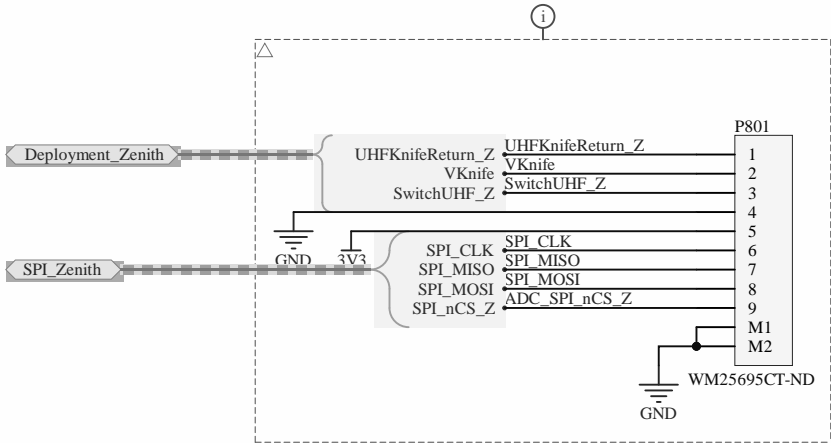
Nicholas J. Sorensen, and Erik F. Halliwell

This file and the information within it are licensed under the terms of the Apache License, Version 2.0 (the "License"); you may not use or redistribute this file except in compliance with the License. You may obtain a copy of the License at: <http://www.apache.org/licenses/LICENSE-2.0>

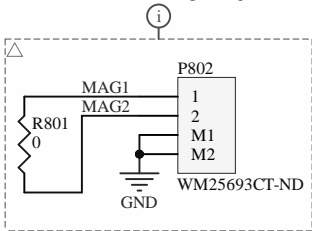
Unless required by applicable law or agreed to in writing, content distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

Title <i>Mech_Interface_Zenith</i>			University of Alberta Department of Electrical and Computer Engineering Edmonton AB, Canada T6G 1H9	 UNIVERSITY OF ALBERTA EDMONTON · ALBERTA · CANADA
Size: Letter	Number: 7	Revision: *		
Date: 5/31/2020	Time: 10:01:31 PM	Sheet 7 of 8		
File: C:\Users\nicho\AlbertaSat\projects\Hyperion Solar Panels\Zenith\Mech_Interface_Zenith.SchDoc				

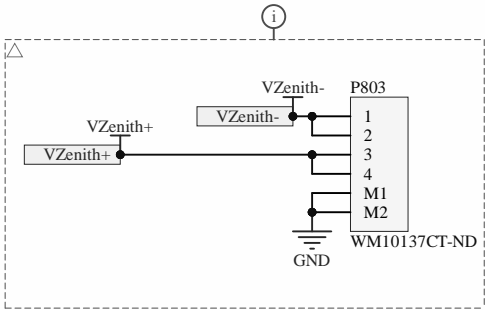
Zenith to Athena Burnwires/SPI



Zenith to Athena Magnetorquers




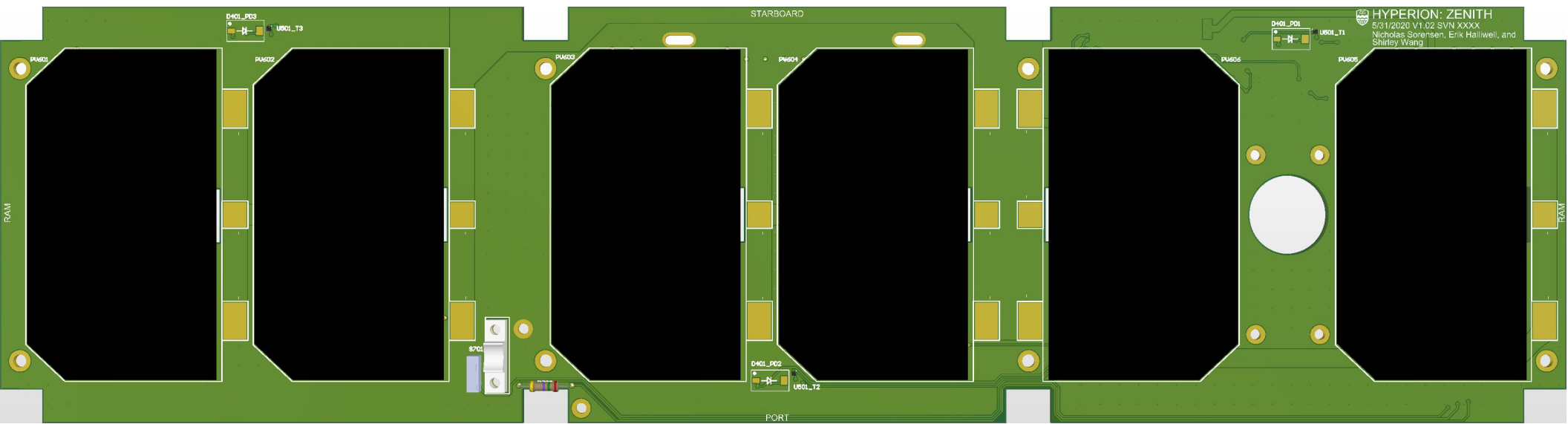
Zenith to EPS



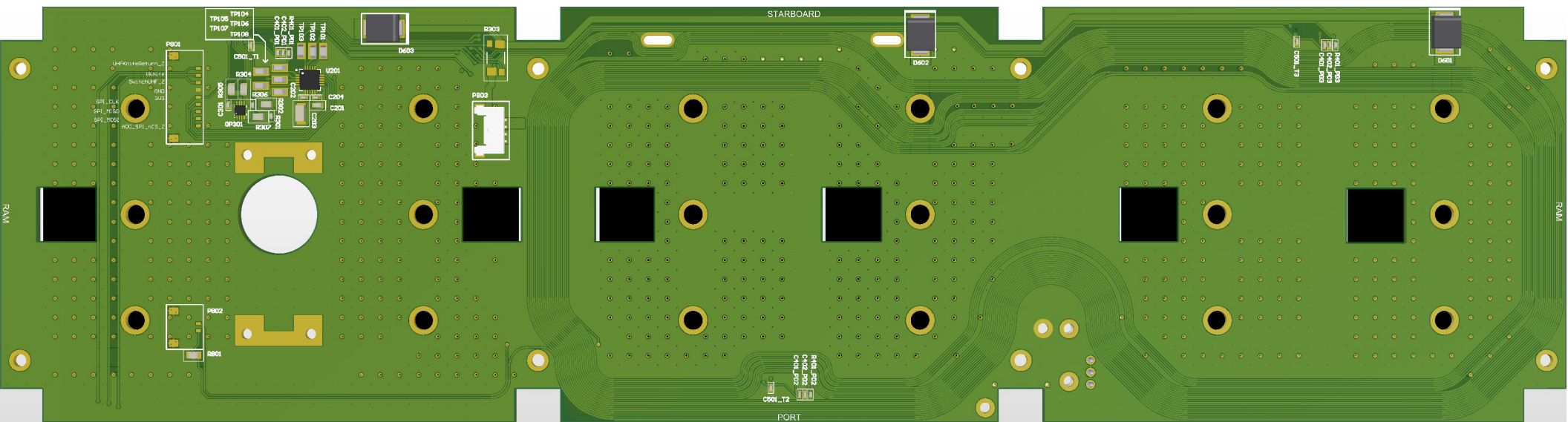
Copyright Nicholas J. Sorensen, and Erik F. Halliwell

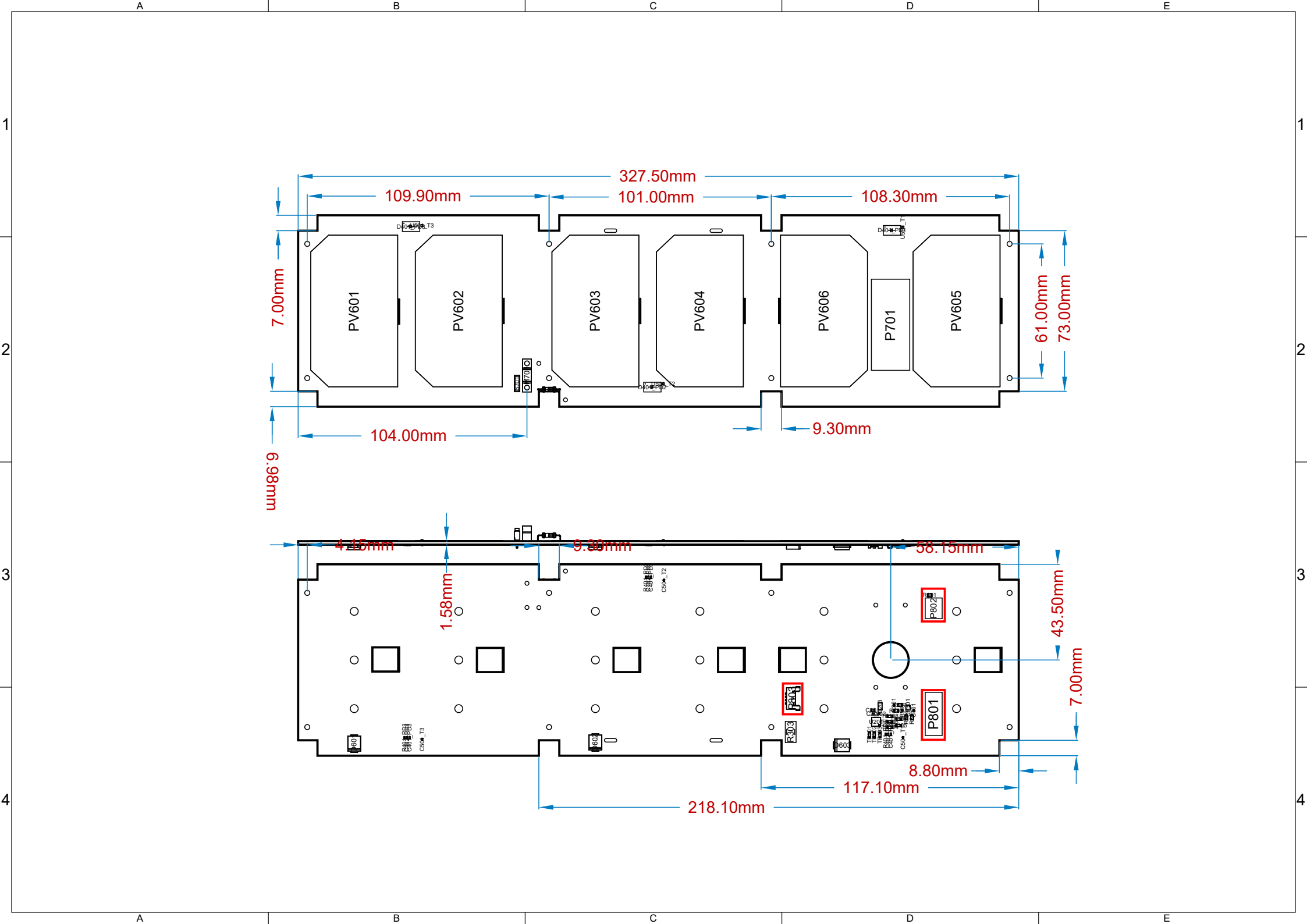
This file and the information within it are licensed under the terms of the Apache License, Version 2.0 (the "License"); you may not use or redistribute this file except in compliance with the License. You may obtain a copy of the License at: <http://www.apache.org/licenses/LICENSE-2.0> Unless required by applicable law or agreed to in writing, content distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

Title Zenith_Headers			University of Alberta Department of Electrical and Computer Engineering Edmonton AB, Canada T6G 1H9	 EDMONTON · ALBERTA · CANADA
Size: Letter	Number: 8	Revision: *		
Date: 5/31/2020			Time: 10:01:31 PM Sheet 8 of 8	
File: C:\Users\nicho\AlbertaSat\projects\Hyperion Solar Panels\Zenith\Zenith_Headers.SchDoc				



HYPERION: ZENITH
5/31/2020 V1.02 SVN XXXX
Nicholas Sorensen, Erik Halliwell, and
Shirley Wang





Description	Designator	Footprint	LibRef	Quantity	Supplier 1	Supplier Link
CAP CER 1UF 25V X7R 0603	C201	TDK-CGA3E	PC-TDK-02603	1	Digi-key	http://www.digikey.ca/product-search/en?keywords=445-6931-1-ND
CAP CER 0.1UF 50V X7R 0402	C202, C204	TDK-CGA2B	PC-TDK-02259	2	Digi-key	http://www.digikey.ca/product-search/en?keywords=445-6899-1-ND
CAP CER 10UF 25V X7R 1206	C203	TDK-CGA5L	PC-TDK-02917	1	Digi-key	http://www.digikey.ca/product-search/en?keywords=445-6990-1-ND
CAP CER 0.1UF 35V X7R 0402, CAP CER 0.1UF 50V X7R 0402, CAP CER 100PF 50V COG 0402	C301, C401_PD1, C401_PD2, C401_PD3, C402_PD1, C402_PD2, C402_PD3, C501_T1, C501_T2, C501_T3	TDK-CGA2B	PC-TDK-02255, PC-TDK-02259, PC-TDK-01227	10	Digi-key	http://www.digikey.ca/product-search/en?keywords=445-6901-1-ND , http://www.digikey.ca/product-search/en?keywords=445-6899-1-ND , http://www.digikey.ca/product-search/en?keywords=445-5596-1-ND
SENSOR PHOTODIODE 850NM 2SMD GW	D401_PD1, D401_PD2, D401_PD3	PDB-C160SM	PXX-ADP-00000	3	Digi-key	
SCHOTTKY BARRIER RECTIFIERS 4.0 AMPERES, 10 VOLTS, V_F = 0.31V	D601, D602, D603	ONS-875	PXX-ONS-00003	3	Digi-key	#https://www.digikey.com/product-detail/en/on-semiconductor/MBRS410LT3G/MBRS410LT3GOSCT-ND/1967073#
	M701	ANTENNA_SADDLE	PXX-ABS-00001	1	Digi-key	
CMOS Amplifier 2 Circuit Rail-to-Rail 8-WSON (2x2)	OP301	TI-DSG0008A	73	1	Digi-Key	#https://www.digikey.ca/product-detail/en/texas-instruments/OPA2333PIDSGR/296-51501-1-ND/9745865#
	P701	Cubesense_Mount	PXX-ABS-00006	1	Digi-key	
CONN HEADER SMD R/A 9POS 1.5MM	P801	MOLX-5040500991	68	1	Digi-Key	#https://www.digikey.ca/product-detail/en/molex/5040500991/WM25695CT-ND/9954121#
CONN HEADER SMD R/A 2POS 1.5MM	P802	MOLX-5040500291	61	1	Digi-Key	#https://www.digikey.ca/product-detail/en/molex/5040500291/WM25693CT-ND/9954119#
CONN HEADER SMD R/A 4POS 1.5MM	P803	MOLX-5040500491	63	1	Digi-Key	#https://www.digikey.ca/product-detail/en/molex/5040500491/WM10137CT-ND/4357653#
	PV601, PV602, PV603, PV604, PV605, PV606	XTJ Prime	PBT-SPEC-00002	6	Spectrolab	
RES SMD 6.2K OHM 0.1% 1/16W 0402, RES SMD 24K OHM 0.1% 1/16W 0402	R301, R306, R401_PD1, R401_PD2, R401_PD3	PANA-ERA2A	16853, 17830	5	Digi-Key	http://www.digikey.ca/product-search/en?keywords=P6.2KCNCT-ND , http://www.digikey.ca/product-search/en?keywords=P24KCNCT-ND
RES SMD 1M OHM 0.1% 1/8W 0805, RES SMD 845K OHM 0.1% 1/8W 0805	R302, R304, R305, R307	PANA-ERA6A	19706, 19643	4	Digi-Key	http://www.digikey.ca/product-search/en?keywords=P1MDACT-ND , http://www.digikey.ca/product-search/en?keywords=P845KDACT-ND
RES SMD 0.01 OHM 0.1% 1W 2512	R303	VSH-2512R4C	PR-VSH-00237	1	Digi-key	http://www.digikey.ca/product-search/en?keywords=Y1487-.01-ND
21 Ohms ±1% 1W Through Hole Resistor Axial Flame Proof, Moisture Resistant, Safety Metal Film	R702	VSH-CPF1	PR-VSH-00317	1	Digi-key	#https://www.digikey.ca/product-detail/en/vishay-dale/CPF121R000FKEE6/CPF21.0CCT-ND/2713126#
RES SMD 0.0 OHM JUMPER 1/5W 0805	R801	VSH-0805MCU	PR-VSH-00003	1	Digi-key	http://www.digikey.ca/product-search/en?keywords=MCU0805-0.0-ZZCT-ND
SWITCH SNAP ACT SPDT 500MA 30V	S701	PANA-AV4424	20035	1	Digi-Key	#https://www.digikey.com/product-detail/en/panasonic-electric-works/AV4424/255-3743-ND/646766#
PC TEST POINT MINI SMD	TP101, TP102, TP103, TP104, TP105, TP106, TP107, TP108	KS-5017	PTP-KS-00001	8	Digi-key	http://www.digikey.ca/product-detail/en/keystone-electronics/5017/36-5017TR-ND/2217304
IC ADC 12BIT SAR 20LFCSP-WQ	U201	ADI-CP-20-8	PU-ADI-00007	1	Digi-key	#https://www.digikey.ca/product-detail/en/analog-devices-inc/AD7298BCPZ/AD7298BCPZ-ND/2507320#
Temperature Sensor Analog, Local - 55°C ~ 150°C 5.194mV/°C 4-DSBGA (0.81x0.81)	U501_T1, U501_T2, U501_T3	TI-YFQ0004	70	3	Digi-Key	#https://www.digikey.ca/product-detail/en/texas-instruments/LMT70YFQR/296-47337-1-ND/7688347#

