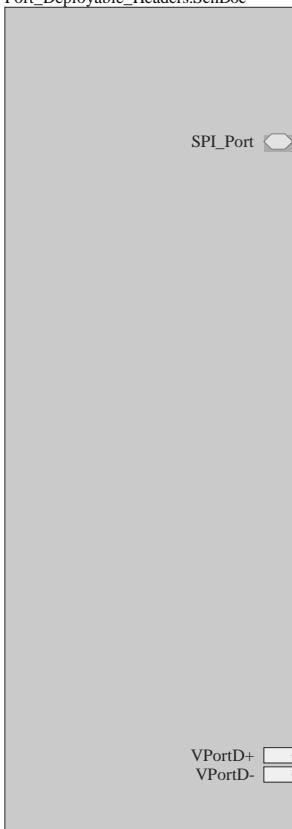
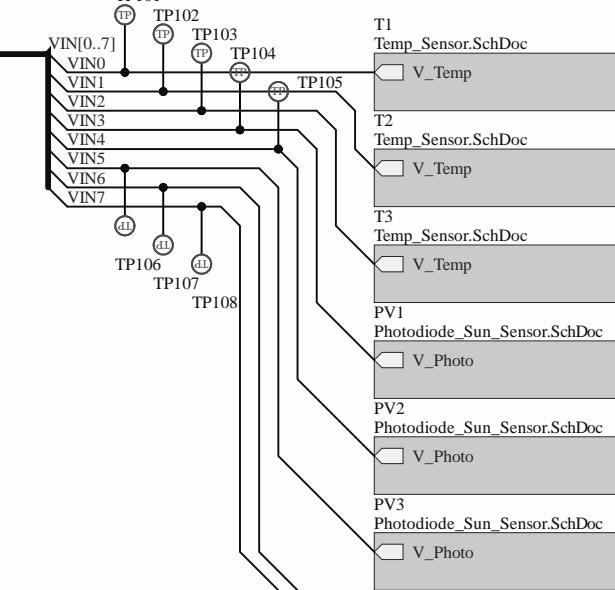
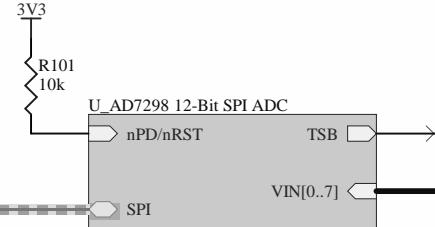


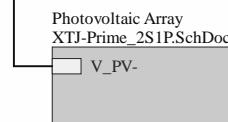
Port Deployable Headers
Port_Deployable_Headers.SchDoc



SPI_CLK → SPI_CLK
SPI_MISO → SPI_MISO
SPI_MOSI → SPI_MOSI
SPI_nCS_PD → SPI_nCS
SPI_nCS_P ←



VPortD+
VPortD-



Mechanical Interfacing
Mech_Interface_Port_Deployable.SchDoc

VPortD-

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 **Port Deployable**

Size: Letter Number: 1 Revision: *

Date: 6/27/2020 Time: 8:14:20 PM Sheet 1 of 8

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

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



A

A

B

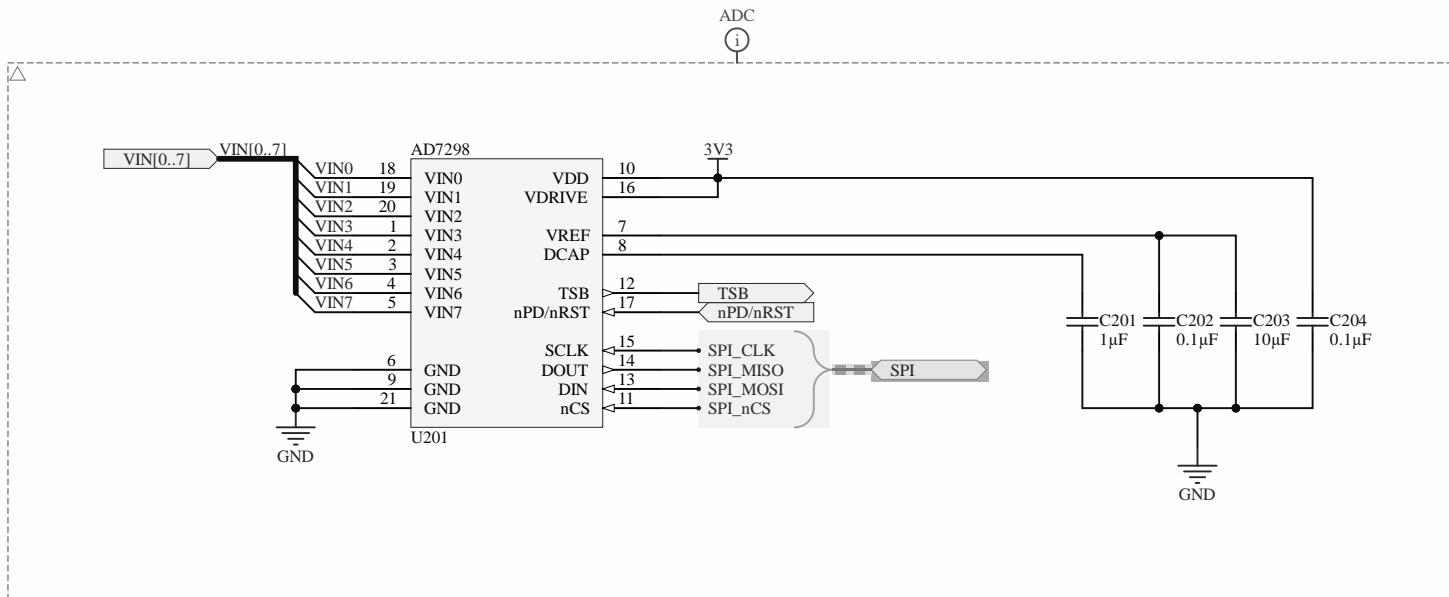
B

C

C

D

D



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**

Size: Letter	Number: 2	Revision: *
--------------	-----------	-------------

Date: 6/27/2020	Time: 8:14:20 PM	Sheet 2 of 7
-----------------	------------------	--------------

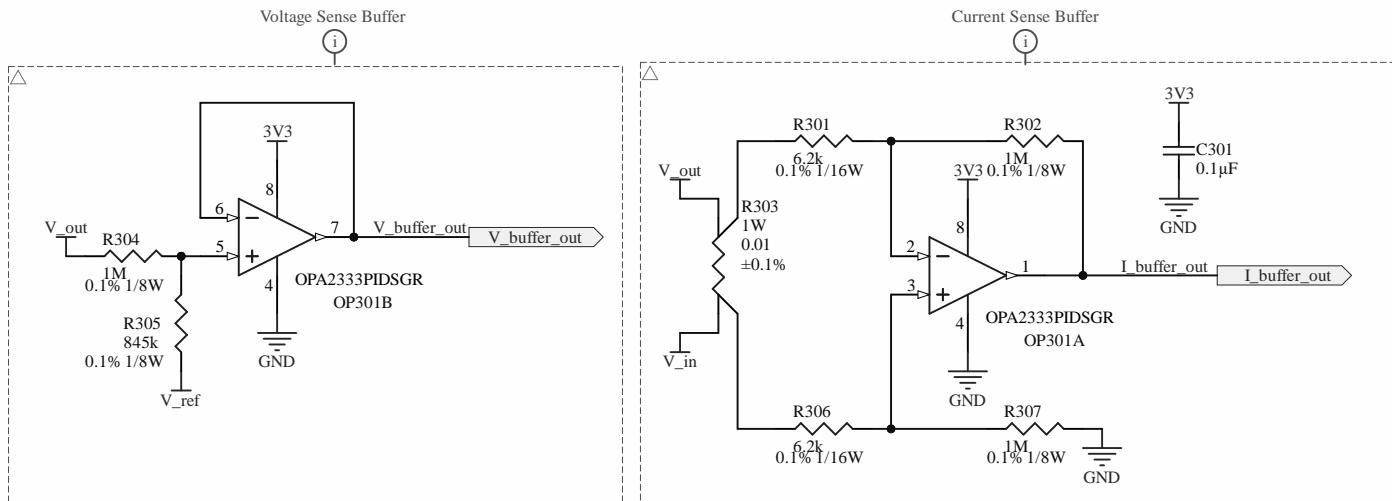
File: C:\Users\nicho\AlbertaSat\libraries\Schematic Sheets\AD7298 12-Bit SPI ADC.SchDoc

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

UNIVERSITY OF
ALBERTA
EDMONTON-ALBERTA-CANADA

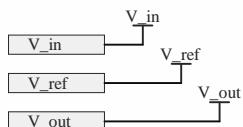
A

A



B

B



C

C

Voltage Sense Buffer:

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

Current Sense Buffer:

$$\begin{aligned} V_{\text{sense}} &= V_{\text{in}} - V_{\text{out}} \\ &= I^2 R303 \\ &\leq 1.5 \text{ A} * 0.01 \text{ Ohm} \\ &\leq 0.015 \text{ V} \\ G_{\text{diff}} &= R304 / R301 \\ &= 1\text{M} / 6.2\text{k} = 161 \\ G_{\text{cm}} &= 0 \\ I_{\text{buffer_out}} &\leq 2.415 \text{ V} \end{aligned}$$

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 <i>Current_Voltage_Sensor</i>			University of Alberta Department of Electrical and Computer Engineering Edmonton AB, Canada T6G 1H9
Size: Letter	Number: 3	Revision: *	UNIVERSITY OF ALBERTA EDMONTON-ALBERTA-CANADA
Date: 6/27/2020	Time: 8:14:20 PM	Sheet 3 of 8	
File: C:\Users\nicho\AlbertaSat\libraries\Schematic Sheets\Current_Voltage_Sensor.SchDoc			

A

A

B

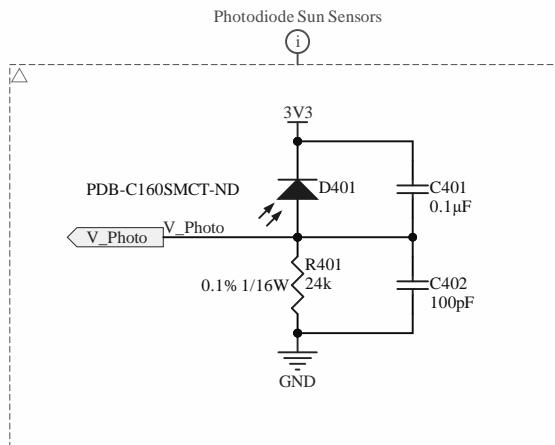
B

C

C

D

D



Photodiode:

$$I_{sc} = 80\mu A; I_{dark} = 2nA \rightarrow I_{illum} < 100\mu A$$

$$V_{photo} = I_{illum} R \leq 2.5 V \rightarrow R \geq 25k\Omega$$

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 Photodiode_Sun_Sensor			<i>University of Alberta Department of Electrical and Computer Engineering Edmonton AB, Canada T6G 1H9</i>
Size: Letter	Number: 4	Revision: *	
Date: 6/27/2020	Time: 8:14:20 PM	Sheet 4 of 7	
File: C:\Users\nicho\AlbertaSat\libraries\Schematic Sheets\Photodiode_Sun_Sensor.SchDoc			UNIVERSITY OF ALBERTA EDMONTON-ALBERTA-CANADA

A

A

B

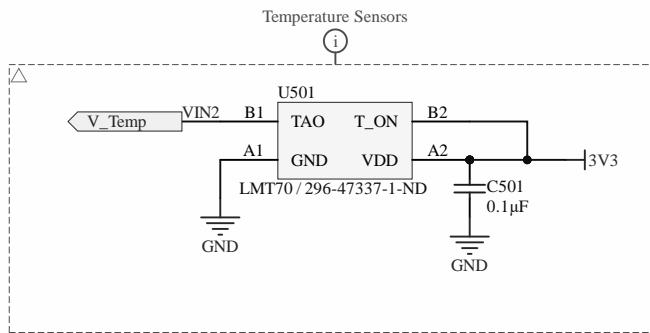
B

C

C

D

D



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 Temp_Sensor			<i>University of Alberta Department of Electrical and Computer Engineering Edmonton AB, Canada T6G 1H9</i>
Size: Letter	Number: 5	Revision: *	
Date: 6/27/2020	Time: 8:14:20 PM	Sheet 5 of 7	
File: C:\Users\nicho\AlbertaSat\libraries\Schematic Sheets\Temp_Sensor.SchDoc			UNIVERSITY OF ALBERTA EDMONTON·ALBERTA·CANADA

A

A

B

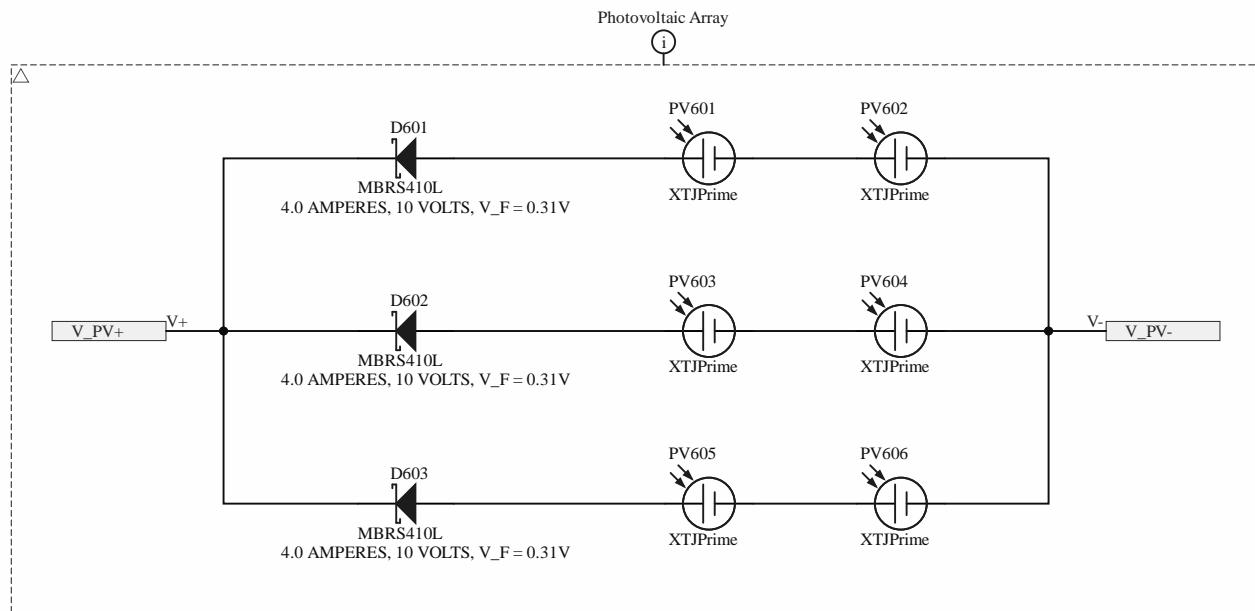
B

C

C

D

D



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 XTJ-Prime_2S2P			<i>University of Alberta Department of Electrical and Computer Engineering Edmonton AB, Canada T6G 1H9</i>
Size: Letter	Number: 6	Revision: *	
Date: 6/27/2020	Time: 8:14:20 PM	Sheet 6 of 8	
File: C:\Users\nicho\AlbertaSat\libraries\Schematic Sheets\XTJ-Prime_2S1P.SchDoc			UNIVERSITY OF ALBERTA EDMONTON-ALBERTA-CANADA

A

A

B

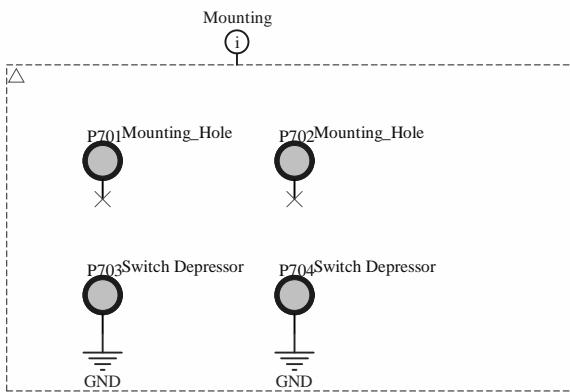
B

C

C

D

D



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 ***Mech_Interface_Port_Deployable***

Size: Letter Number: 7 Revision: *

Date: 6/27/2020 Time: 8:14:20 PM Sheet 7 of 8

File: C:\Users\nicho\AlbertaSat\projects\Hyperion Solar Panels\Port Deployable\Mech_Interface_Port_Deployable.SchDoc

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

UNIVERSITY OF
ALBERTA
EDMONTON-ALBERTA-CANADA

A

A

B

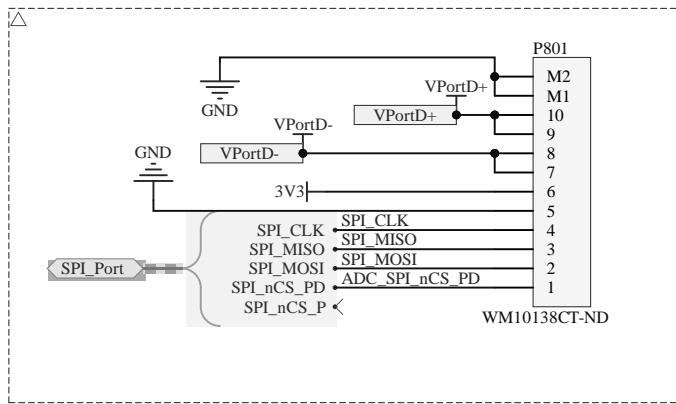
B

C

C

D

D



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 *Port_Deployable_Headers*

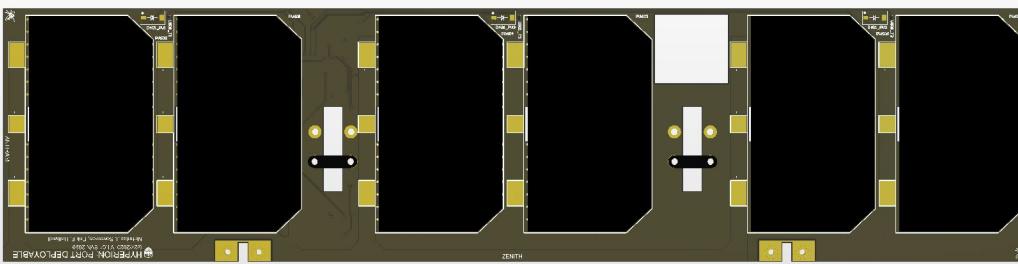
Size: Letter	Number: 8	Revision: *
--------------	-----------	-------------

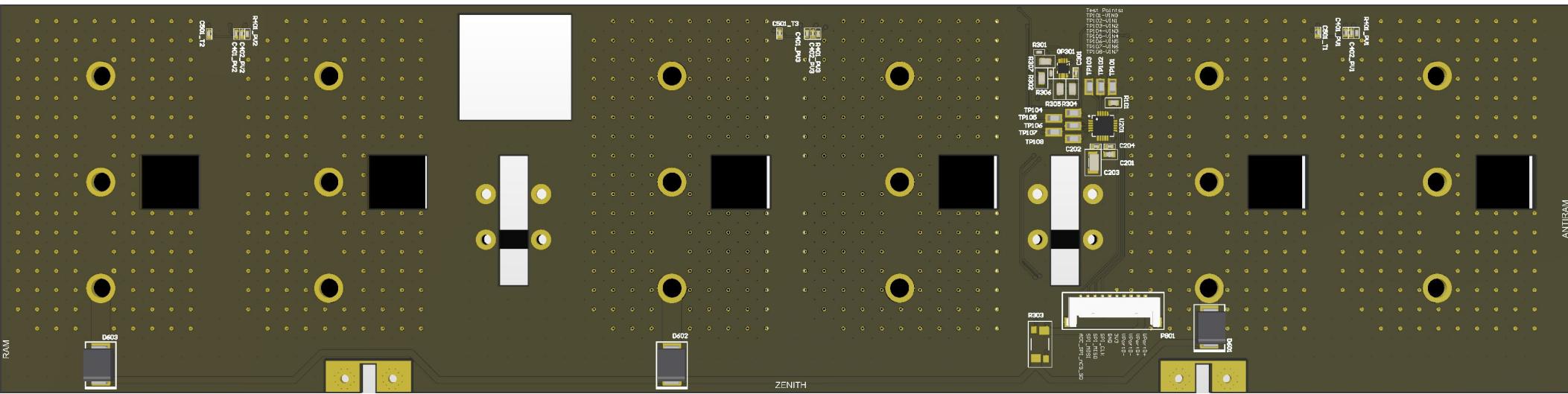
Date: 6/27/2020	Time: 8:14:20 PM	Sheet 8 of 8
-----------------	------------------	--------------

File: C:\Users\nicho\AlbertaSat\projects\Hyperion Solar Panels\Port Deployable\Port_Deployable_Headers.SchDoc

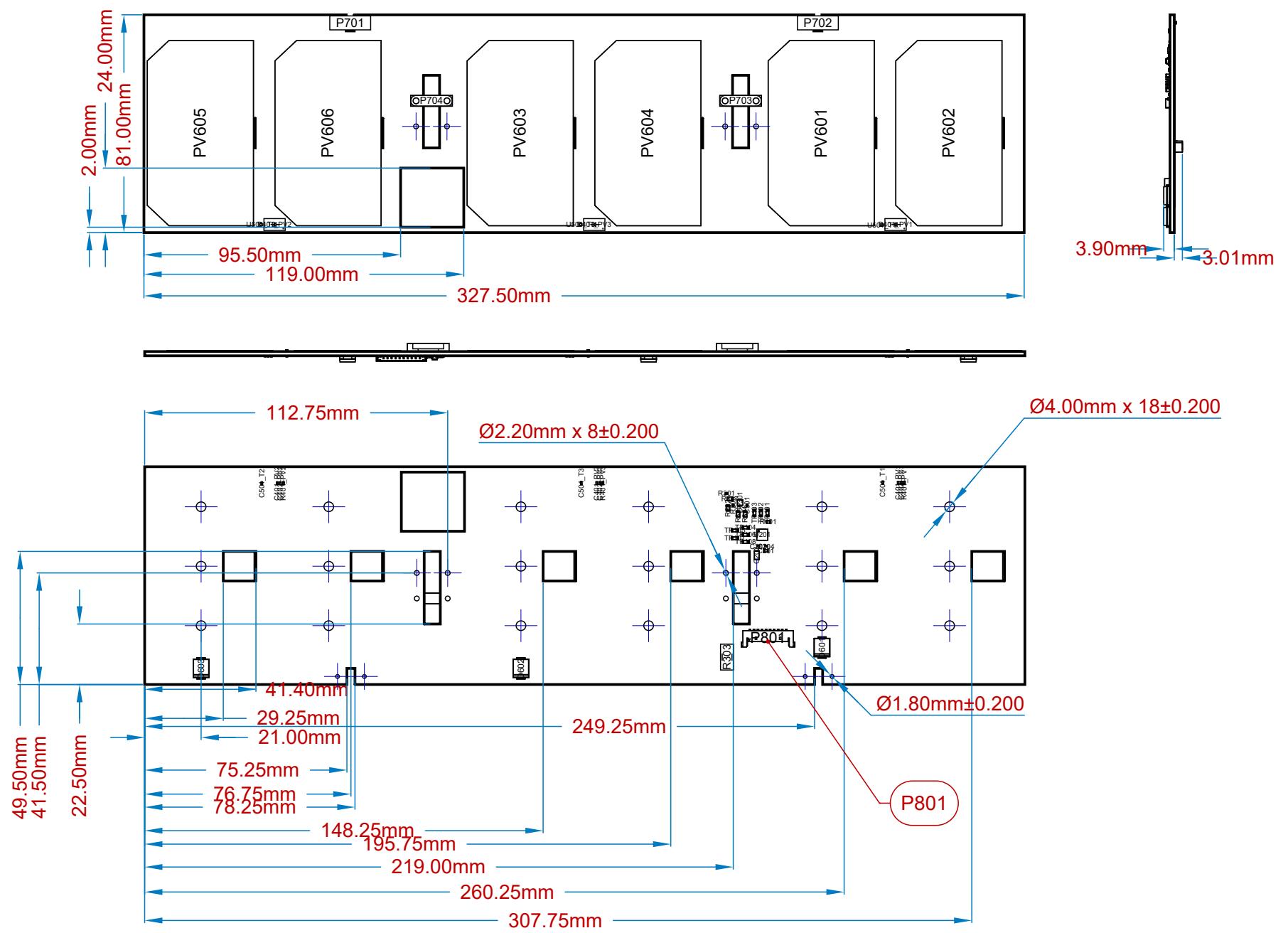
University of Alberta
Department of Electrical
and Computer Engineering
Edmonton AB, Canada
T6G 1H9

 UNIVERSITY OF
ALBERTA
EDMONTON·ALBERTA·CANADA





Unless specified, all measurements are tolerated to +/- 0.1 mm. Solar cell outline measurements are approximate. Contact manufacturer for accurate cell dimensions.



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_PV1, C401_PV2, C401_PV3, C402_PV1, C402_PV2, C402_PV3, 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_PV1, D401_PV2, D401_PV3	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#
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#
Deployable Hinge Mounting hole.	P701, P702	DepHinge_Mounting_Hole	PXX-ABS-00003	2	N/A	
Hardware for depressing the switch	P703, P704	Switch_Depressor	PXX-ABS-00005	2	Digi-key	
CONN HEADER SMD R/A 10POS 1.5MM	P801	MOLX-5040501091	69	1	Digi-Key	# https://www.digikey.ca/product-detail/en/molex/5040501091/WM10138CT-ND/4357655#
	PV601, PV602, PV603, PV604, PV605, PV606	XTJ Prime	PBT-SPEC-00002	6	Spectrolab	
RES SMD 10K OHM 1% 1/8W 0603	R101	VSH-0603MCT	PR-VSH-00143	1	Digi-key	http://www.digikey.ca/product-search/en?keywords=MCT0603-10.0K-CFCT-ND
RES SMD 6.2K OHM 0.1% 1/16W 0402, RES SMD 24K OHM 0.1% 1/16W 0402	R301, R306, R401_PV1, R401_PV2, R401_PV3	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
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#

