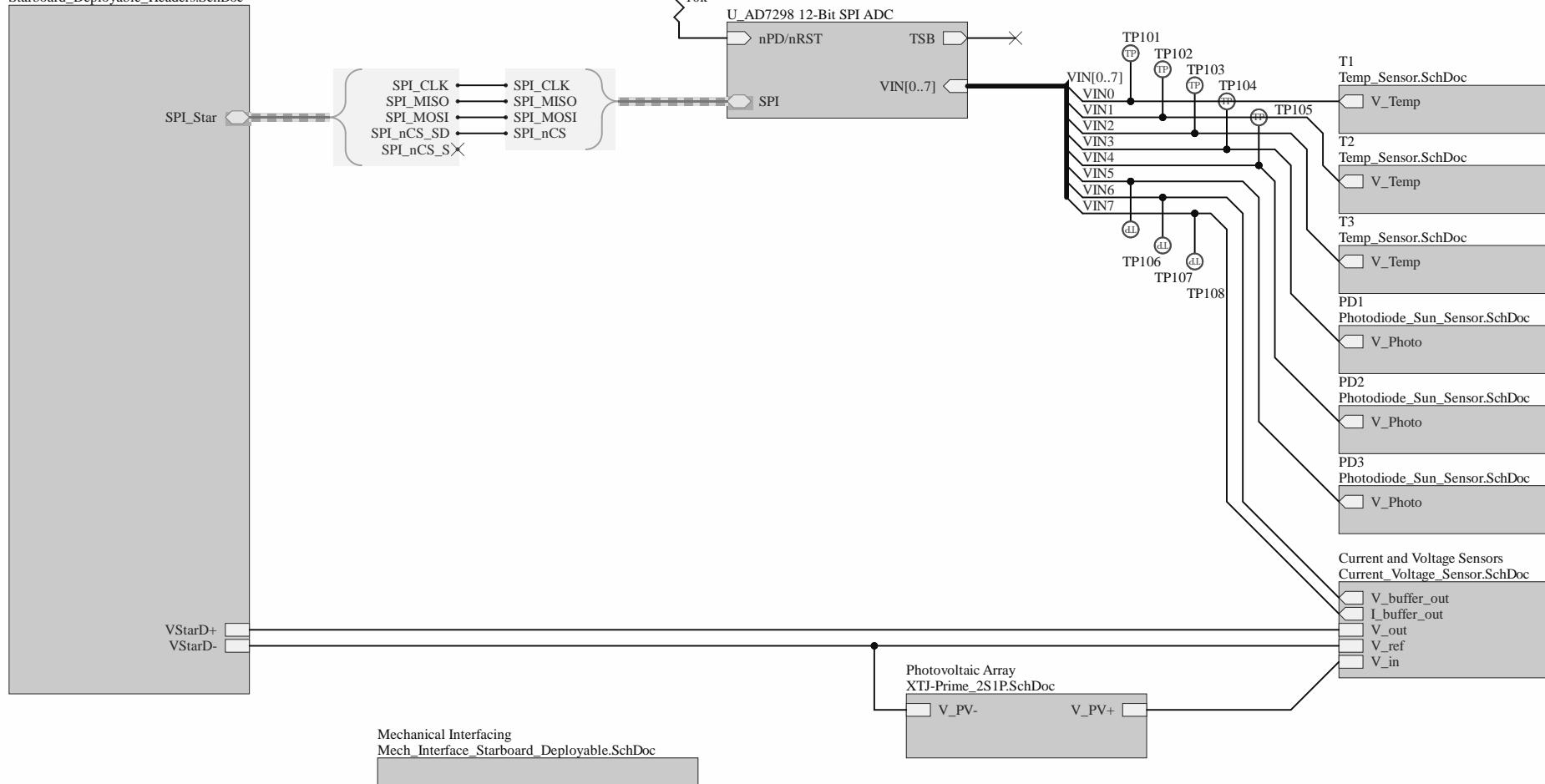


Starboard Deployable Headers  
Starboard\_Deployable\_Headers.SchDoc



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 <b>Starboard Deployable</b>			University of Alberta Department of Electrical and Computer Engineering Edmonton AB, Canada T6G 1H9
Size: Letter	Number: 1	Revision: *	
Date: 6/27/2020	Time: 8:10:54 PM	Sheet 1 of 8	
File: C:\Users\nicho\AlbertaSat\projects\Hyperion Solar Panels\Starboard Deployable\Starboard Deployable.SchDoc			UNIVERSITY OF ALBERTA EDMONTON·ALBERTA·CANADA

A

A

B

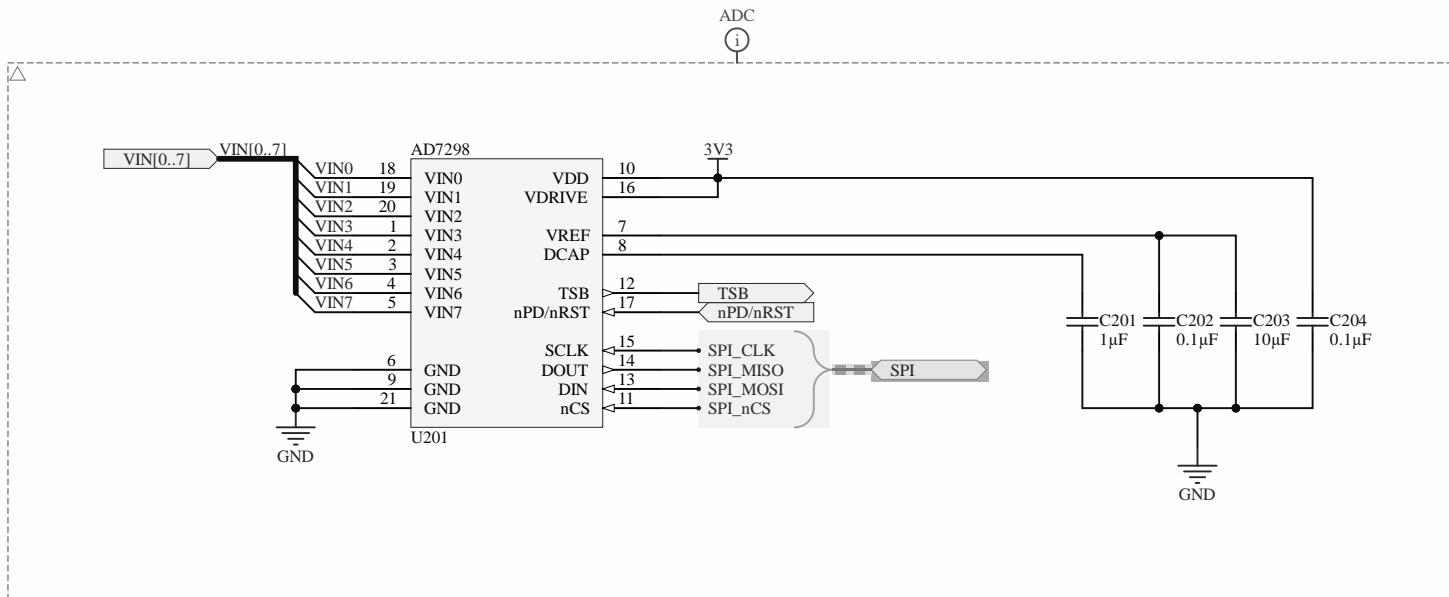
B

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: 8:10:54 PM	Sheet 2 of 7
-----------------	------------------	--------------

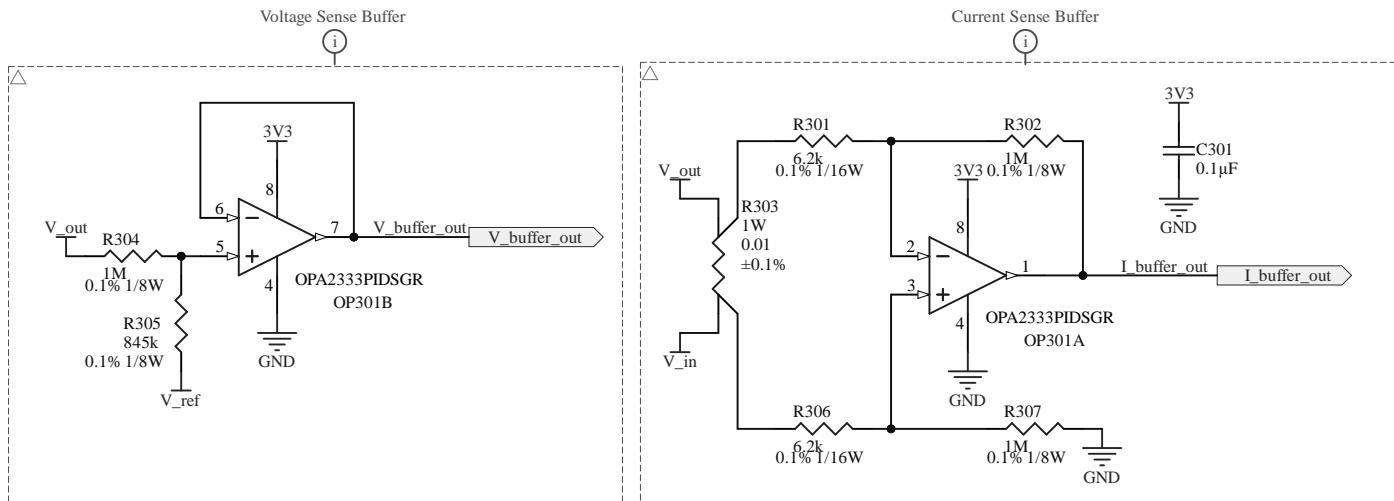
File: C:\Users\nicho\AlbertaSat\libraries\Schematic Sheets\AD7298 12-Bit SPI ADC.SchDoc
---

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

UNIVERSITY OF  
ALBERTA  
EDMONTON-ALBERTA-CANADA

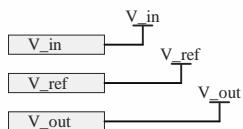
A

A



B

B



C

C

#### Voltage Sense Buffer:

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

#### Current Sense Buffer:

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

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>			<i>University of Alberta Department of Electrical and Computer Engineering Edmonton AB, Canada T6G 1H9</i>
Size: Letter	Number: 3	Revision: *	<i>UNIVERSITY OF ALBERTA EDMONTON-ALBERTA-CANADA</i>
Date: 6/27/2020	Time: 8:10:54 PM	Sheet 3 of 8	
File: C:\Users\nicho\AlbertaSat\libraries\Schematic Sheets\Current_Voltage_Sensor.SchDoc			

A

A

B

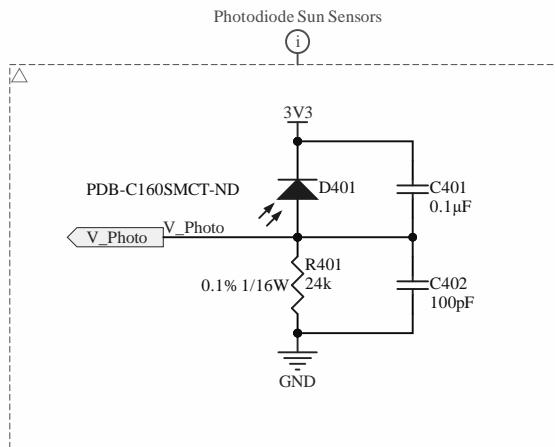
B

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**

Size: Letter Number:4 Revision:\*

Date: 6/27/2020 Time: 8:10:54 PM Sheet 4 of 7

File: C:\Users\nicho\AlbertaSat\libraries\Schematic Sheets\Photodiode\_Sun\_Sensor.SchDoc

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

UNIVERSITY OF  
ALBERTA  
EDMONTON·ALBERTA·CANADA

A

A

B

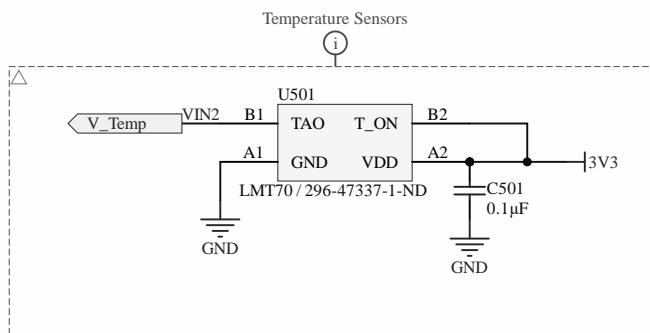
B

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 <b>Temp_Sensor</b>			<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: 8:10:54 PM	Sheet 5 of 7	
File: C:\Users\nicho\AlbertaSat\libraries\Schematic Sheets\Temp_Sensor.SchDoc			<b>UNIVERSITY OF ALBERTA</b> EDMONTON·ALBERTA·CANADA

A

A

B

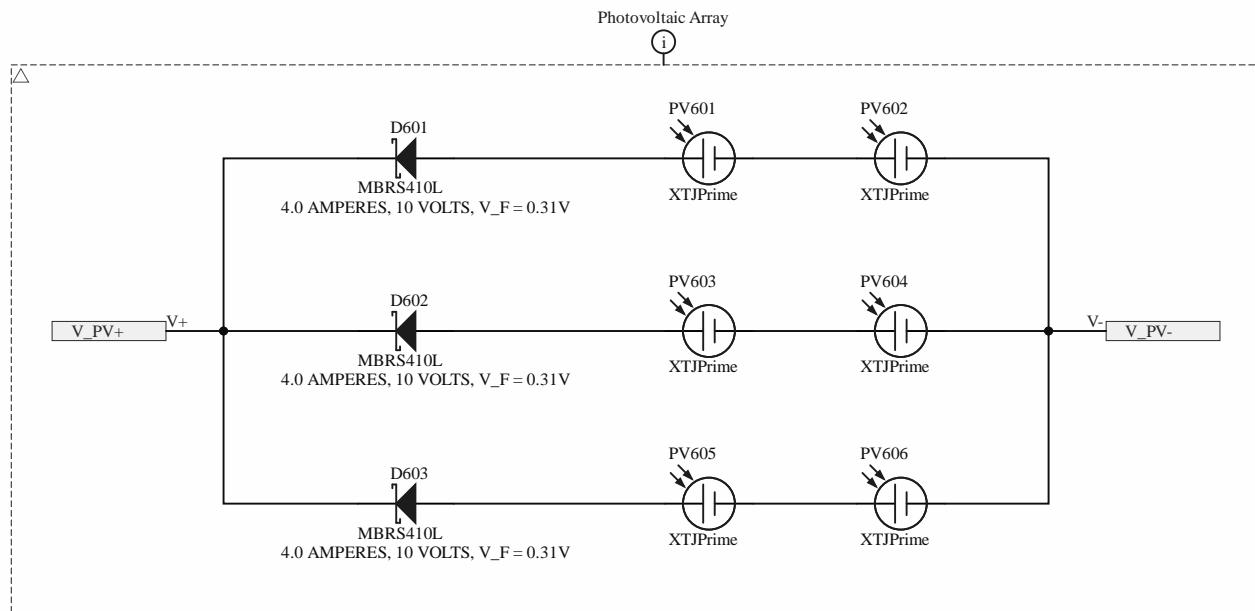
B

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 <b>XTJ-Prime_2S2P</b>			<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: 8:10:54 PM	Sheet 6 of 8	
File: C:\Users\nicho\AlbertaSat\libraries\Schematic Sheets\XTJ-Prime_2S1P.SchDoc			<b>UNIVERSITY OF ALBERTA</b> EDMONTON-ALBERTA-CANADA

A

A

B

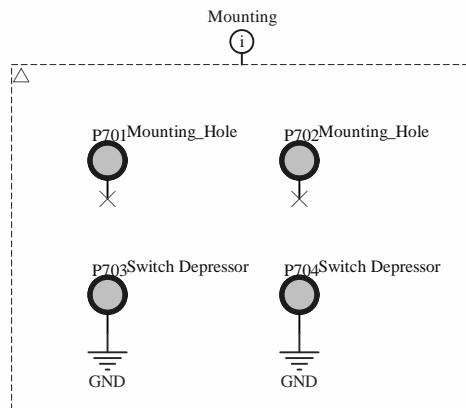
B

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\_Starboard\_Deployable**

*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: 6/27/2020 Time: 8:10:54 PM Sheet 7 of 8

File: C:\Users\nicho\AlbertaSat\projects\Hyperion Solar Panels\Starboard Deployable\Mech\_Interface\_Starboard\_Deployable.Sc

A

A

B

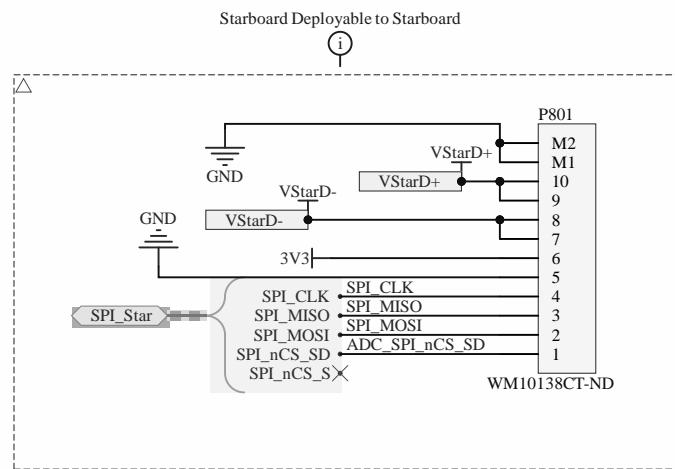
B

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 ***Starboard\_Deployable\_Headers***

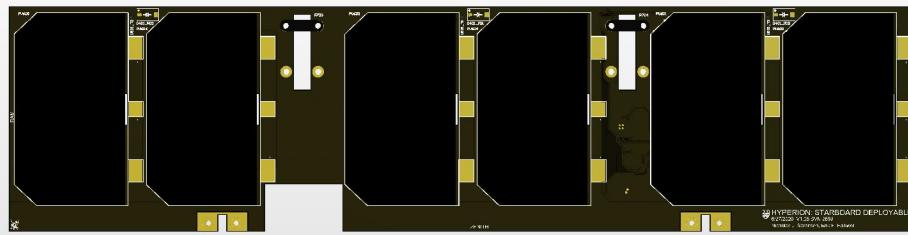
Size: Letter	Number: 8	Revision: *
--------------	-----------	-------------

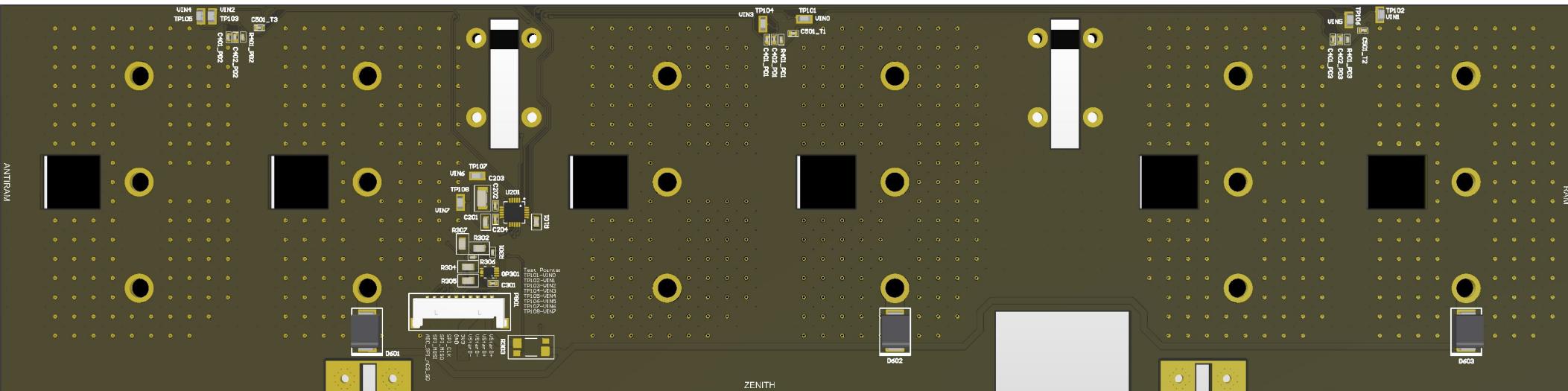
Date: 6/27/2020 Time: 8:10:54 PM Sheet 8 of 8

File: C:\Users\nicho\AlbertaSat\projects\Hyperion Solar Panels\Starboard Deployable\Starboard\_Deployable\_Headers.SchDoc

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

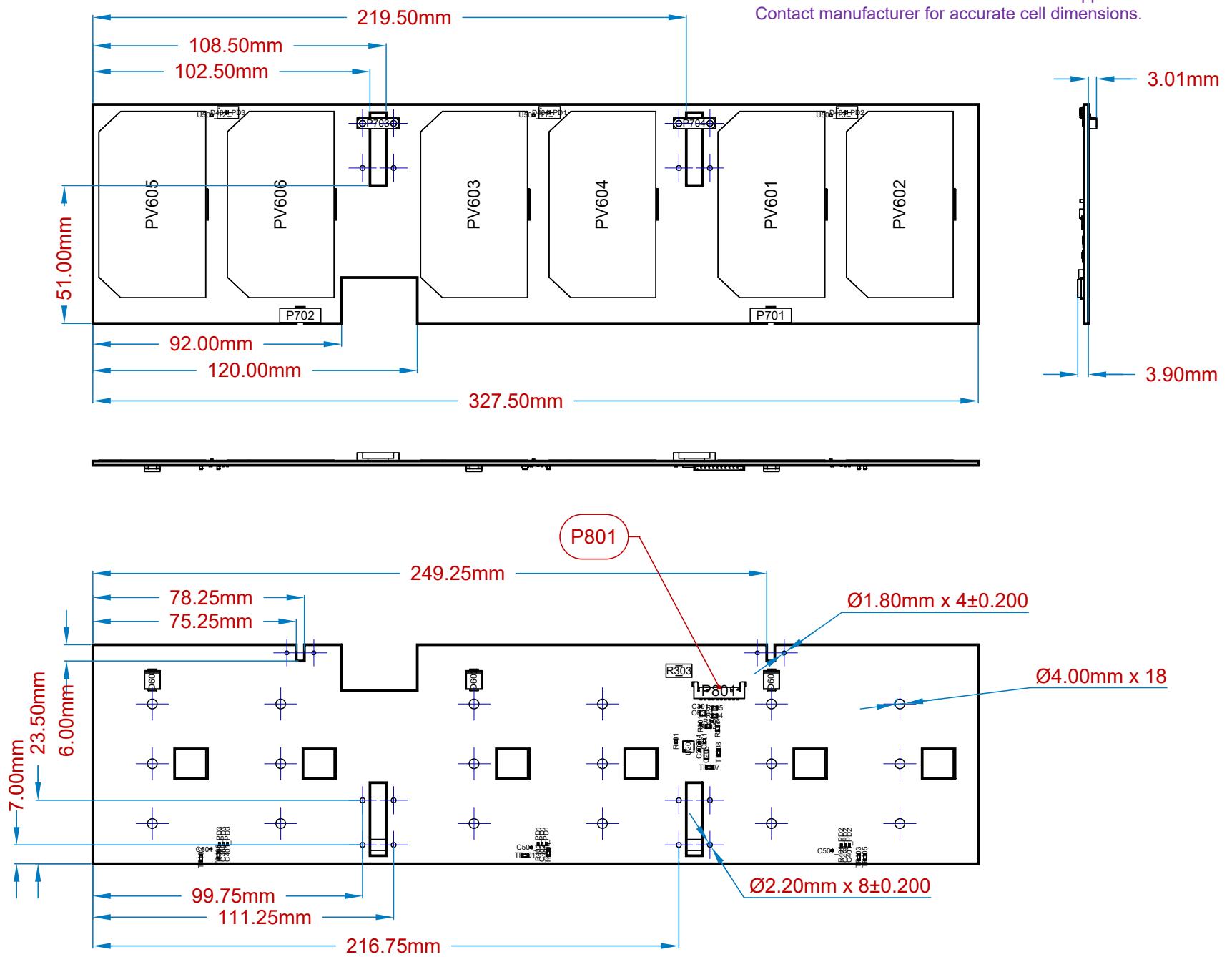








Unless specified, all measurements are toleranced to +/- 0.1 mm. Solar cell outline measurements are approximate. Contact manufacturer for accurate cell dimensions.



Description	Designator	Footprint	LibRef	Quantity	Supplier 1	Supplier Link
CAP CER 1UF 25V X7R 0603	C201	TDK-CGA3E	PC-TDK-02603	1	Digi-key	<a href="http://www.digikey.ca/product-search/en?keywords=445-6931-1-ND">http://www.digikey.ca/product-search/en?keywords=445-6931-1-ND</a>
CAP CER 0.1UF 50V X7R 0402	C202, C204	TDK-CGA2B	PC-TDK-02259	2	Digi-key	<a href="http://www.digikey.ca/product-search/en?keywords=445-6899-1-ND">http://www.digikey.ca/product-search/en?keywords=445-6899-1-ND</a>
CAP CER 10UF 25V X7R 1206	C203	TDK-CGA5L	PC-TDK-02917	1	Digi-key	<a href="http://www.digikey.ca/product-search/en?keywords=445-6990-1-ND">http://www.digikey.ca/product-search/en?keywords=445-6990-1-ND</a>
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	<a href="http://www.digikey.ca/product-search/en?keywords=445-6901-1-ND">http://www.digikey.ca/product-search/en?keywords=445-6901-1-ND</a> , <a href="http://www.digikey.ca/product-search/en?keywords=445-6899-1-ND">http://www.digikey.ca/product-search/en?keywords=445-6899-1-ND</a> , <a href="http://www.digikey.ca/product-search/en?keywords=445-5596-1-ND">http://www.digikey.ca/product-search/en?keywords=445-5596-1-ND</a>
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	# <a href="https://www.digikey.com/product-detail/en/on-semiconductor/MBRS410LT3G/MBRS410LT3GOSCT-ND/1967073#">https://www.digikey.com/product-detail/en/on-semiconductor/MBRS410LT3G/MBRS410LT3GOSCT-ND/1967073#</a>
CMOS Amplifier 2 Circuit Rail-to-Rail 8-WSON (2x2)	OP301	TI-DSG0008A	73	1	Digi-Key	# <a href="https://www.digikey.ca/product-detail/en/texas-instruments/OPA2333PIDSGR/296-51501-1-ND/9745865#">https://www.digikey.ca/product-detail/en/texas-instruments/OPA2333PIDSGR/296-51501-1-ND/9745865#</a>
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	# <a href="https://www.digikey.ca/product-detail/en/molex/5040501091/WM10138CT-ND/4357655#">https://www.digikey.ca/product-detail/en/molex/5040501091/WM10138CT-ND/4357655#</a>
	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	<a href="http://www.digikey.ca/product-search/en?keywords=MCT0603-10.0K-CFCT-ND">http://www.digikey.ca/product-search/en?keywords=MCT0603-10.0K-CFCT-ND</a>
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	<a href="http://www.digikey.ca/product-search/en?keywords=P6.2KCNCT-ND">http://www.digikey.ca/product-search/en?keywords=P6.2KCNCT-ND</a> , <a href="http://www.digikey.ca/product-search/en?keywords=P24KCNCT-ND">http://www.digikey.ca/product-search/en?keywords=P24KCNCT-ND</a>
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	<a href="http://www.digikey.ca/product-search/en?keywords=P1MDACT-ND">http://www.digikey.ca/product-search/en?keywords=P1MDACT-ND</a> , <a href="http://www.digikey.ca/product-search/en?keywords=P845KDACT-ND">http://www.digikey.ca/product-search/en?keywords=P845KDACT-ND</a>
RES SMD 0.01 OHM 0.1% 1W 2512	R303	VSH-2512R4C	PR-VSH-00237	1	Digi-key	<a href="http://www.digikey.ca/product-search/en?keywords=Y1487-.01-ND">http://www.digikey.ca/product-search/en?keywords=Y1487-.01-ND</a>
PC TEST POINT MINI SMD	TP101, TP102, TP103, TP104, TP105, TP106, TP107, TP108	KS-5017	PTP-KS-00001	8	Digi-key	<a href="http://www.digikey.ca/product-detail/en/keystone-electronics/5017/36-5017TR-ND/2217304">http://www.digikey.ca/product-detail/en/keystone-electronics/5017/36-5017TR-ND/2217304</a>
IC ADC 12BIT SAR 20LFCSP-WQ	U201	ADI-CP-20-8	PU-ADI-00007	1	Digi-key	# <a href="https://www.digikey.ca/product-detail/en/analog-devices-inc/AD7298BCPZ/AD7298BCPZ-ND/2507320#">https://www.digikey.ca/product-detail/en/analog-devices-inc/AD7298BCPZ/AD7298BCPZ-ND/2507320#</a>
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	# <a href="https://www.digikey.ca/product-detail/en/texas-instruments/LMT70YFOR/296-47337-1-ND/7688347#">https://www.digikey.ca/product-detail/en/texas-instruments/LMT70YFOR/296-47337-1-ND/7688347#</a>

