

Starboard Deployable Headers
Starboard_Deployable_Headers.SchDoc

SPI_Star

SPI_CLK → SPI_CLK
SPI_MISO → SPI_MISO
SPI_MOSI → SPI_MOSI
SPI_nCS_SD → SPI_nCS
SPI_nCS_S

U_AD7298 12-Bit SPI ADC

nPD/nRST

TSB

VIN[0..7]

VIN[0..7]

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

VStarD+

VStarD-

Mechanical Interfacing

Mech_Interface_Starboard_Deployable.SchDoc

Photovoltaic Array
XTJ-Prime_2S1P.SchDoc

V_PV-

V_PV+

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Title **Starboard Deployable**

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



Size: Letter

Number: 1

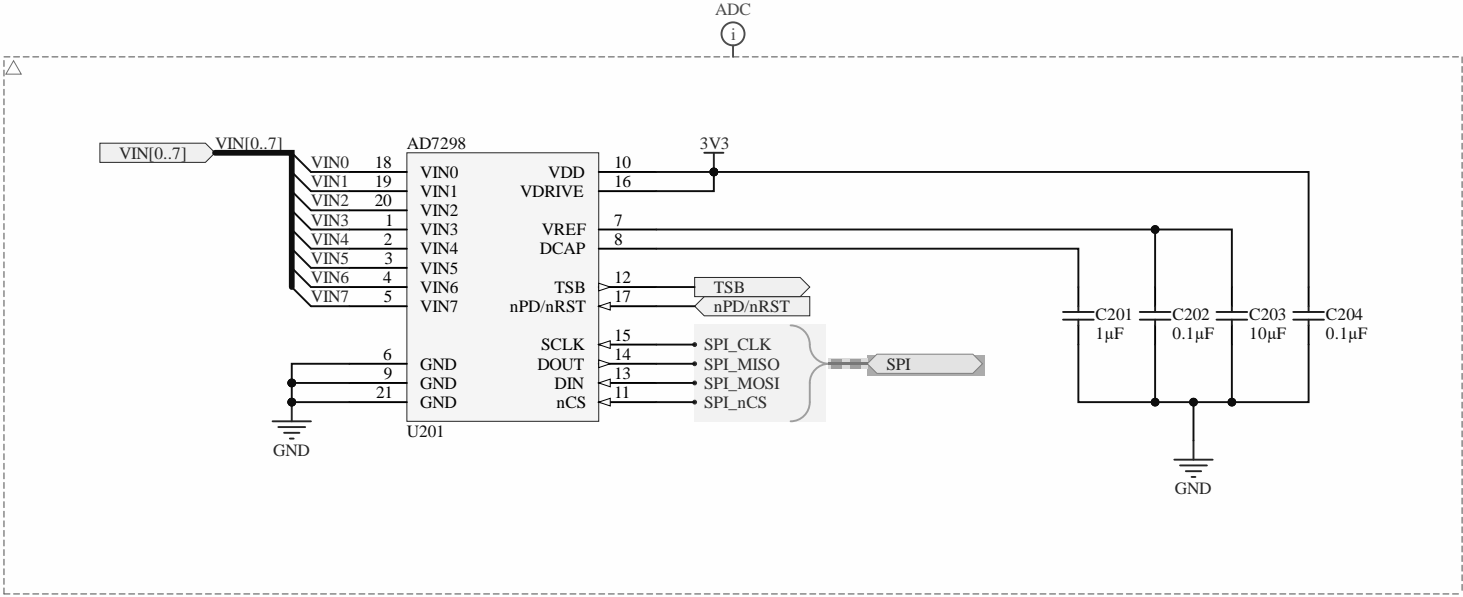
Revision:*

Date: 6/2/2020

Time: 7:54:05 PM

Sheet 1 of 8

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



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Title **AD7298 12-Bit SPI ADC**

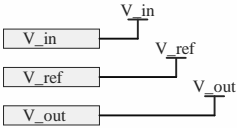
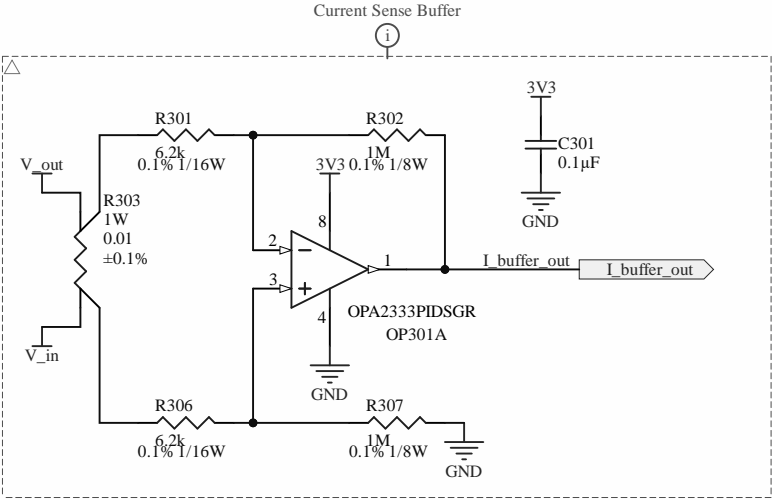
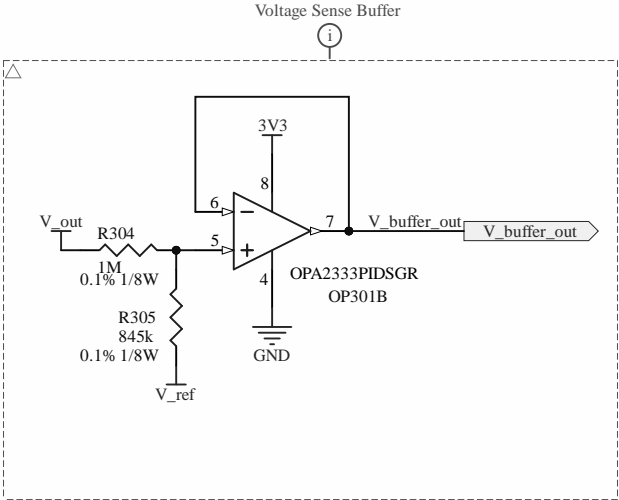
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Size: Letter Number: 2 Revision: *

Date: 6/2/2020 Time: 7:54:05 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:

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

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Title **Current_Voltage_Sensor**

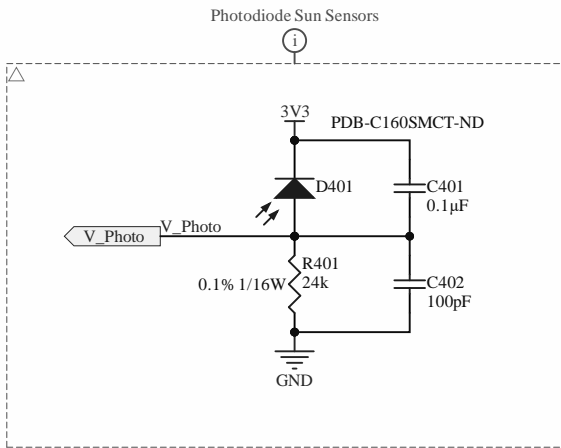
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Department of Electrical
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T6G 1H9



Size: Letter Number: 3 Revision: *

Date: 6/2/2020 Time: 7:54:05 PM Sheet 3 of 8

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



Photodiode:

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


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

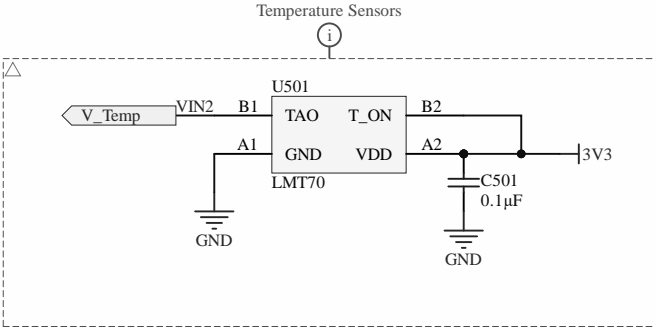
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Title <i>Photodiode_Sun_Sensor</i>			University of Alberta Department of Electrical and Computer Engineering Edmonton AB, Canada T6G 1H9	 UNIVERSITY OF ALBERTA EDMONTON · ALBERTA · CANADA
Size: Letter	Number: 4	Revision: *		
Date: 6/2/2020	Time: 7:54:05 PM	Sheet 4 of 8		
File: C:\Users\nicho\AlbertaSat\projects\Hyperion Solar Panels\Common Schematics\Photodiode_Sun_Sensor.SchDoc				

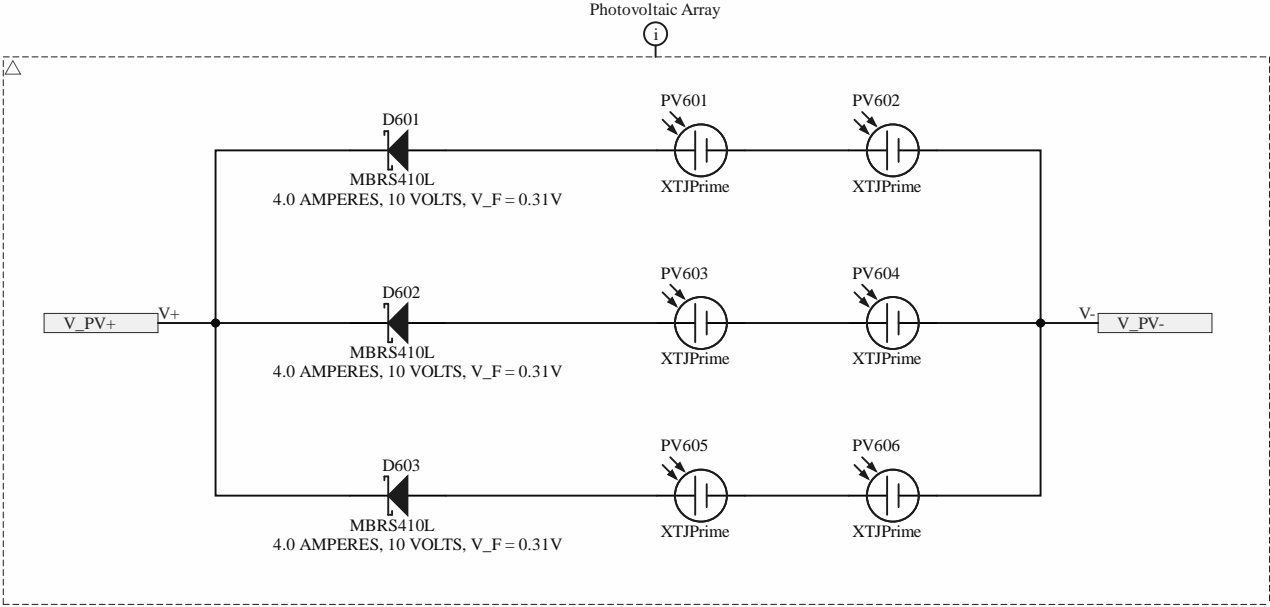


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Title <i>Temp_Sensor</i>			University of Alberta Department of Electrical and Computer Engineering Edmonton AB, Canada T6G 1H9	UNIVERSITY OF ALBERTA EDMONTON · ALBERTA · CANADA
Size: Letter	Number: 5	Revision: *		
Date: 6/2/2020	Time: 7:54:06 PM	Sheet 5 of 8		
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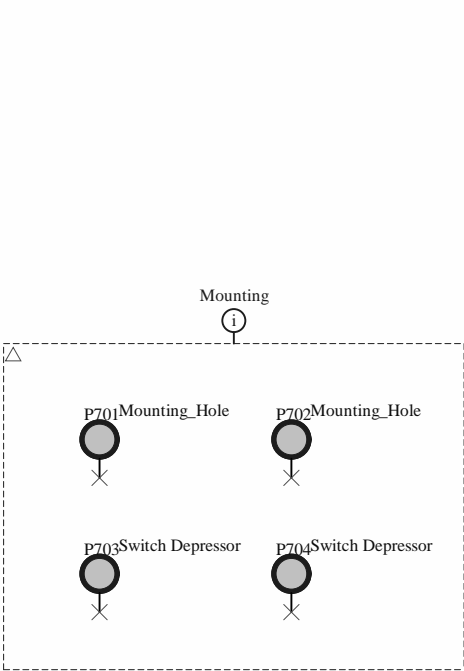


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Title			<i>XTJ-Prime_2S2P</i>		<i>University of Alberta Department of Electrical and Computer Engineering Edmonton AB, Canada T6G 1H9</i>	 UNIVERSITY OF ALBERTA EDMONTON · ALBERTA · CANADA
Size:	Letter	Number:6	Revision:*			
Date:	6/2/2020	Time: 7:54:06 PM	Sheet 6 of 8			
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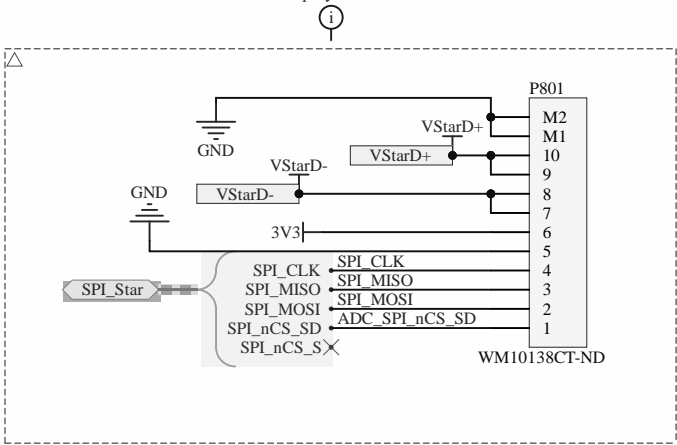
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Title <i>Mech_Interface_Starboard_Deployable</i>			<div><div>University of Alberta</div><div>Department of Electrical and Computer Engineering</div><div>Edmonton AB, Canada</div><div>T6G 1H9</div><div> UNIVERSITY OF ALBERTA</div><div>EDMONTON · ALBERTA · CANADA</div></div>
Size: Letter	Number: 7	Revision: *	
Date: 6/2/2020	Time: 7:54:06 PM	Sheet 7 of 8	
File: C:\Users\nicho\AlbertaSat\projects\Hyperion Solar Panels\Starboard Deployable\Mech_Interface_Starboard_Deployable.Sc			

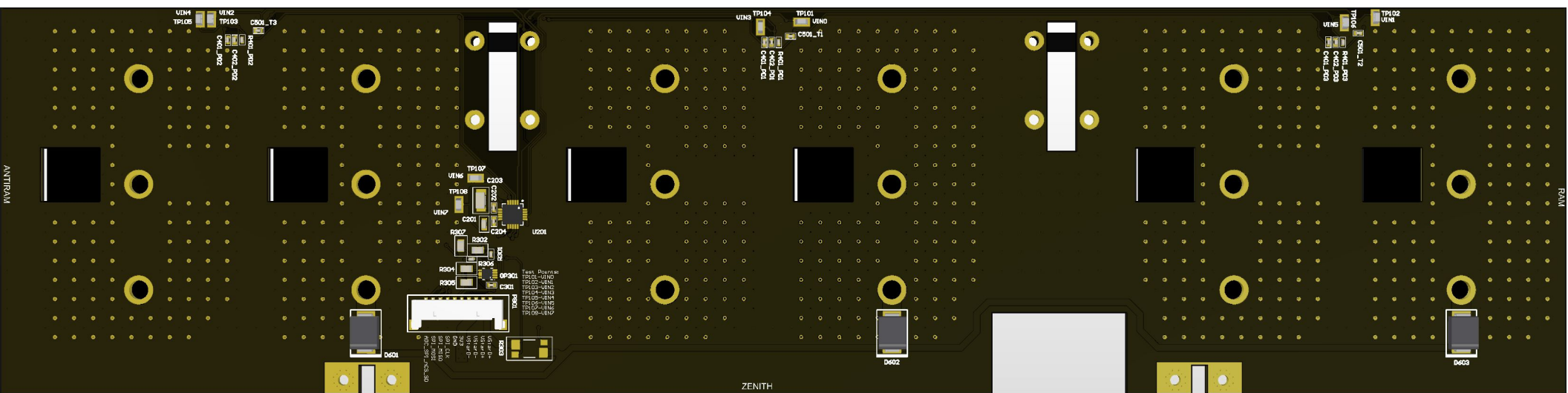
Starboard Deployable to Starboard



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Title <i>Starboard_Deployable_Headers</i>			University of Alberta Department of Electrical and Computer Engineering Edmonton AB, Canada T6G 1H9		 EDMONTON · ALBERTA · CANADA
Size: Letter	Number: 8	Revision: *	Date: 6/2/2020 Time: 7:54:06 PM Sheet 8 of 8		
File: C:\Users\nicho\AlbertaSat\projects\Hyperion Solar Panels\Starboard Deployable\Starboard_Deployable_Headers.SchDoc					





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#
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#
Depolyable 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 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
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/LMT70YFOR/296-47337-1-ND/7688347#

