**H1**

Samtec Header ESQ-126-39-G-D

1	2
3	4
5	6
7	8
9	10
11	12
13	14
15	16
17	18
19	20
21	22
23	24
25	26
27	28
29	30
31	32
33	34
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39	40
41	42
43	44
45	46
47	48
49	50
51	52

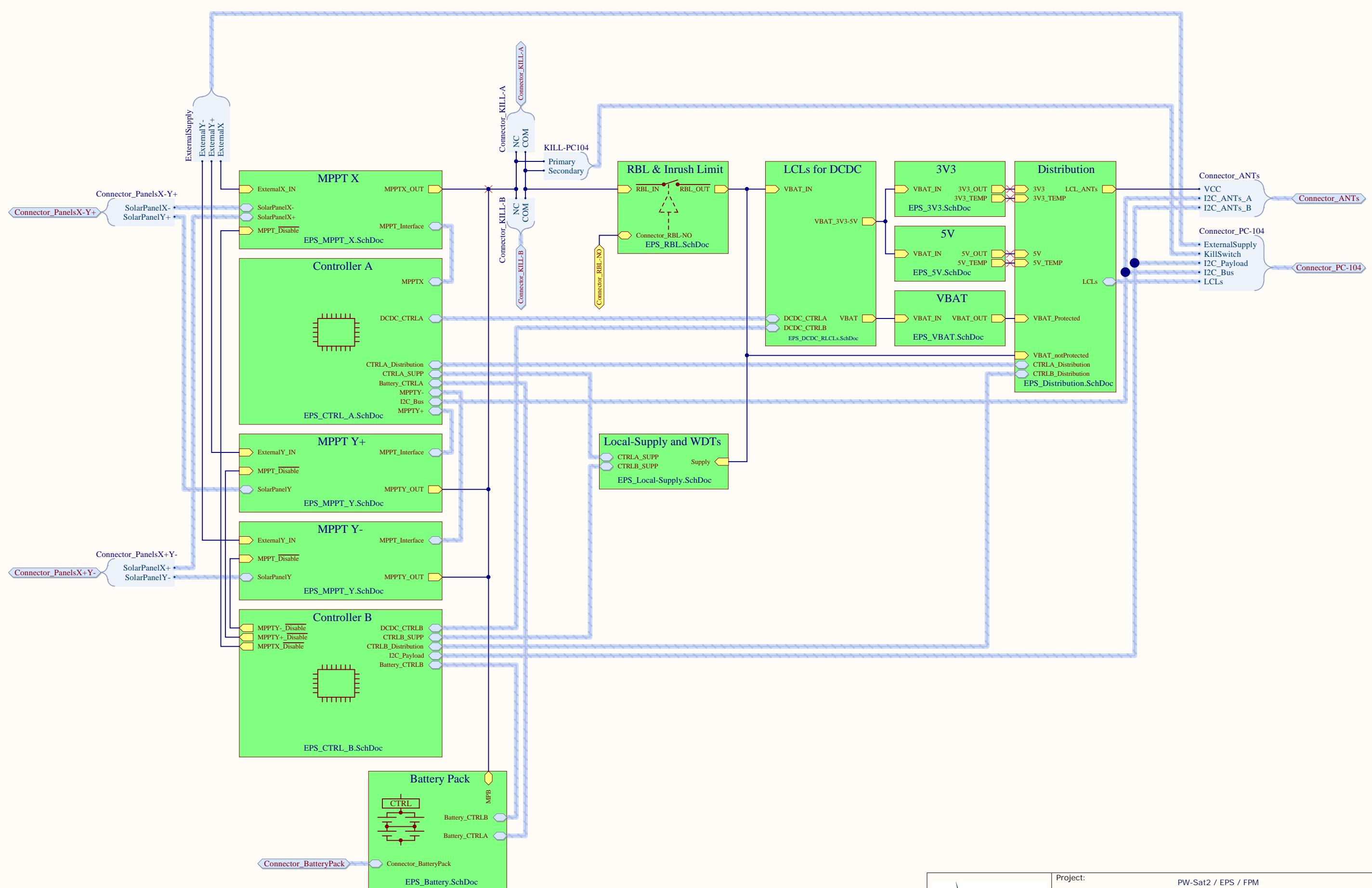
H2

Samtec Header ESQ-126-39-G-D

1	2
3	4
5	6
7	8
9	10
11	12
13	14
15	16
17	18
19	20
21	22
23	24
25	26
27	28
29	30
31	32
33	34
35	36
37	38
39	40
41	42
43	44
45	46
47	48
49	50
51	52



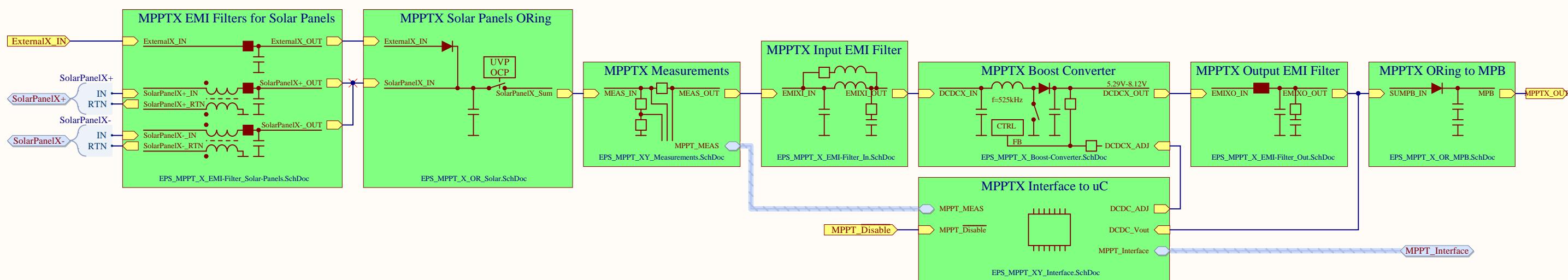
Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / Connectors / PC-104			
Model:	Document Number:	Rev:	Date:	Sheet:	
FPM	PWSat2-xxx-DW-xxx	3	2019/2/28	2	of 51
Author:	Checked by:		Approved by:		
Piotr Kuligowski	(not checked)		(not approved)		
File name: EPS_Connectors_PC-104.SchDoc					



Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / Top			
Model:	Document Number:	Rev:	Date:	Sheet:	
FPM	PWSat2-xxx-DW-xxx	3	2019/2/28	3 of 51	
Author:	Checked by:		Approved by:		
Piotr Kuligowski	(not checked)		(not approved)		
File name: EPS_Top.SchDoc					

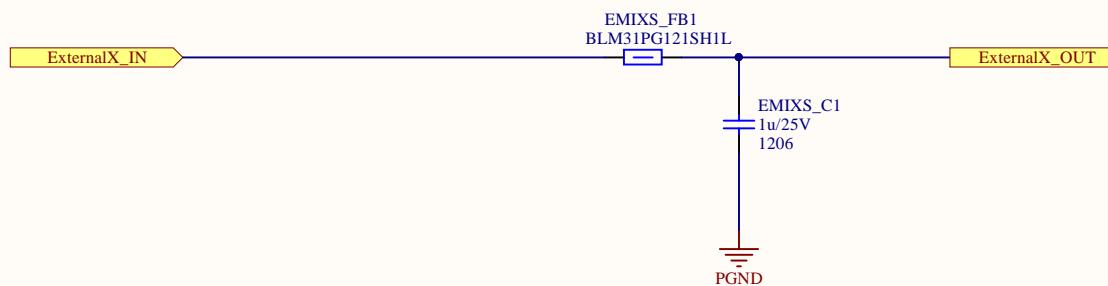
A

A

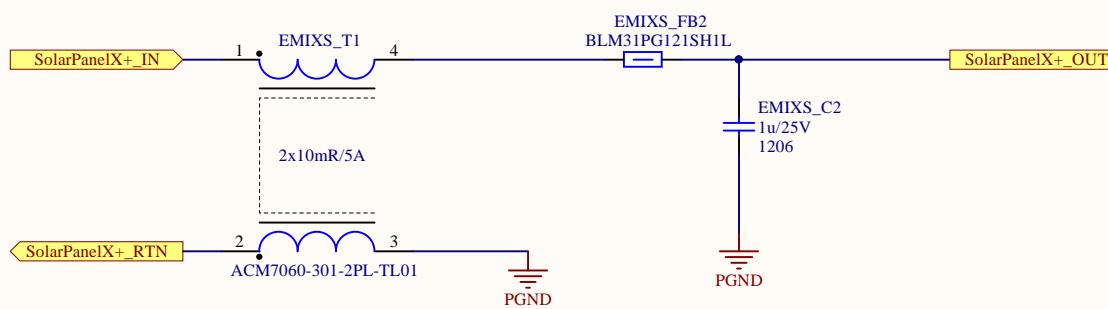


Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / MPPT-X			
Model:	Document Number:	Rev:	Date:	Sheet:	
FPM	PWSat2-xxx-DW-xxx	3	2019/2/28	4	of 51
Author:	Checked by:		Approved by:		
Piotr Kulligowski	(not checked)		(not approved)		
File name: EPS_MPPT_X.SchDoc					

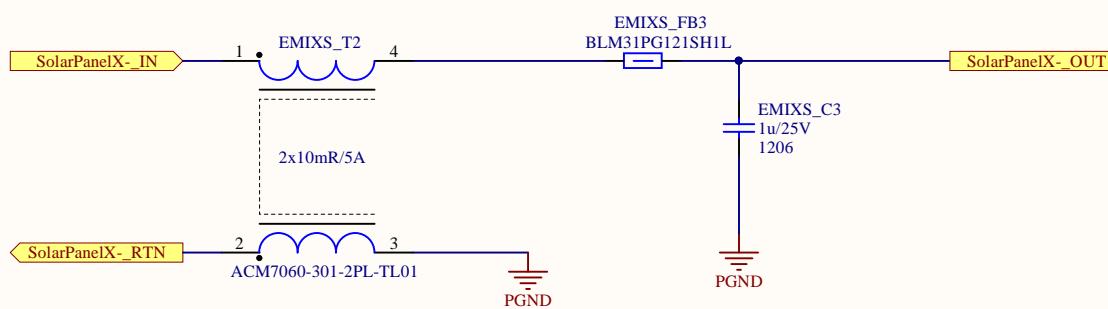
A



B



C



D



Title: MPPTX EMI Filters for Solar Panels			Sheet: 5 of 51
Model: EMPSat2	Document Number: xxx-DW-xxx	Iss-Rev: 1-0	Date: 2015-02-21
Author: Piotr Kuligowski	Checked by: *	Approved by: *	
File name: EPS_MPPT_X_EMI-Filter_Solar-Panels.SchDoc			

A

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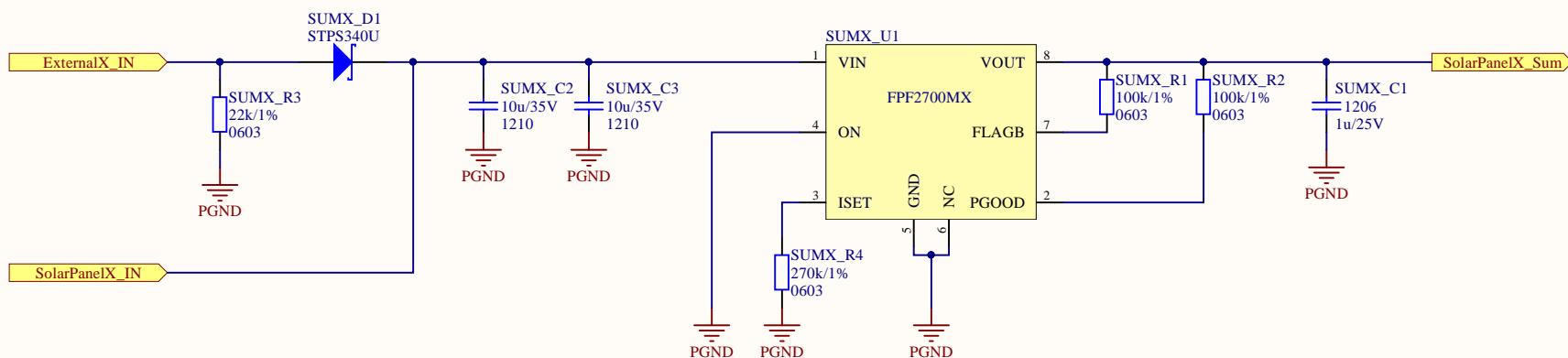
B

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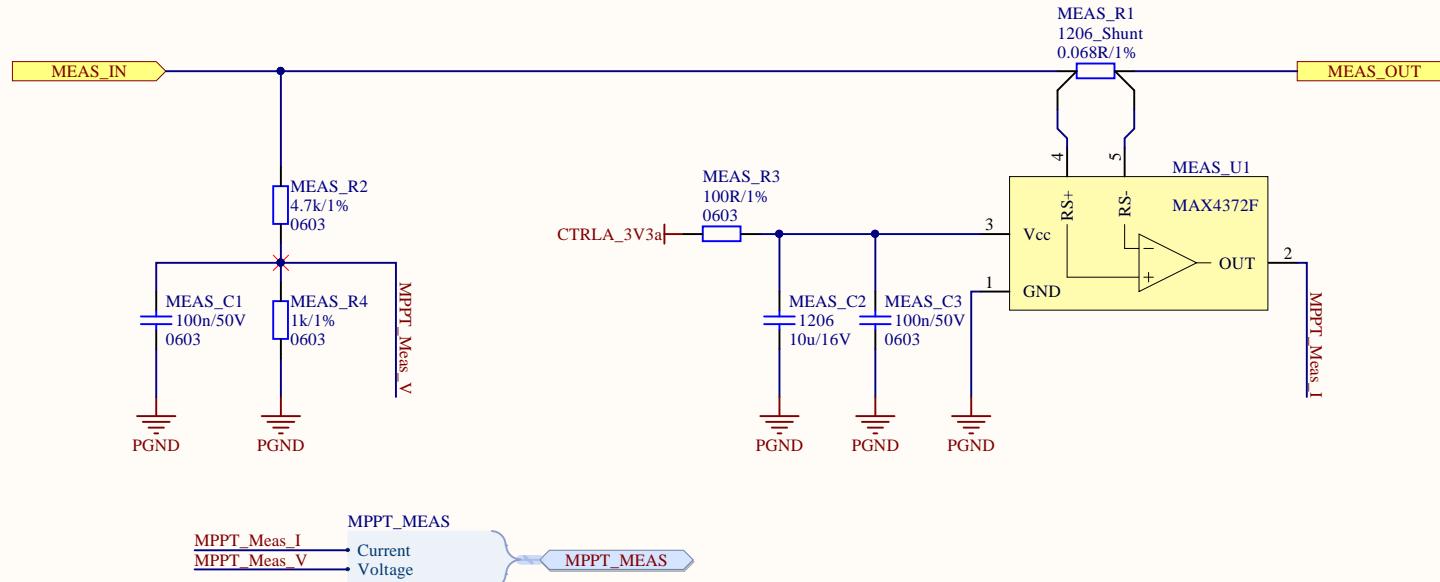


Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / MPPT-X / Solar Panels ORing			
Model:	Document Number:	FPM	Rev:	Date:	Sheet:
PWSat2-xxx-DW-xxx		3	2019/2/28	6	of 51
Author:		Checked by:		Approved by:	
Piotr Kuligowski		(not checked)		(not approved)	
File name: EPS_MPPT_X_OR_Solar.SchDoc					

A

VOLTAGE MEASUREMENT:
 Voltage division: $x \cdot 0.31972$
 Nominal meas. voltage: 5V
 Max meas. voltage: 20V
 Nominal MeasCH0_V voltage:
 $5 \cdot 0.17544 = 0.8772V$
 Max MeasCH0_V voltage:
 $19.5 \cdot 0.17544 = 3.24V$

CURRENT MEASUREMENT:
 MAX4372 voltage gain: 50 V/V
 Shunt's resistance: 68mR
 Nominal meas current: 0.5A
 Max meas. current: 0.7A
 Nominal MeasCH0_I voltage:
 $0.5 \cdot 0.068 \cdot 50 = 1.7V$
 Max MeasCH0_I voltage:
 $0.7 \cdot 0.068 \cdot 50 = 2.38V$



B

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D



Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / MPPT-X and MPPT-Y / Measurements			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	Date:	Sheet:
Author:		Checked by:	3		2019/2/28 7 of 51
Piotr Kuligowski		(not checked)	Approved by:		(not approved)
File name: EPS_MPPT_XY_Measurements.SchDoc					

A

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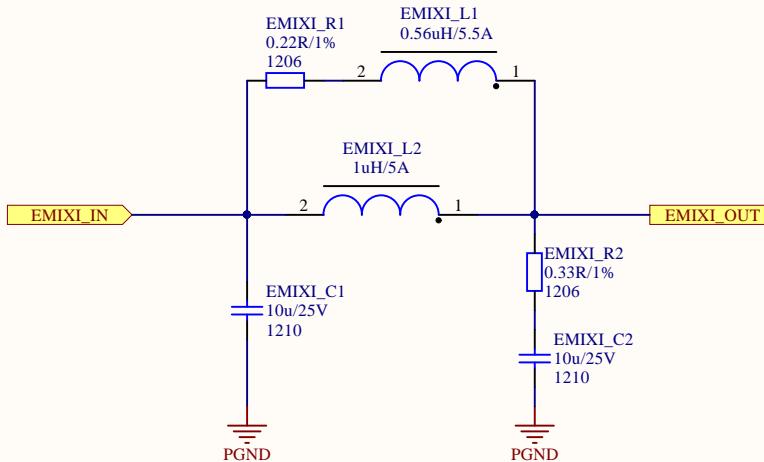
B

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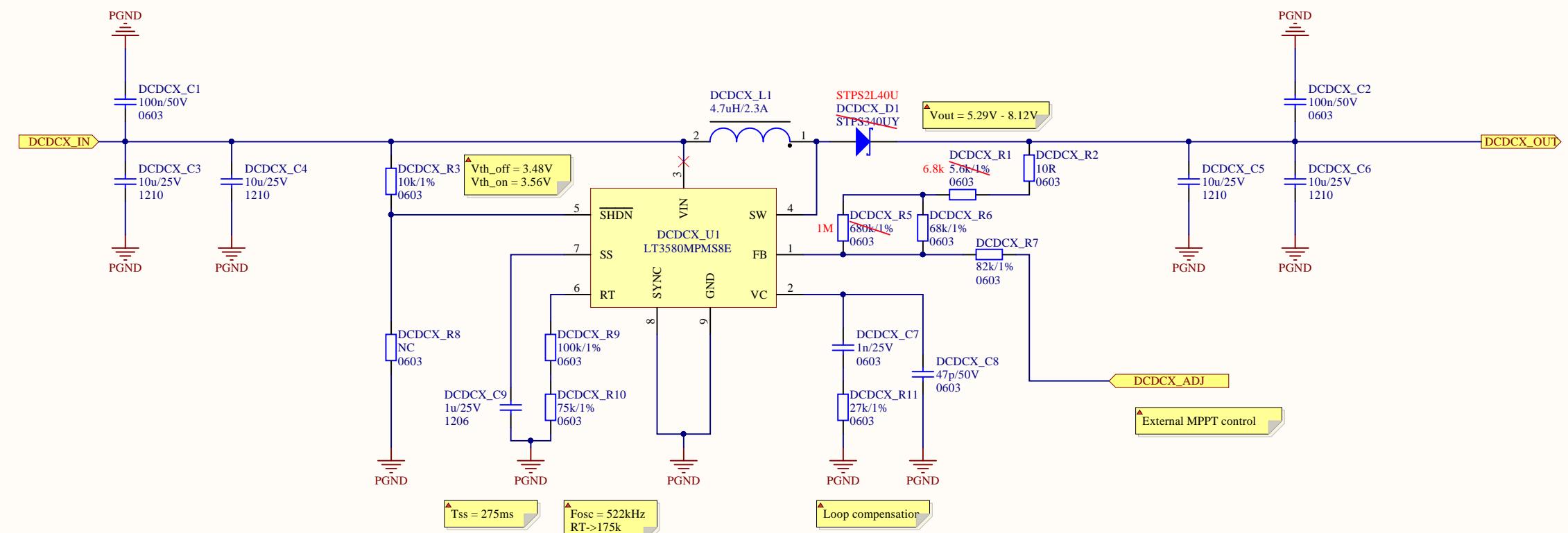
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Project: PW-Sat2 / EPS / FPM				
Title: EPS / MPPT-X / EMI-Filter / In				
Model: FPM	Document Number: PWSat2-xxx-DW-xxx	Rev: 3	Date: 2019/2/28	Sheet: 8 of 51
Author: Piotr Kuligowski		Checked by: (not checked)	Approved by: (not approved)	
File name: EPS_MPPT_X_EMI-Filter_In.SchDoc				

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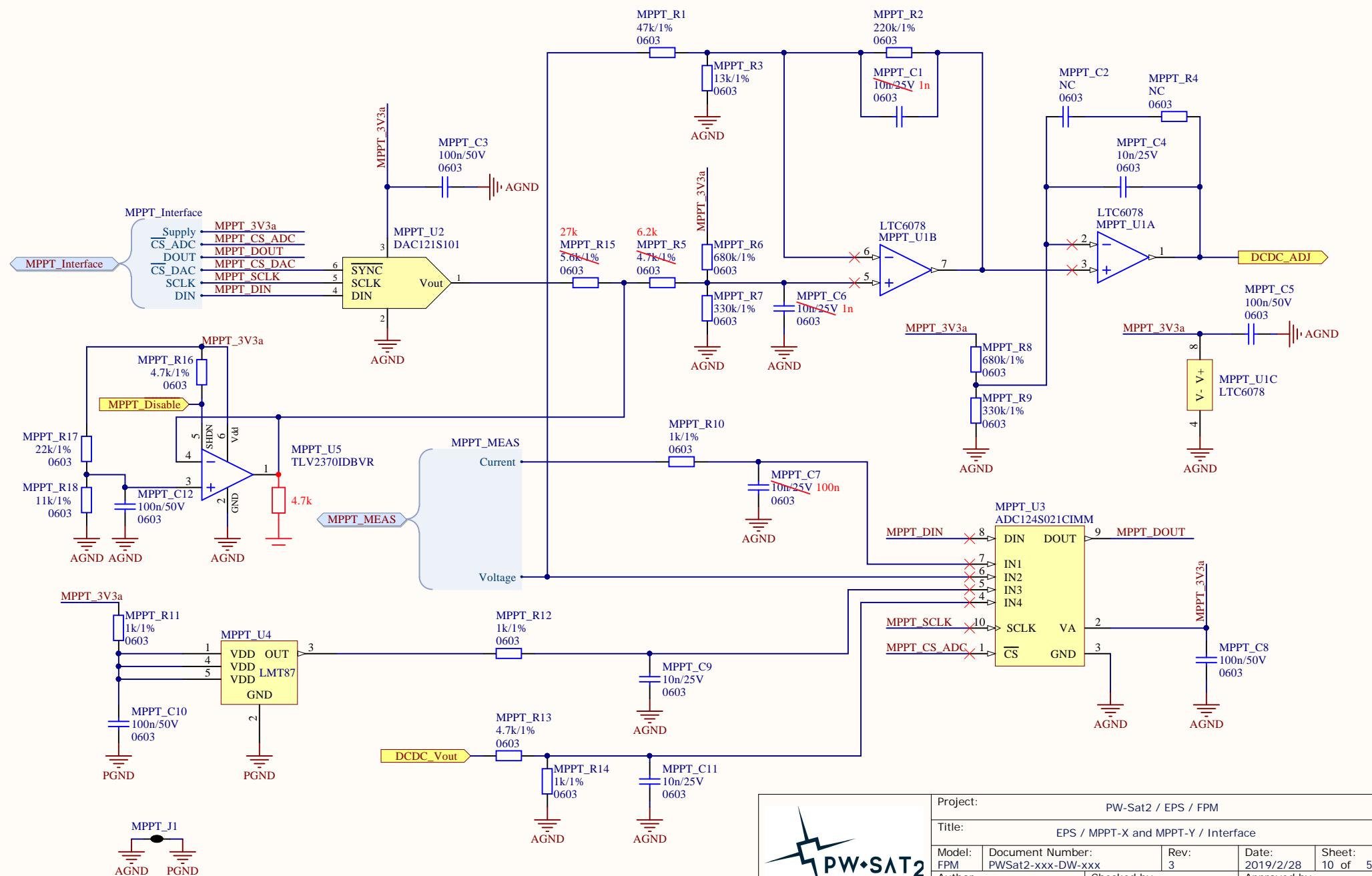
C

D

D



Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / MPPT-X / Boost-Converter			
Model:	Document Number:	FPM	PWSat2-xxx-DW-xxx	Rev:	Date: 2019/2/28 Sheet: 3 of 51
Author:	Checked by:	Piotr Kulligowski	(not checked)	Approved by:	(not approved)
File name: EPS_MPPT_X_Boost-Converter.SchDoc					



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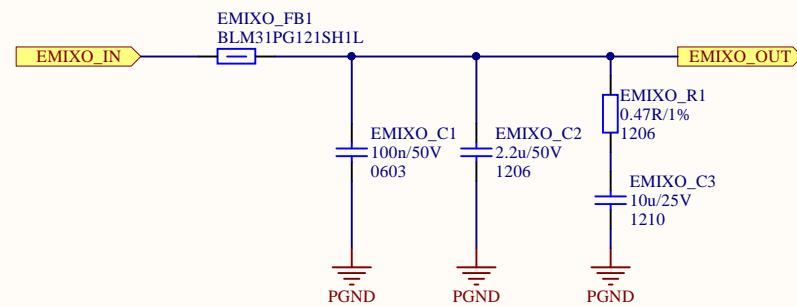
B

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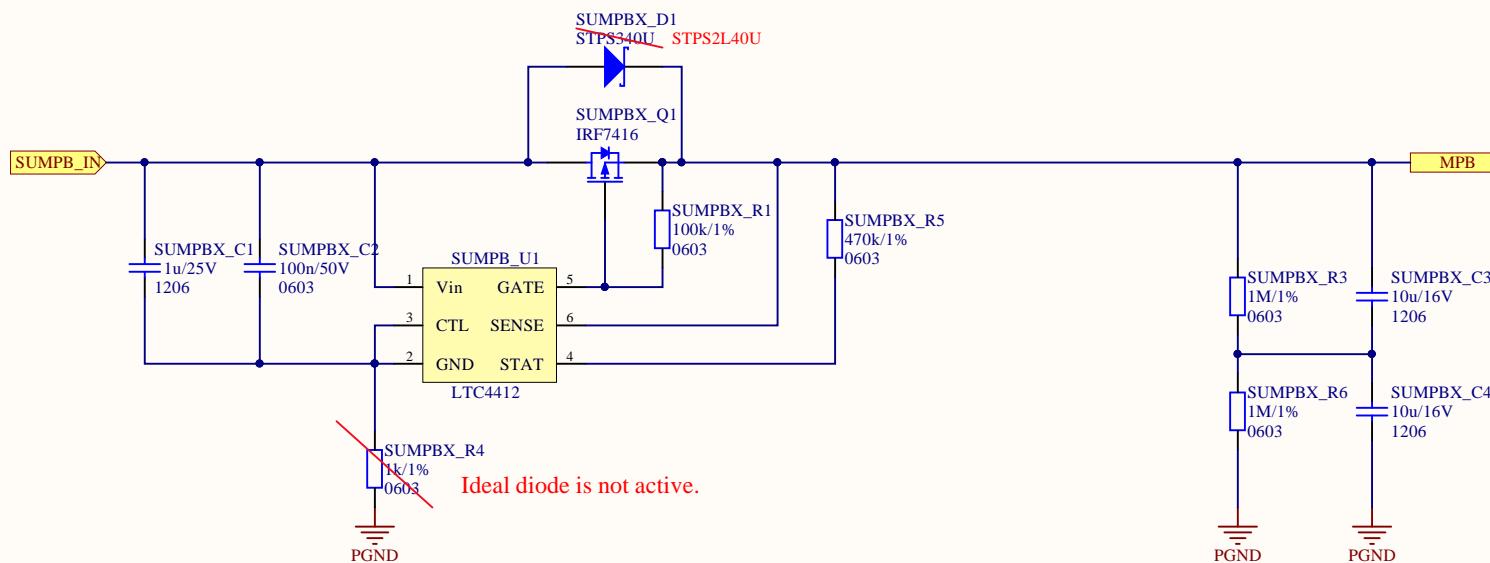
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Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / MPPT-X / EMI-Filter / Out			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	Date:	Sheet:
FPM			3	2019/2/28	11 of 51
Author:		Checked by:		Approved by:	
Piotr Kuligowski		(not checked)		(not approved)	
File name: EPS_MPPT_X_EMI-Filter_Out.SchDoc					

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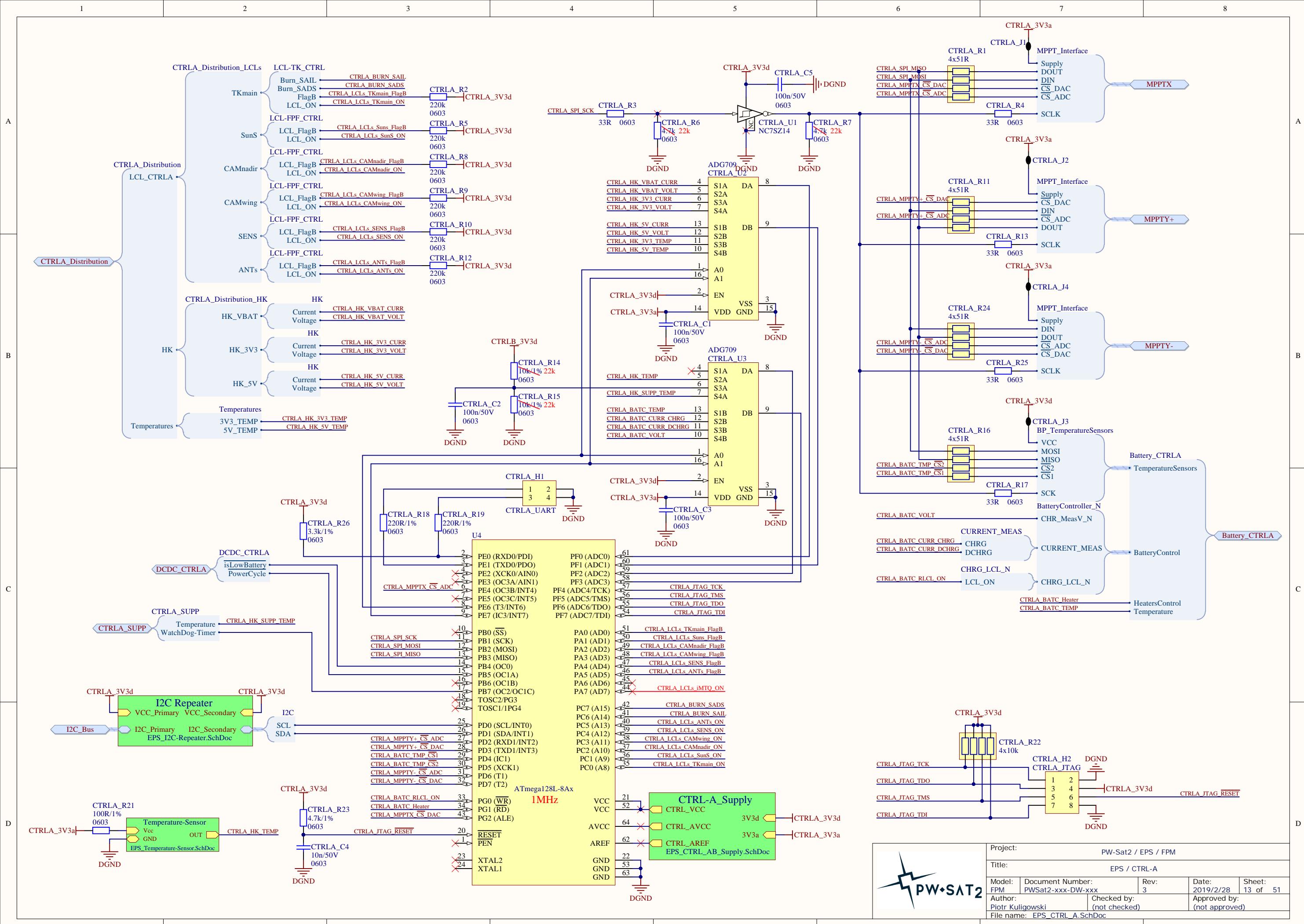
C

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Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / MPPT-X / MPB ORing			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	Date:	Sheet:
		3	2019/2/28	12	of 51
Author:		Checked by:	Approved by:		
Piotr Kuligowski		(not checked)	(not approved)		
File name: EPS_MPPT_X_OR_MPB.SchDoc					



A

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B

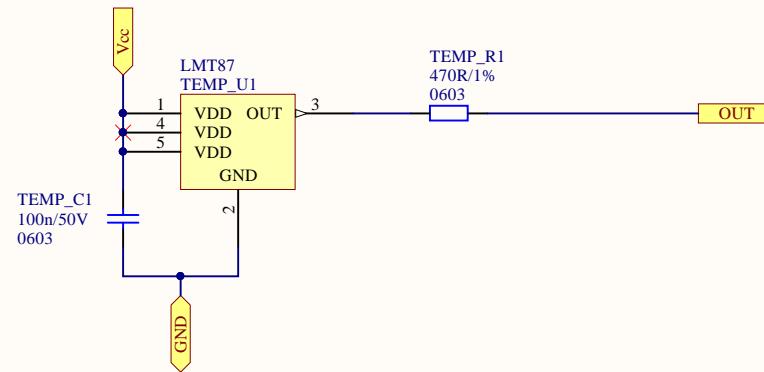
B

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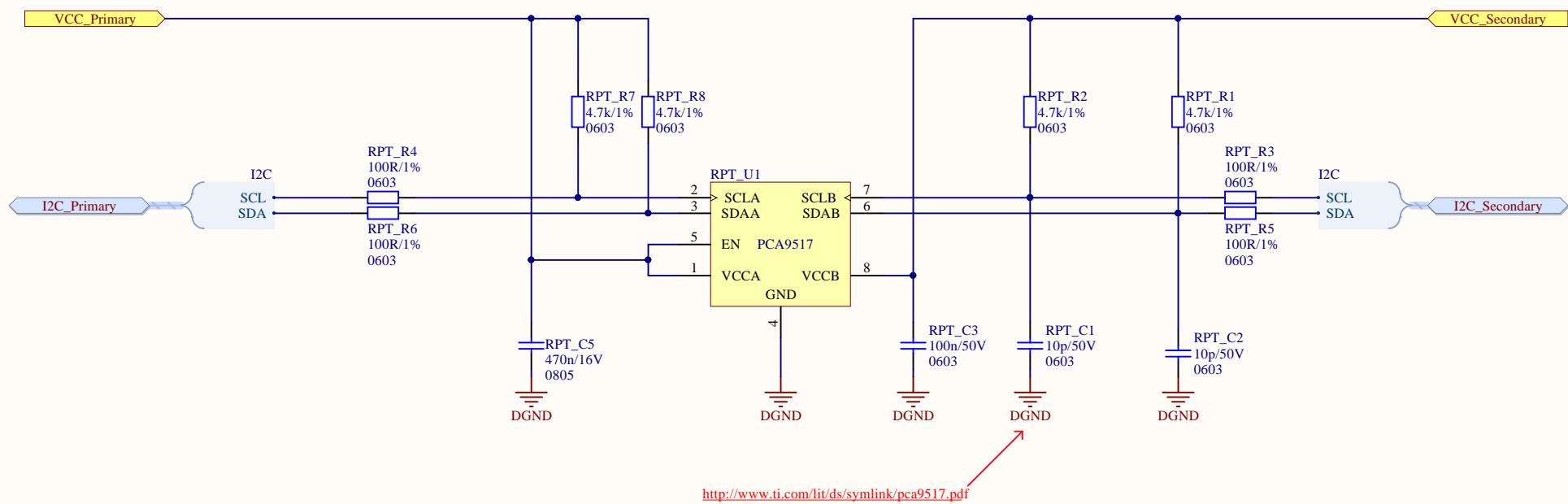
D



Project: PW-Sat2 / EPS / FPM				
Title: EPS / Temperature Sensor				
Model: FPM	Document Number: PWSat2-xxx-DW-xxx	Rev: 3	Date: 2019/2/28	Sheet: 14 of 51
Author: P. Kuligowski		Checked by: (not checked)	Approved by: (not approved)	
File name: EPS_Temperature-Sensor.SchDoc				

A

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Project:

PW-Sat2 / EPS / FPM

Title:

EPS / I2C Repeater

Model:

FPM | Document Number: PWSat2-xxx-DW-xxx | Rev: 3 | Date: 2019/2/28 | Sheet: 15 of 51

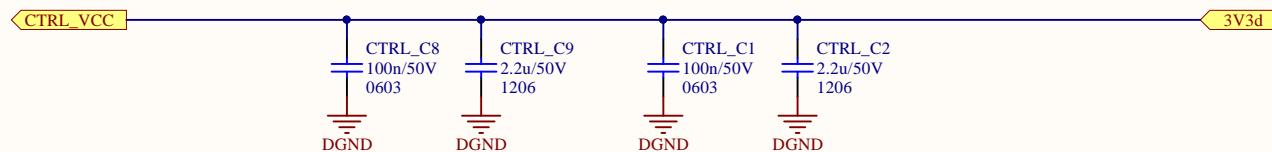
Author:

Piotr Kuligowski | Checked by: (not checked) | Approved by: (not approved)

File name: EPS_I2C-Repeater.SchDoc

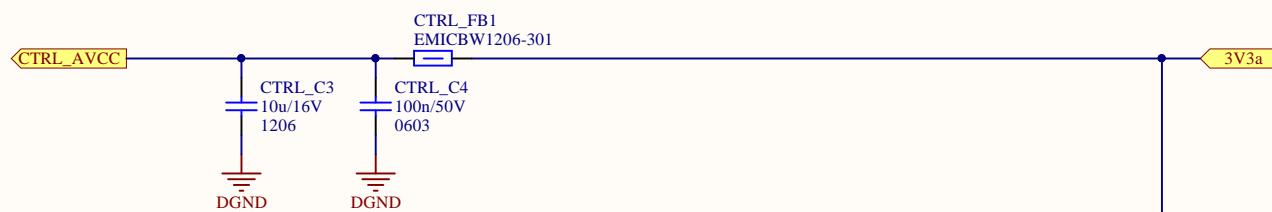
A

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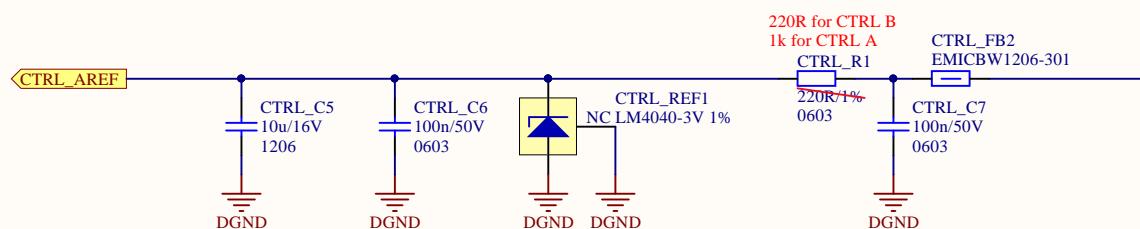
B

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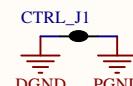
C

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Project: PW-Sat2 / EPS / FPM				
Title: EPS / CTRL-A and CTRL-B / Supply				
Model:	Document Number: PW-Sat2-xxx-DW-xxx	Rev:	Date: 2019/2/28	Sheet: 16 of 51
Author: Piotr Kuligowski		Checked by: (not checked)	Approved by: (not approved)	
File name: EPS_CTRL_AB_Supply.SchDoc				

A

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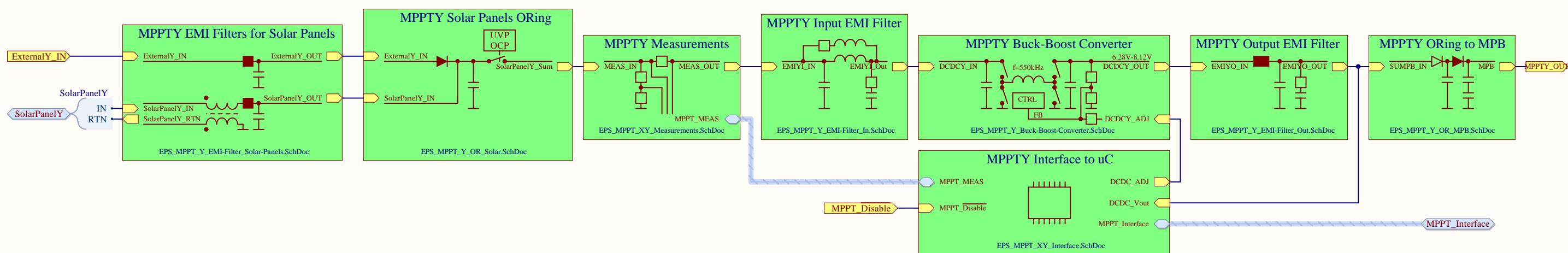
B

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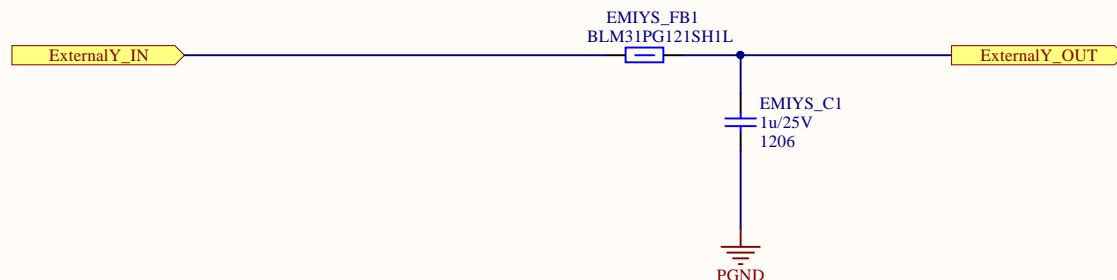
D



Project:		PW-Sat2 / EPS / FPM		
Title:		EPS / MPPT-Y		
Model:	Document Number:	Rev:	Date:	Sheet:
FPM	PWSat2-xxx-DW-xxx	3	2019/2/28	17 of 51
Author:		Checked by:	Approved by:	
Piotr Kulligowski		(not checked)	(not approved)	
File name: EPS_MPPT_Y.SchDoc				

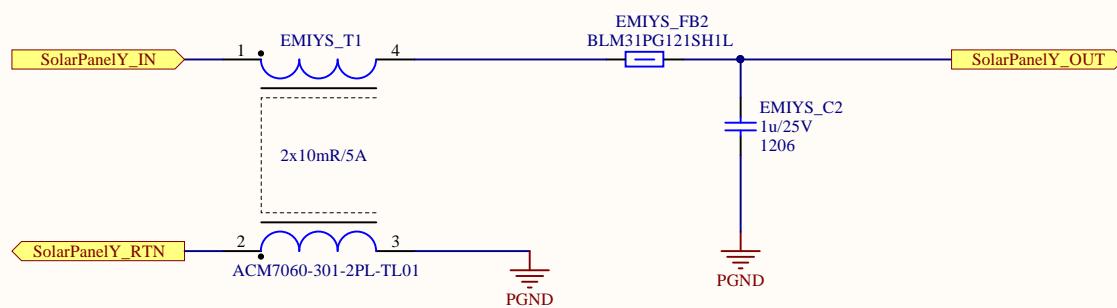
A

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Title: MPPTY EMI Filters for Solar Panels			Sheet: 18 of 51
Model: EMPSat2 xxx-DW-xxx	Document Number:	Iss-Rev: 1-0	Date: 2015-02-21
Author: Piotr Kuligowski	Checked by: *	Approved by: *	
File name: EPS_MPPT_Y_EMI-Filter_Solar-Panels.SchDoc			

A

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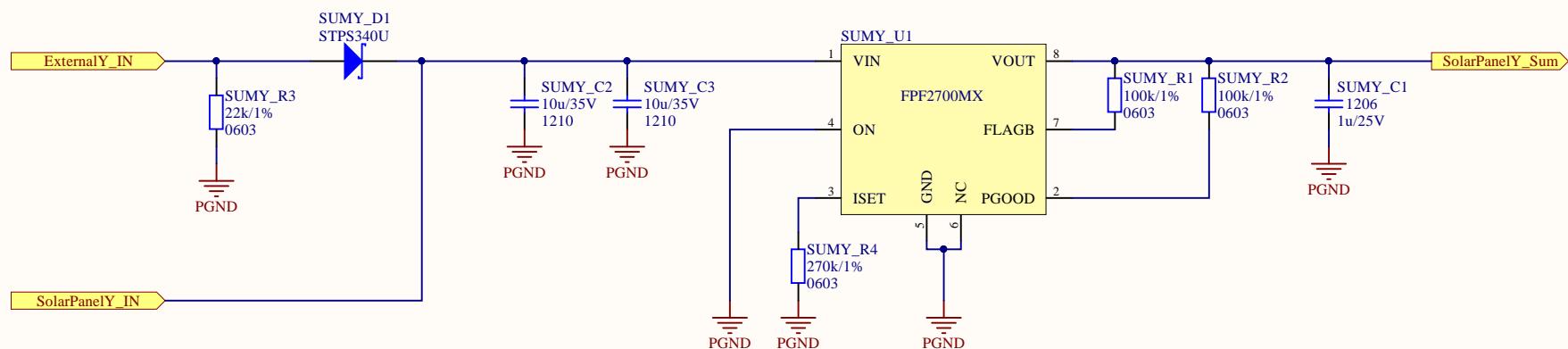
B

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Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / MPPT-Y / Solar Panels ORing			
Model:	Document Number:	FPM	Rev:	Date:	Sheet:
PWSat2-xxx-DW-xxx		3	2019/2/28	19	of 51
Author:		Checked by:		Approved by:	
Piotr Kuligowski		(not checked)		(not approved)	
File name: EPS_MPPT_Y_OR_Solar.SchDoc					

A

A

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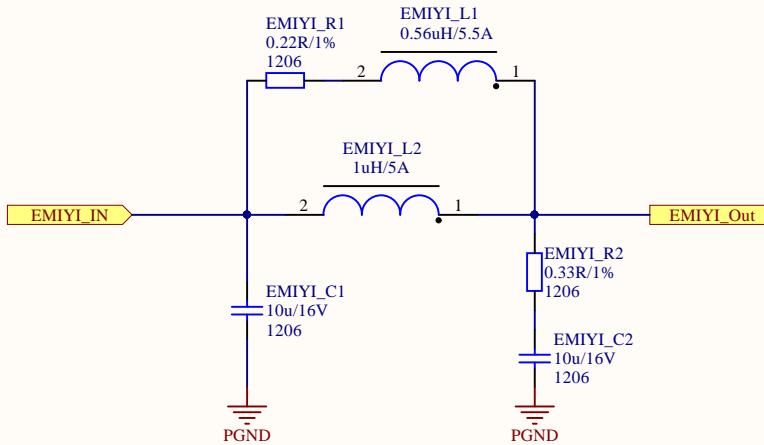
B

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D



Title: MPPTY Input EMI Filter			Sheet: 20 of 51
Model: EMPSat2 xxx-DW-xxx	Document Number:	Iss-Rev: 1-0	Date: 2015-10-11
Author: Piotr Kuligowski	Checked by: *	Approved by: *	
File name: EPS_MPPT_Y_EMI-Filter_In.SchDoc			

A

A

B

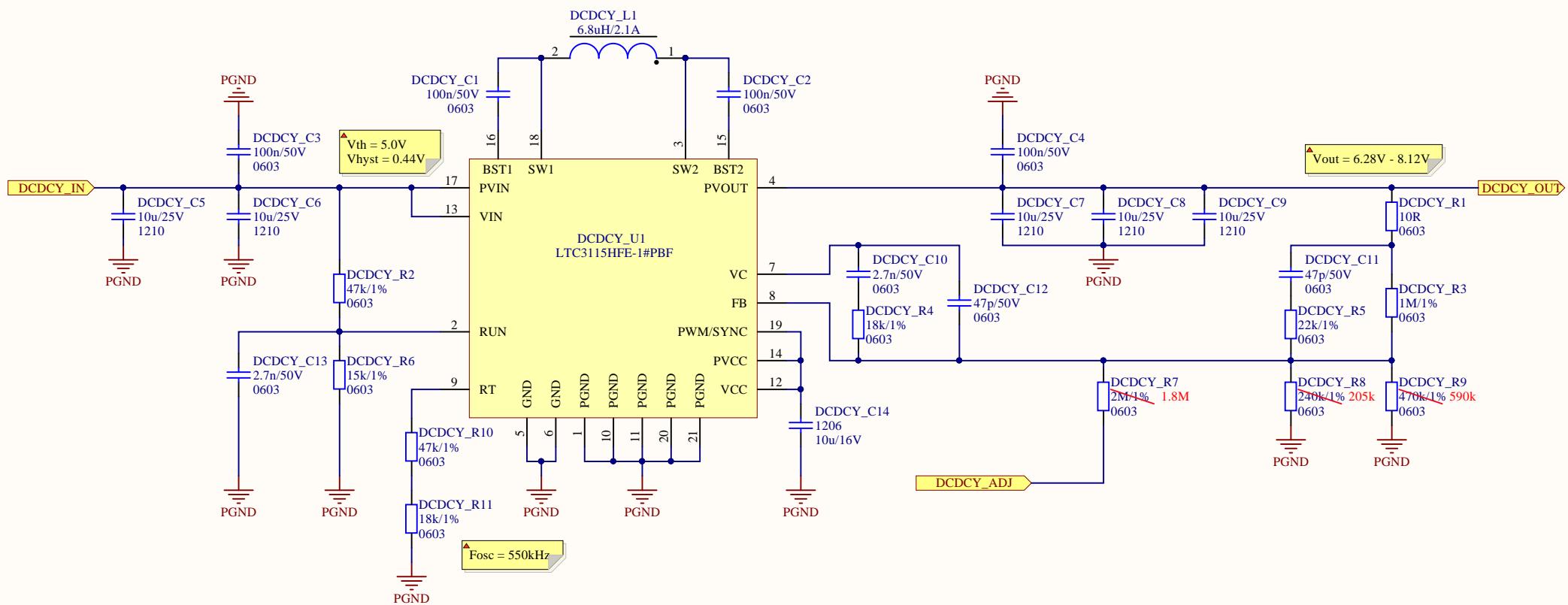
B

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Title:		Sheet:	
Controlled Buck-Boost Converter CH1		21 of 51	
Model:	Document Number:	Iss-Rev:	Date:
EMPSat2	xxx-DW-xxx	1-0	2016-01-06
Author: Piotr Kuligowski	Checked by: *	Approved by: *	
File name: EPS_MPPT_Y_Buck-Boost-Converter.SchDoc			

A

A

B

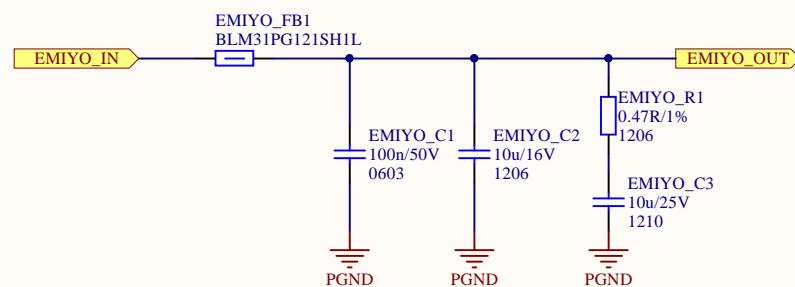
B

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C

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D



Title: EMI Filter CH1 B			Sheet: 22 of 51
Model: EMPSat2	Document Number: xxx-DW-xxx	Iss-Rev: 1-0	Date: 2015-10-11
Author: Piotr Kuligowski	Checked by: *	Approved by: *	
File name: EPS_MPPT_Y_EMI-Filter_Out.SchDoc			

A

A

B

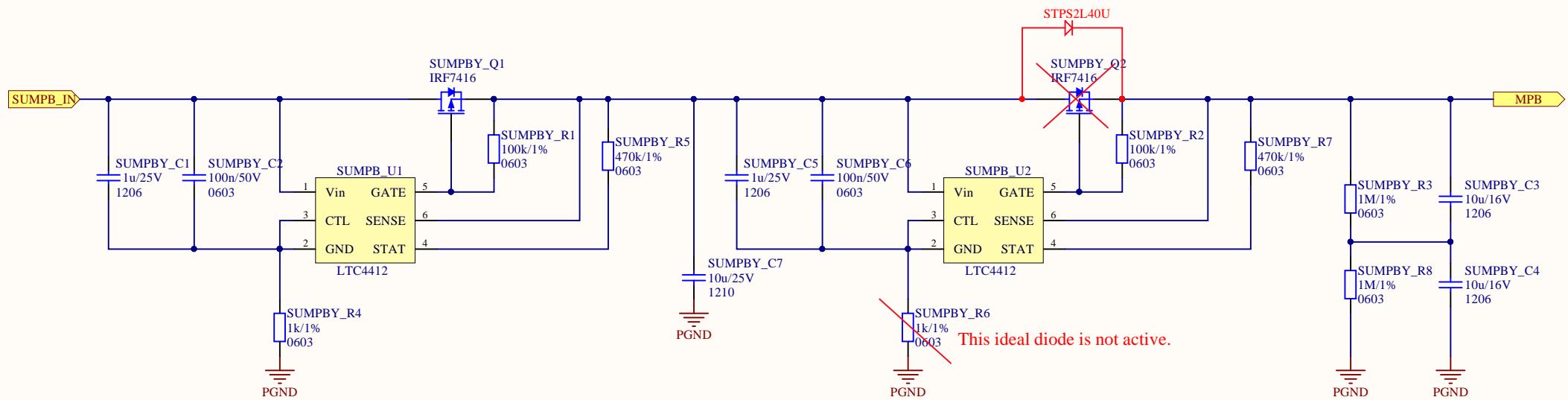
B

C

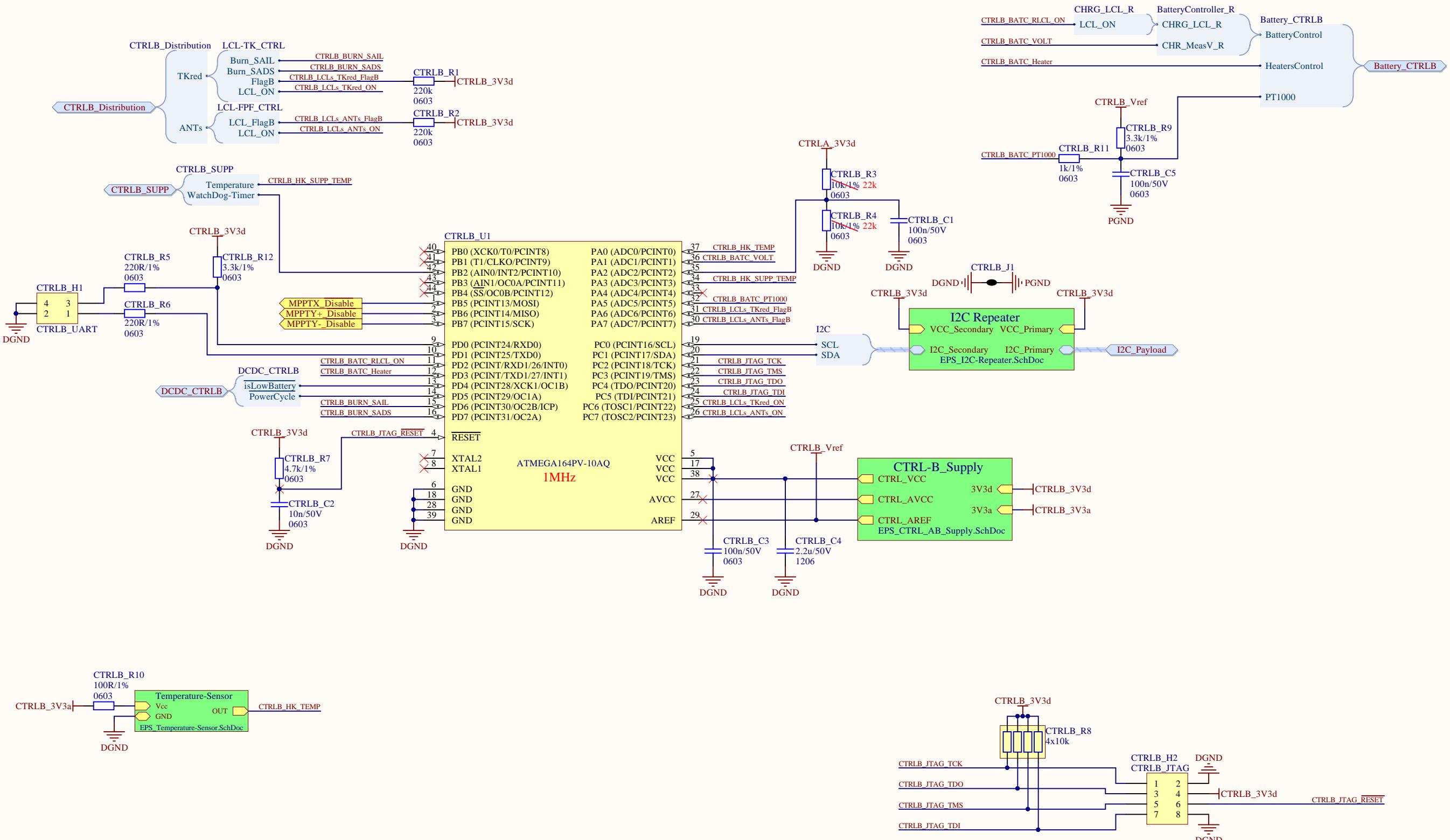
C

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Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / MPPT-Y / MPB ORING			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	Date:	Sheet:
Author:		Checked by:	3		2019/2/28 23 of 51
Piotr Kuligowski		(not checked)	Approved by:		(not approved)
File name: EPS_MPPT_Y_OR_MPB.SchDoc					

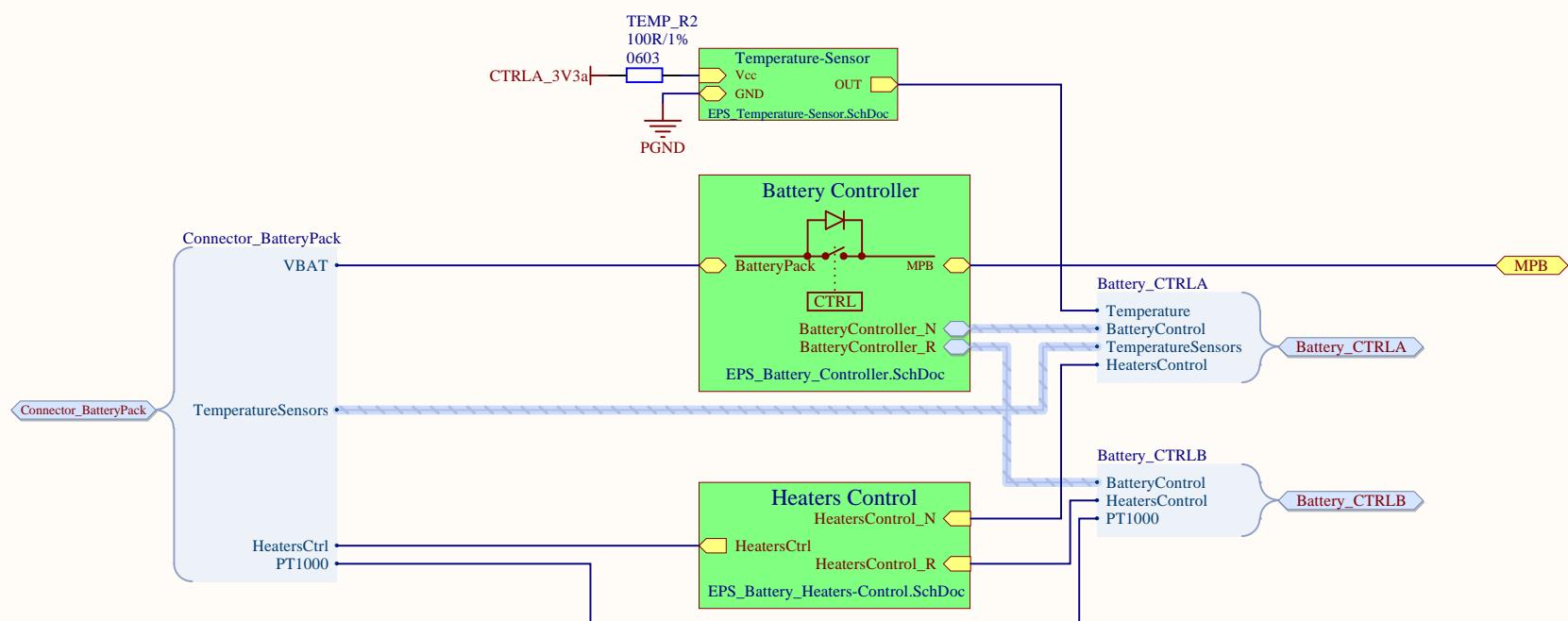


PW-SAT2 / EPS / FPM

Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / CTRL-B			
Model:	Document Number:	FPM	PWSat2-xxx-DW-xxx	Rev:	3
Author:	Checked by:	Piotr Kullgowski	(not checked)	Date:	2019/2/28
	Approved by:		(not approved)	Sheet:	24 of 51
File name: EPS_CTRL_B.SchDoc					

A

A



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B

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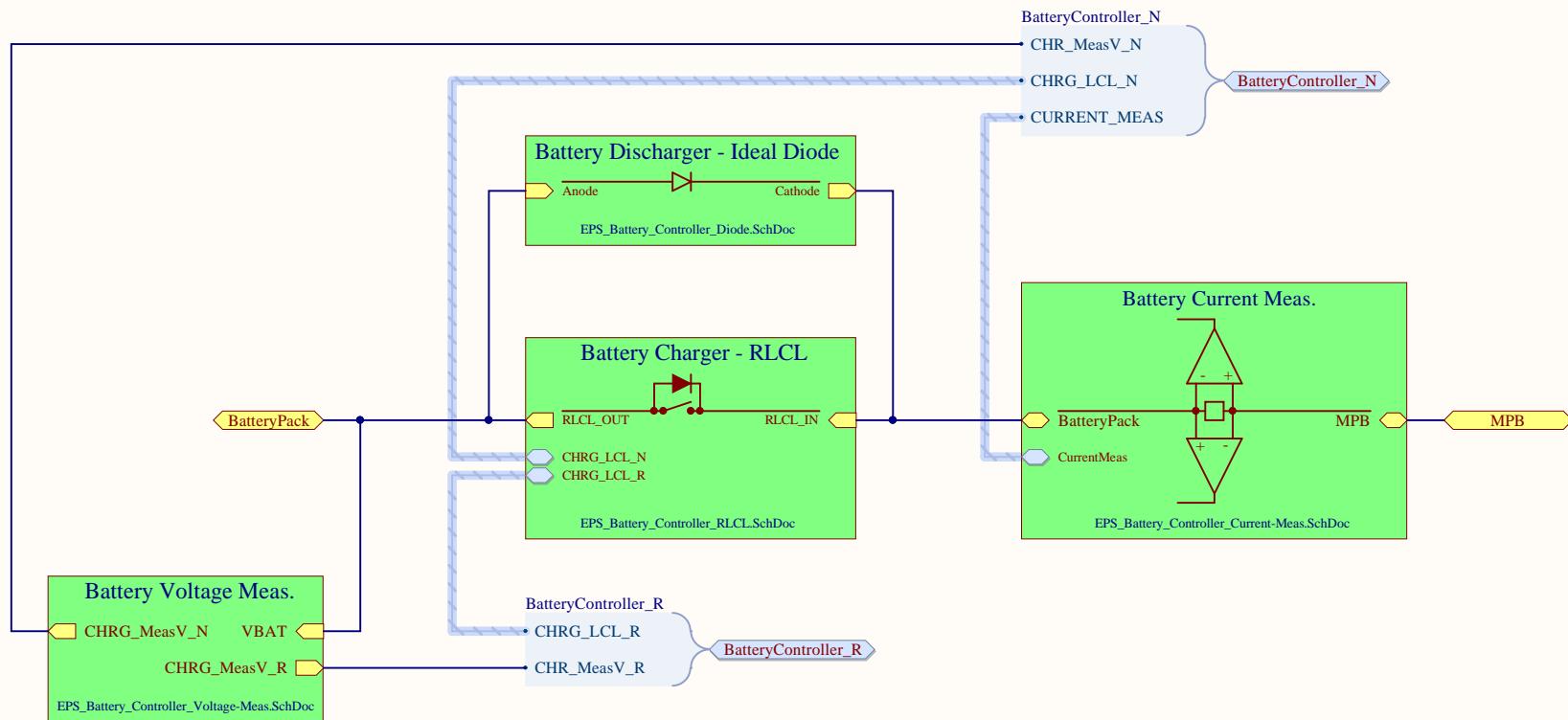
C

D

D



Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / Battery			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	3	Date: 2019/2/28 Sheet: 25 of 51
Author: Piotr Kuligowski		Checked by: (not checked)		Approved by: (not approved)	
File name: EPS_Battery.SchDoc					



Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / Battery / Controller			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	3	Date: 2019/2/28 Sheet: 26 of 51
Author: Piotr Kuligowski		Checked by: (not checked)		Approved by: (not approved)	
File name: EPS_Battery_Controller.SchDoc					

A

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B

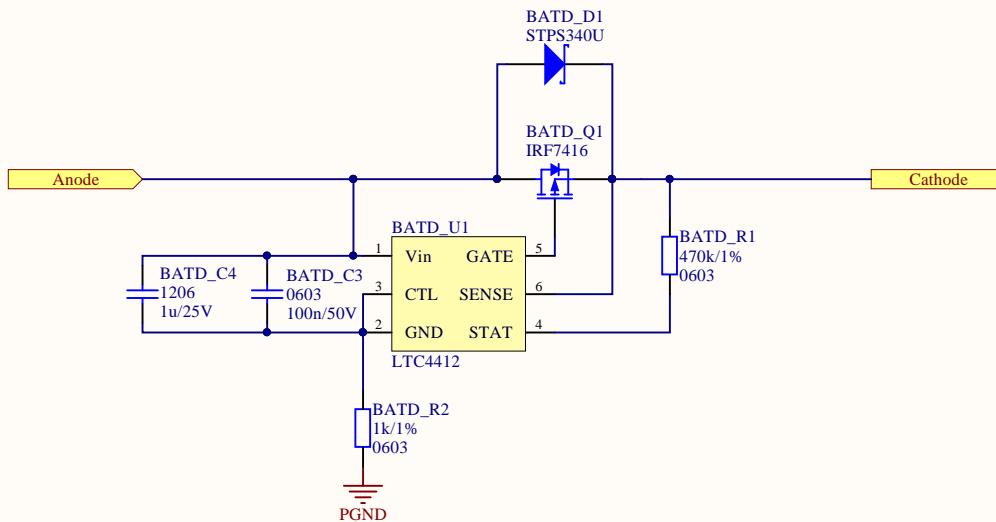
B

C

C

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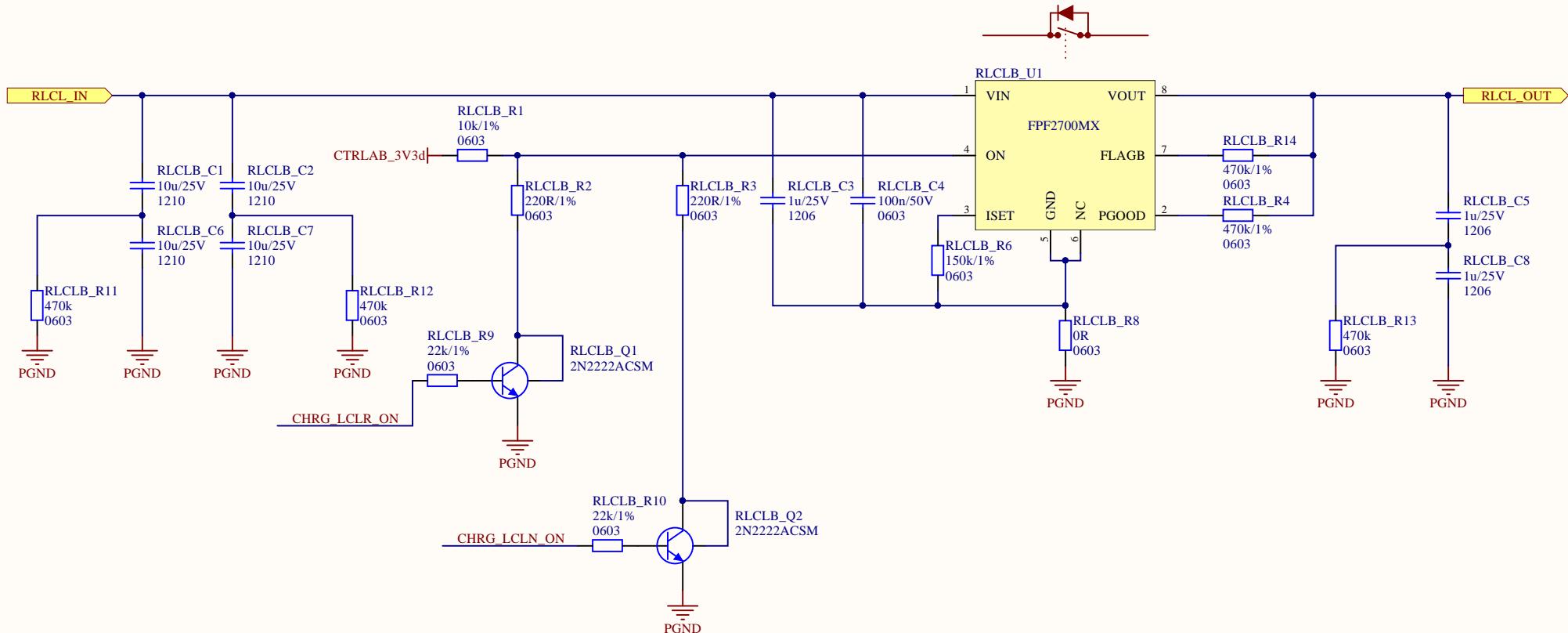
D



Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / Battery / Controller / Ideal Diode			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	3	Date: 2019/2/28 Sheet: 27 of 51
Author: Piotr Kuligowski		Checked by: (not checked)		Approved by: (not approved)	
File name: EPS_Battery_Controller_Diode.SchDoc					

A

A



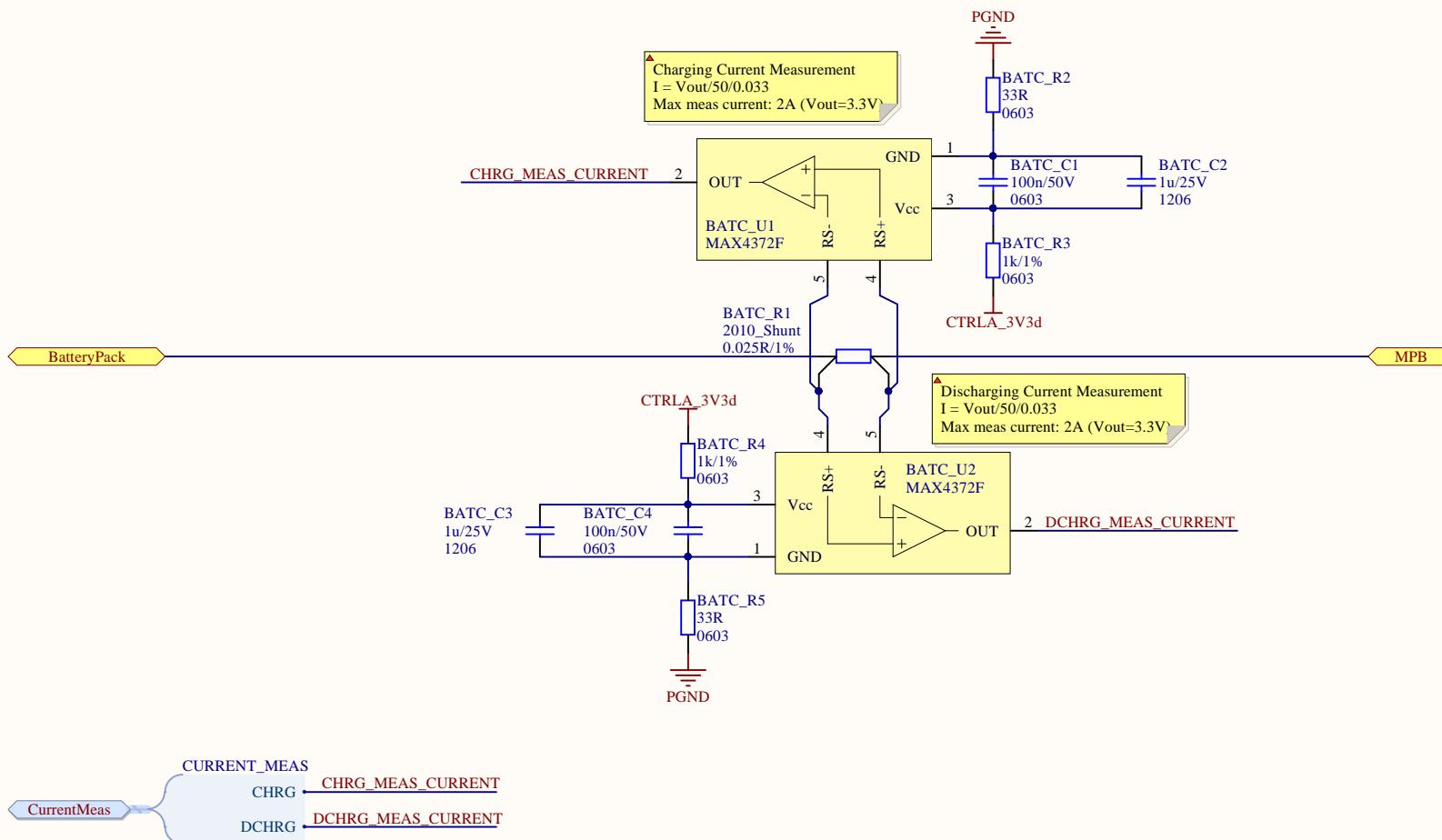
CHRG_LCL_N
LCL_ON
CHRG_LCLN_ON

CHRG_LCL_R
LCL_ON
CHRG_LCLR_ON



Project: PW-Sat2 / EPS / FPM					
Title: EPS / Battery / Controller / RLCL					
Model: FPM	Document Number: PWSat2-xxx-DW-xxx	Rev: 3	Date: 2019/2/28	Sheet: 28	of 51
Author: Piotr Kuligowski	Checked by: (not checked)	Approved by: (not approved)			
File name: EPS_Battery_Controller_RLCL.SchDoc					

A



B

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B

C

D



Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / Battery / Current Measurement			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	Date:	Sheet:
Author:		Checked by:		Approved by:	
Piotr Kuligowski		(not checked)		(not approved)	
File name: EPS_Battery_Controller_Current-Meas.SchDoc					

A

A

B

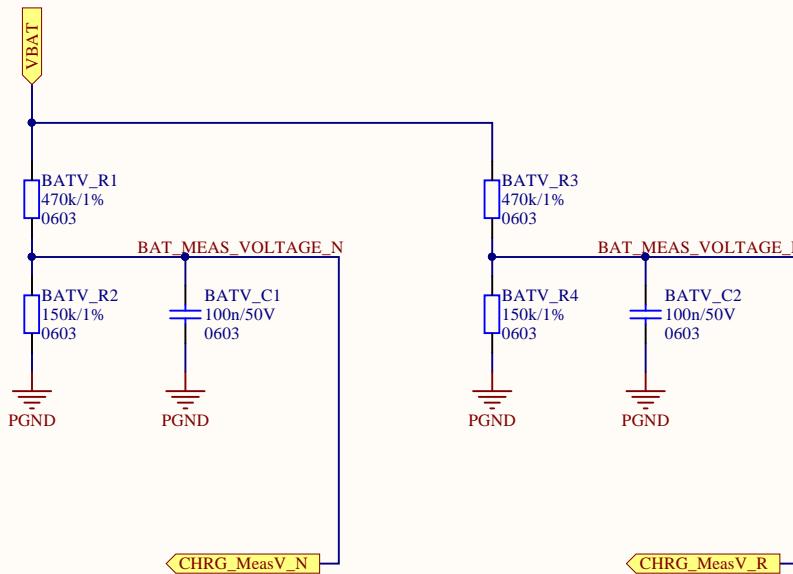
B

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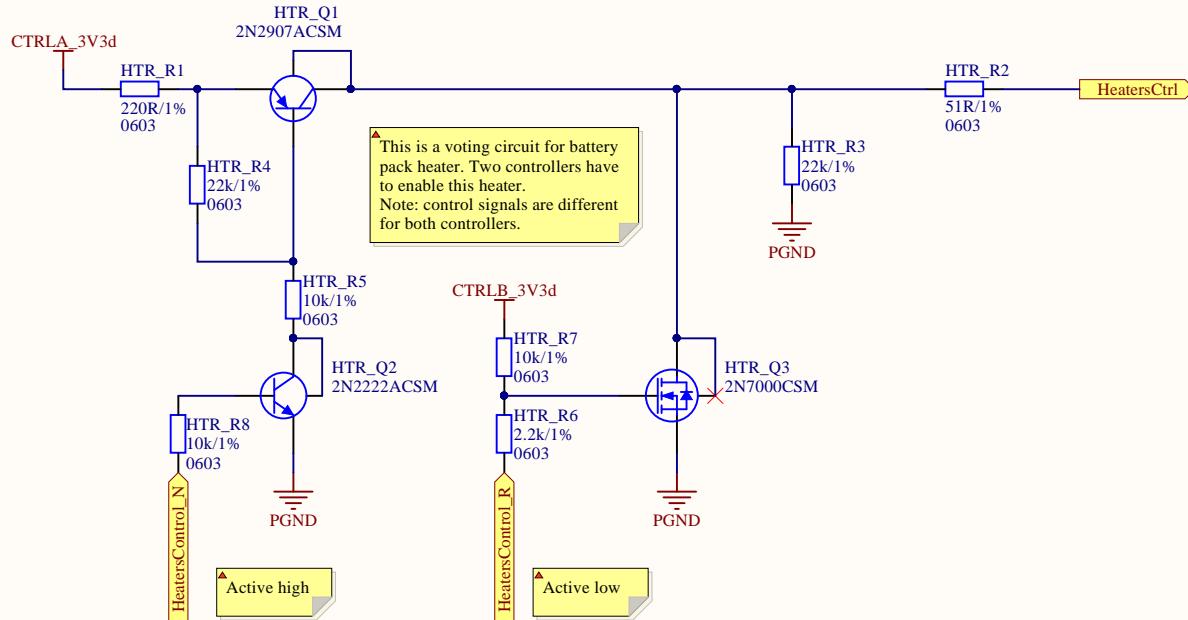
D



Project: PW-Sat2 / EPS / FPM				
Title: EPS / Battery / Voltage Measurement				
Model: FPM	Document Number: PWSat2-xxx-DW-xxx	Rev: 3	Date: 2019/2/28	Sheet: 30 of 51
Author: Piotr Kuligowski		Checked by: (not checked)	Approved by: (not approved)	
File name: EPS_Battery_Controller_Voltage-Meas.SchDoc				

A

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Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / Battery / Heaters Control			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	3	Date: 2019/2/28 Sheet: 31 of 51
Author: Piotr Kuligowski		Checked by: (not checked)		Approved by: (not approved)	
File name: EPS_Battery_Heaters-Control.SchDoc					

A

A

B

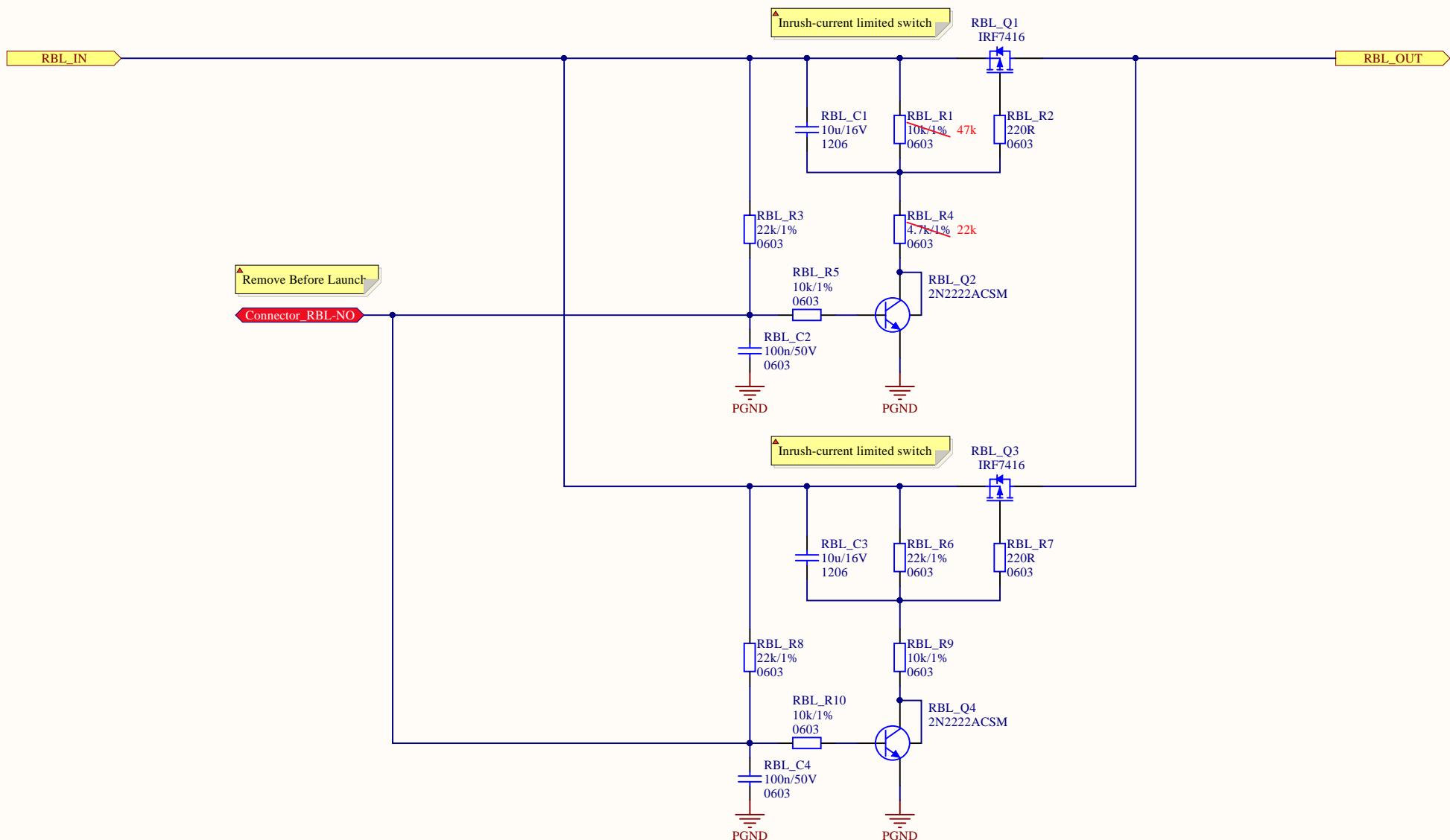
B

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C

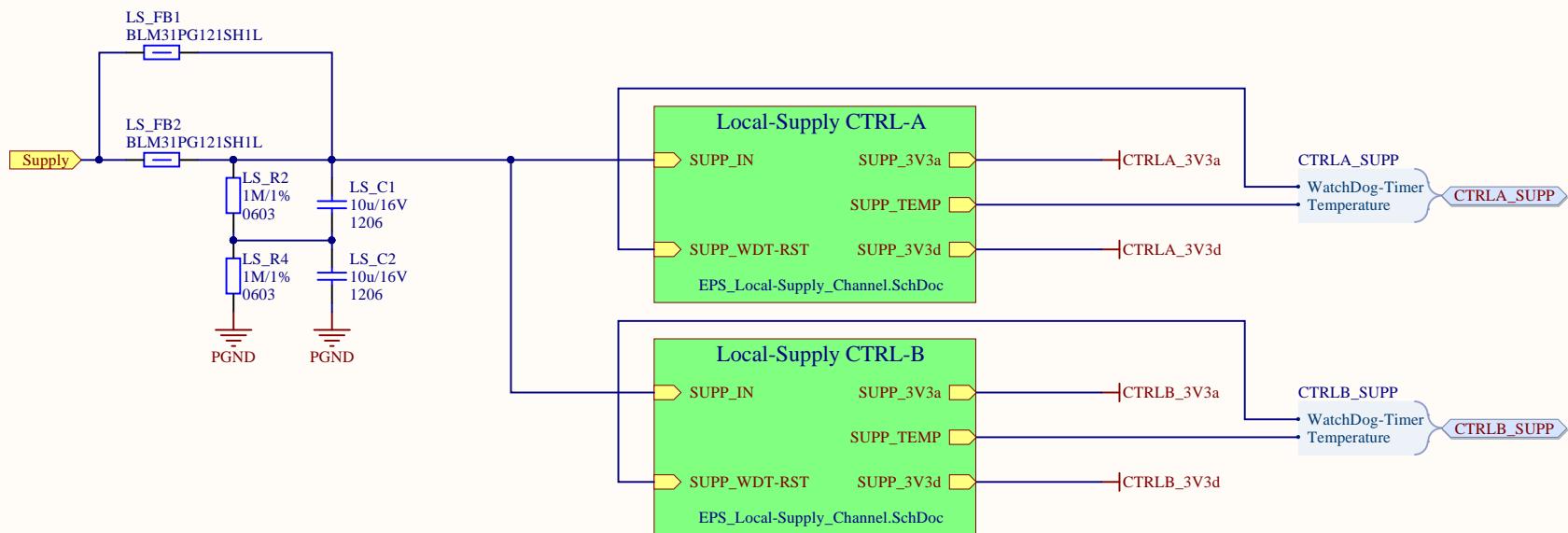
D

D



Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / Remove Before Launch			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	Date:	Sheet:
Author: Piotr Kuligowski		Checked by: (not checked)	Approved by: (not approved)		
File name: EPS_RBL.SchDoc					

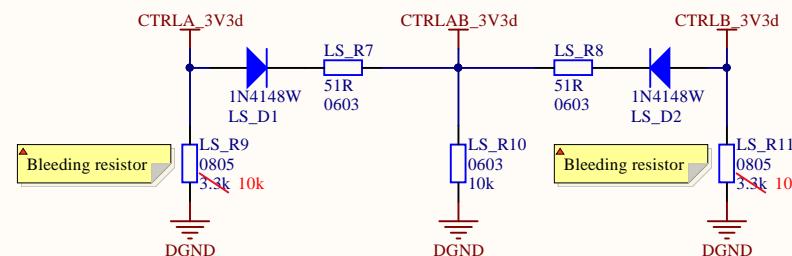
A



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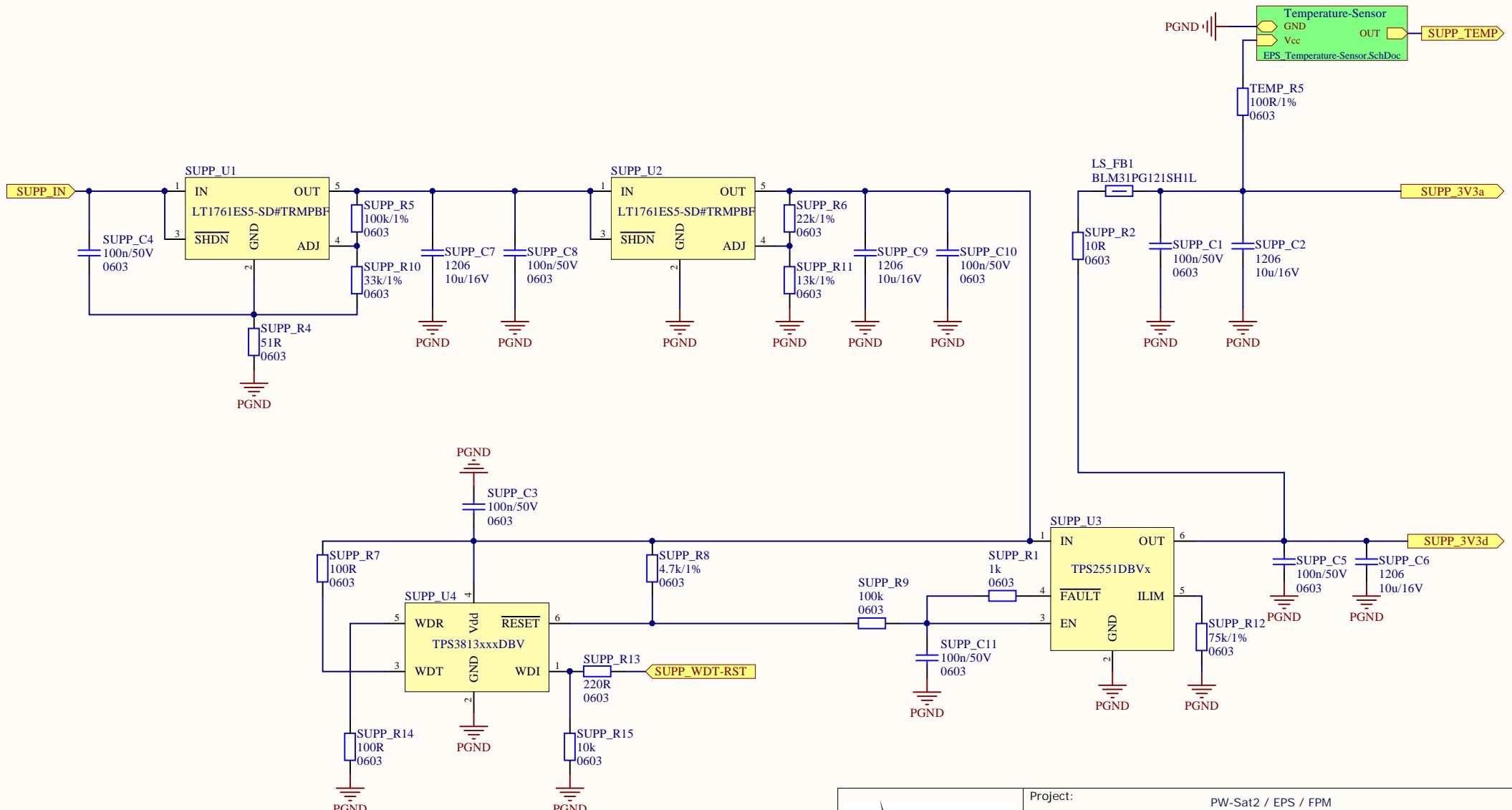
C

D



Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / Local Supply			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	3	Date: 2019/2/28 Sheet: 33 of 51
Author:	Checked by:	(not checked)	Approved by:	(not approved)	
File name: EPS_Local-Supply.SchDoc					

A



Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / Local Supply / Channel			
Model:	Document Number:	FPM	DW-xxx	Rev:	Date: 2019/2/28 Sheet: 34 of 51
Author:	Checked by:	Piotr Kuligowski	(not checked)	Approved by:	(not approved)
File name: EPS_Local-Supply_Channel.SchDoc					

A

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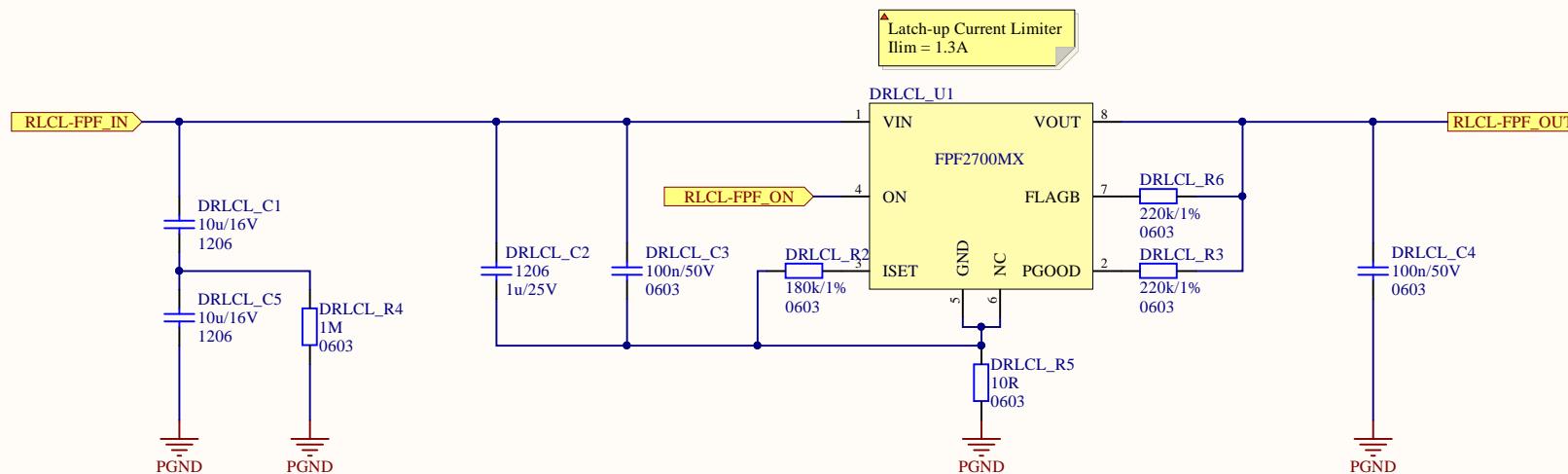
B

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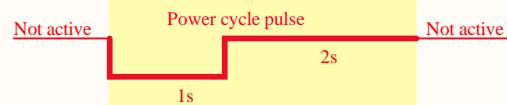
D

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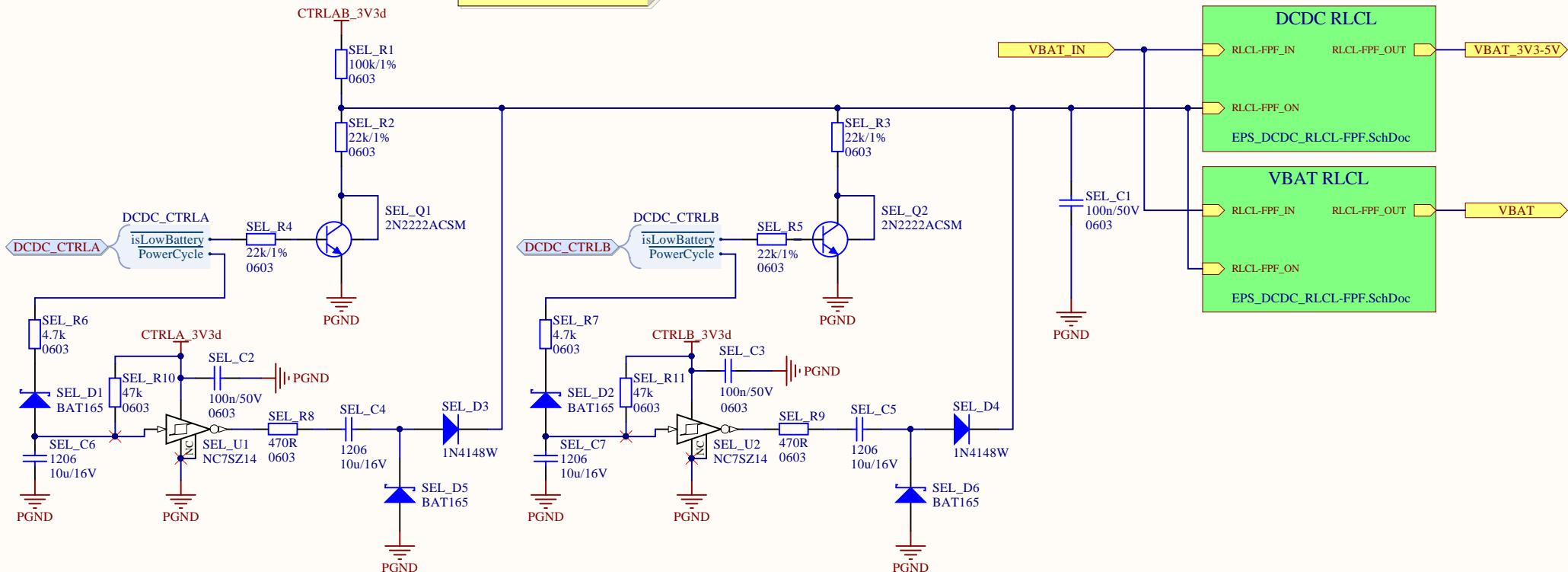


Project: PW-Sat2 / EPS / FPM				
Title: EPS / DCDC / RLCL-FPF				
Model:	Document Number: PWSat2-xxx-DW-xxx	Rev:	Date: 2019/2/28	Sheet: 35 of 51
Author: Piotr Kuligowski		Checked by: (not checked)	Approved by: (not approved)	
File name: EPS_DCDC_RLCL-FPF.SchDoc				

#PowerCycle:
any controller can perform the power cycle sequence. To perform the power cycle sequence a proper pulse should be provided.



#isLowBattery:
any controller can switch the LCLs on. To switch off the LCLs two controllers have to switch it off. If the battery is off then the battery pack is disconnected from the MPPT (main power bus).



Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / DCDC / RLCLS			
Model:	Document Number: PWSat2-xxx-DW-xxx	Rev:	Date:	Sheet:	51 36 of
Author: Piotr Kuligowski		Checked by: (not checked)		Approved by: (not approved)	
File name: EPS_DCDC_RLCLS.SchDoc					

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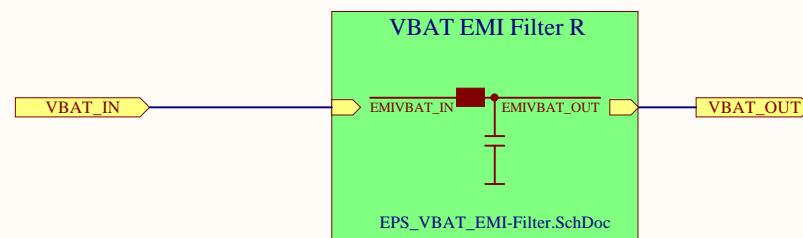
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Project: PW-Sat2 / EPS / FPM					
Title: EPS / VBAT					
Model: FPM	Document Number: PWSat2-xxx-DW-xxx	Rev: 3	Date: 2019/2/28	Sheet: 37	of 51
Author: Piotr Kuligowski		Checked by: (not checked)	Approved by: (not approved)		
File name: EPS_VBAT.SchDoc					

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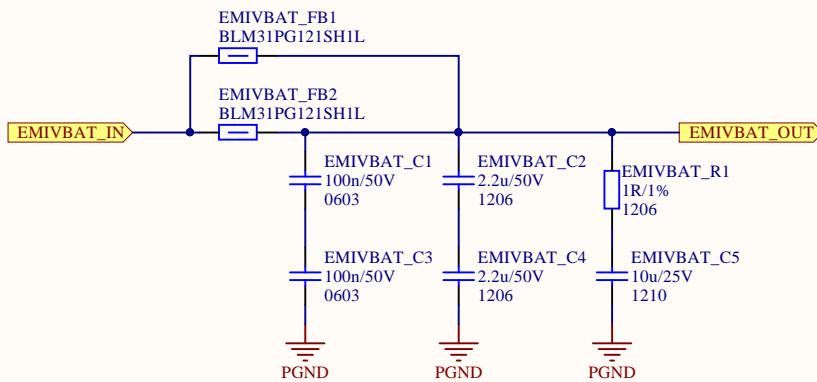
B

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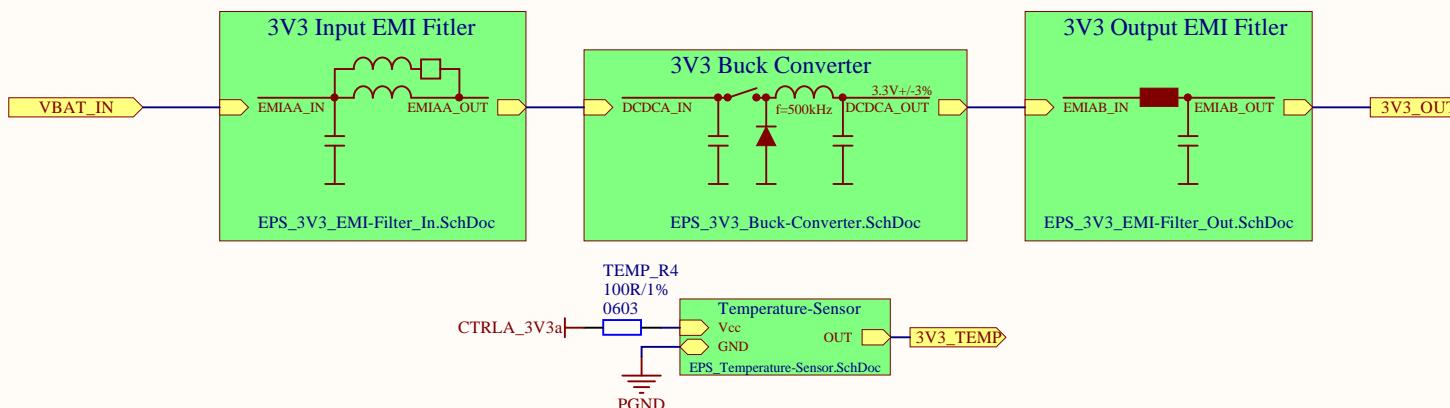
Project: PW-Sat2 / EPS / EM1				
Title: EPS / VBAT / EMI Filter				
Model: EM1	Document Number: PWSat2-xxx-DW-xxx	Rev: 1-0	Date: 2019/2/28	Sheet: 38 of 51
Author: Piotr Kuligowski	Checked by: *		Approved by: *	
File name: EPS_VBAT_EMI-Filter.SchDoc				

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Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / 3V3			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	3	Date: 2019/2/28 Sheet: 39 of 51
Author: Piotr Kuligowski		Checked by: (not checked)		Approved by: (not approved)	
File name: EPS_3V3.SchDoc					

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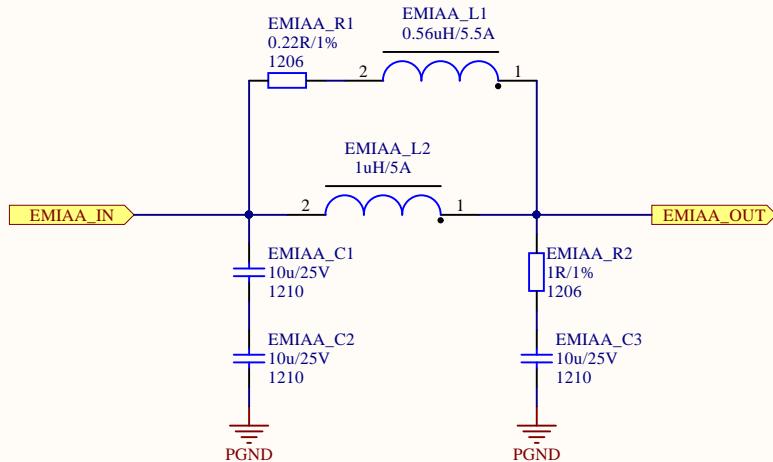
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Project: PW-Sat2 / EPS / FPM				
Title: EPS / 3V3 / EMI-Filter / In				
Model: FPM	Document Number: PWSat2-xxx-DW-xxx	Rev: 3	Date: 2019/2/28	Sheet: 40 of 51
Author: Piotr Kuligowski		Checked by: (not checked)	Approved by: (not approved)	
File name: EPS_3V3_EMI-Filter_In.SchDoc				

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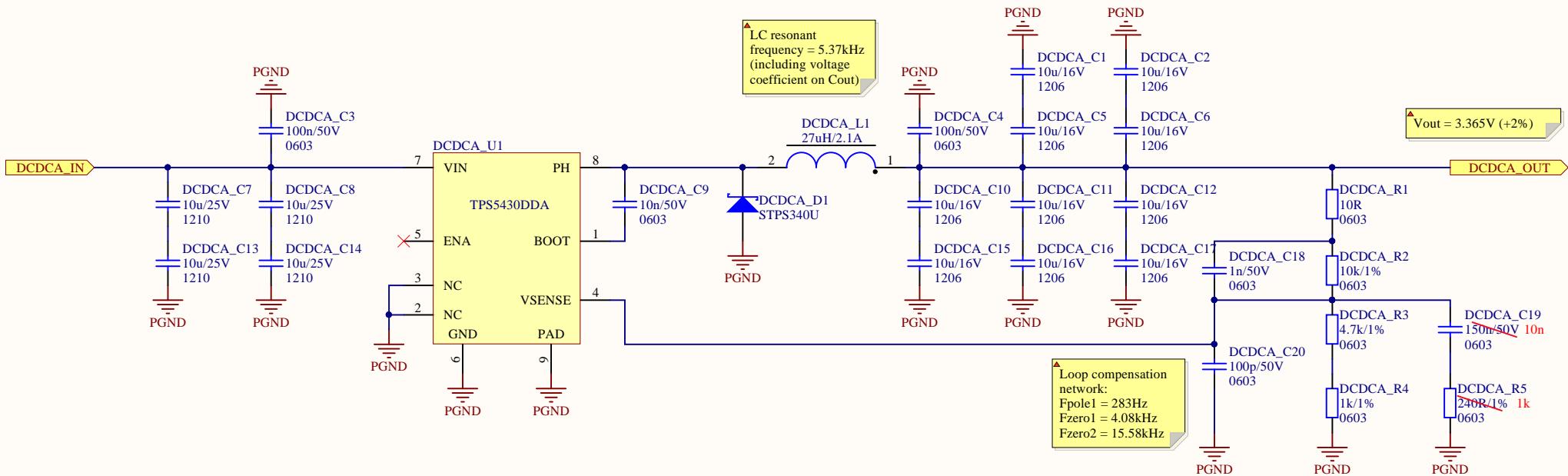
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Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / 3V3 / Buck-Converter			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	3	Date: 2019/2/28 Sheet: 41 of 51
Author: Piotr Kuligowski		Checked by: (not checked)		Approved by: (not approved)	
File name: EPS_3V3_Buck-Converter.SchDoc					

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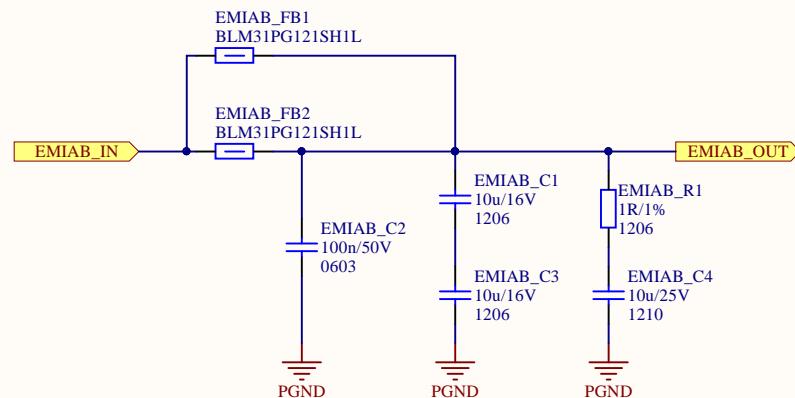
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Project: PW-Sat2 / EPS / FPM				
Title: EPS / 3V3 / EMI-Filter / Out				
Model: FPM	Document Number: PWSat2-xxx-DW-xxx	Rev: 3	Date: 2019/2/28	Sheet: 42 of 51
Author: Piotr Kuligowski		Checked by: (not checked)	Approved by: (not approved)	
File name: EPS_3V3_EMI-Filter_Out.SchDoc				

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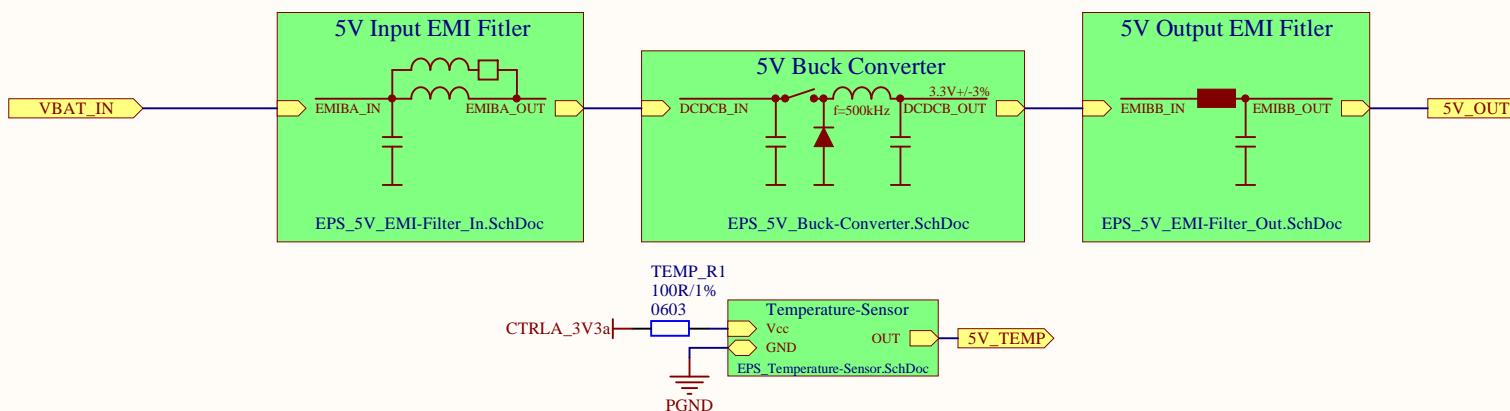
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Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / 5V			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	3	Date: 2019/2/28 Sheet: 43 of 51
Author: Piotr Kuligowski		Checked by: (not checked)		Approved by: (not approved)	
File name: EPS_5V.SchDoc					

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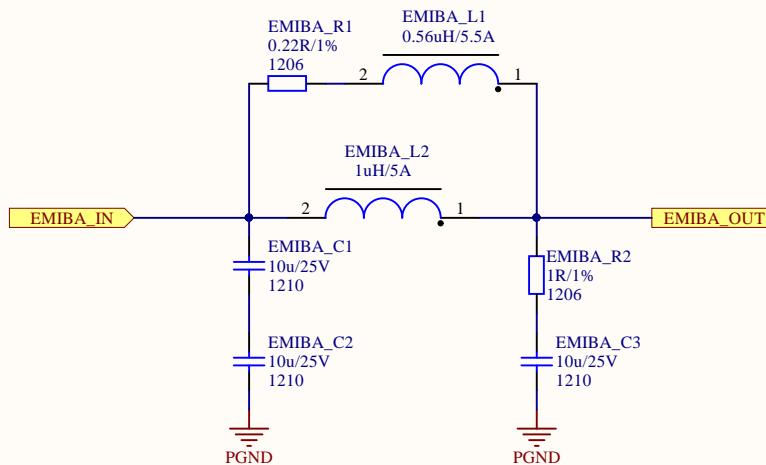
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Project: PW-Sat2 / EPS / FPM				
Title: EPS / 5V / EMI-Filter / In				
Model: FPM	Document Number: PWSat2-xxx-DW-xxx	Rev: 3	Date: 2019/2/28	Sheet: 44 of 51
Author: Piotr Kuligowski		Checked by: (not checked)	Approved by: (not approved)	
File name: EPS_5V_EMI-Filter_In.SchDoc				

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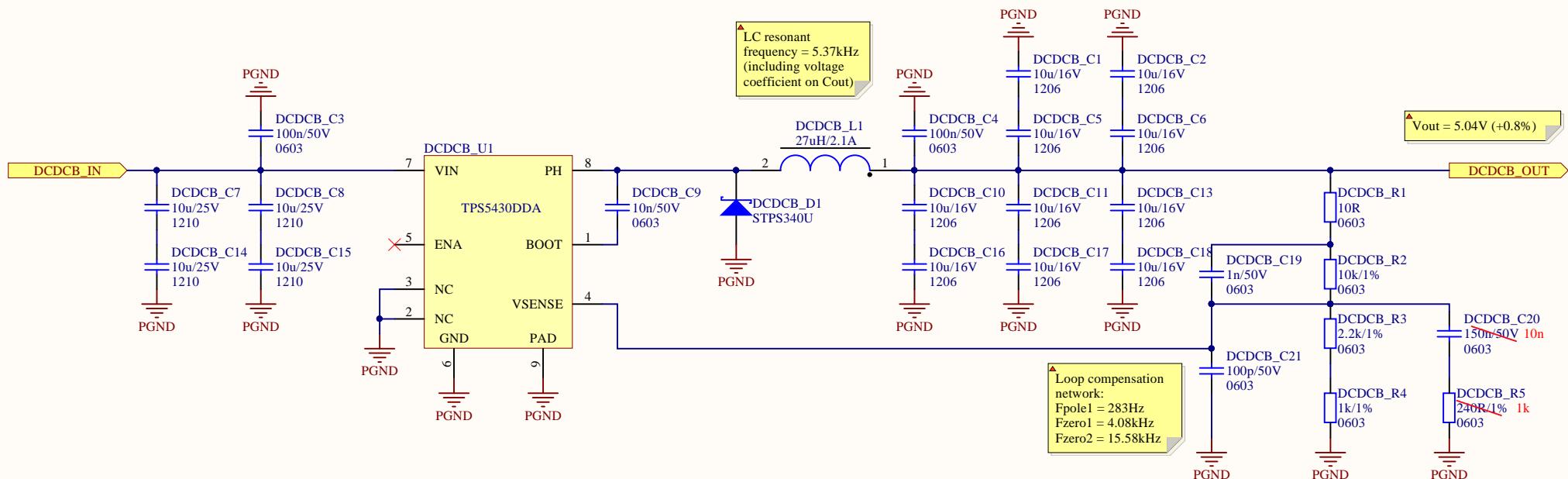
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Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / 5V / Buck-Converter			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	Date:	Sheet:
FPM			3	2019/2/28	45 of 51
Author:		Checked by:		Approved by:	
Piotr Kuligowski		(not checked)		(not approved)	
File name: EPS_5V_Buck-Converter.SchDoc					

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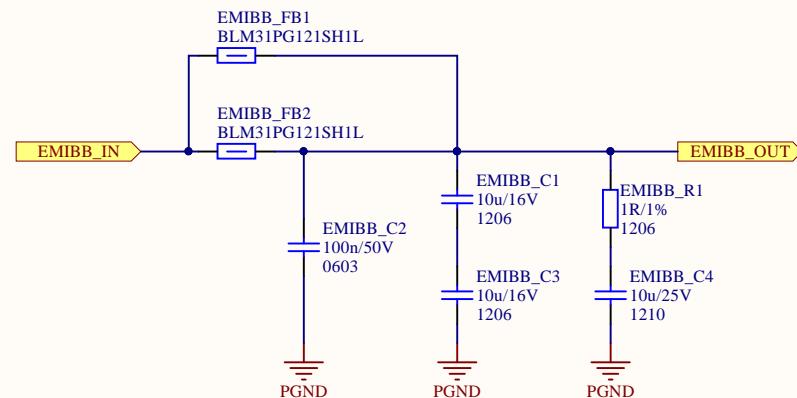
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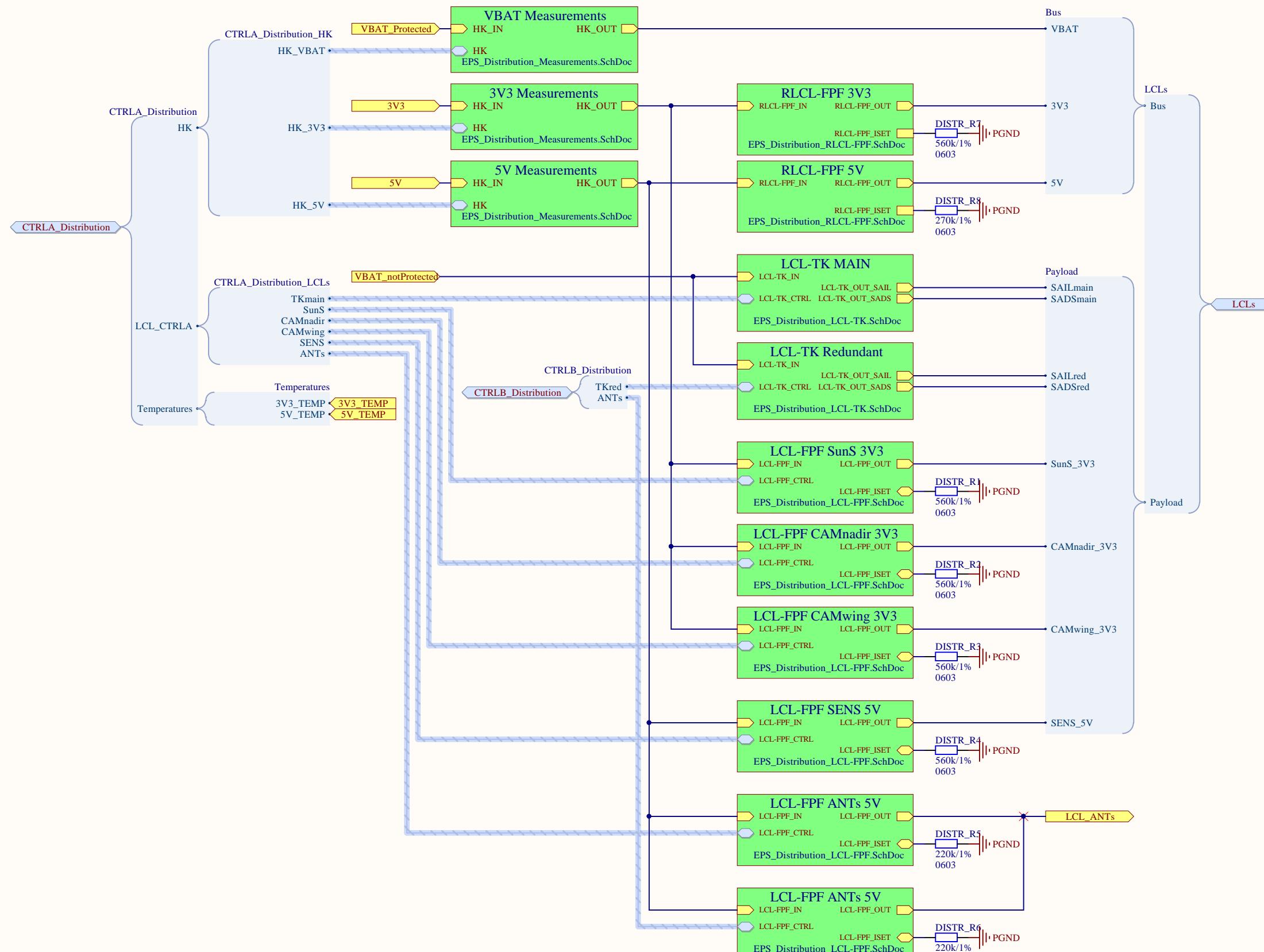
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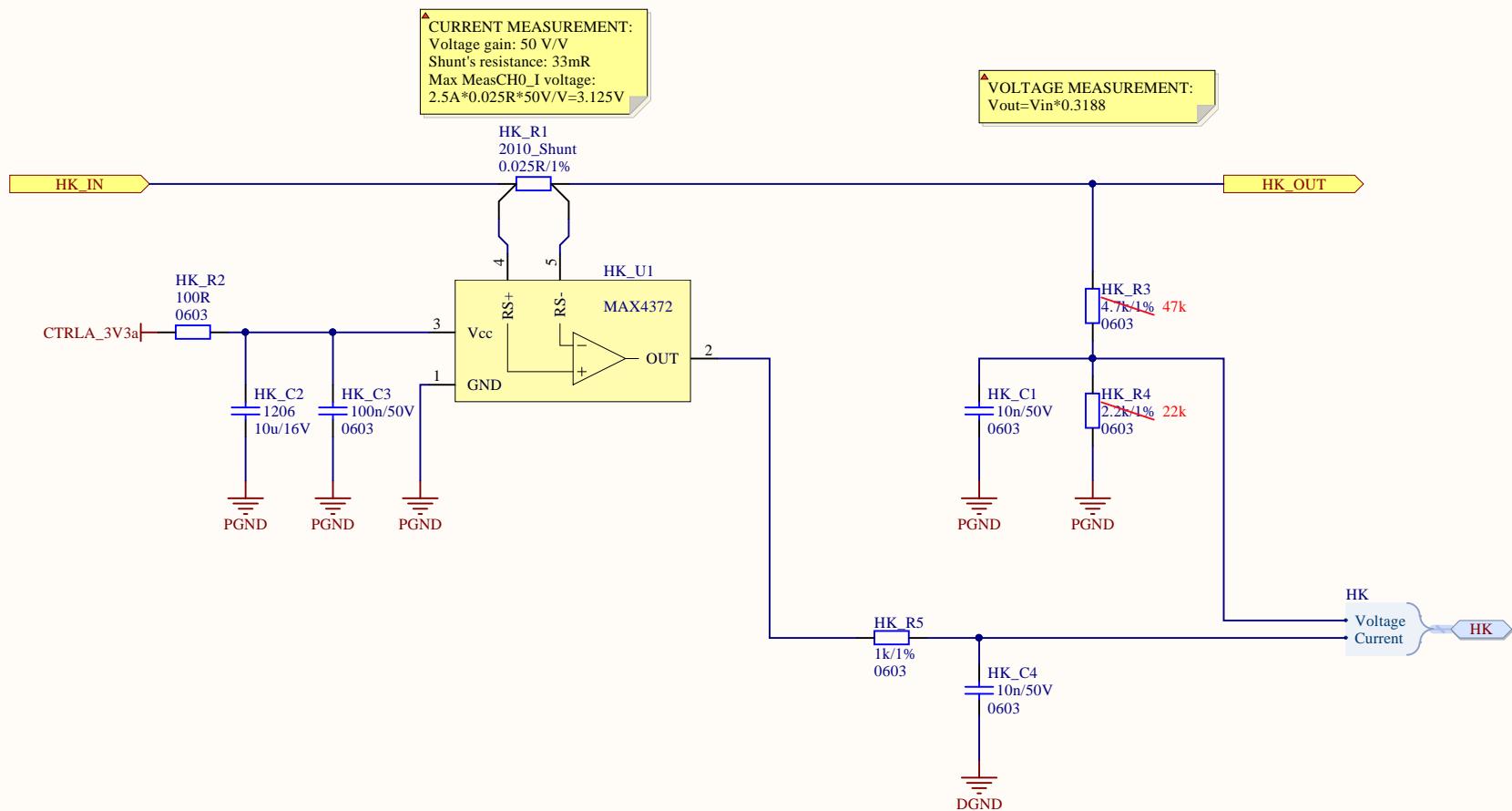
Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / 5V / EMI-Filter / Out			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	Date:	Sheet:
FPM			3	2019/2/28	46 of 51
Author:		Checked by:		Approved by:	
Piotr Kuligowski		(not checked)		(not approved)	
File name: EPS_5V_EMI-Filter_Out.SchDoc					



Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / Distribution			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	3	Date: 2019/2/28 Sheet: 47 of 51
Author:	Checked by:	(not checked)	Approved by:		(not approved)
File name: EPS_Distribution.SchDoc					

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Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / Distribution / Measurements			
Model:	Document Number:	PWSat2-xxx-DW-xxx	Rev:	Date:	Sheet:
Author:		Checked by:		Approved by:	
Piotr Kuligowski		(not checked)		(not approved)	
File name: EPS_Distribution_Measurements.SchDoc					

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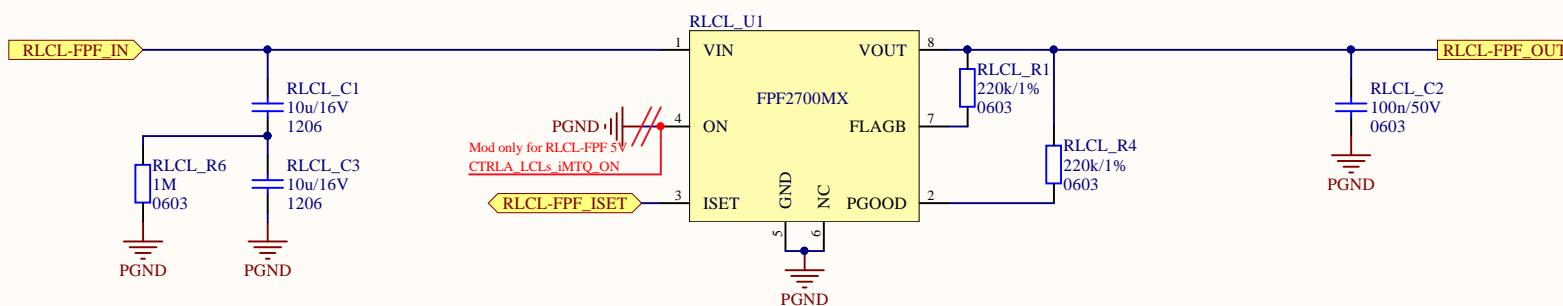
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Project: PW-Sat2 / EPS / FPM				
Title: EPS / Distribution / RLCL-FPF				
Model: FPM	Document Number: PWSat2-xxx-DW-xxx	Rev: 3	Date: 2019/2/28	Sheet: 49 of 51
Author: Piotr Kuligowski		Checked by: (not checked)	Approved by: (not approved)	
File name: EPS_Distribution_RLCL-FPF.SchDoc				

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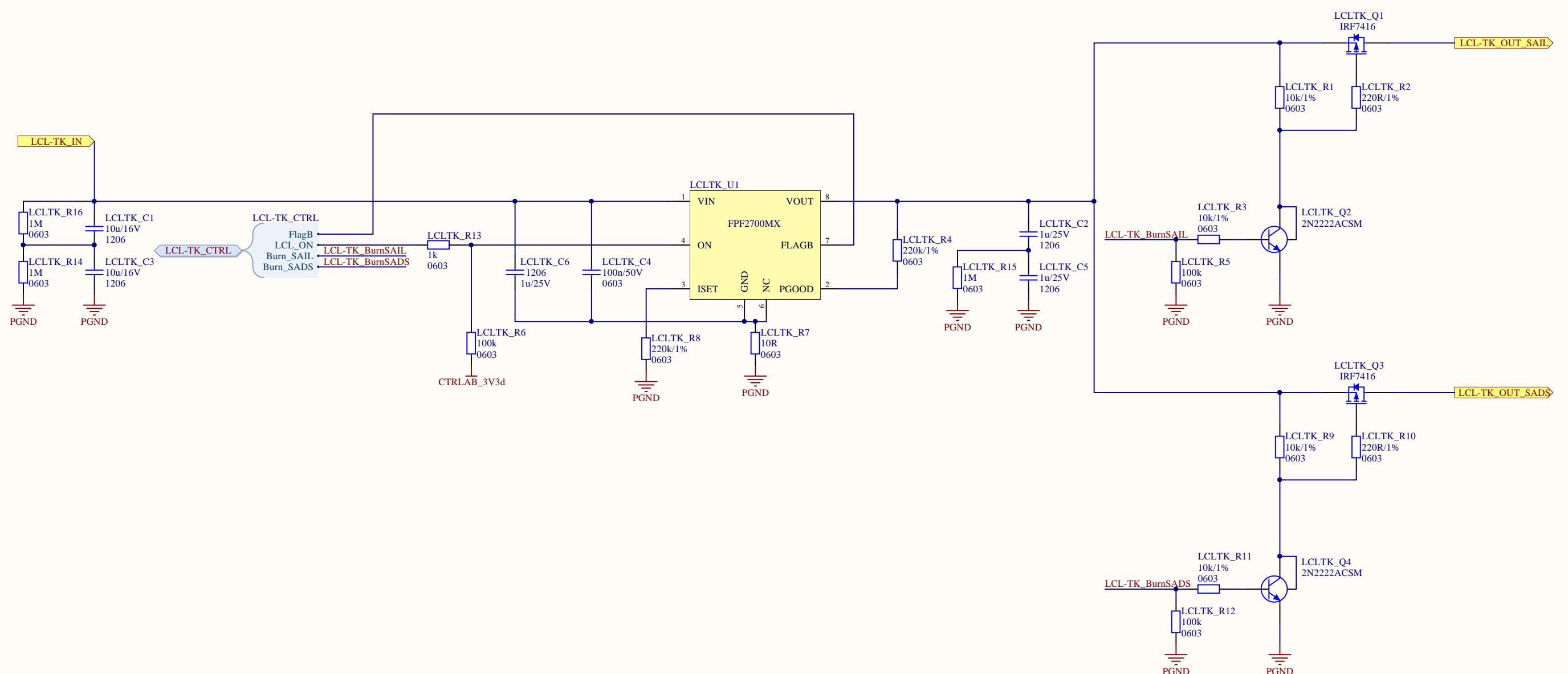
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Project:		PW-Sat2 / EPS / FPM		
Title:		EPS / Distribution / LCL-TK		
Model:	Document Number:	Rev:	Date:	Sheet:
FPM	PWSat2-xxx-DW-xxx	3	2019/2/28	50 of 51
Author:	Checked by:		Approved by:	
Piotr Kuligowski	(not checked)		(not approved)	
File name: EPS_Distribution_LCL-TK.SchDoc				

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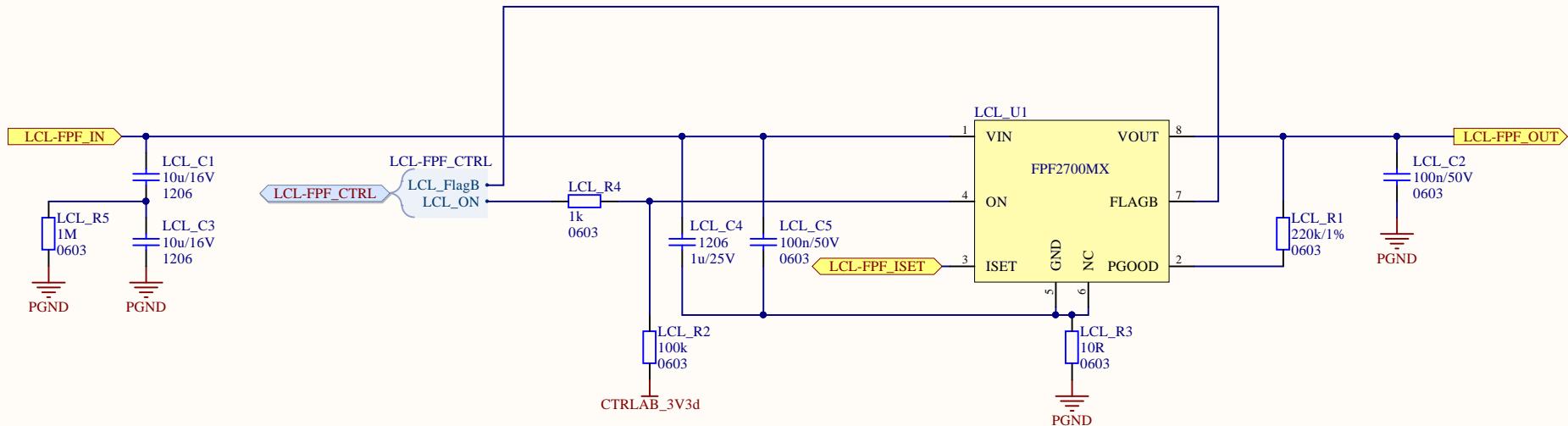
B

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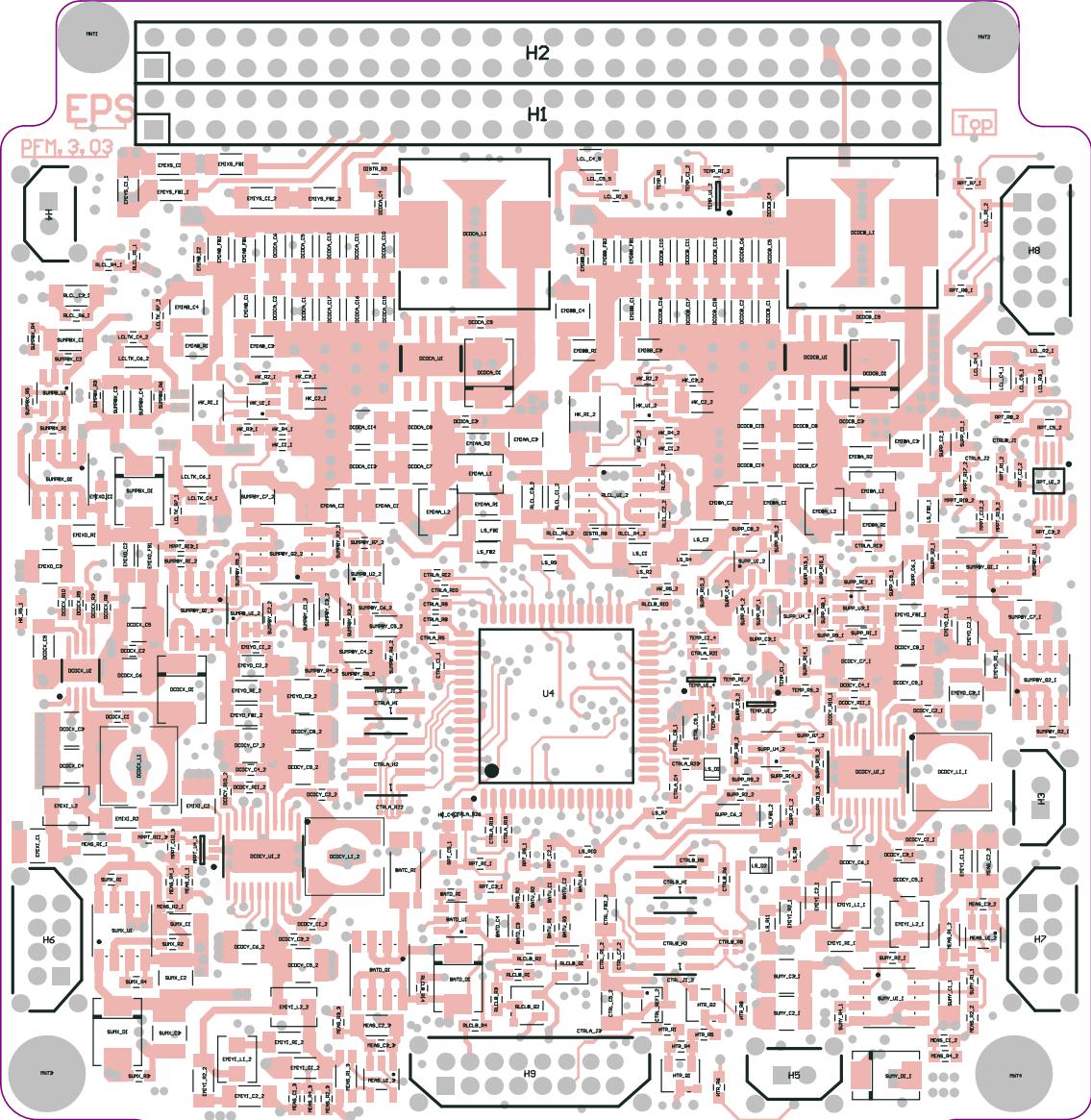
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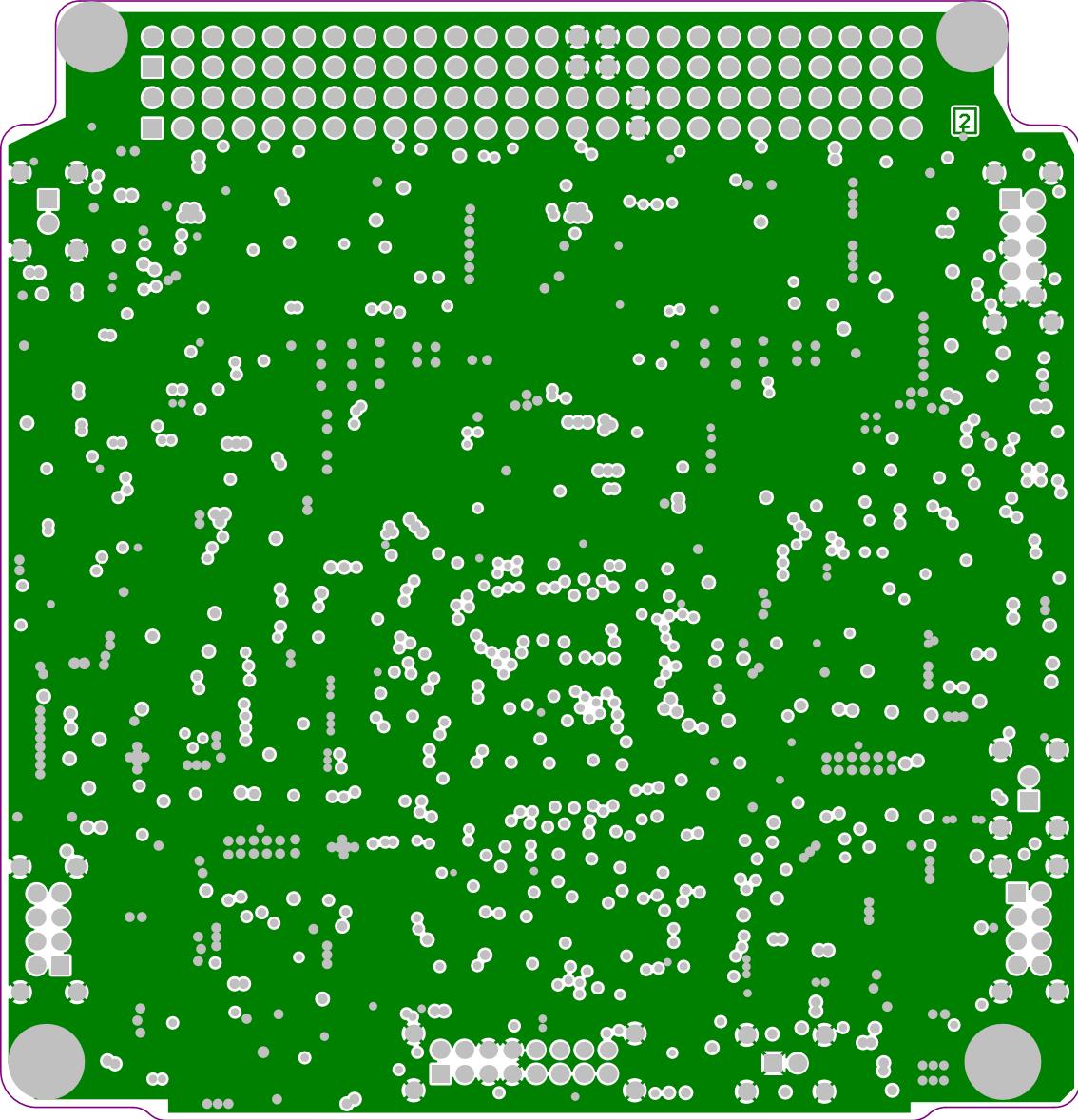
D

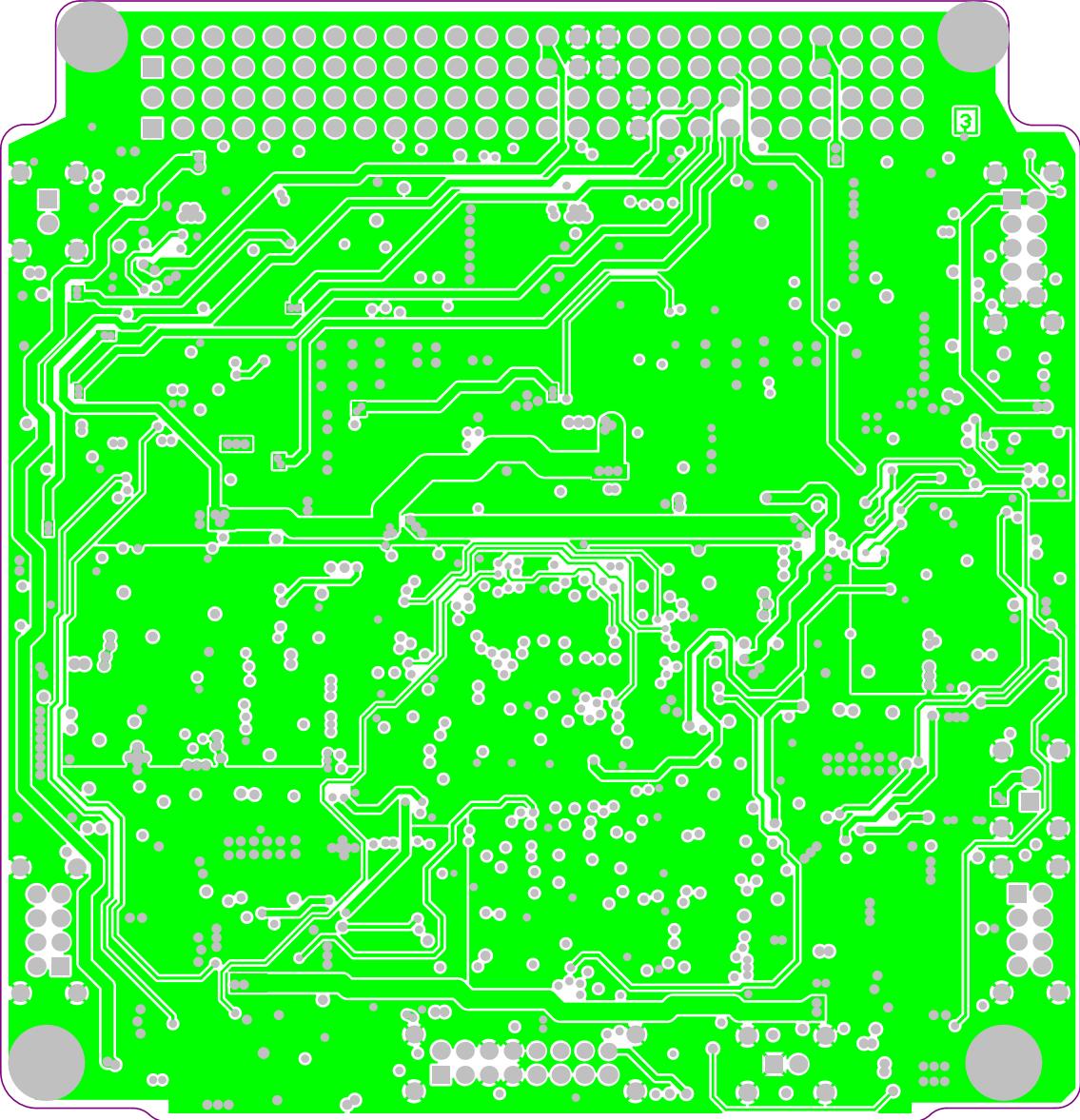
D

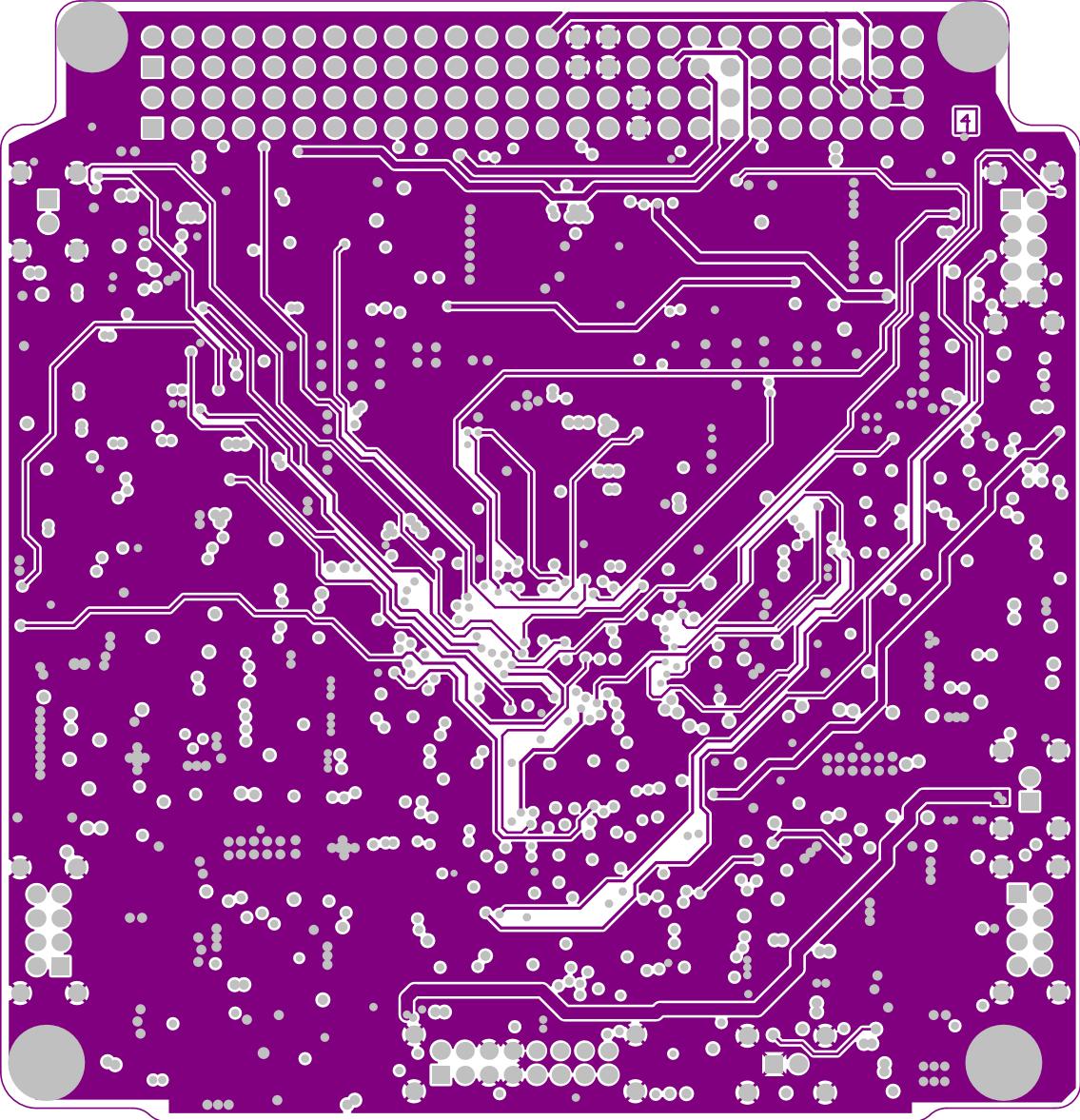


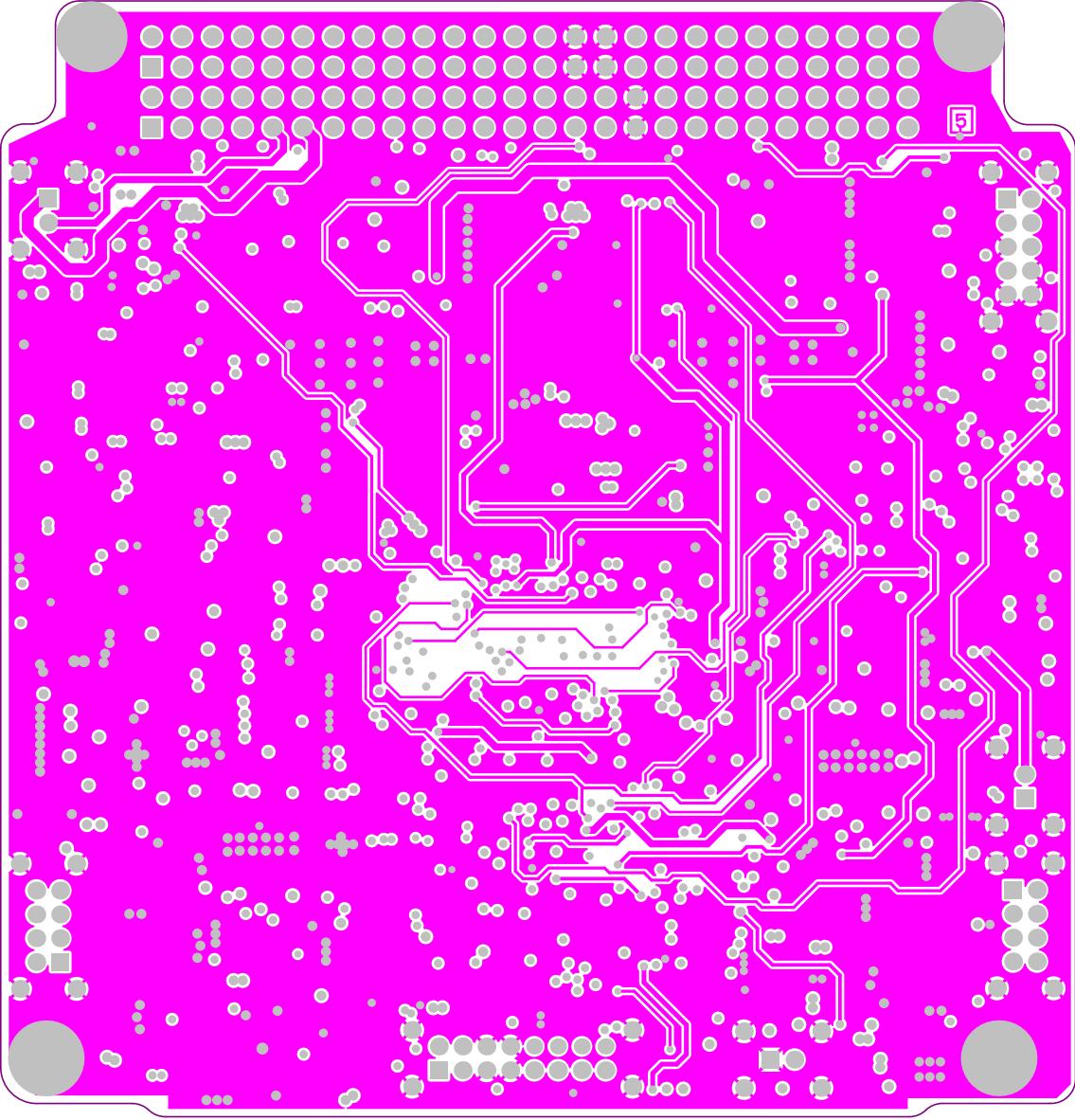
Project:		PW-Sat2 / EPS / FPM			
Title:		EPS / Distribution / LCL-FPF			
Model:	Document Number:	FPM	Rev:	Date:	Sheet:
PWSat2-xxx-DW-xxx		3	2019/2/28	51	of 51
Author:		Checked by:	Approved by:		
Piotr Kuligowski		(not checked)	(not approved)		
File name: EPS_Distribution_LCL-FPF.SchDoc					

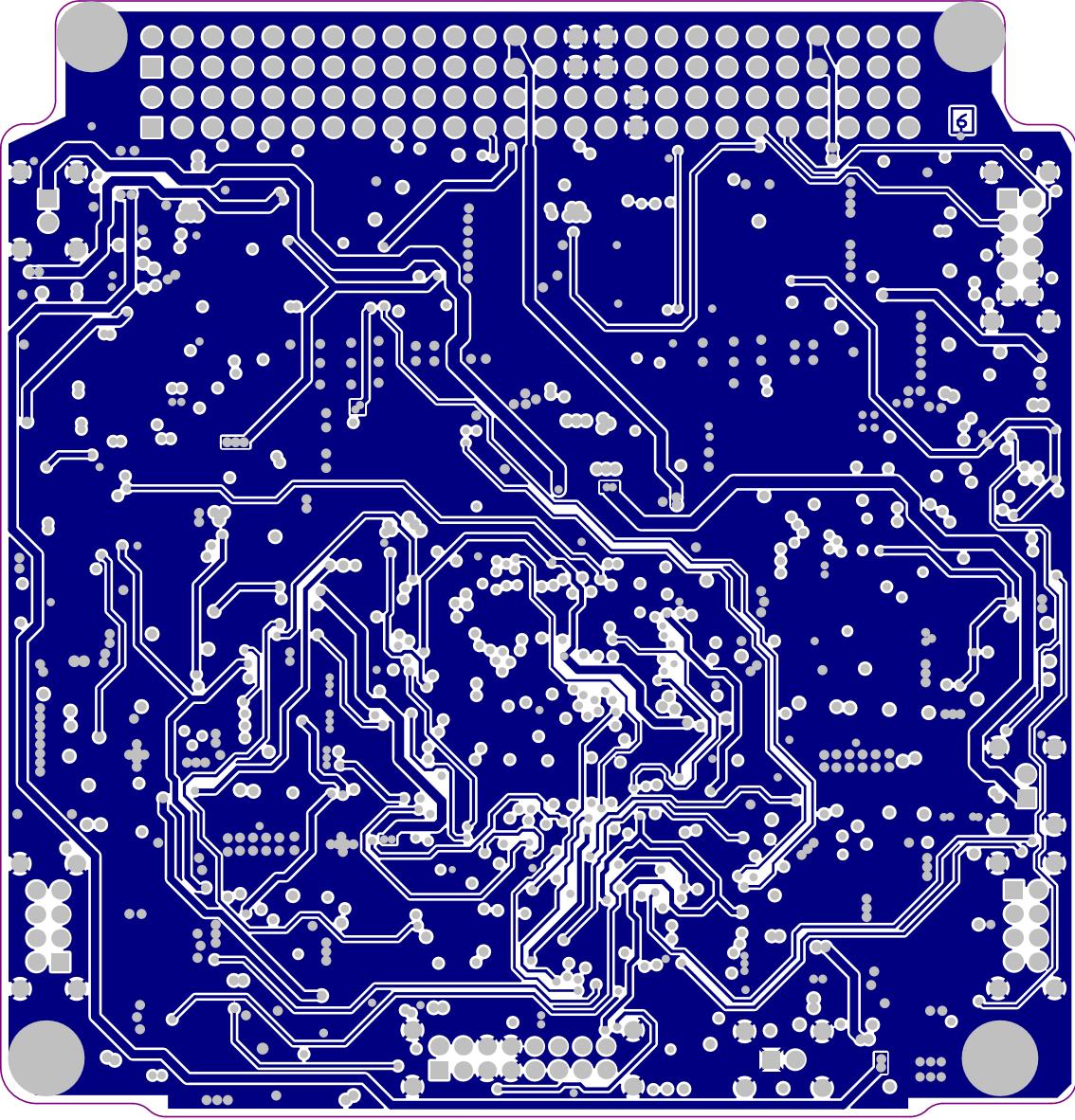


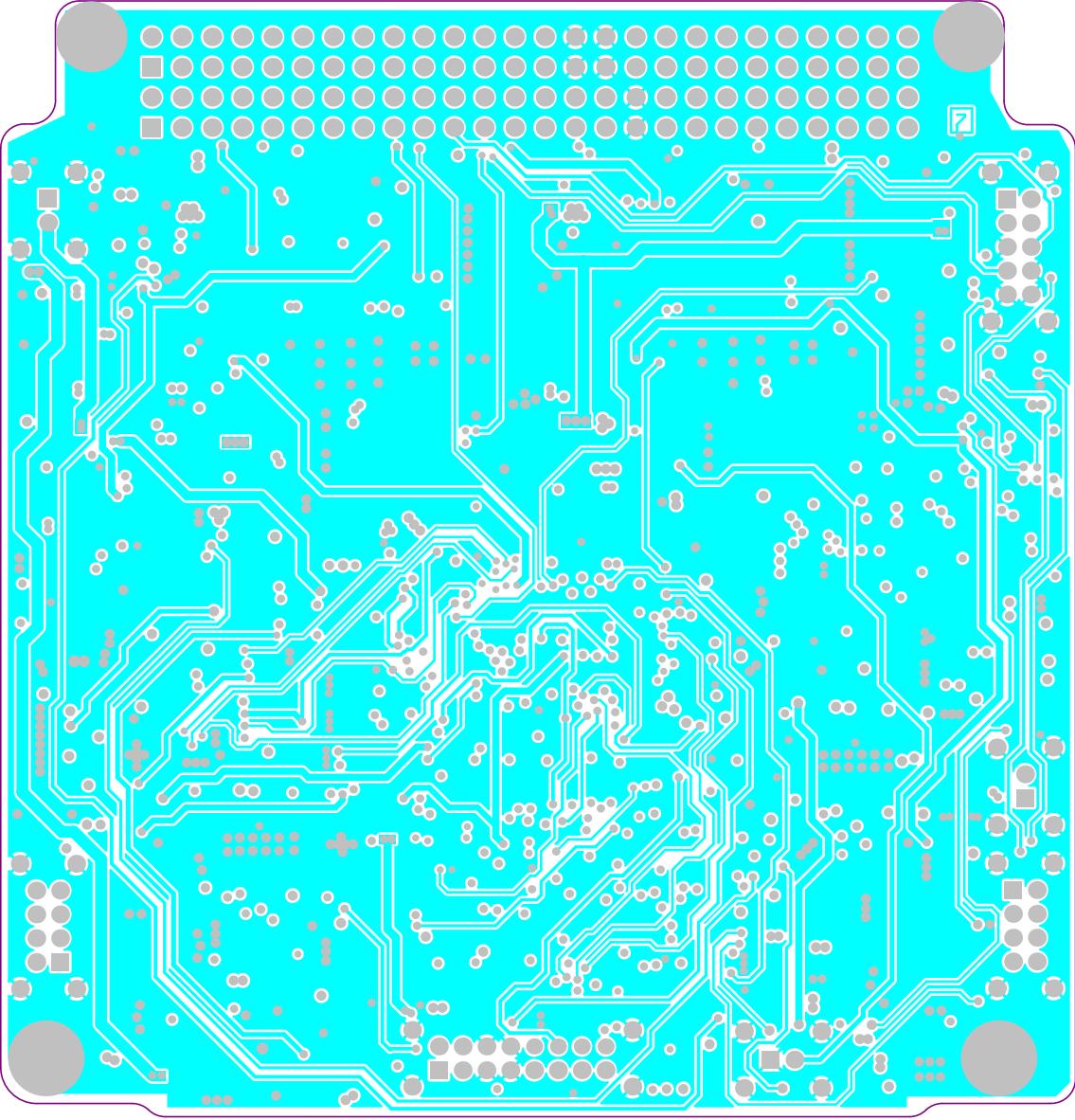












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PH-Sat2

