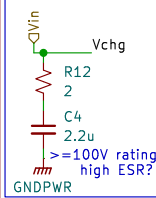
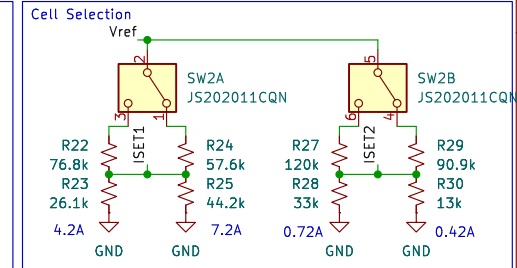
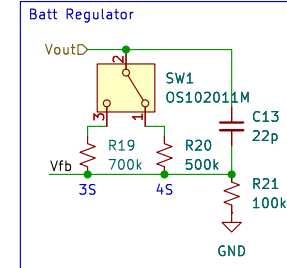
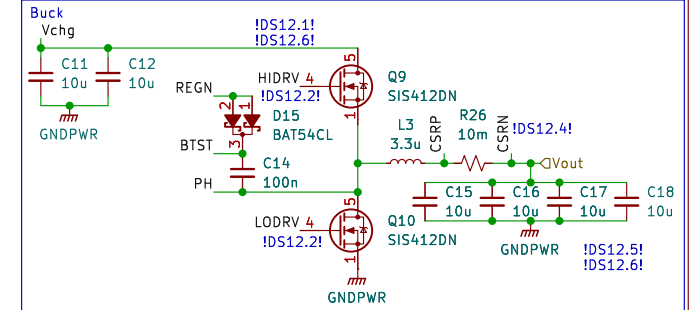
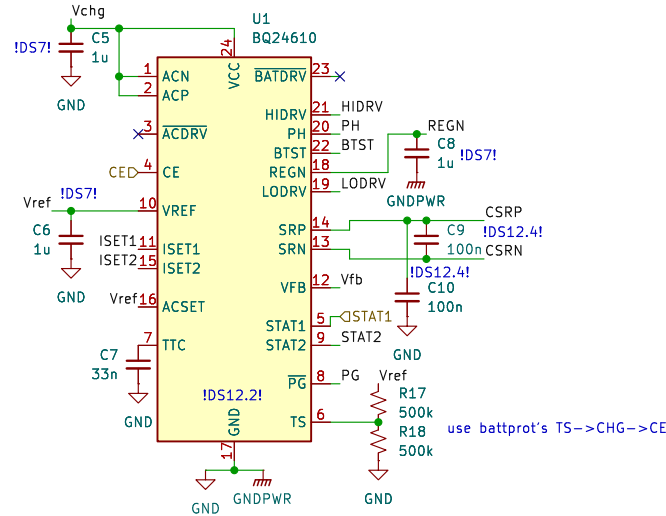
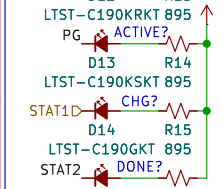


USB Input



Status



hell to RC: Cin ftw
high ESR high C

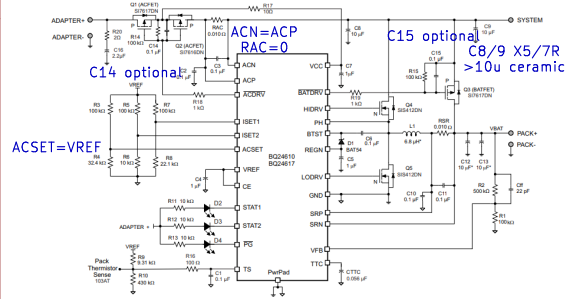


Figure 20. System Schematic with Power Path

Calculations

$V_{in}=20V$	$V_{in}=20V$	$CTTC=33nF$
$I_{chg}=7.2A$	$I_{chg}=7.2A$	$t_{max}=184.8min$
$V_{batt}=16.8V=4*4.2V$	$V_{batt}=12.6V=4*4.2V$	$R2/R1=7or5$
$P_{chg}=103.68W$	$P_{chg}=46.62W$	$R1=100k$
$D=84\%$	$D=63\%$	
$L=3.3uH$	$L=3.3uH$	
$dI=1.4A$	$dI=2.4A$	
$I_{chg}=7.2A$	$I_{chg}=4.2A$	
$C=40u$ (datasheet)	$C=40u$ (datasheet)	
$I_{chg}=7.2A$	$I_{chg}=4.2A$	
$V_{set1}=1.44V$	$V_{set1}=0.84V$	
$R8=1.44/3.3=43.6\%$	$R8=0.84/3.3=25.4\%$	
$R8=44.2k, R7=57.6k$	$R8=26.1k, R7=76.8k$	
$I_{pcg}=I_{term}=0.72A$	$I_{pcg}=I_{term}=0.42A$	
$V_{set2}=0.72V$	$V_{set2}=0.42V$	
$R6=0.72/3.3=21.8\%$	$R6=0.42/3.3=12.7\%$	
$R6=33k, R5=120k$	$R6=13k, R5=90.9k$	

PWR_FLAG PWR_FLAG



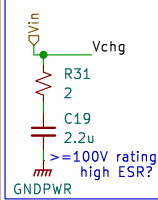
www.ti.com/lit/ds/symlink/bq24617.pdf

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File: battcharge_v0.2.kicad_sch

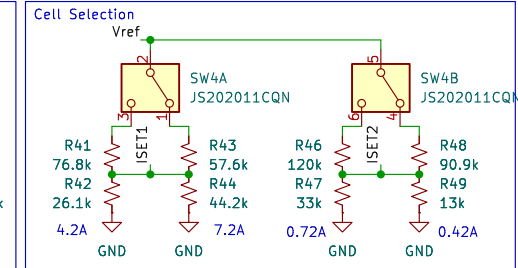
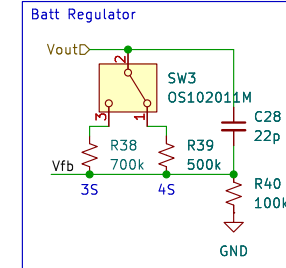
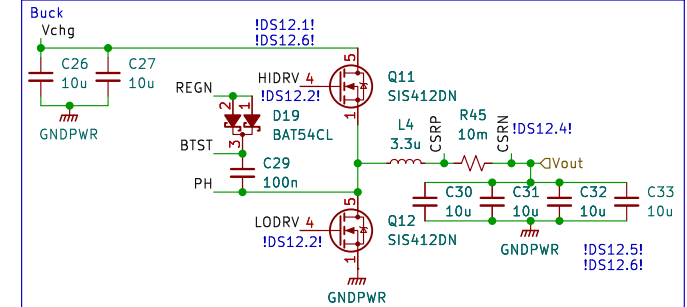
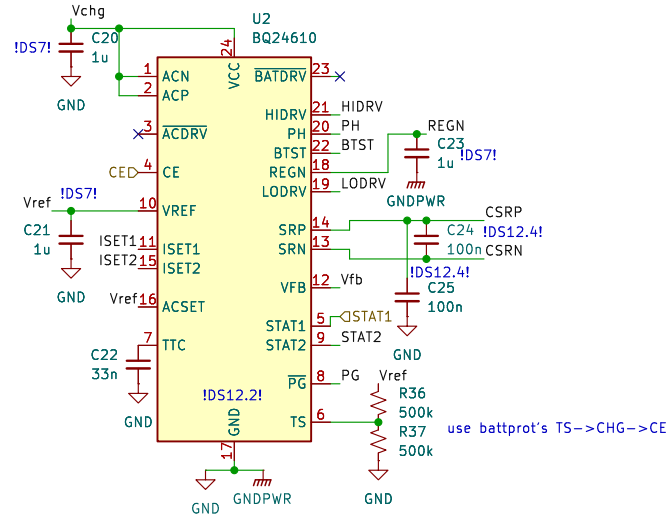
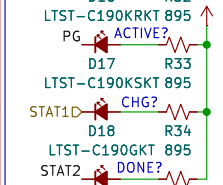
Title: Battery Charger Circuit

Size: A4	Date:	Rev: v0.2
KiCad E.D.A. 9.0.5		Id: 2/17

USB Input



Status



hell to RC: Cin ftw
high ESR high C

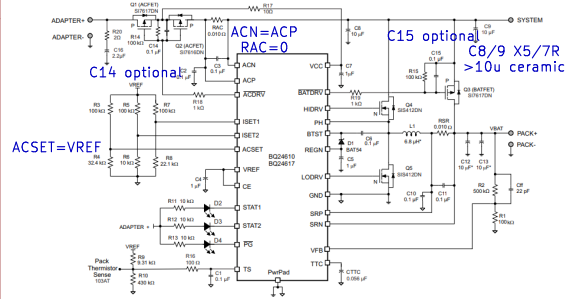


Figure 20. System Schematic with Power Path

Calculations

$V_{in}=20V$	$V_{in}=20V$	$CTTC=33nF$
$I_{4S}=7.2Ah$	$I_{3S}=4.2Ah$	$t_{max}=184.8min$
$V_{batt}=16.8V=4*4.2V$	$V_{batt}=12.6V=4*4.2V$	$R2/R1=7or5$
$P_{chg}=103.68W$	$P_{chg}=46.62W$	$R1=100k$
$D=84\%$	$D=63\%$	
$L=3.3uH$	$L=3.3uH$	
$dI=1.4A$	$dI=2.4A$	
$I_{chg}=7.2A$	$I_{chg}=4.2A$	
$C=40u$ (datasheet)	$C=40u$ (datasheet)	
$I_{chg}=7.2A$	$I_{chg}=4.2A$	
$V_{set1}=1.44V$	$V_{set1}=0.84V$	
$R8=1.44/3.3=43.6\%$	$R8=0.84/3.3=25.4\%$	
$R8=44.2k, R7=57.6k$	$R8=26.1k, R7=76.8k$	
$I_{pcg}=I_{term}=0.72A$	$I_{pcg}=I_{term}=0.42A$	
$V_{set2}=0.72V$	$V_{set2}=0.42V$	
$R6=0.72/3.3=21.8\%$	$R6=0.42/3.3=12.7\%$	
$R6=33k, R5=120k$	$R6=13k, R5=90.9k$	

PWR_FLAG PWR_FLAG



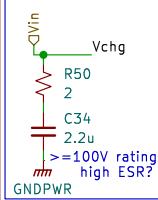
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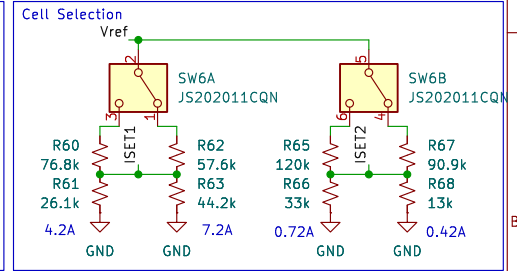
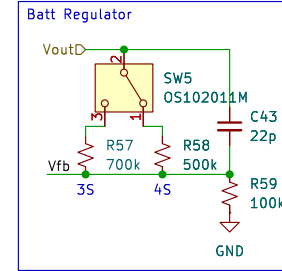
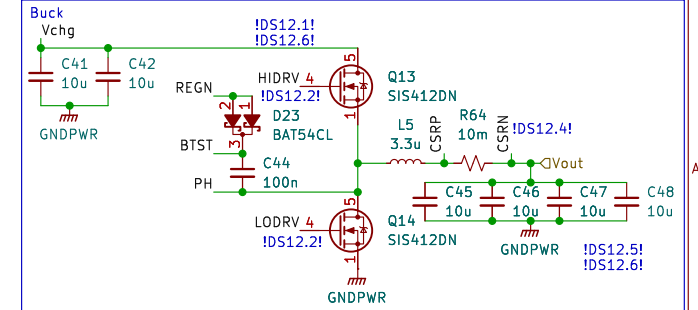
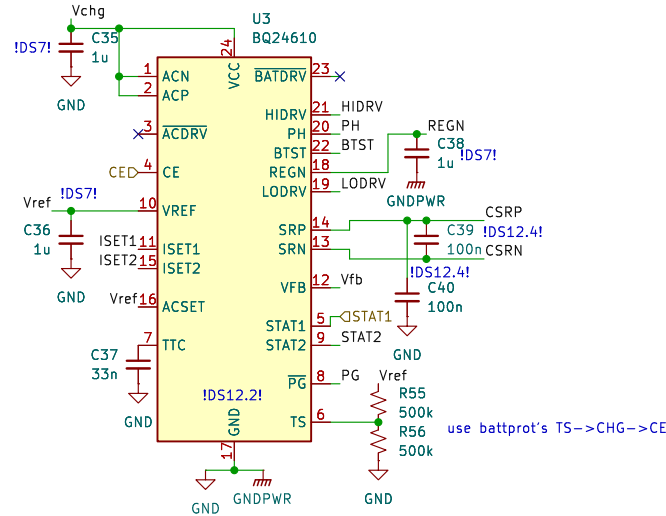
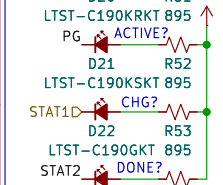
Title: Battery Charger Circuit

Size: A4	Date:	Rev: v0.2
KiCad E.D.A. 9.0.5		Id: 3/17

USB Input



Status



hell to RC: Cin ftw
high ESR high C

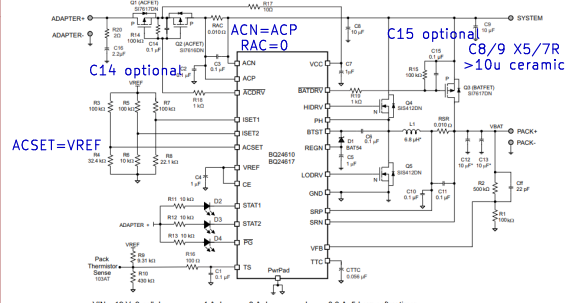


Figure 20. System Schematic with Power Path

Calculations

$V_{in}=20V$	$V_{in}=20V$	$CTTC=33nF$
$I_{ch}=7.2A$	$I_{ch}=7.2A$	$t_{max}=184.8min$
$V_{batt}=16.8V=4*4.2V$	$V_{batt}=12.6V=4*4.2V$	$R2/R1=7or5$
$P_{chg}=103.68W$	$P_{chg}=46.62W$	$R1=100k$
$D=84\%$	$D=63\%$	
$L=3.3uH$	$L=3.3uH$	
$dI=1.4A$	$dI=2.4A$	
$I_{chg}=7.2A$	$I_{chg}=4.2A$	
$C=40u$ (datasheet)	$C=40u$ (datasheet)	
$I_{chg}=7.2A$	$I_{chg}=4.2A$	
$V_{set1}=1.44V$	$V_{set1}=0.84V$	
$R8=1.44/3.3=43.6\%$	$R8=0.84/3.3=25.4\%$	
$R8=44.2k, R7=57.6k$	$R8=26.1k, R7=76.8k$	
$I_{pcg}=I_{term}=0.72A$	$I_{pcg}=I_{term}=0.42A$	
$V_{set2}=0.72V$	$V_{set2}=0.42V$	
$R6=0.72/3.3=21.8\%$	$R6=0.42/3.3=12.7\%$	
$R6=33k, R5=120k$	$R6=13k, R5=90.9k$	

PWR_FLAG PWR_FLAG

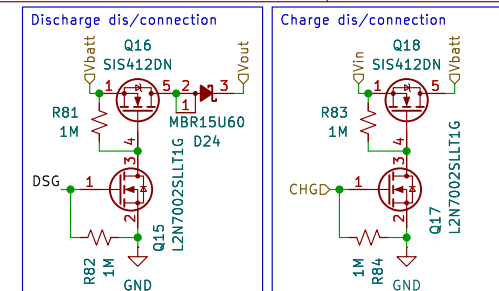
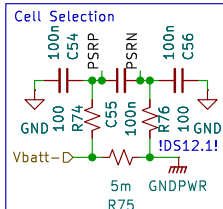
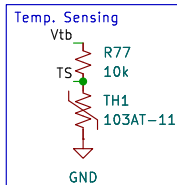
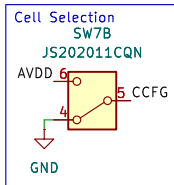
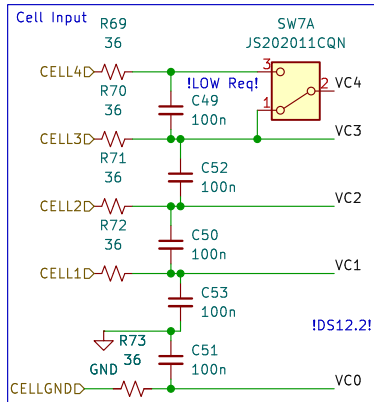


www.ti.com/lit/ds/symlink/bq24617.pdf

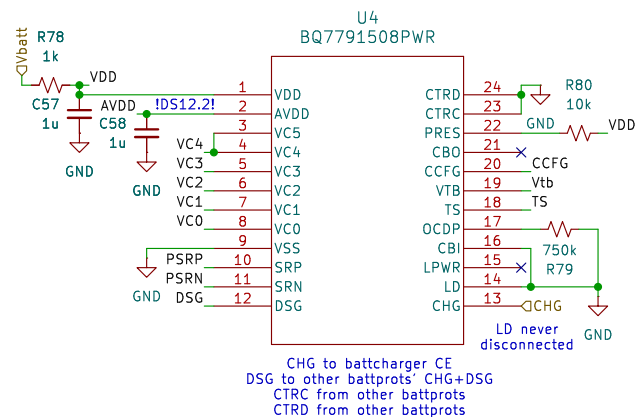
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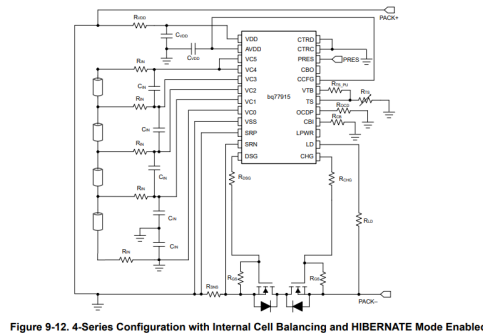
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KiCad E.D.A. 9.0.5		Id: 4/17



high side: keeps common GND
separated CHG/DSG paths: easy battery isolation
from www.ti.com/lit/ds/symlink/bq77207.pdf
from www.ti.com/lit/an/slua910/slua910.pdf



$I_{bal}=50mA < I_{term}=0.72A$ or $0.42A$
 $V_{cell}=4.2V$
 $R_{bal}=12$
 $V_{cell}/I_{bal}=2 \cdot R_{in} + R_{bal}$
 $R_{in} = 5 \cdot (V_{cell}/I_{bal} - R_{bal})$
 $R_{in}=36$
 $V_{ocd1}=70mV$
 $I_{ocd1}=14A$ (138W@9.9V, 229W@16.4V)
 $R_{sns}=5m$
 $V_{ocd2}=140mV$
 $I_{ocd2}=28A$
 $V_{scd}=300mV$
 $I_{scd}=60A$
 $V_{occ}=60mV$
 $I_{occ}=12A$



www.ti.com/lit/ds/symlink/bq77915.pdf

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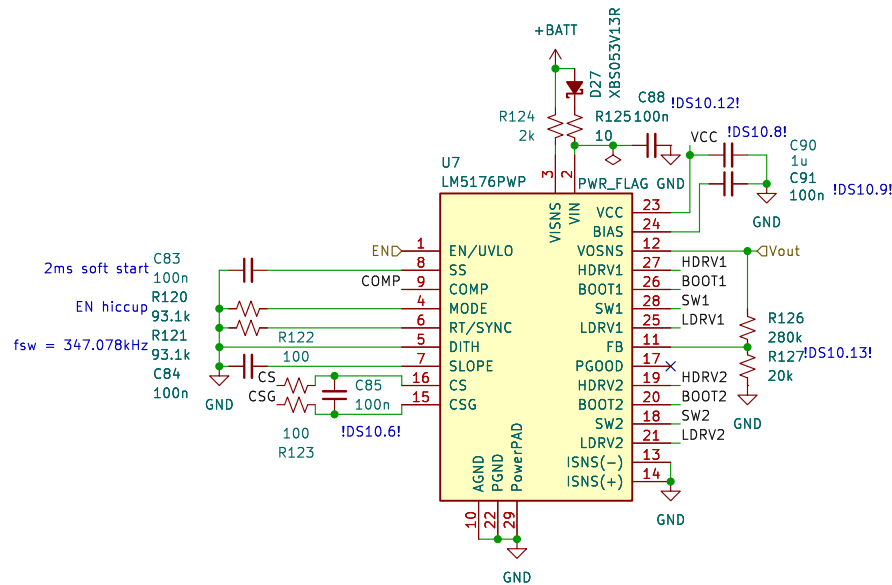
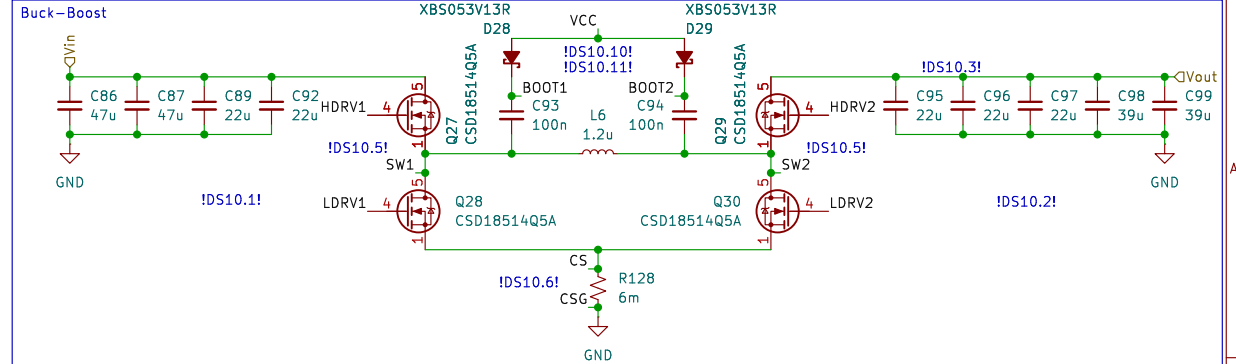
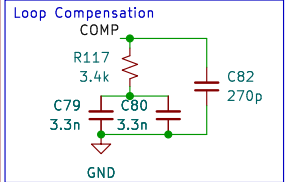
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Rev: v0.2

KiCad E.D.A. 9.0.5

Id: 5/17



VCC
PWR_FLAG

www.ti.com/lit/ds/symlink/lm5176.pdf

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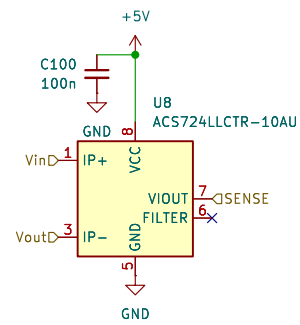
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Rev: v0.1

Id: 8/17

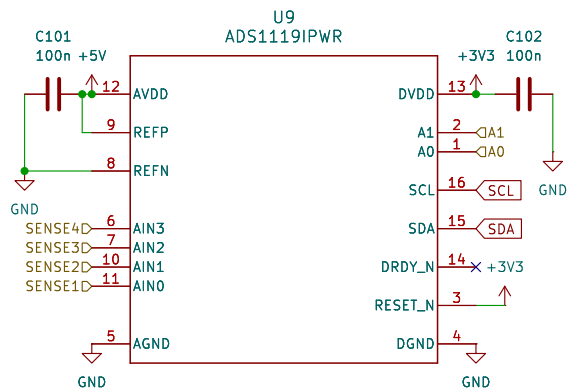


www.allegromicro.com/~media/Files/Datasheets/ACS724-Datasheet.ashx

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Title: Power Monitor

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KiCad E.D.A. 9.0.5		Id: 9/17



www.ti.com/lit/ds/symlink/ads1119.pdf

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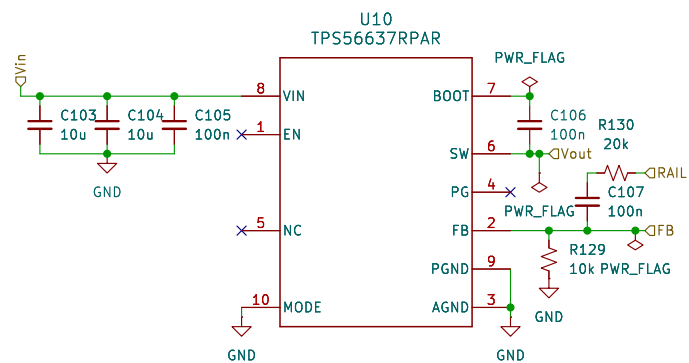
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Rev: v0.1

Id: 10/17



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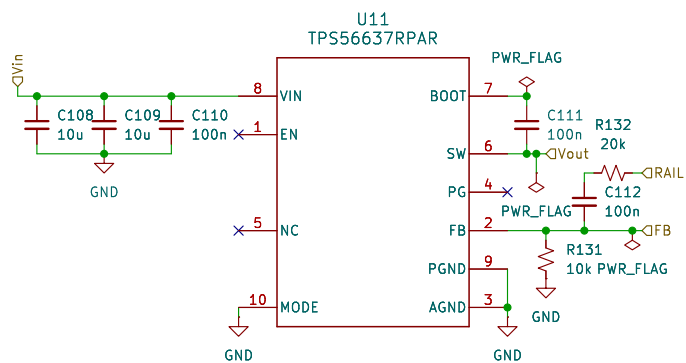
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Rev: v0.1

Id: 11/17



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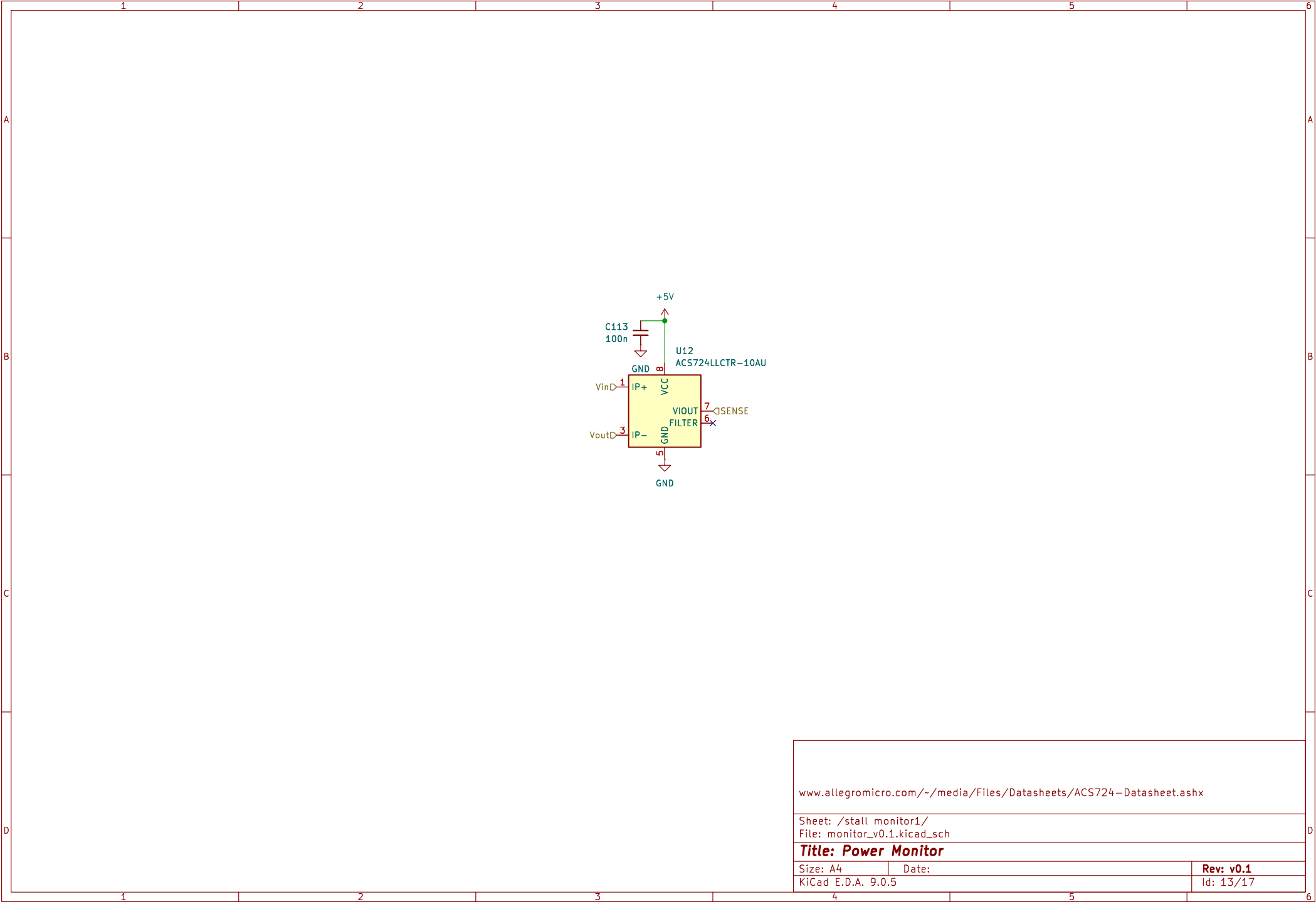
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Id: 12/17

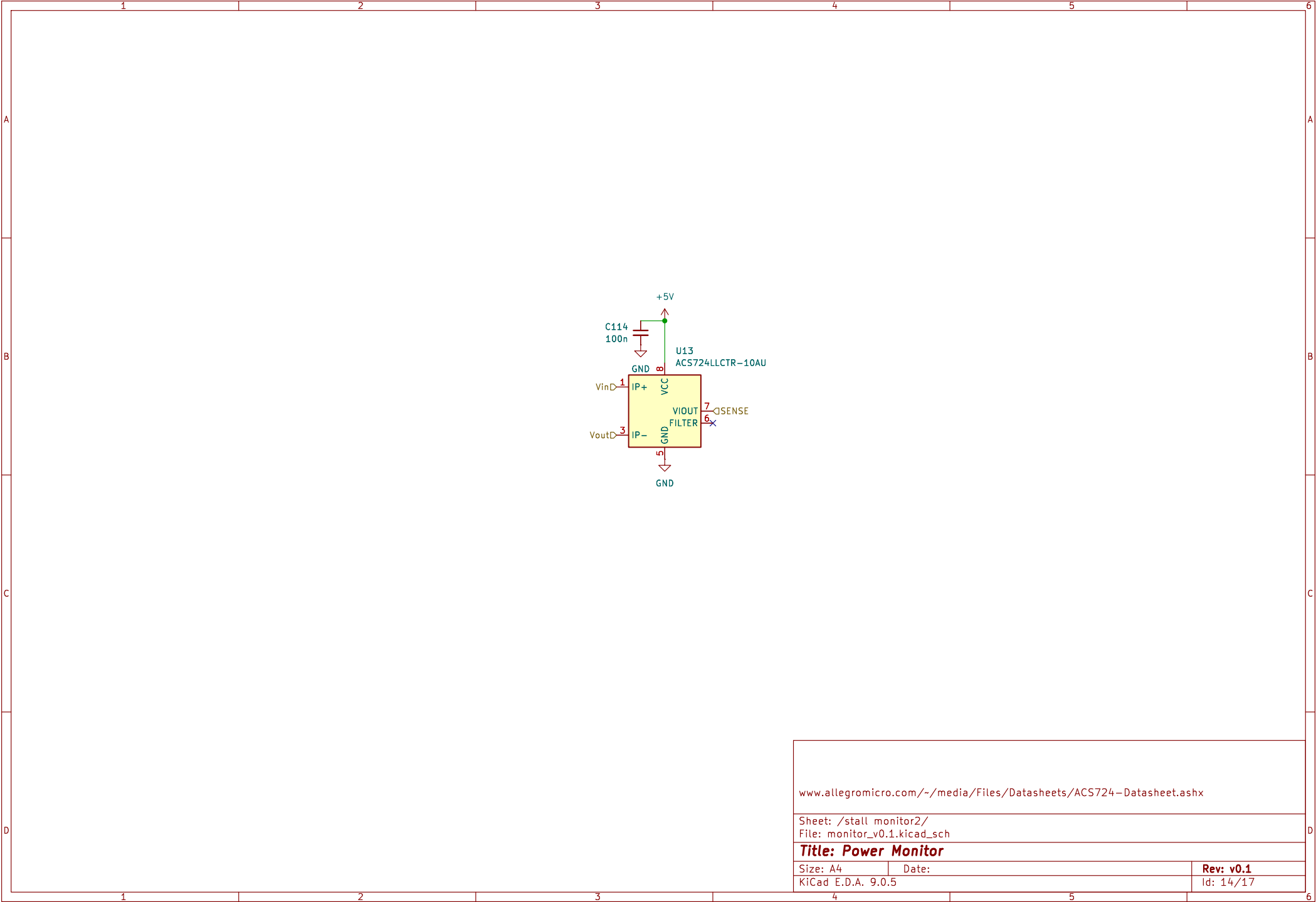


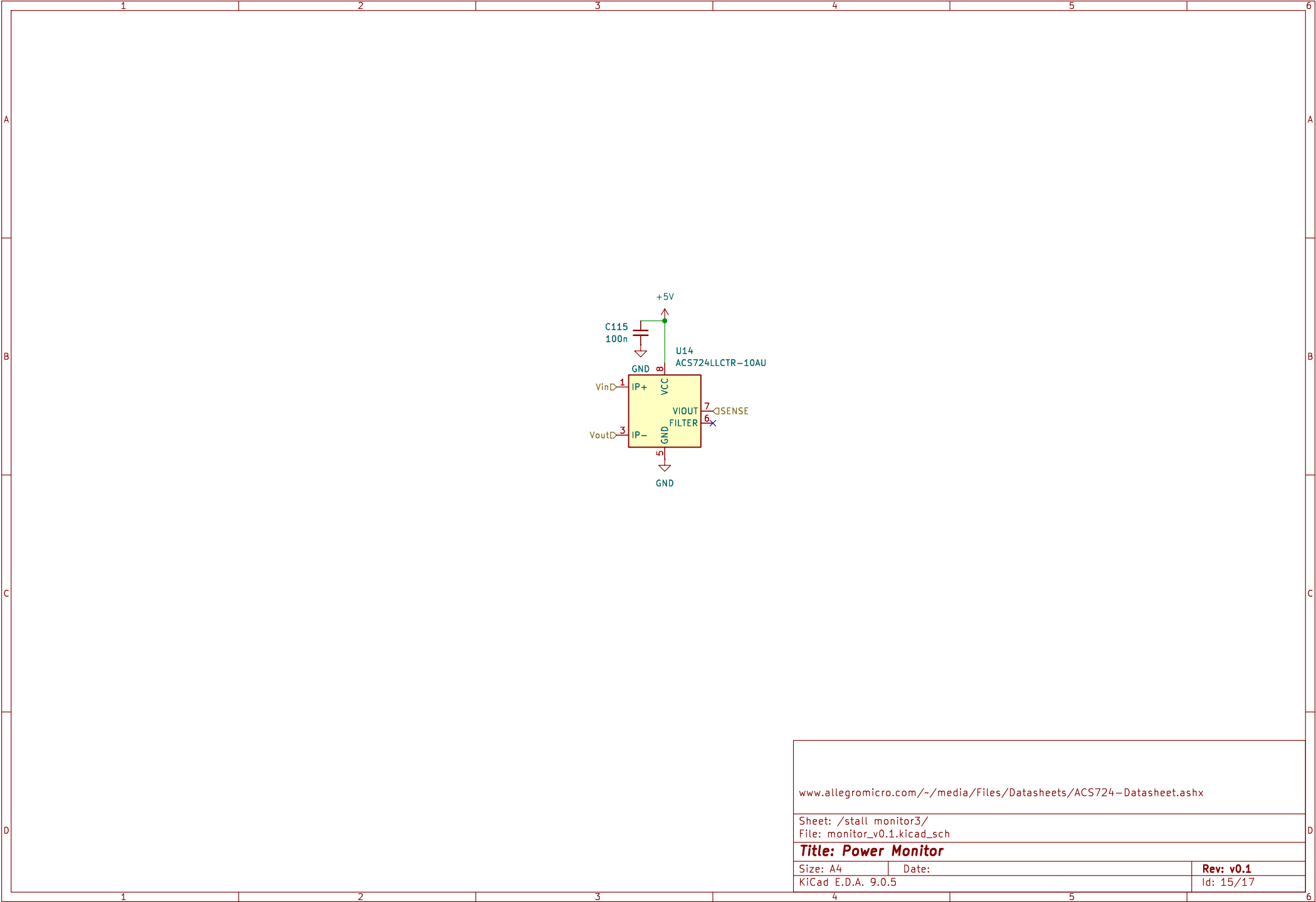
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www.allegromicro.com/~media/Files/Datasheets/ACS724-Datasheet.ashx

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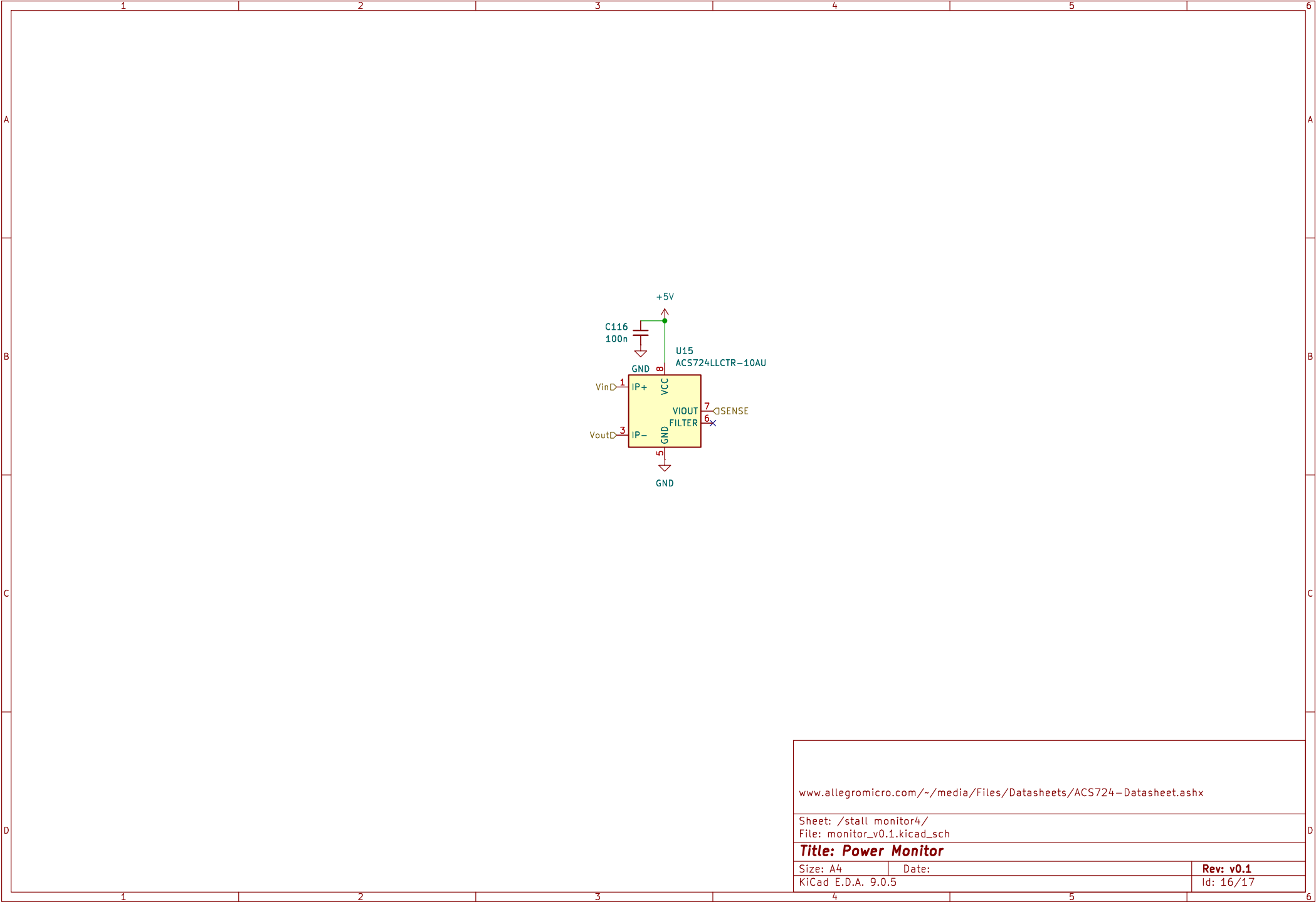
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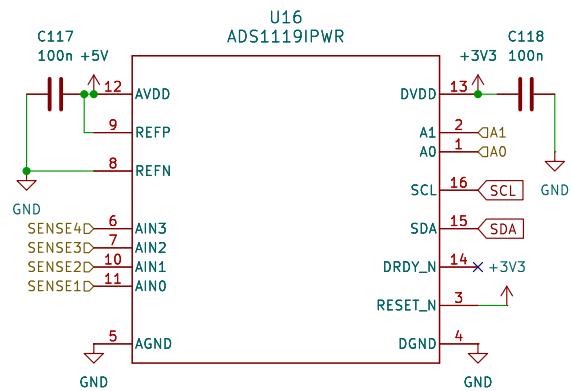
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KiCad E.D.A. 9.0.5

Id: 15/17





www.ti.com/lit/ds/symlink/ads1119.pdf

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Size: A4

Date:

Rev: v0.1

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