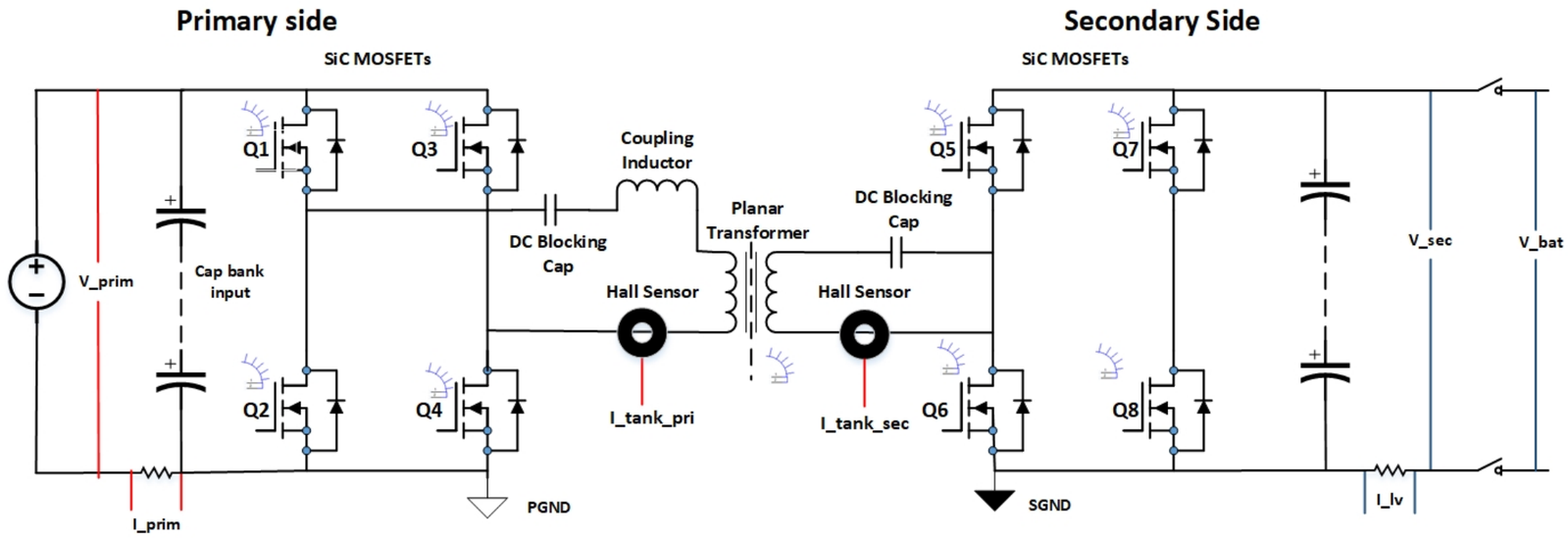

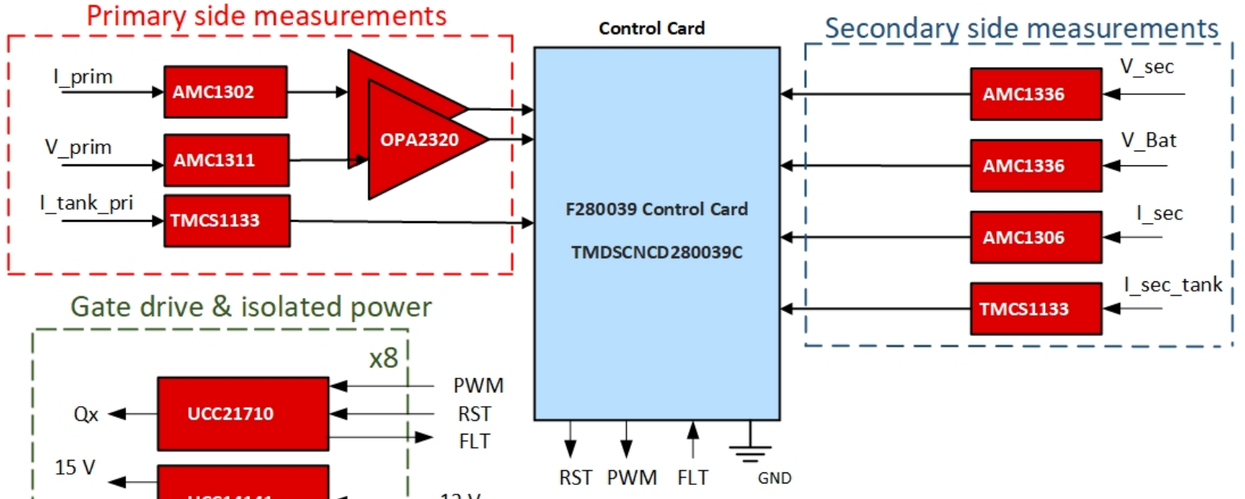

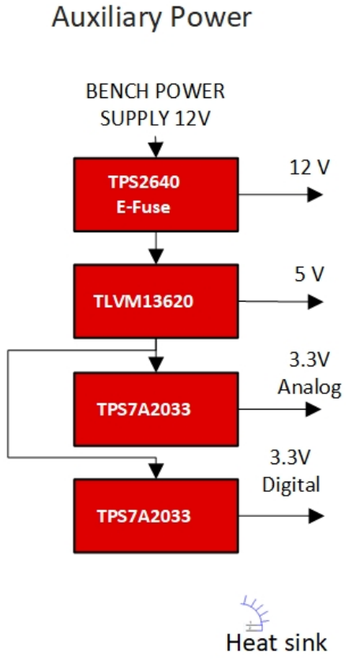

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TID #: TIDA-010054	Project Title: 10KW DC-DC CONVERTER	
Number: TIDA-DAB-010054 Rev: E4	Sheet Title:	
SVN Rev: Not in version control	Assembly Variant: 001	Sheet: 1 of 11
Drawn By: Andreas Lechner	File: TIDA-DAB-010054-E4_Block Diagram.SchDoc	Size: B
Engineer: Andreas Lechner	Contact: http://www.ti.com/support	

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Dual Active Bridge Power Stage

TP3
VBUS_P
J11
74650073R
800V
Input DC Voltage
J13
74650073R
HV_P_N
TP4
VBUS_N
R58
0.003
Iin+
Iin-
C23
15uF
1.1kV
C24
15uF
1.1kV
HV_P_H
R66
1.00M
R128
1.00M
R226
1.00M
MPP
R281
1.00M
R327
1.00M
R361
1.00M
C16
1kV
0.1uF
C20
1kV
0.1uF
C26
1kV
0.1uF
C30
1kV
0.1uF
HV_P_N
PGND

C31
C33 0.47µF
C35 0.47µF
C37 0.47µF
C39 0.47µF
C41 0.47µF
C43 0.47µF
C45 0.47µF
C47 0.47µF
C49 0.47µF
C51 0.47µF
C53 0.47µF
C55 0.47µF
C57 0.47µF
1kV

HV_P_H
D1H_P
HV_P_SW1
G1H_P
S1H_P
Q9
C3M0075120K
HV_P_SW1
D1L_P
HV_P_N
G1L_P
HV_P_N
S1L_P
Q12
C3M0075120K
HV_P_N

HV_P_H
D2H_P
HV_P_SW2
G2H_P
HV_P_SW2
S2H_P
Q8
C3M0075120K
HV_P_SW2
D2L_P
HV_P_N
G2L_P
HV_P_N
S2L_P
Q13
C3M0075120K
PGND

HV_P_SW1
T1
HV_P_SW2
1
2
3
4
61259
I_PRI_N
I_PRI_P

HV_S_SW1
I_SEC_P
HV_S_SW2
C32
C34 0.47µF
C36 0.47µF
C38 0.47µF
C40 0.47µF
C42 0.47µF
C44 0.47µF
C46 0.47µF
C48 0.47µF
C50 0.47µF
C52 0.47µF
C54 0.47µF
C56 0.47µF
C58 0.47µF
630V

Blocking Caps can be replaced with CRCW20100000Z0EF to short them for testing without them

HV_S_P
C15
1kV
0.1uF
C19
1kV
0.1uF
C25
1kV
0.1uF
C28
1kV
0.1uF
SGND
R127
1.00M
R222
1.00M
R228
1.00M
MPS
R285
1.00M
R359
1.00M
R363
1.00M
HV_S_N
C21
30uF
800V
C22
30uF
800V
1.5m
R59
I_OUT_P
I_OUT_N

TP1
V_OUT
TP2
K1
G9KB-1A DC12
HV_BAT_P
VBATT_P
12V
C138
25V
100µF
D1
BAV21WS-TP
D2
1SMA5927BT3G
12V
RELAY_P
GND
J12
74650073R
500V
Output DC voltage
12V
C145
25V
100µF
D3
BAV21WS-TP
D4
1SMA5927BT3G
12V
RELAY_N
GND
J14
74650073R
K3
G9KB-1A DC12
HV_BAT_N
TP5
VBATT_N

HV_S_P
D1H_S
HV_S_SW1
G1H_S
HV_S_SW1
S1H_S
Q6
C3M0030090K
I_SEC_N
HV_S_SW1
HV_S_P
D2H_S
HV_S_SW2
G2H_S
HV_S_SW2
S2H_S
Q7
C3M0030090K
HV_S_SW2

HV_S_SW1
D1L_S
HV_S_N
G1L_S
HV_S_N
S1L_S
Q10
C3M0030090K
HV_S_N
HV_S_SW2
D2L_S
HV_S_N
G2L_S
HV_S_N
S2L_S
Q11
C3M0030090K
SGND

C59 3KV 2200pF PGND SGND
C60 3KV 2200pF PGND GND
C61 3KV 2200pF GND SGND

Isolated Thermal sheets betwwen FET and Heatsink

MP1 CD-02-05-247
MP2 CD-02-05-247
MP3
MP7
CR201-50VE
CR201-50VE
SGND

MP4 CD-02-05-247
MP5 CD-02-05-247
MP6
MP10
CR201-50VE
CR201-50VE
PGND
MP11 CD-02-05-247
MP12 CD-02-05-247

Isolated Thermal sheets betwwen FET and Heatsink

MP8 CD-02-05-247
MP9 CD-02-05-247

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TID #: TIDA-010054	Project Title: 10KW DC-DC CONVERTER	
Number: TIDA-DAB-010054 Rev: E4	Sheet Title:	
SVN Rev: Not in version control	Assembly Variant: 001	Sheet: 2 of 11
Drawn By: Andreas Lechner	File: TIDA-DAB-010054-E4_PowerStage.SchDoc	Size: B
Engineer: Andreas Lechner	Contact: http://www.ti.com/support	

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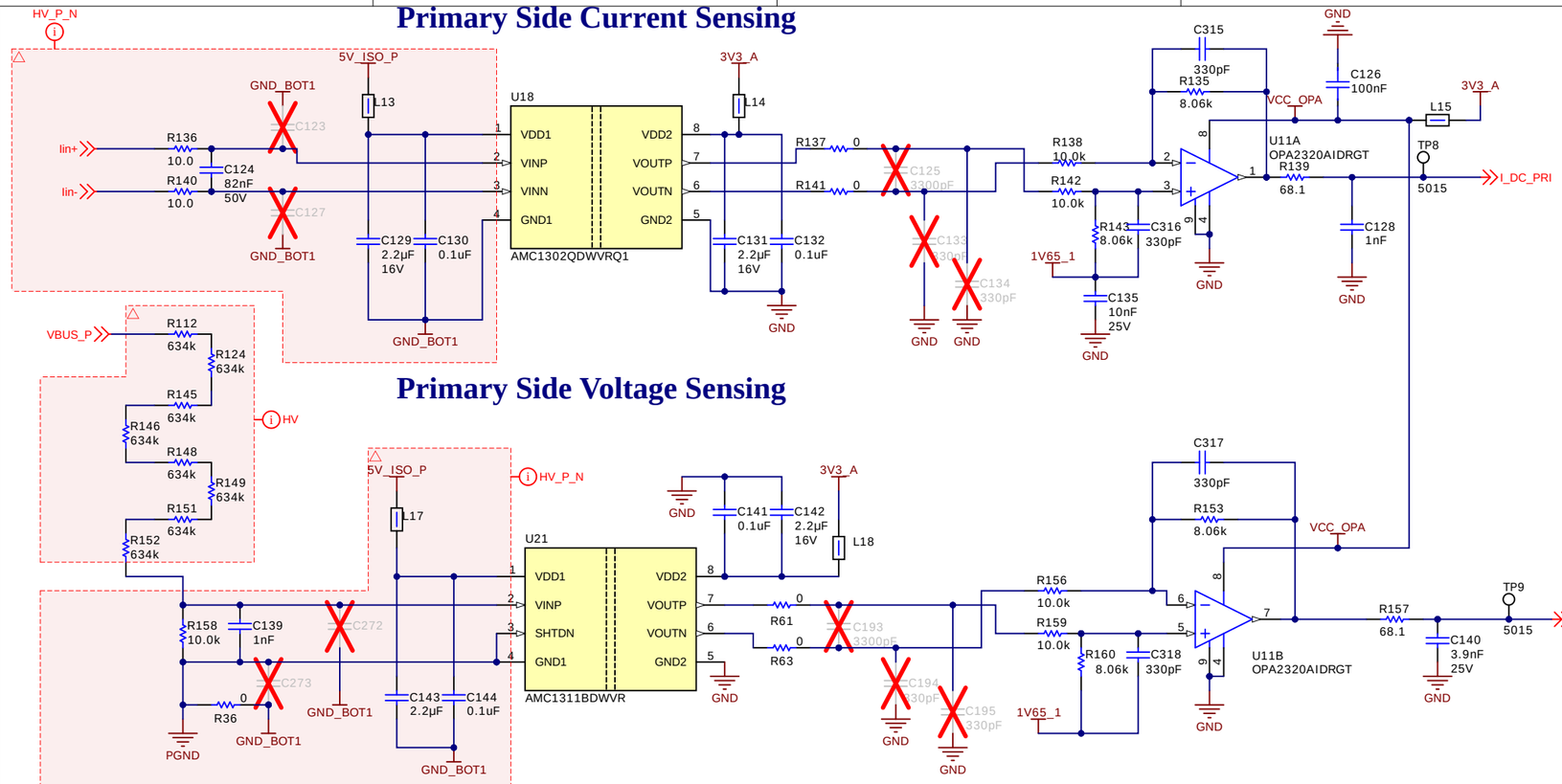
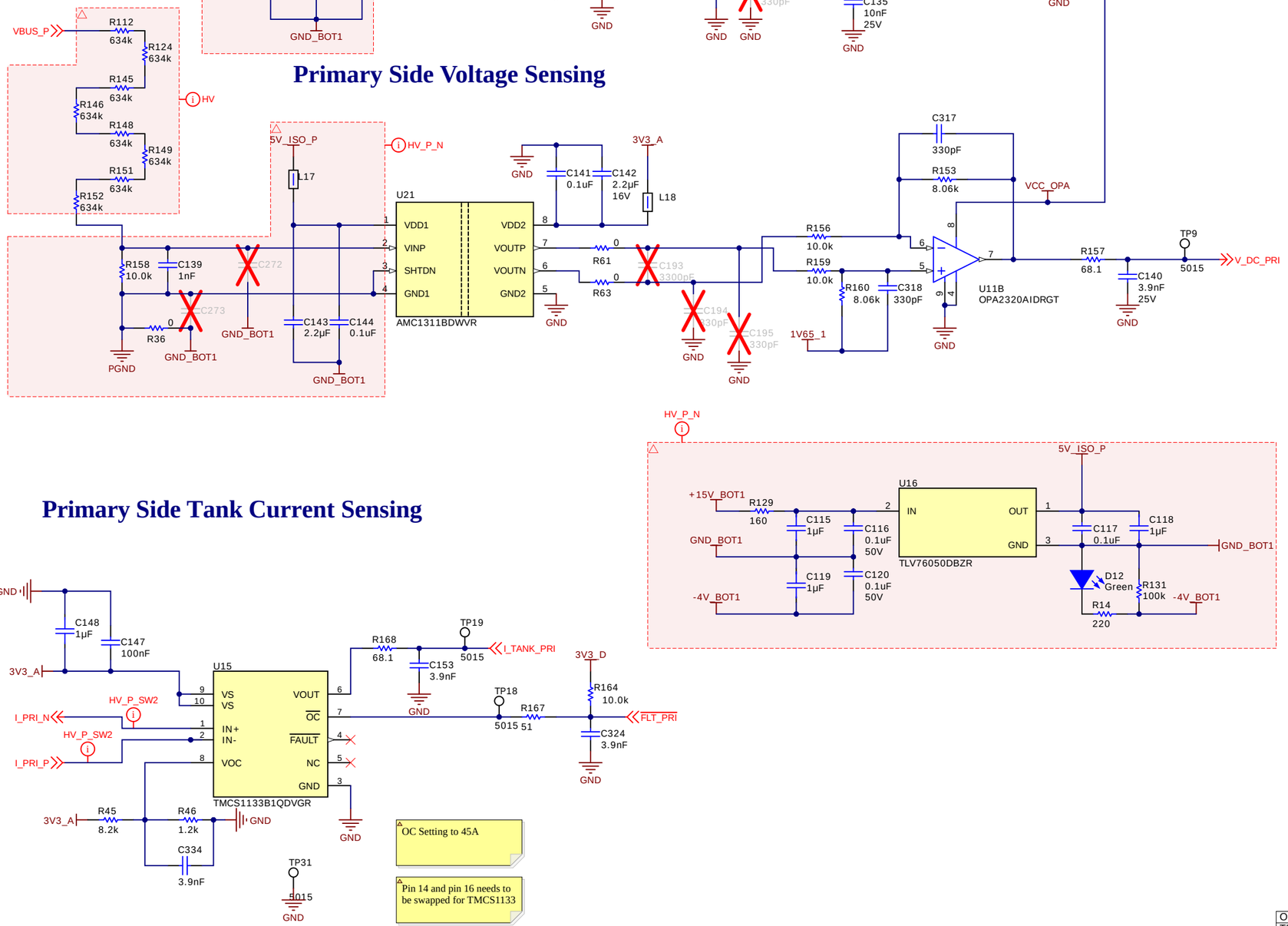
Primary Side Current Sensing

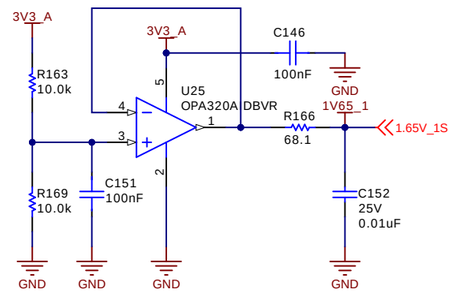


Primary Side Voltage Sensing



Primary Side Tank Current Sensing

1V65 Generation



Orderable: NA	Designed for: Public Release	Mod. Date: 18-Jan-24
TID #: TIDA-010054	Project Title: 10KW DC-DC CONVERTER	
Number: TIDA-DAB-010054 Rev: E4	Sheet Title:	
SVN Rev: Not in version control	Assembly Variant: 001	Sheet: 3 of 11
Drawn By: Andreas Lechner	File: TIDA-DAB-010054-E4_PrimarySideSensing.SchDoc	Size: B
Engineer: Andreas Lechner	Contact: http://www.ti.com/support	

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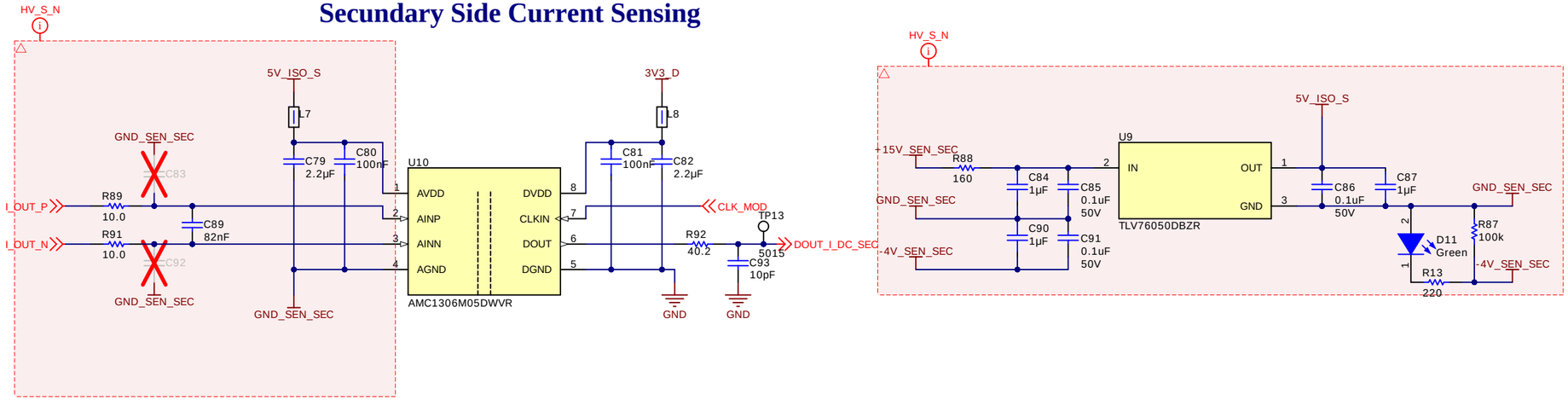
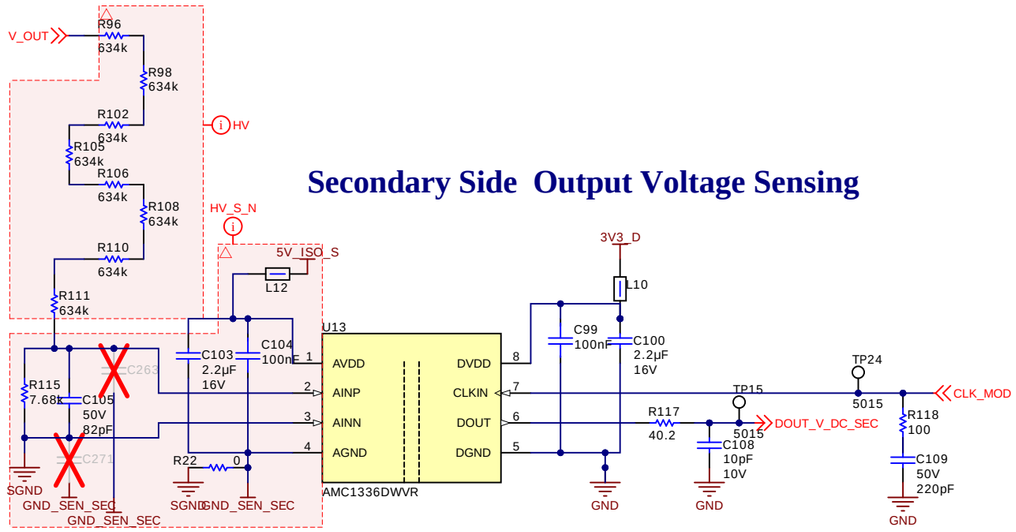
Secundary Side Current Sensing

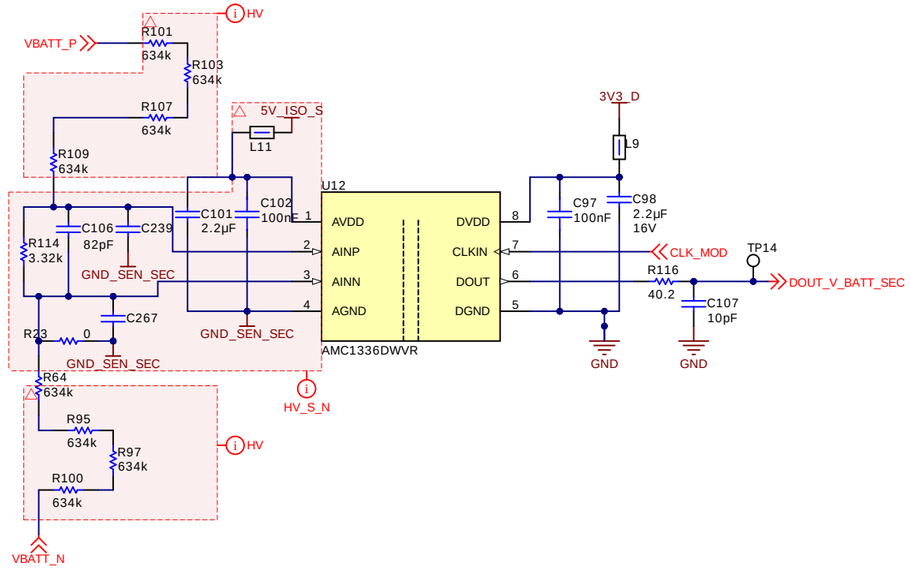


DS Modulators are used because distance to ControlCard is longer (25-30cm) and sihnal passes the switch nodes.

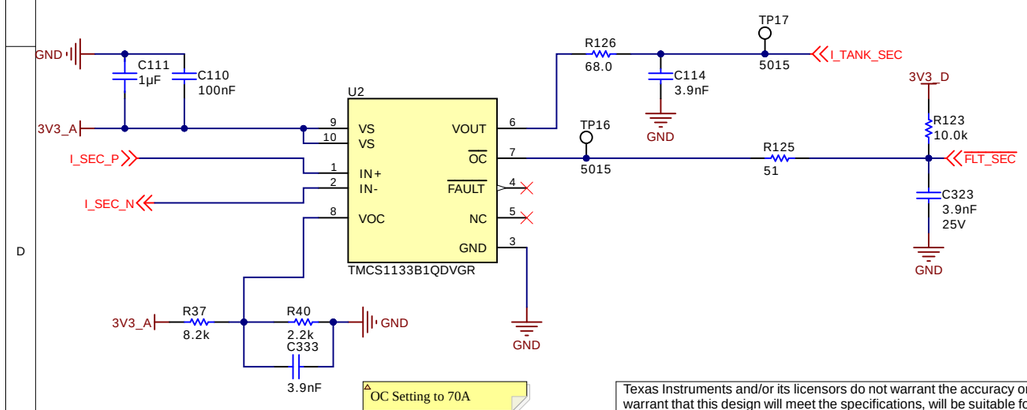
Secondary Side Output Voltage Sensing



Secondary Side Battery Voltage Sensing



Secondary Side Tank Current Sensing



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TID #: TIDA-010054	Project Title: 10KW DC-DC CONVERTER	
Number: TIDA-DAB-010054	Rev: E4	Sheet Title:
SVN Rev: Not in version control	Assembly Variant: 001	Sheet: 4 of 11
Drawn By: Andreas Lechner	File: TIDA-DAB-010054-E4_SecondarySideSensing.SchDoc	Size: D
Engineer: Andreas Lechner	Contact: http://www.ti.com/support	

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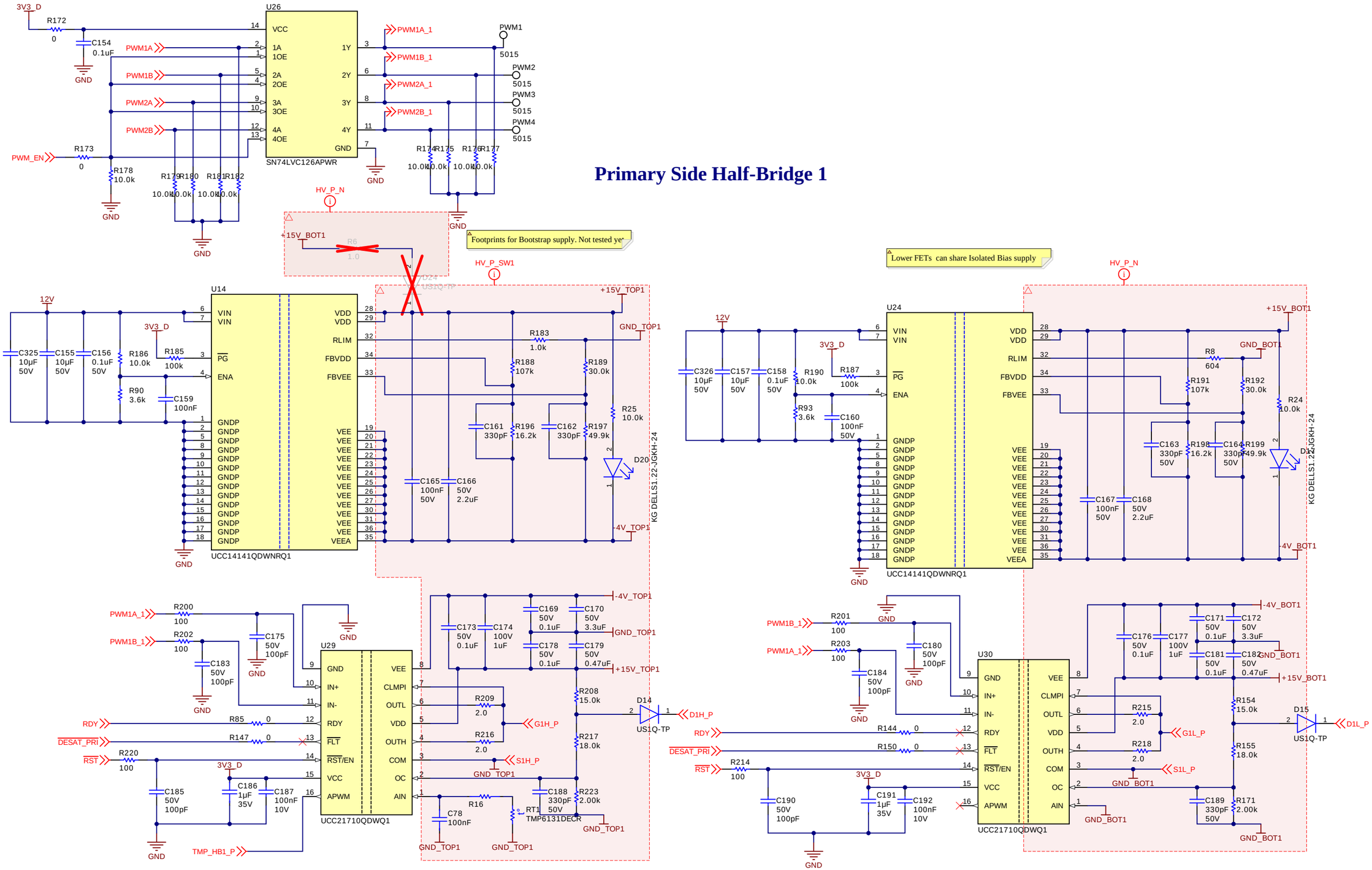
Primary Side Half-Bridge 1



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TID #: TIDA-010054	Project Title: 10KW DC-DC CONVERTER		
Number: TIDA-DAB-010054 Rev: E4	Sheet Title:		
SVN Rev: Not in version control	Assembly Variant: 001	Sheet: 5 of 11	
Drawn By: Andreas Lechner	File: TIDA-DAB-010054-E4_GateDriverPrimHB1.SchDoc	Size: B	
Engineer: Andreas Lechner	Contact: http://www.ti.com/support		

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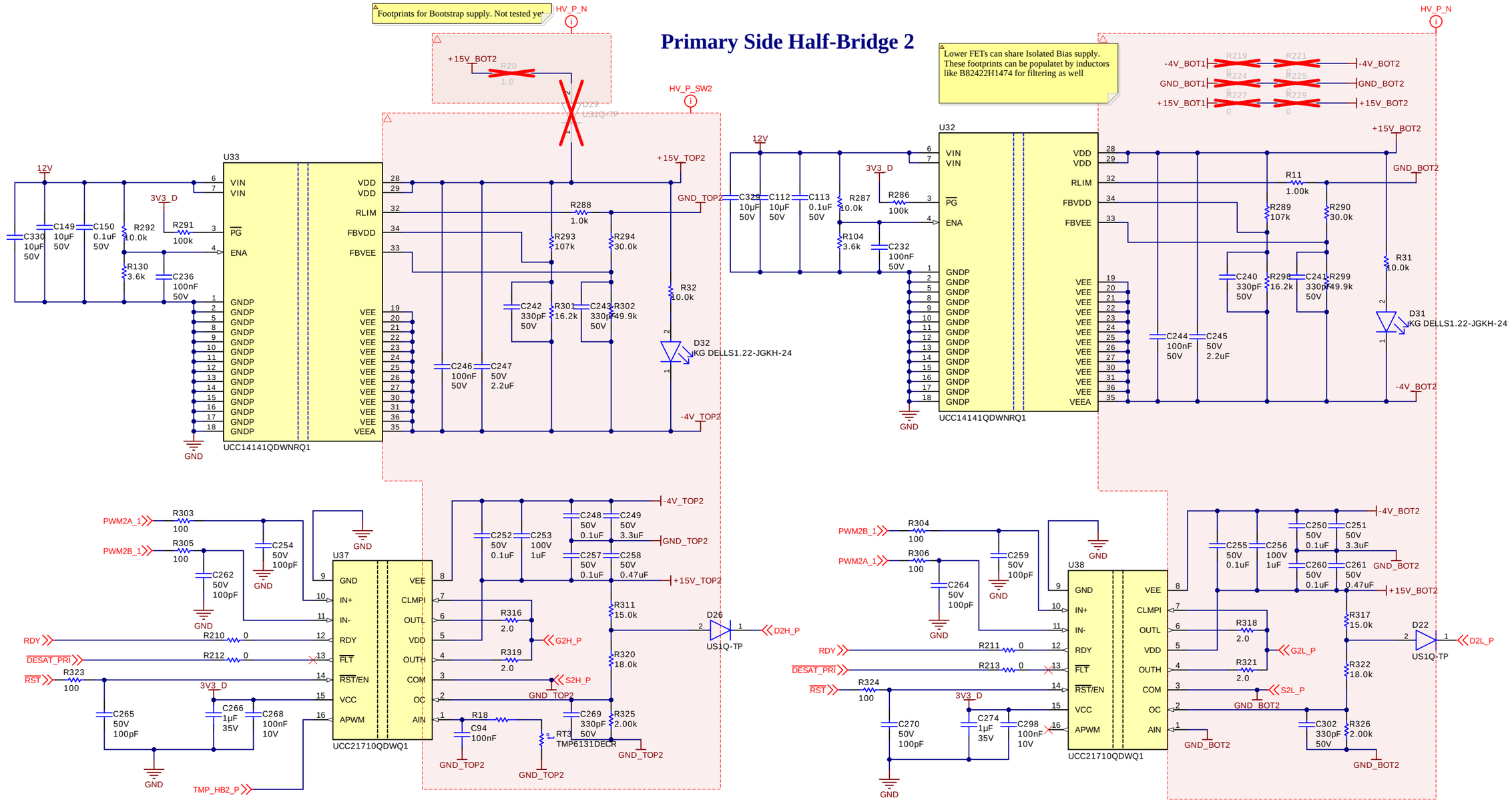
Primary Side Half-Bridge 2

Footprints for Bootstrap supply. Not tested yet

Lower FETs can share Isolated Bias supply. These footprints can be populatet by inductors like B82422H1474 for filtering as well



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Number: TIDA-DAB-010054 Rev: E4	Sheet Title:	
SVN Rev: Not in version control	Assembly Variant: 001	Sheet: 6 of 11
Drawn By: Andreas Lechner	File: TIDA-DAB-010054-E4_GateDriverPrimHB2.SchDoc	Size: B
Engineer: Andreas Lechner	Contact: http://www.ti.com/support	

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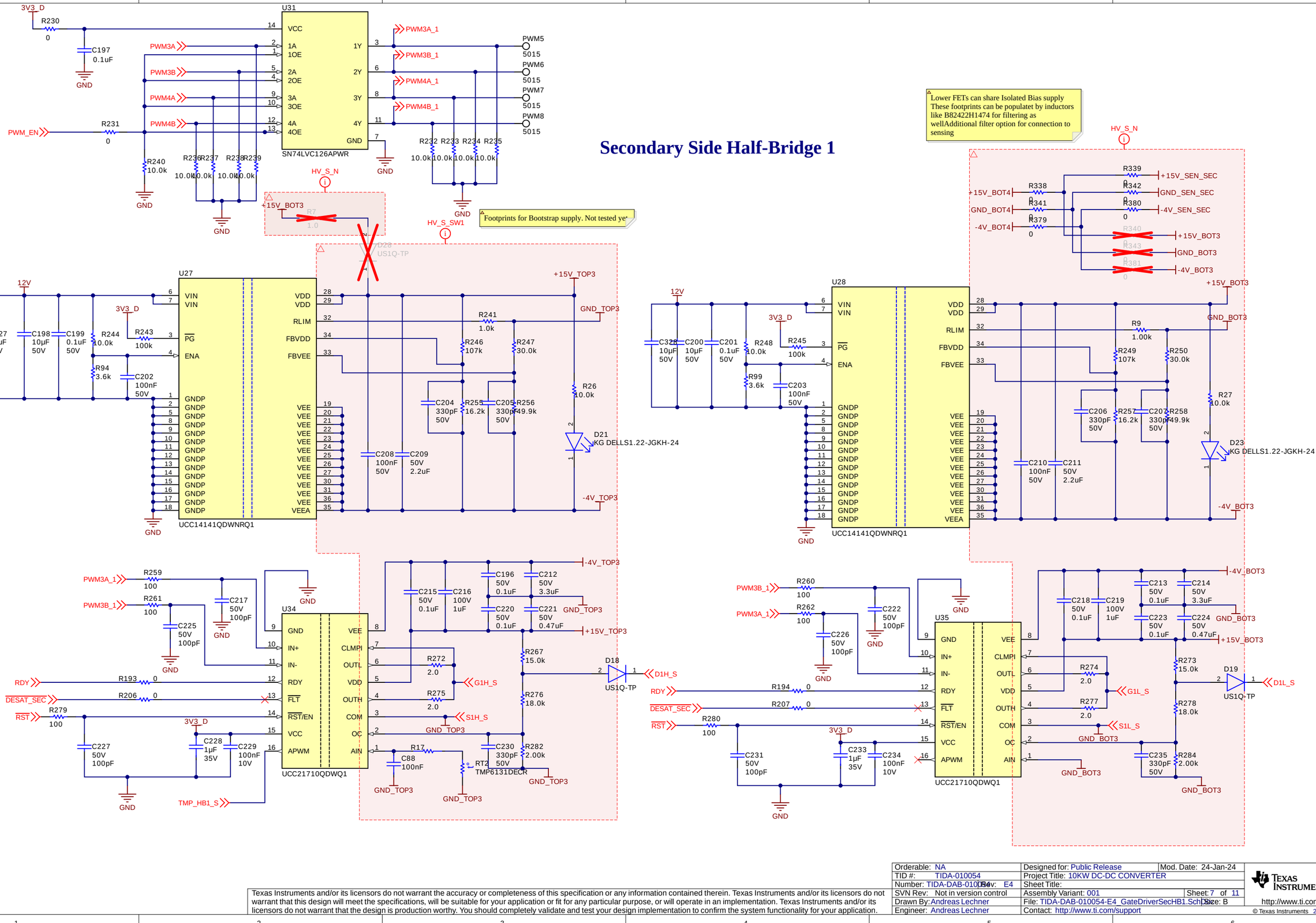
Secondary Side Half-Bridge 1



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Number: TIDA-DAB-010054	Rev: E4	Sheet Title:	
SVN Rev: Not in version control	Assembly Variant: 001	Sheet: 7 of 11	
Drawn By: Andreas Lechner	File: TIDA-DAB-010054-E4_GateDriverSecHB1.SchDoc	Size: B	
Engineer: Andreas Lechner	Contact: http://www.ti.com/support		

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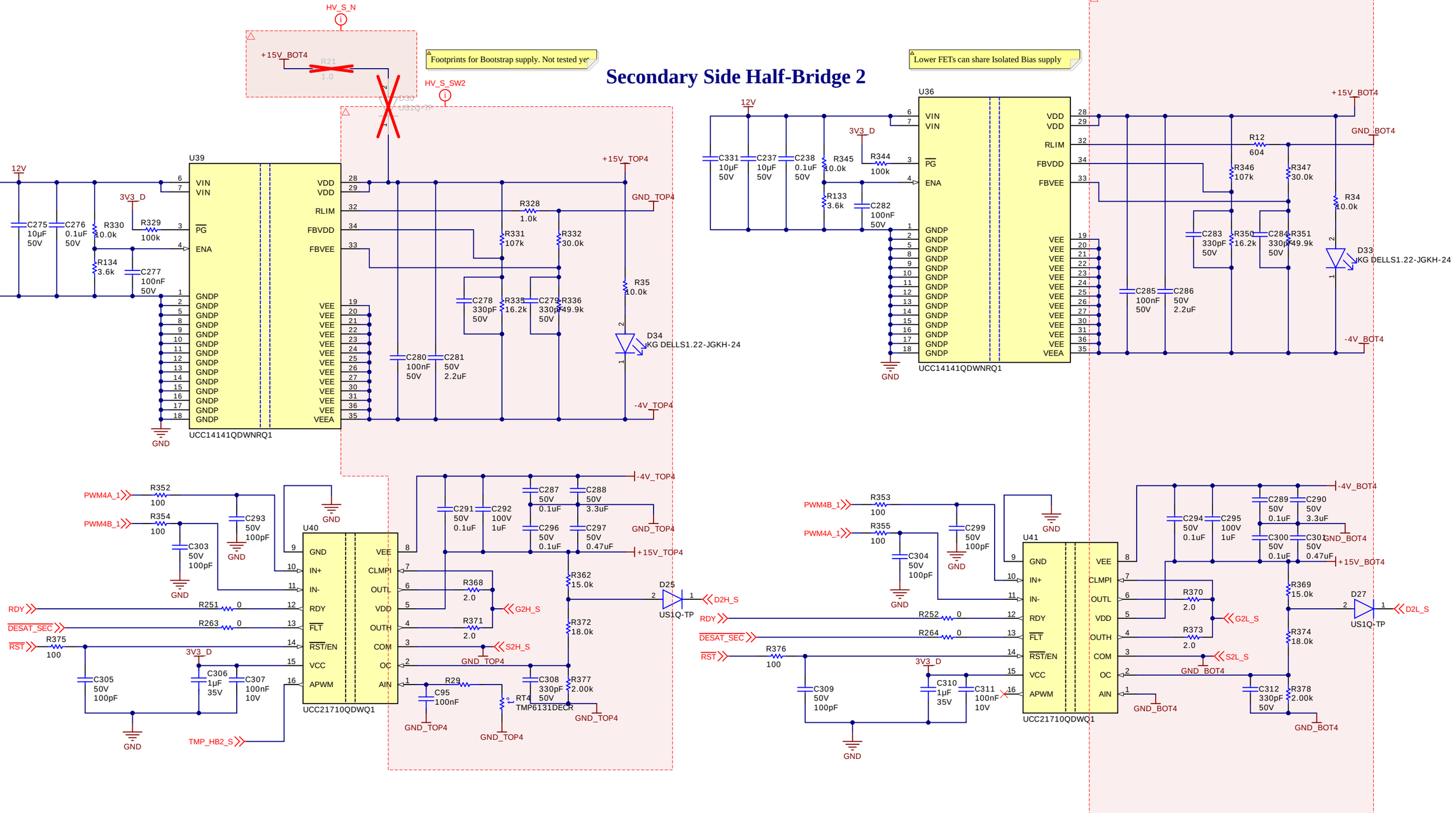
Secondary Side Half-Bridge 2

Footprints for Bootstrap supply. Not tested yet

Lower FETs can share Isolated Bias supply



Orderable: NA	Designed for: Public Release	Mod. Date: 24-Jan-24	
TID #: TIDA-010054	Project Title: 10KW DC-DC CONVERTER		
Number: TIDA-DAB-010054 Rev: E4	Sheet Title:		
SVN Rev: Not in version control	Assembly Variant: 001	Sheet: 8 of 11	
Drawn By: Andreas Lechner	File: TIDA-DAB-010054-E4_GateDriverSecHB2.SchDoc	Size: B	
Engineer: Andreas Lechner	Contact: http://www.ti.com/support		

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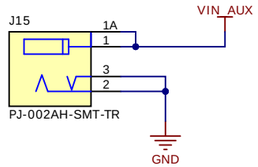
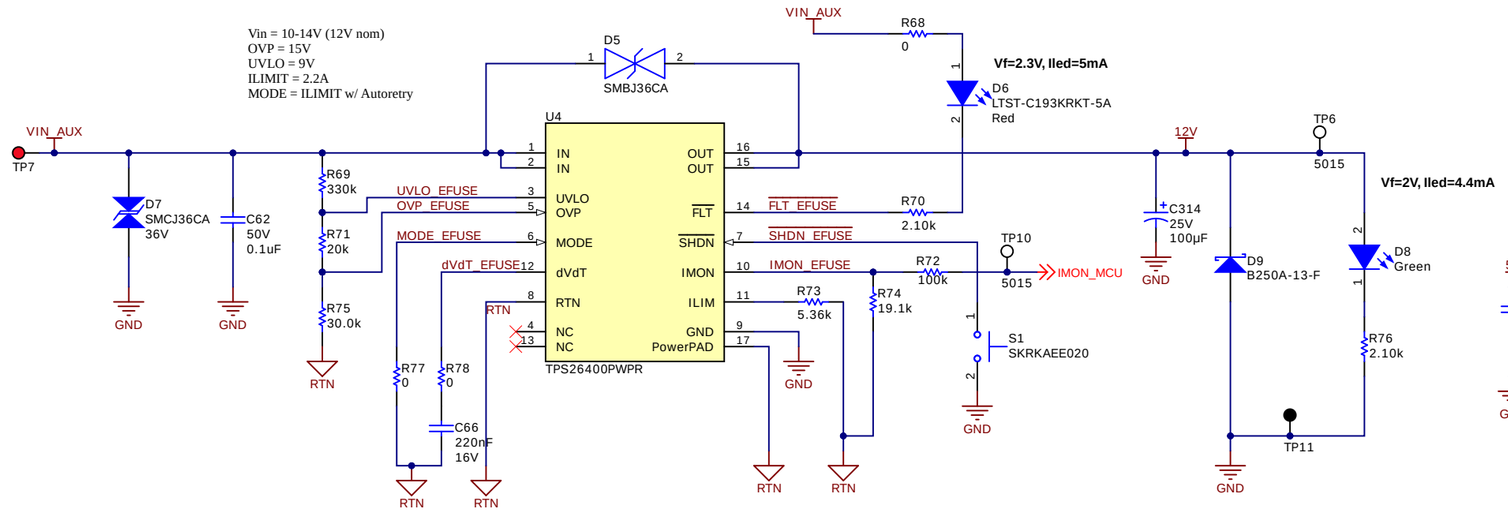
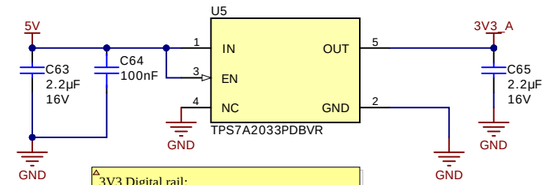
Auxillary power supply DC Jack



Vin = 10-14V (12V nom)
OVP = 15V
UVLO = 9V
ILIMIT = 2.2A
MODE = ILIMIT w/ Autoretry

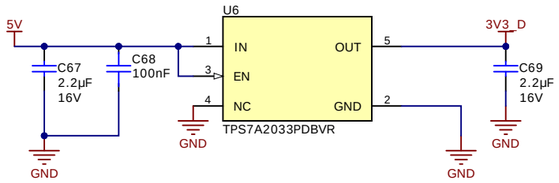


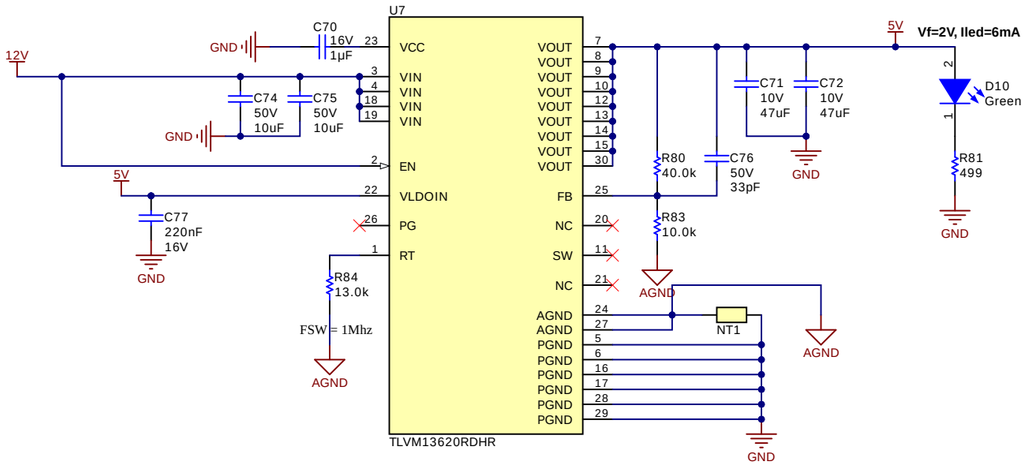
3V3 Analog rail:
AMC1302
AMC1311
OPA320 x 3
TMCS1133 x2
Total current consumption 220mA
Power dissipation: 1.7V * 0.22A = 0.37W



3V3 Digital rail:
AMC1336 x2
AMC1306
SN74LVC126 x 2
ISOW1044(VIO)
UCC21710(LV Side)

Total current consumption 70mA
Power dissipation: 1.7V * 0.07A = 0.12W





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SVN Rev: Not in version control	Assembly Variant: 001	Sheet: 9 of 11
Drawn By: Andreas Lechner	File: TIDA-DAB-010054-E4_Power Tree.SchDoc	Size: B
Engineer: Andreas Lechner	Contact: http://www.ti.com/support	

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CONTROL CARD PIN MAPPING

J2

ID_A
IMON_MCU
1.65V_1S — R3 0
I_TANK_SEC
I_TANK_PRI
I_DC_PRI
V_DC_PRI
GND

3V3_D — C319 10nF 100V — GND
3V3_D — R205 10.0k — GND
3V3_D — C320 10nF 100V — R204 10.0k — GND

PWM1A
PWM1B
PWM2A
PWM2B
PWM3A
PWM3B
PWM4A
PWM4B

CLK_MOD — R10 0
CLK_MOD_DELAYED — R19 0
PWM_EN
FAN_CTL
Prof_GPIO1
Prof_GPIO2

DESAT_PRI
RST_MCU

DESAT_SEC
RDY
TEMP_SENSE
MUX_A0
MUX_A1

R79 10.0k — C322 10nF 100V — GND
3V3_D
R82 10.0k — C321 10nF 100V — GND
3V3_D

R38 0
R41 0
CAN_RX
CAN_TX

FLT_PRI
FLT_SEC
EN_RELAY_P
EN_RELAY_N

DOUT_V_BATT_SEC
CLK_MOD_DELAYED
DOUT_V_DC_SEC
CLK_MOD_DELAYED
DOUT_I_DC_SEC
CLK_MOD_DELAYED

TP12 5015
5V
GND

With this setup DESAT fault can only be removed by power cycling the board.
Since RST needs to be high to reset DESAT_PRI and DESAT_SEC signal

DESAT_SEC — TP23 5015
DESAT_PRI — TP21 5015
RST_MCU — TP20 5015
TP22 5015 — RST
U1A

3V3_D — C1 10nF 100V — GND
U1B VCC GND

Board Identification Resistors

3V3_A — R15 0 — ID_A — R28 10.0k — GND

TP25 5015
TP26 5015
TP27 5015
TP28 5015
TP29 5015
GND

Profiling GPIO

J4
Prof_GPIO2
Prof_GPIO1
61000318221
GND

MUX for Temp Sensing using APWM of Gate driver and thermistor

Temperature sensing not tested yet

U8
GND
A1 — MUX_A1
A0 — MUX_A0
S4 — R30 49.9 — TMP_HB1_S
S3 — R33 49.9 — TMP_HB2_P
S2 — R42 49.9 — TMP_HB2_S
S1 — R86 49.9 — TMP_HB1_P
EN
TEMP_SENSE
D
VDD — C313 10nF 100V — GND
TMUX1204DGSR
C121 50V 10pF
C122 50V 10pF
C136 50V 10pF
C137 50V 10pF
3V3_D

5V — L1 — C2 10µF 25V — C3 16V 1µF — C4 10nF 100V — GND_CAN

CAN Interface not used and not tested yet

CAN Interface

3V3_D — L2 — C5 0.1uF — GND_CAN
R52 10.0k — GND_CAN

J5
3
2
1
61000318221
GND_CAN

U3
VDD
VIO
EN — CAN_EN
STB
TXD — CAN_TX
RXD — CAN_RX
IN
NC
GND1
GND1
VISOIN
VISOOUT
VISOOUT
CANH
CANL
OUT
GND2
GND2
GND2
GND2
ISOW1044DFM

L4 — GND_CAN — GND

VP_CAN
C6 10nF 100V
C7 16V 1µF
C8 10µF 25V
GND_ISO_CAN
VISOOUT

ACT45B-101-2P-TL003
L3
R54 56.2
R55 56.2
C9 50V 47pF
C10 4.7nF 50V
C11 50V 47pF
GND_ISO_CAN
R53
R56

J6
618009231121
GND_ISO_CAN

VISOOUT
C12 10nF 100V
C13 16V 1µF
C14 10µF 25V
VP_CAN
L5
L6
GND_ISO_CAN

VIN_AUX
J8
VIN_AUX_CAN
999-11-113-10-000000
J9
999-11-113-10-000000
GND
GND_ISO_CAN

VIN_AUX_CAN
VP_CAN
J10 61300211121

FAN CONTROL FOR COOLING

Connect 12 V to provide airflow to heatsinks.

12V — C73 25V 100µF — GND
D13 SBR0560S1-7
J1
61000218321

FAN_CTL — R1 200 — Q1 CSD17318Q2
R2 10.0k — GND

12V — C96 25V 100µF — GND
D16 SBR0560S1-7
J3
61000218321

R4 200 — Q2 CSD17318Q2
R5 10.0k — GND

BATTERY RELAY COONTROL

RELAY_N
EN_RELAY_N — R48 200 — Q3 CSD17318Q2
R51 10.0k — GND

RELAY_P
EN_RELAY_P — R39 200 — Q4 CSD17318Q2
R43 10.0k — GND

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Orderable: NA	Designed for: Public Release	Mod. Date: 24-Jan-24	
TID #: TIDA-010054	Project Title: 10KW DC-DC CONVERTER		
Number: TIDA-DAB-010054 Rev: E4	Sheet Title:		
SVN Rev: Not in version control	Assembly Variant: 001	Sheet: 10 of 11	
Drawn By: Andreas Lechner	File: TIDA-DAB-010054-E4_Control Card.SchDoc	Size: B	
Engineer: Andreas Lechner	Contact: http://www.ti.com/support		

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H1 1 NY PMS 440 0025 PH

H2 1 NY PMS 440 0025 PH

H3 1 NY PMS 440 0025 PH

H4 1 NY PMS 440 0025 PH

MP17 PMSSS 832 0063 PH

MP18 PMSSS 832 0063 PH

MP19 PMSSS 832 0063 PH

MP20 PMSSS 832 0063 PH

H5 1902C

H6 1902C

H7 1902C

H8 1902C

MP13 1474C

MP14 1474C

MP15 1474C

MP16 1474C

FID1 FID2 FID3 FID4 FID5 FID6

PCB LOGO
Texas Instruments

PCB Number: TIDA-DAB-010054
PCB Rev: E4

LOGO1 LOGO2 LOGO3 LOGO4 LOGO5 LOGO6 LOGO7 LOGO8 LOGO9 LOGO10 LOGO11 LOGO12

CE Mark

PCB LOGO
WEEE logo

PCB LOGO
FCC disclaimer

PCB LOGO
Pb-Free Symbol

PCB LOGO
Logo17

PCB LOGO
Logo18

Variant/Label Table	
Variant	Label Text
001	001

LBL1
PCB Label
THT-14-423-10
Size: 0.65" x 0.20 "

ZZ1
Label Assembly Note
This Assembly Note is for PCB labels only

ZZ2
Assembly Note
These assemblies are ESD sensitive, ESD precautions shall be observed.

ZZ3
Assembly Note
These assemblies must be clean and free from flux and all contaminants. Use of no clean flux is not acceptable.

ZZ4
Assembly Note
These assemblies must comply with workmanship standards IPC-A-610 Class 2, unless otherwise specified.

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Drawn By: Andreas Lechner	File: TIDA-DAB-010054-E4_EVM_Hardware.SchDoc	Size: B
Engineer: Andreas Lechner	Contact: http://www.ti.com/support	

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