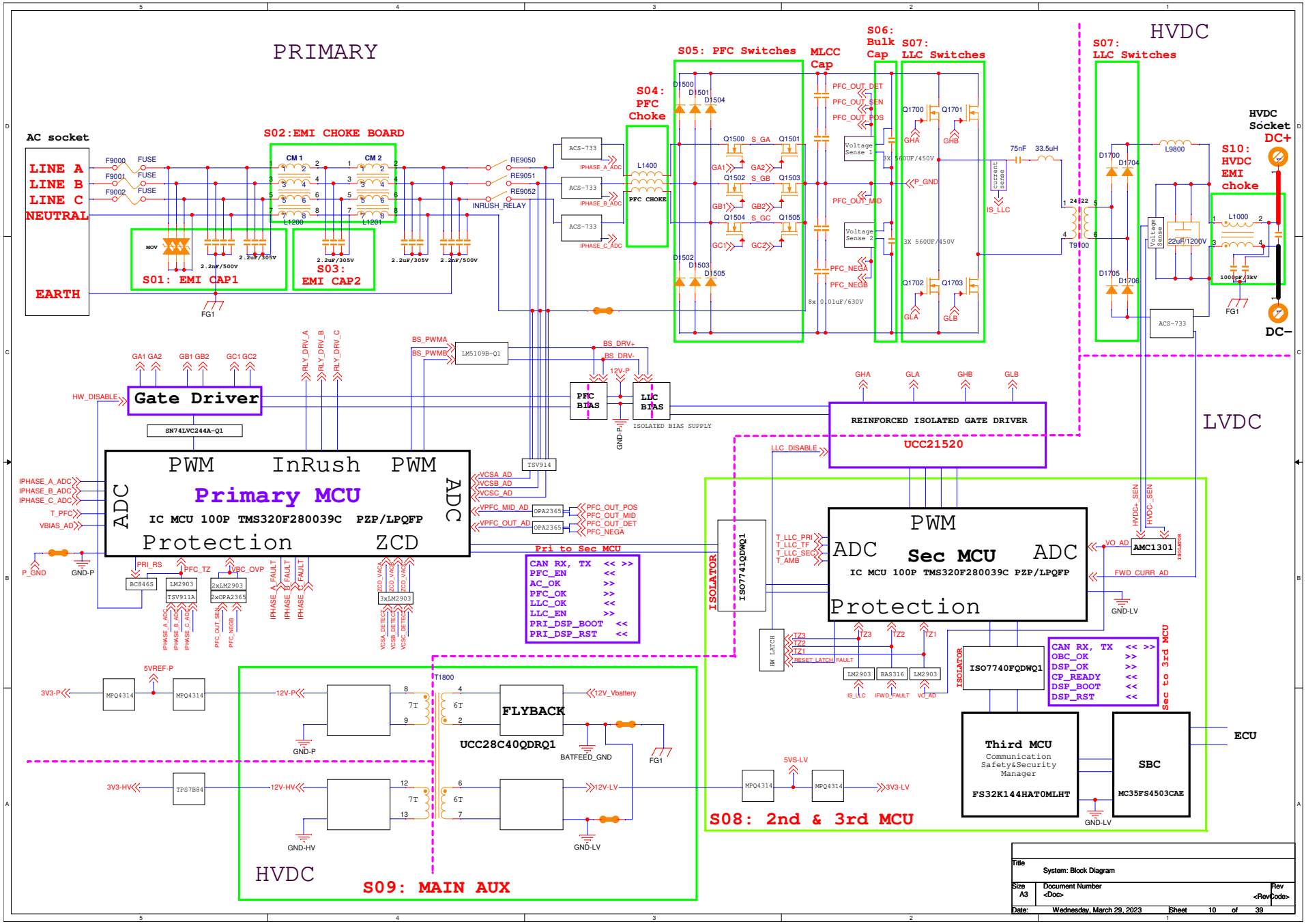

PRIMARY
HVDC
LVDC
AC socket
LINE A
LINE B
LINE C
NEUTRAL
EARTH
S01: EMI CAP1
S02:EMI CHOKE BOARD
S03: EMI CAP2
S04: PFC Choke
S05: PFC Switches
MLCC Cap
S06: Bulk Cap
S07: LLC Switches
S07: LLC Switches
HVDC Socket
DC+
DC−
S10: HVDC EMI choke
Gate Driver
SN74LVC244A-Q1
REINFORCED ISOLATED GATE DRIVER
UCC21520
PFC BIAS
LLC BIAS
ISOLATED BIAS SUPPLY
PWM InRush PWM
Primary MCU
IC MCU 100P TMS320F280039C PZP/LPQFP
ADC
Protection
ZCD
Pri to Sec MCU
CAN RX, TX << >>
PFC_EN <<
AC_OK >>
PFC_OK >>
LLC_OK <<
LLC_EN >>
PRI_DSP_BOOT <<
PRI_DSP_RST <<
ISOLATOR
ISO7741QDWQ1
PWM
Sec MCU
IC MCU 100P TMS320F280039C PZP/LPQFP
Protection
AMC1301
ISO7740FQDWQ1
CAN RX, TX << >>
OBC_OK >>
DSP_OK >>
CP_READY <<
DSP_BOOT <<
DSP_RST <<
Sec to 3rd MCU
Third MCU
Communication Safety&Security Manager
FS32K144HAT0MLHT
SBC
MC35FS4503CAE
ECU
S08: 2nd & 3rd MCU
FLYBACK
UCC28C40QDRQ1
S09: MAIN AUX
HVDC
Title
System: Block Diagram
Size A3
Document Number <Doc>
Rev <RevCode>
Date: Wednesday, March 29, 2023
Sheet 10 of 39

Check:

1. Net name
2. Board to board connectors
3. Ground: GND-P, GNDA-P (MAKE SURE NOT AGND), ... -HV,... -LV,
4. DNE parts: IF FOUND "DNE" IN BOM, THEN NEED TO MANUALLY CHANGE TO "DONOT STUFF" IN SCHEMATIC
5. Re-calc Bandwidth of filter (for controller, to approach Win)
6. Re-calc Gain of sense and remark
7. Re-check Gate Drive circuit (gate res, limiter)
8. Check part with A/B/C sub part
9. Add title for MB and each sub-board
10. Check all remarks (refer to closest part refererence)

Title: System: Remarks		
Size: A3	Document Number: <Doc>	Rev: <RevCode>
Date: Tuesday, March 14, 2023	Sheet 11 of 39	

PRIMARY (AC input)

3V3A-P GNDA-P

3V3D-P GNDD-P

12V-P GND-P (symbol "P")

Pri Main Aux

P_GND

NEG OF BULK VOLTAGE (PFC, LLC PRI)

P_GND GND-P GNDD-P GNDA-P

SH8903 SH8904 SH8905

SHORT-PIN_0 SHORT-PIN_0 SHORT-PIN_0

Pri MCU

HVDC

3V3A-HV GNDA-HV

3V3D-HV GNDD-HV

12V-HV GND-HV

MAIN OUTPUT

GND-HV GNDD-HV GNDA-HV

SH8906 SH8907

SHORT-PIN_0 SHORT-PIN_0

LVDC

5VA-LV GNDA-LV

5VS-LV GNDS-LV

12V-LV GND-LV

3V3A-LV GNDA-LV

3V3D-LV GNDD-LV

SEC & THIRD MCU

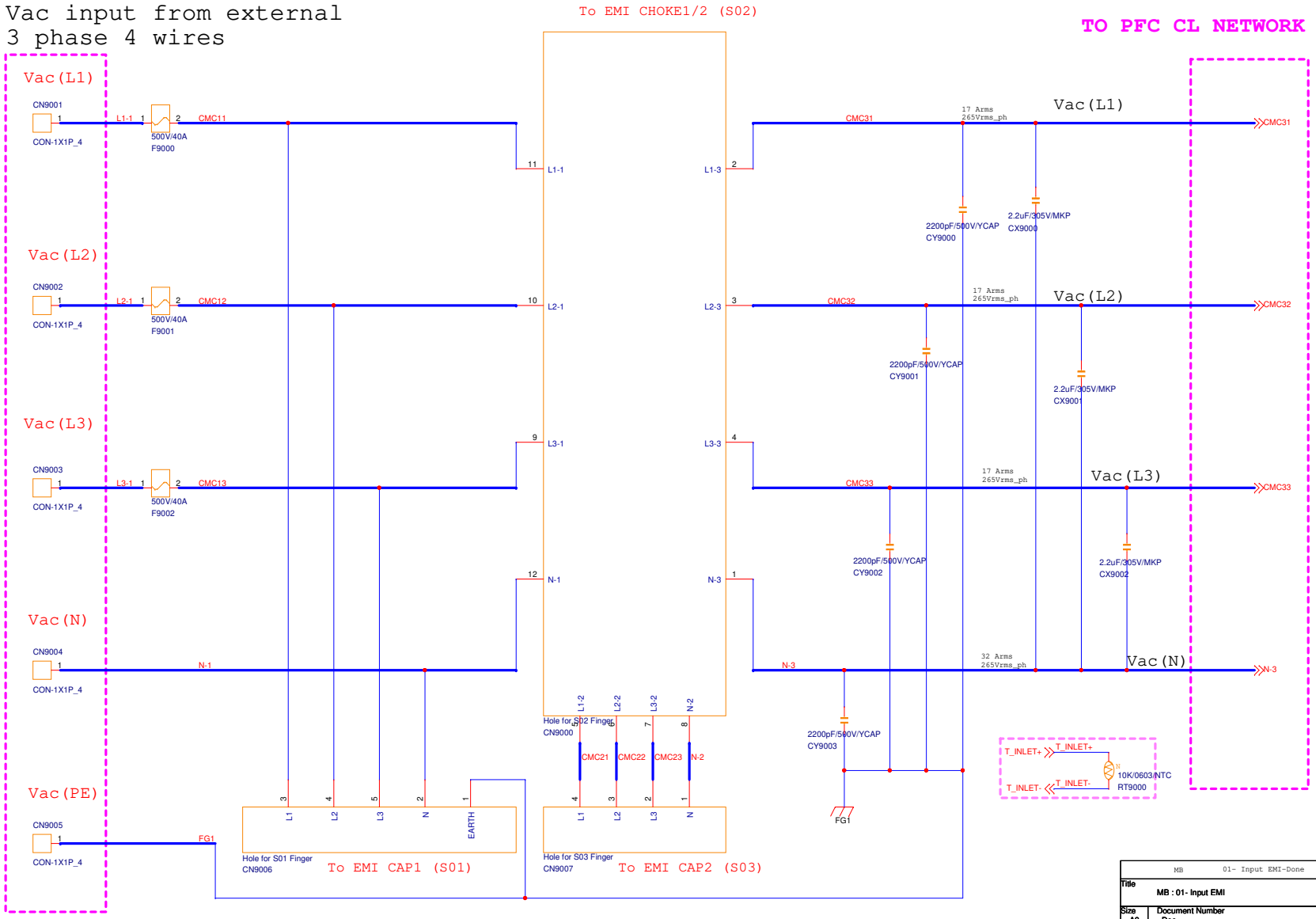
Title: System: Bias Standard		
Size: A	Document Number: <Doc>	Rev: <RevCo
Date: Tuesday, March 14, 2023	Sheet 12 of 39	

Standard part location numbering

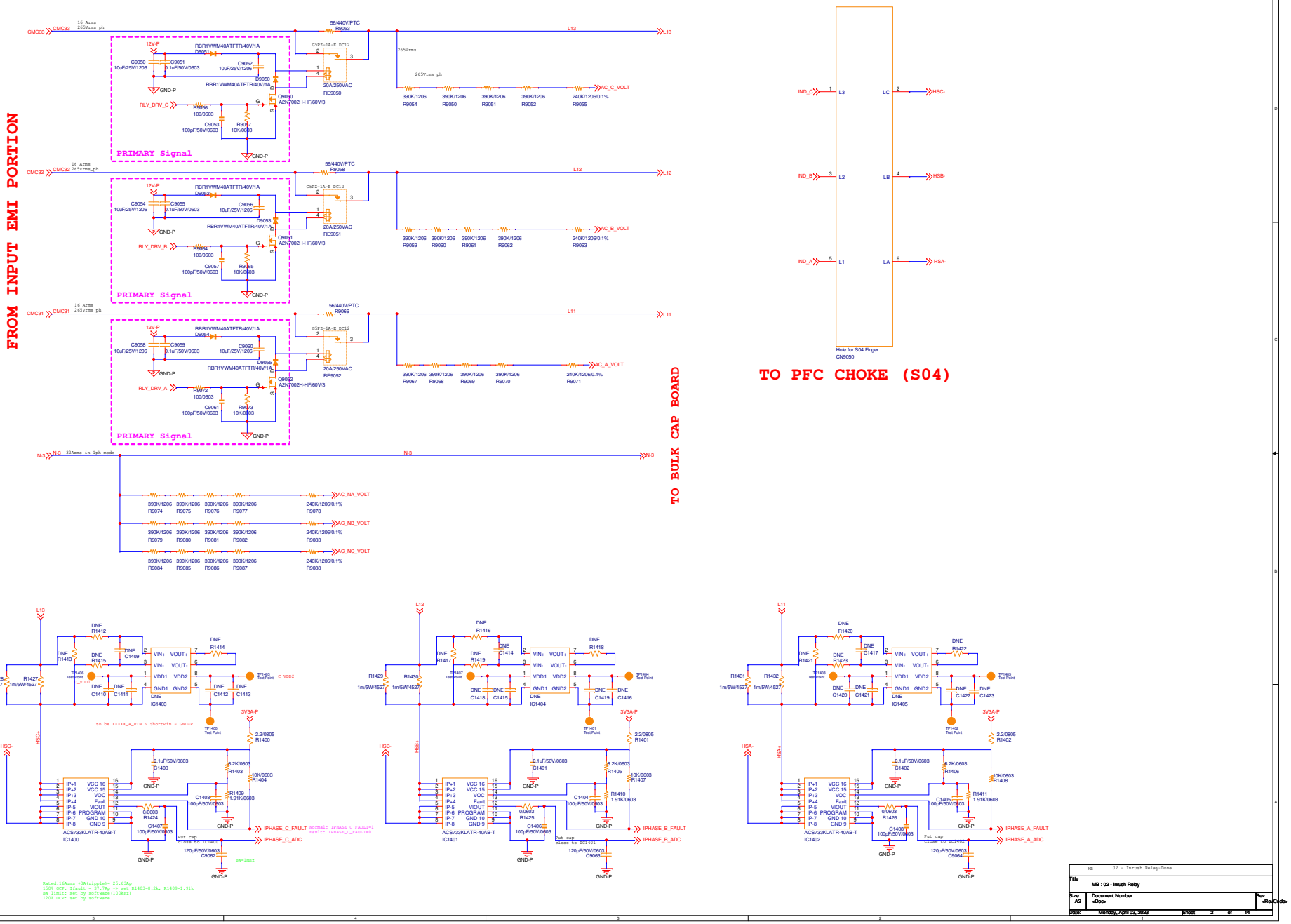
MB 01-Input EMI: 9000-9049
MB 02-Inrush Relay: 9050-9099
MB 03-LLC tank: 9100-9199
MB 04-Connector to IMSboard: 9200-9249
MB 05-PFC LLC Bias: 9250-9299
MB 06-PFC Drive: 9300-9349
MB 07-LLC Drive: 9350-9399
MB 08-Pri MCU PFC ADC: 9400-9449
MB 09-Pri MCU Protection: 9450-9499
MB 11-Pri MCU Main: 9550-9649
MB 12-Pri MCU Bias: 9650-9699
MB 13-Pri MCU Comm: 9700-9749
MB 14-LVDC connectors: 9750-9799
MB 15-HVDC Output: 9800-9849
S01-EMI Cap1: 1100-1199
S02-EMI Choke: 1200-1299
S03-EMI Cap2: 1300-1399
S04-PFC Choke: 1400-1499
S05-PFC Switches: 1500-1599
S06-Bulk cap: 1600-1699
S07-LLC Switches: 1700-1799
S08-2nd & 3rd MCU: 8000-8999
S09-Main Aux: 1800-1999
S10-HVDC EMI choke: 1000-1099

Title: System: Part numbering standard		
Size: A	Document Number: <Doc>	Rev: <RevCo
Date: Wednesday, March 29, 2023	Sheet 13 of 39	

AC EMI 11KW UNI

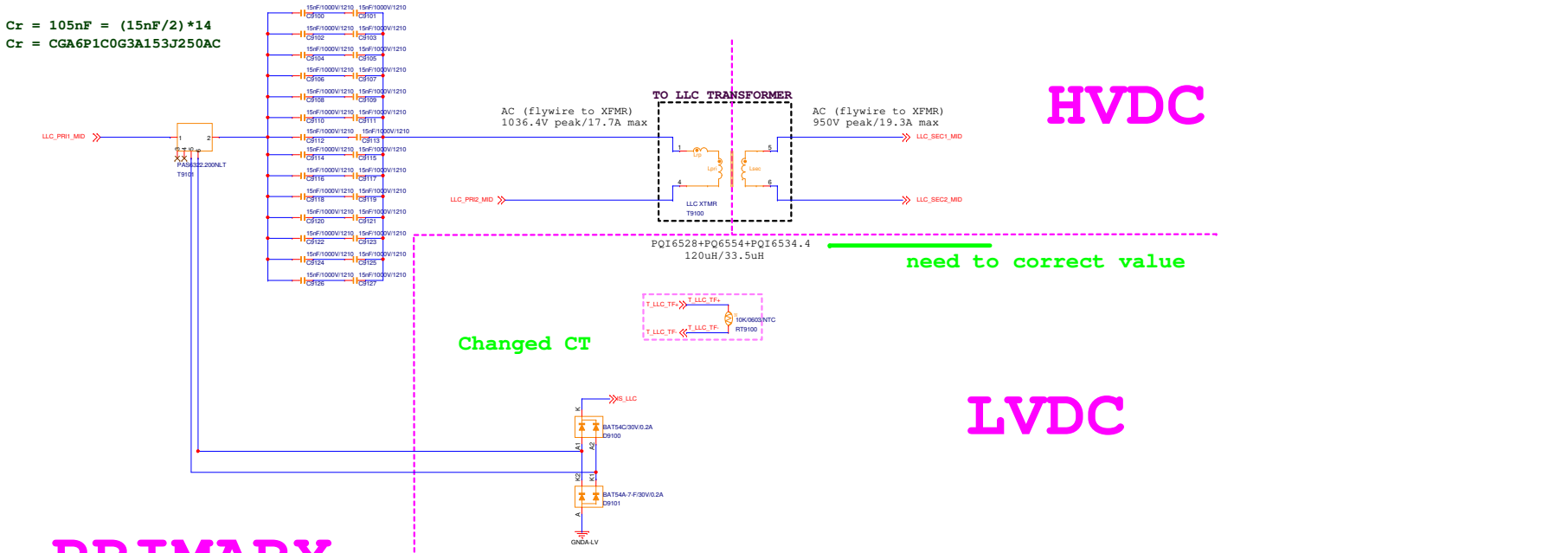


MB	01- Input EMI-Done		
Title	MB : 01- Input EMI		
Size A3	Document Number <Doc>		Rev <RevCode>
Date:	Thursday, March 30, 2023	Sheet 1 of 14	

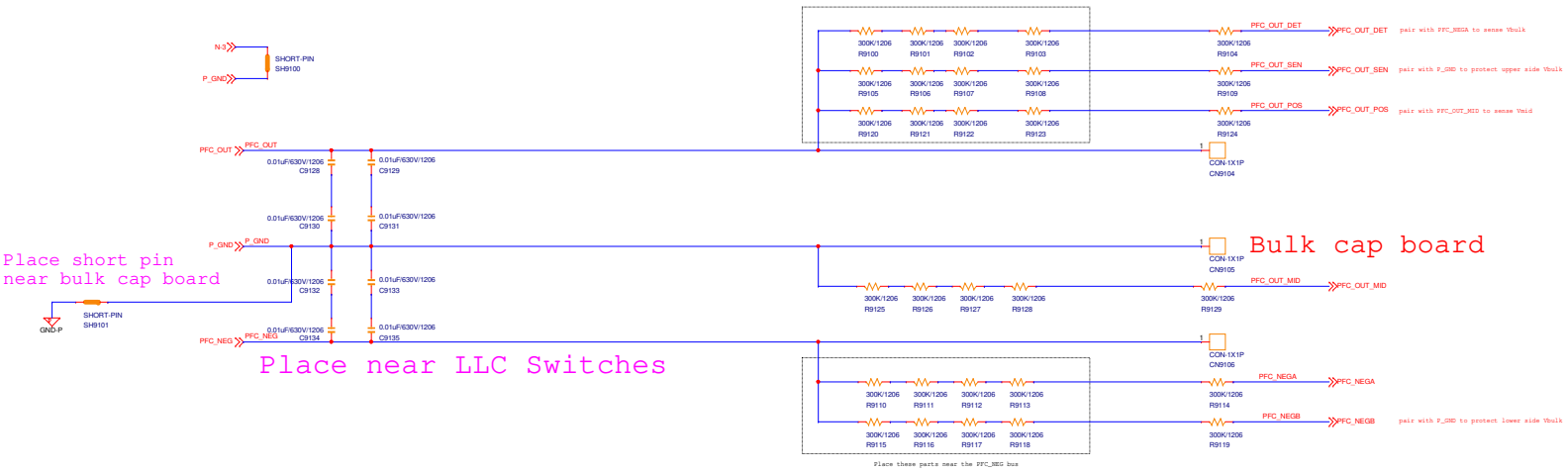


Title	MB : 02 - Inrush Relay		
Size A2	Document Number <Doc>		Rev <RevCode>
Date: Monday, April 03, 2023		Sheet 2 of 14	

Cr = 105nF = (15nF/2)*14
Cr = CGA6P1C0G3A153J250AC



Change signal name in next build

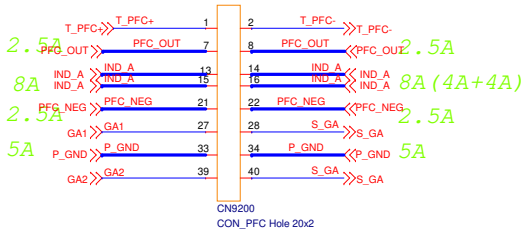


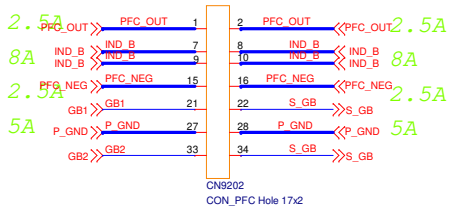
Title	MB : 03 - LLC tank		
Size A2	Document Number <Doc>		Rev <RevCode>
Date: Monday, April 03, 2023		Sheet 3 of 14	

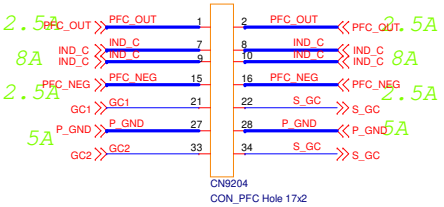
CHECK ALL NET NAME

PFC CONNECTOR TO S05

Imax=5Arms for power trace

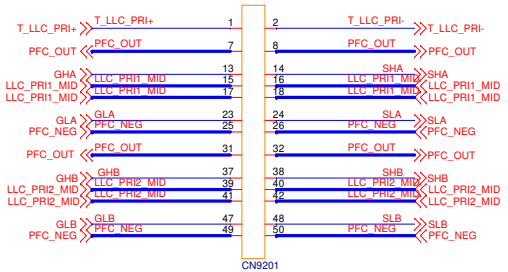




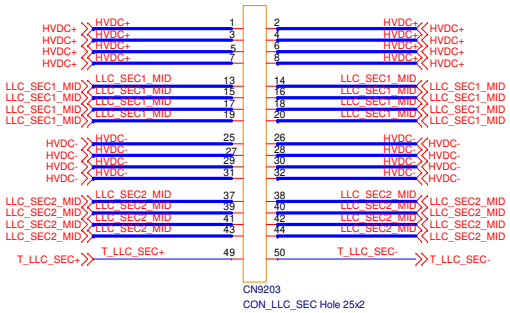


LLC CONNECTOR TO S07

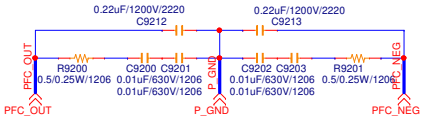
Imax=5Arms for power trace

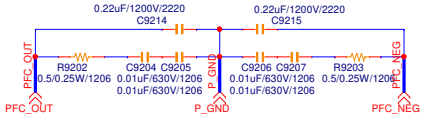


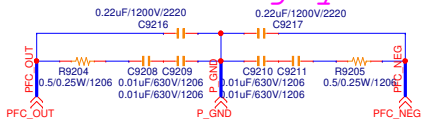
Imax=5Arms for power trace



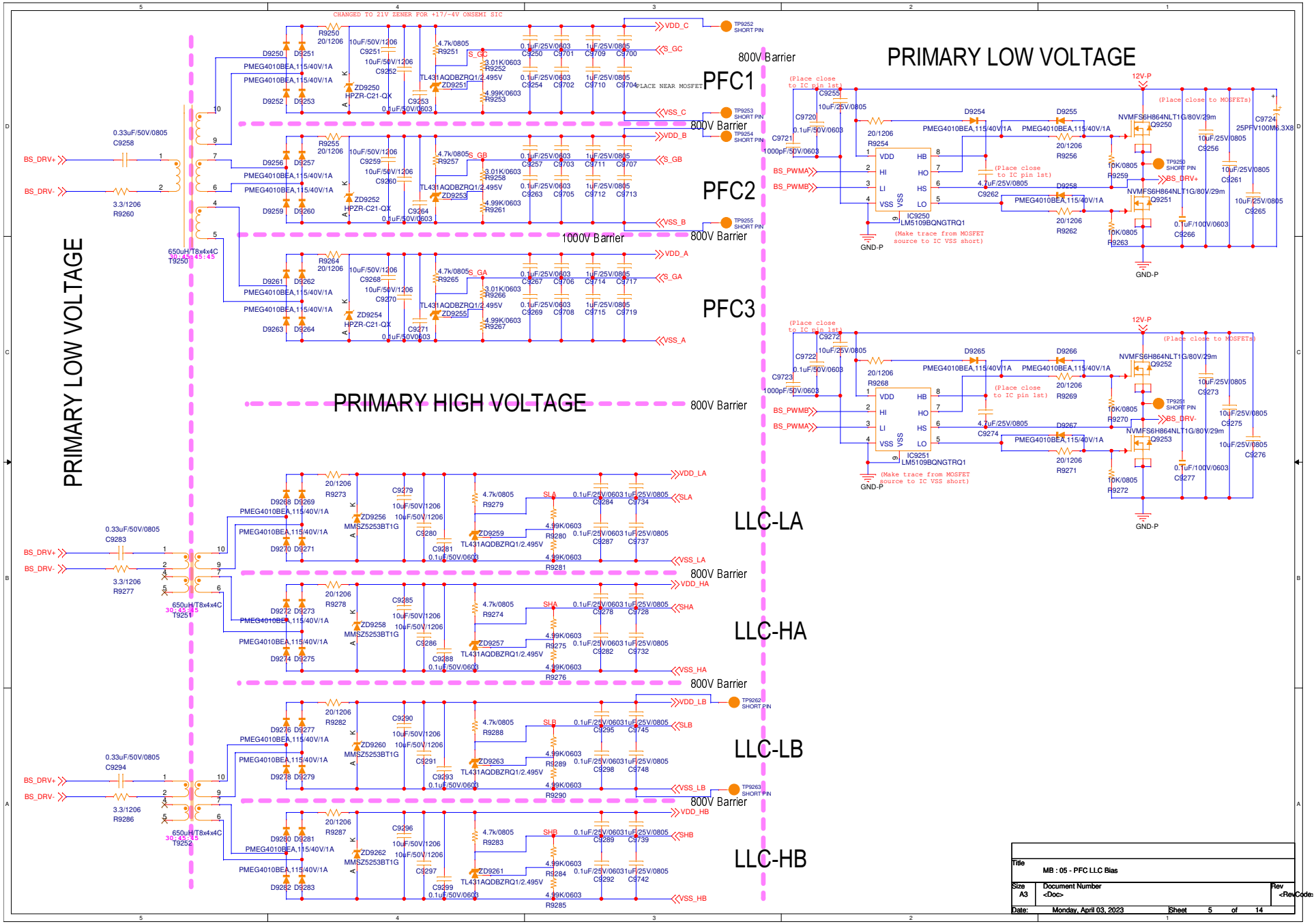
Place near PFC Switchs connector accordingly







Title	MB : 04 - Connector to IMSboard		
Size A3	Document Number <Doc>		Rev <RevCode>
Date: Thursday, March 30, 2023	Sheet 4 of 14		



Title	MB : 05 - PFC LLC Bias
Size	A3
Document Number	<Doc>
Rev	<RevCode>
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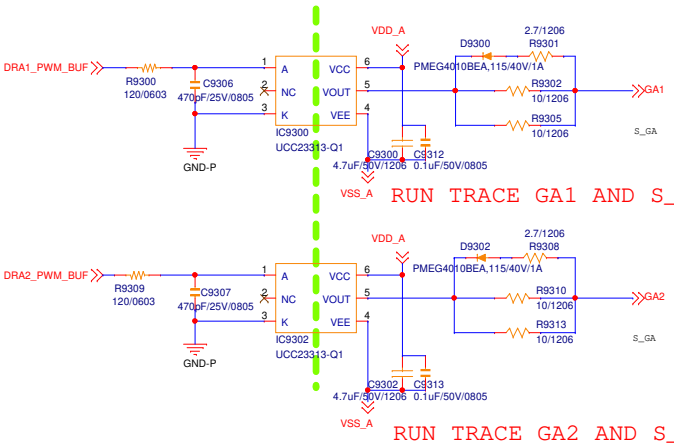
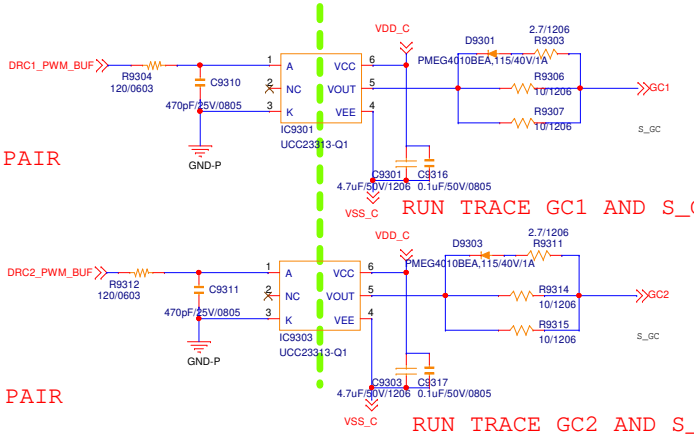
PFC PHASE A



RUN TRACE GA1 AND S_GA AS A PAIR

RUN TRACE GA2 AND S_GA AS A PAIR

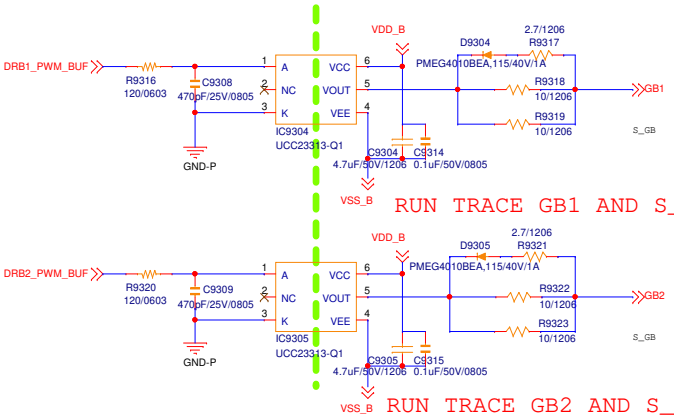
PFC PHASE C



RUN TRACE GC1 AND S_GC AS A PAIR

RUN TRACE GC2 AND S_GC AS A PAIR

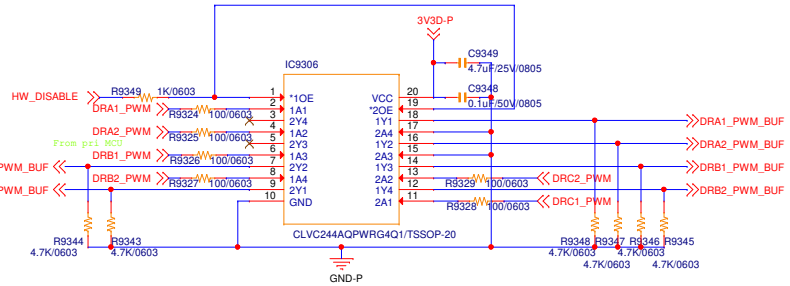
PFC PHASE B



RUN TRACE GB1 AND S_GB AS A PAIR

RUN TRACE GB2 AND S_GB AS A PAIR

Phase current OCP :HW_DISABLE=1: OFF output of PFC Gate Driver
No OCP: HW_DISABLE=0: Normal = Allow to Drive PFC



input filter: 2.8MHz
R9300=120, IAK =10mA(input current of opto driver)

typical pri MCU PWM signal current: +/-4mA
typical PFC gate driver input current:10mA

Buffer spec:
a) Automotive
b) Vcc: 1.6V - 3.6V
c) Recommended output current ability: up to +/-24mA
d) Low-level input voltage=0.35Vcc, High-level input voltage=0.65Vcc
e) Delay from input to output: 5.9ns @Vcc=3.3V
f) 1OE & 2OE: allow to control output regardless of input
g) If any input not in use, connect to GND for noise immunity

Title	MB : 06 - PFC Drive	
Size A3	Document Number <Doc>	Rev <RevCode>
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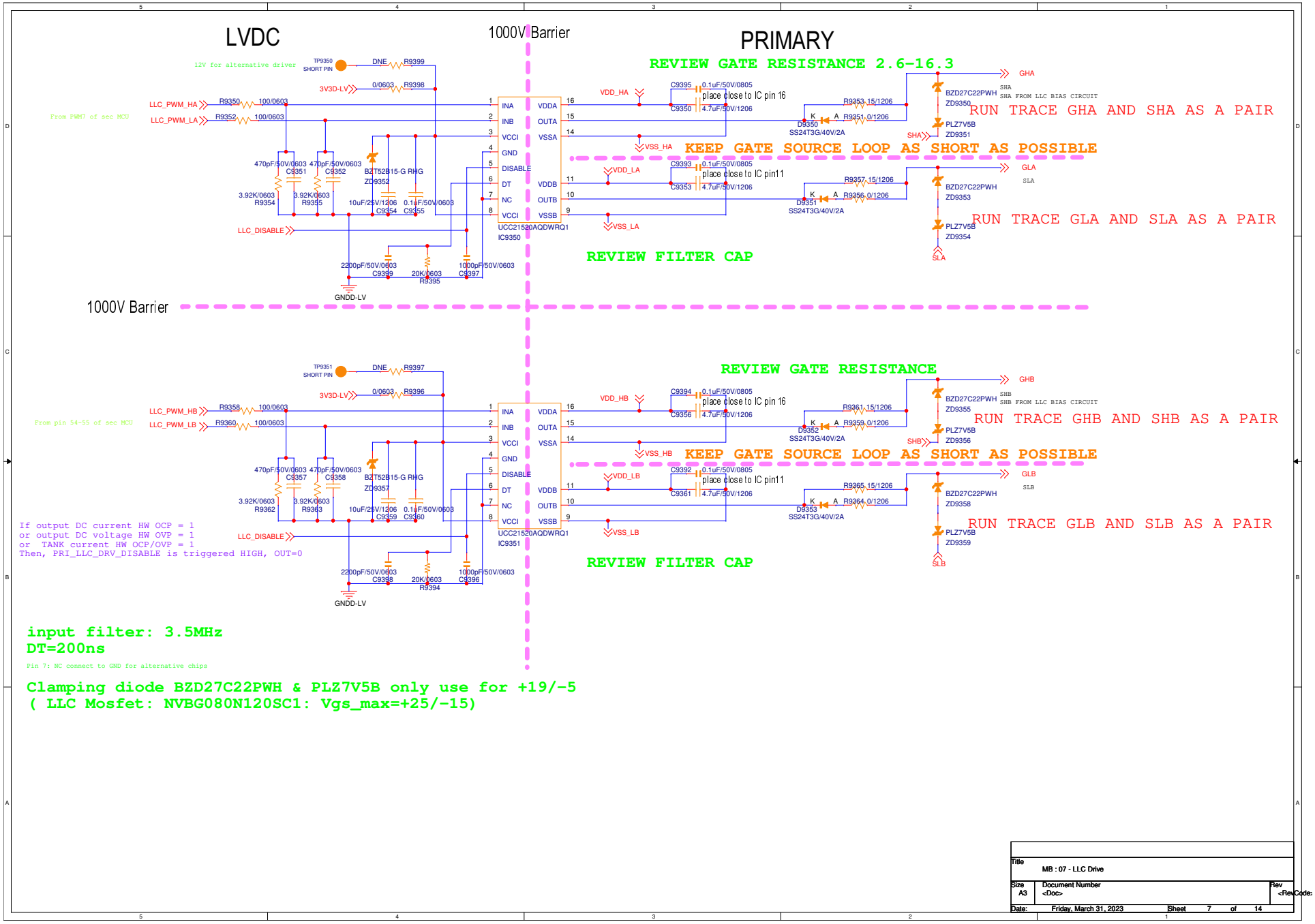
LVDC
1000V Barrier
PRIMARY
REVIEW GATE RESISTANCE 2.6-16.3
RUN TRACE GHA AND SHA AS A PAIR
KEEP GATE SOURCE LOOP AS SHORT AS POSSIBLE
RUN TRACE GLA AND SLA AS A PAIR
REVIEW FILTER CAP
1000V Barrier
REVIEW GATE RESISTANCE
RUN TRACE GHB AND SHB AS A PAIR
KEEP GATE SOURCE LOOP AS SHORT AS POSSIBLE
RUN TRACE GLB AND SLB AS A PAIR
REVIEW FILTER CAP
UCC21520AQDWRQ1
IC9350
UCC21520AQDWRQ1
IC9351
GNDD-LV
GNDD-LV
If output DC current HW OCP = 1
or output DC voltage HW OVP = 1
or TANK current HW OCP/OVP = 1
Then, PRI_LLC_DRV_DISABLE is triggered HIGH, OUT=0
input filter: 3.5MHz
DT=200ns
Clamping diode BZD27C22PWH & PLZ7V5B only use for +19/-5
(LLC Mosfet: NVBG080N120SC1: Vgs_max=+25/-15)
Title
MB : 07 - LLC Drive
Size
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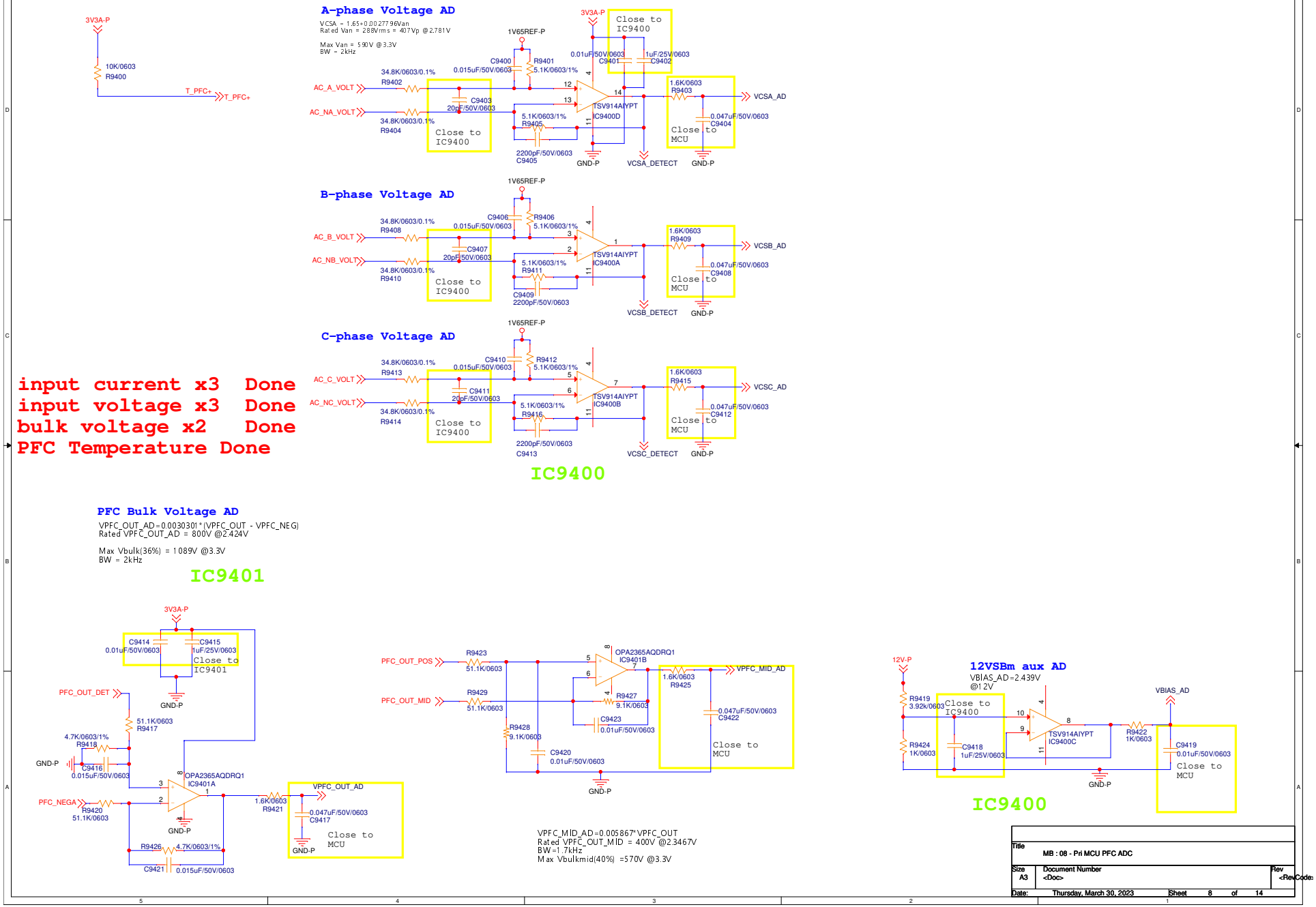
3V3A-P
10K/0603
R9400
T_PFC+
T_PFC+
A-phase Voltage AD
VCSA = 1.65+0.002779*Van
Rated Van = 288Vrms = 407Vp @2.781V
Max Van = 5.90V @3.3V
BW = 2kHz
1V65REF-P
3V3A-P
Close to IC9400
C9400
0.015uF/50V/0603
R9401
5.1K/0603/1%
0.01uF/50V/0603
C9401
1uF/25V/0603
C9402
34.8K/0603/0.1%
R9402
AC_A_VOLT
C9403
20pF/50V/0603
AC_NA_VOLT
34.8K/0603/0.1%
R9404
Close to IC9400
5.1K/0603/1%
R9405
2200pF/50V/0603
C9405
TSV914AIYPT
IC9400D
1.6K/0603
R9403
VCSA_AD
0.047uF/50V/0603
C9404
Close to MCU
GND-P
VCSA_DETECT
GND-P
B-phase Voltage AD
1V65REF-P
C9406
0.015uF/50V/0603
R9406
5.1K/0603/1%
34.8K/0603/0.1%
R9408
AC_B_VOLT
C9407
20pF/50V/0603
AC_NB_VOLT
34.8K/0603/0.1%
R9410
Close to IC9400
5.1K/0603/1%
R9411
C9409
2200pF/50V/0603
TSV914AIYPT
IC9400A
1.6K/0603
R9409
VCSB_AD
0.047uF/50V/0603
C9408
Close to MCU
VCSB_DETECT
GND-P
C-phase Voltage AD
1V65REF-P
C9410
0.015uF/50V/0603
R9412
5.1K/0603/1%
34.8K/0603/0.1%
R9413
AC_C_VOLT
C9411
20pF/50V/0603
AC_NC_VOLT
34.8K/0603/0.1%
R9414
Close to IC9400
5.1K/0603/1%
R9416
2200pF/50V/0603
C9413
TSV914AIYPT
IC9400B
1.6K/0603
R9415
VCSC_AD
0.047uF/50V/0603
C9412
Close to MCU
VCSC_DETECT
GND-P
IC9400
input current x3 Done
input voltage x3 Done
bulk voltage x2 Done
PFC Temperature Done
PFC Bulk Voltage AD
VPFC_OUT_AD=0.0030301*(VPFC_OUT - VPFC_NEG)
Rated VPFC_OUT_AD = 800V @2.424V
Max Vbulk(36%) = 1.089V @3.3V
BW = 2kHz
IC9401
3V3A-P
C9414
0.01uF/50V/0603
C9415
1uF/25V/0603
Close to IC9401
GND-P
PFC_OUT_DET
51.1K/0603
R9417
4.7K/0603/1%
R9418
GND-P
C9416
0.015uF/50V/0603
OPA2365AQDRQ1
IC9401A
PFC_NEGA
R9420
51.1K/0603
1.6K/0603
R9421
VPFC_OUT_AD
0.047uF/50V/0603
C9417
Close to MCU
GND-P
R9426
4.7K/0603/1%
C9421
0.015uF/50V/0603
PFC_OUT_POS
R9423
51.1K/0603
PFC_OUT_MID
R9429
51.1K/0603
OPA2365AQDRQ1
IC9401B
R9428
9.1K/0603
R9427
9.1K/0603
C9423
0.01uF/50V/0603
C9420
0.01uF/50V/0603
1.6K/0603
R9425
VPFC_MID_AD
0.047uF/50V/0603
C9422
Close to MCU
GND-P
VPFC_MID_AD=0.005867*VPFC_OUT
Rated VPFC_OUT_MID = 400V @2.3467V
BW=1.7kHz
Max Vbulkmid(40%) =570V @3.3V
12V-P
12VSBm aux AD
VBIAS_AD=2.439V
@12V
R9419
3.92k/0603
Close to IC9400
R9424
1K/0603
C9418
1uF/25V/0603
TSV914AIYPT
IC9400C
R9422
1K/0603
VBIAS_AD
C9419
0.01uF/50V/0603
Close to MCU
GND-P
IC9400
Title
MB : 08 - Pri MCU PFC ADC
Size
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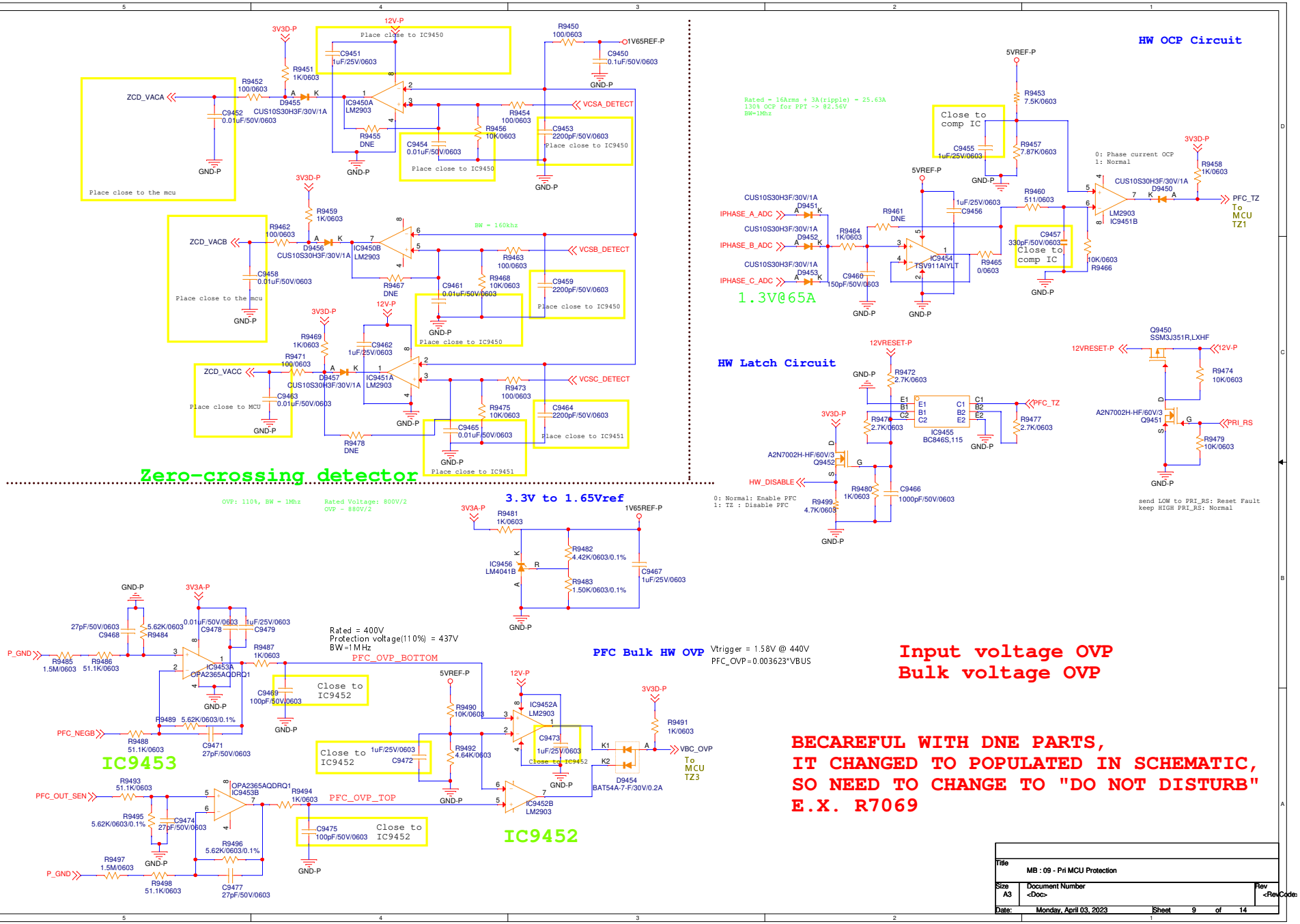
Zero-crossing detector
HW OCP Circuit
HW Latch Circuit
3.3V to 1.65Vref
PFC Bulk HW OVP
Vtrigger = 1.58V @ 440V
PFC_OVP=0.003623*VBUS
Input voltage OVP
Bulk voltage OVP
BECAREFUL WITH DNE PARTS,
IT CHANGED TO POPULATED IN SCHEMATIC,
SO NEED TO CHANGE TO "DO NOT DISTURB"
E.X. R7069
IC9453
IC9452
1.3V@65A
Rated = 400V
Protection voltage(110%) = 437V
BW=1MHz
PFC_OVP_BOTTOM
PFC_OVP_TOP
Rated = 16Arms + 3A(ripple) = 25.63A
130% OCP for PPT -> 82.56V
BW=1Mhz
send LOW to PRI_RS: Reset Fault
keep HIGH PRI_RS: Normal
0: Normal: Enable PFC
1: TZ : Disable PFC
0: Phase current OCP
1: Normal
Title
MB : 09 - Pri MCU Protection
Size A3
Document Number <Doc>
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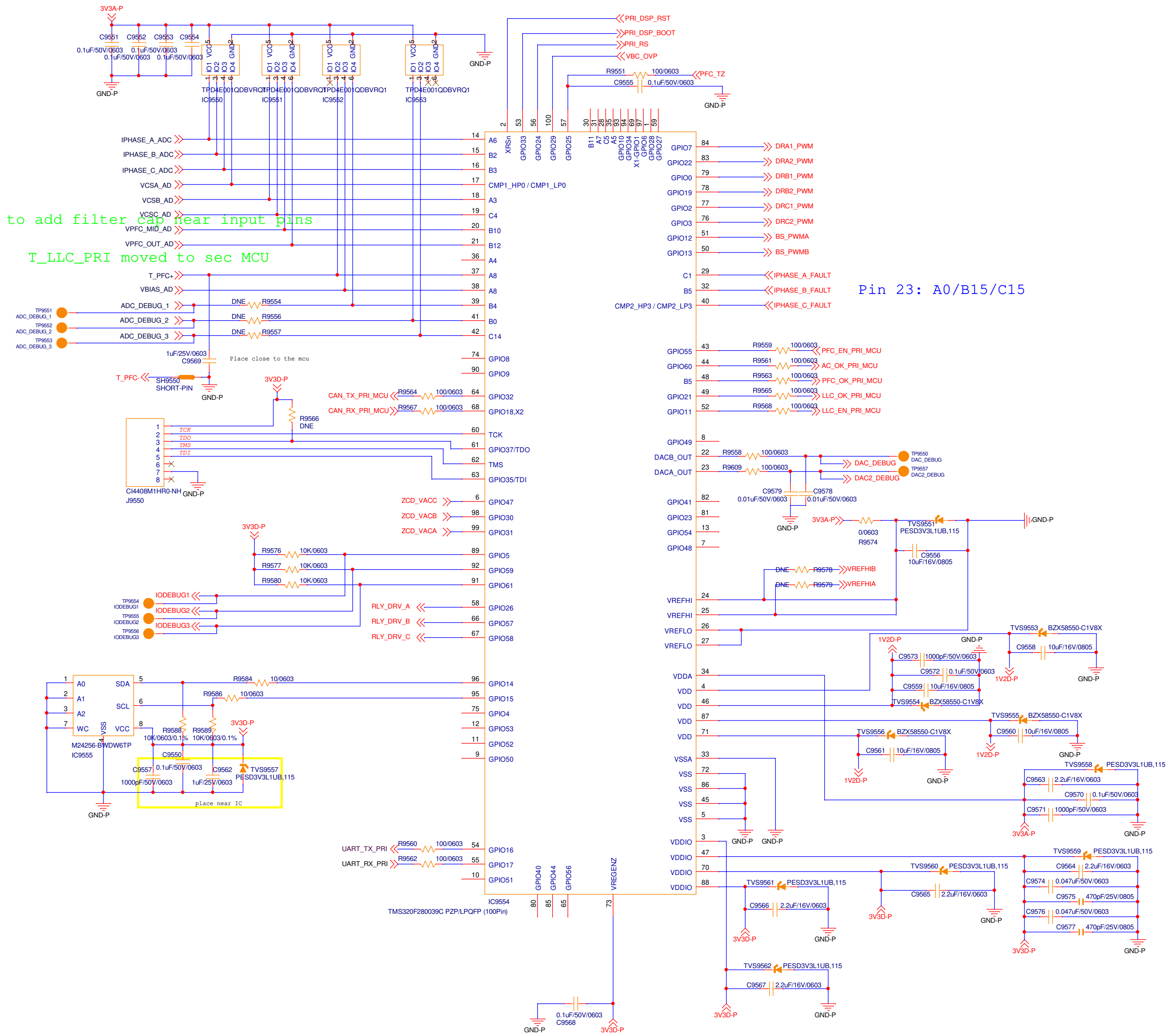

Title	MB : 11 - Pri MCU Main		
Size A2	Document Number <Doc>		Rev <RevCode>
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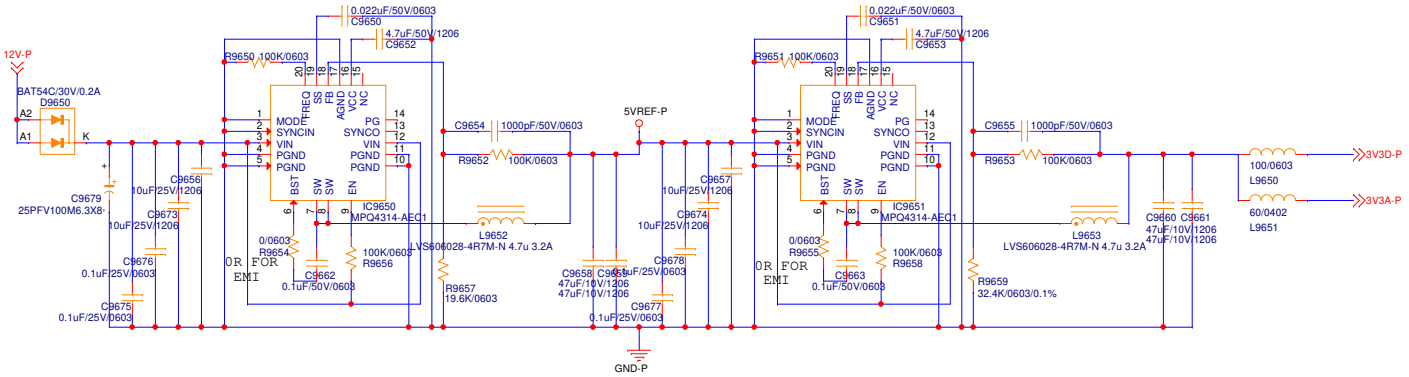
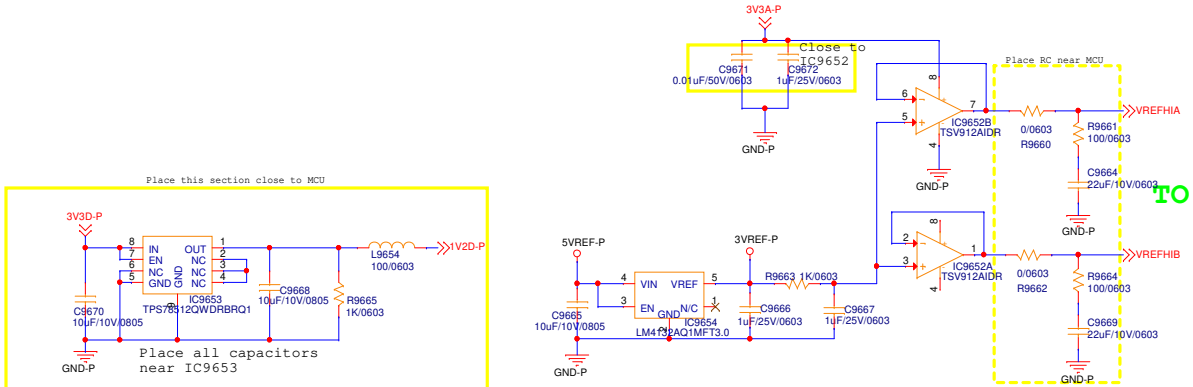
Keep capacitors as close as possible to the IC. Next priority close to the IC are the resistors.





REVIEW WHY 22KW CONNECT NC TO GROUND

Datasheet: Connect to ground for best thermal performance or leave floating.

Title	MB : 12 - Pri MCU Bias	
Size A3	Document Number <Doc>	Rev <RevCode>
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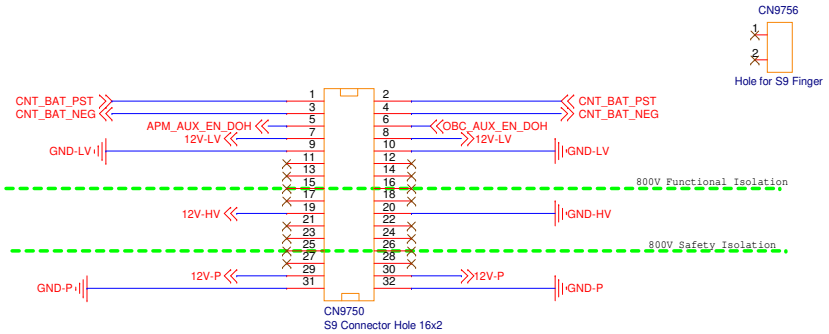
System IO Connector

TO S9: MAIN AUX BOARD

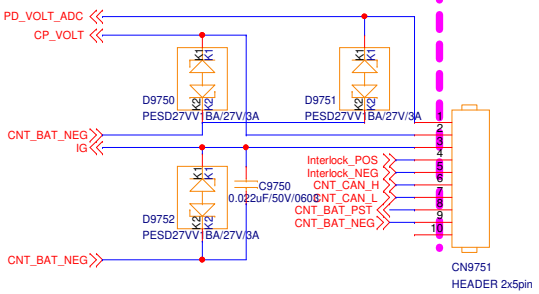
LV in
LV out

HV

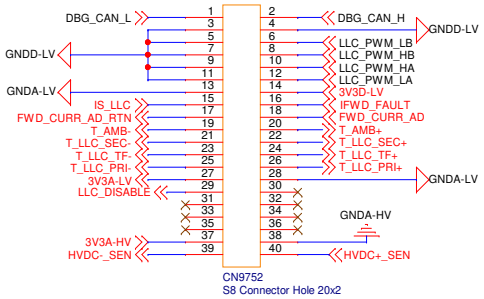
PRI

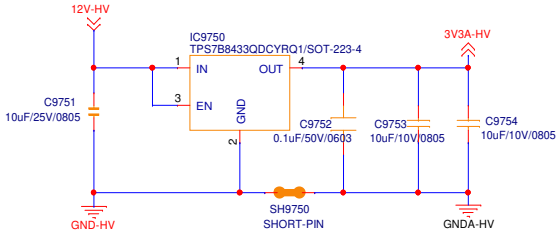


ECU CONNECTOR

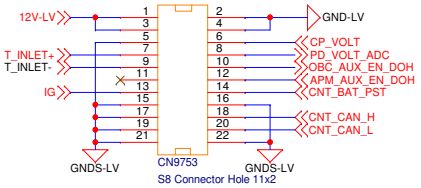


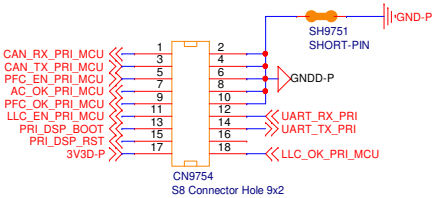
TO S8 (NEAR WATER CHANNEL INLET)



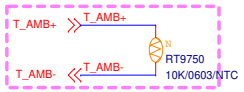


TO S8 (NEAR AUX BOARD S9)





Place near output signal connector



Title	MB : 14 - LVDC connectors	
Size B	Document Number <Doc>	Rev <RevCode>
Date: Friday, March 31, 2023	Sheet 12 of 14	

OBC HVDC Out:
470V/37A between
HVDC+ to HVDC-

FROM BRIDGE DIODE

HVDC+
HVDC-
1.79uH/R8x30
L9800
22uF/1200V
C9800
To Hall Sensor
HVDC_OUT-

TO HVDC EMI CHOKE (S10)

HVDC+_SEN
100/1206 R9800
1M/1206 R9801
1M/1206 R9802
1M/1206 R9803
1M/1206 R9804
1M/1206 R9817
1M/1206 R9818
0/1206 R9815

HVDC-_SEN
100/1206 R9805
1M/1206 R9806
1M/1206 R9807
1M/1206 R9808
1M/1206 R9809
1M/1206 R9819
1M/1206 R9820
0/1206 R9816

HVDC+
HVDC+ DC+
DC+
DC-
DC-
HVDC-
EARTH HVDC-
EARTH
Hole for S10 Finger
CN9800
CN9801 CON-1X1P_4
CN9802 CON-1X1P_4
FG1

HVDC

HVIL Connectors

5023520200
CON9800
HVDC HVIL
5023520200
CON9801
Interlock_NEG
Interlock_POS

loop
gain
resistor

3V3A-LV
R9810
2.2/0805
C9801
0.1uF/50V/0603
R9811
6.8K/0603
R9812
10K/0603
GNDA-LV
C9802
100pF/50V/0603
R9813
1.05K/0603
GNDA-LV
C9803
100pF/50V/0603
GNDA-LV
R9814
33/0603
C9804
0.047UF/50V/0603
Place close to MCU
SH9800
GNDA-LV

HVDC-
HVDC_OUT-
IP+1
IP+2
IP+3
IP+4
IP-5
IP-6
IP-7
IP-8
VCC 16
VCC 15
VOC
Fault
VIOUT
PROGRAM
GND 10
GND 9
ACS733KLATR-40AB-T
IC9800

IFWD_FAULT
FWD_CURR_AD
FWD_CURR_AD_RTN

OUTPUT DC CURRENT SENSE

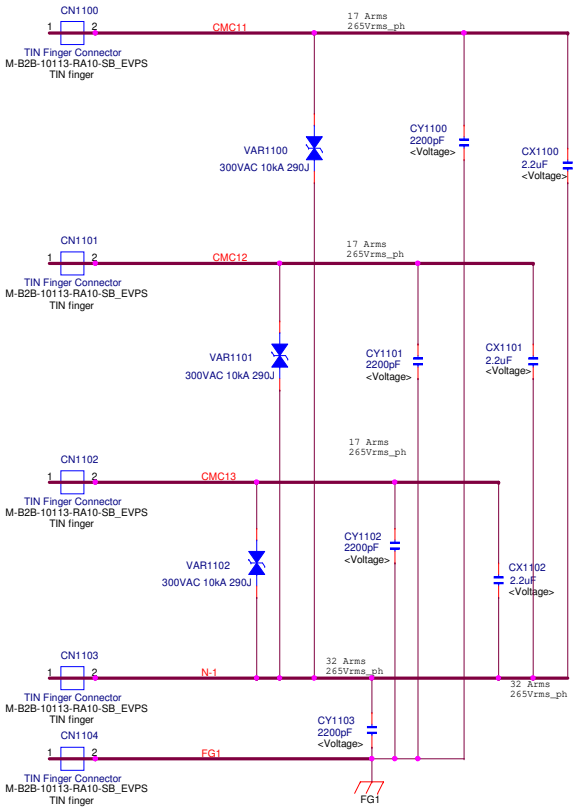
LVDC

BW=100kHz for control
normal(<27A): Fault=1
OCP(>27A): Fault=0

Rated: 19.3A -> Vout=2.287V
140% OCP: Ifault=27A(Vout=2.541V) -> Set R9811=6.8k, R9813=1.05k

Title	MB : 15 - HVDC Output	
Size A3	Document Number <Doc>	Rev <RevCode>
Date: Monday, April 03, 2023	Sheet 13 of 14	

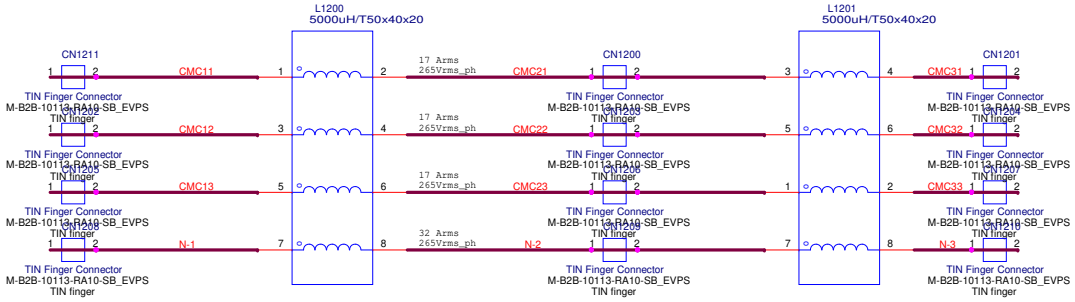
TO MB



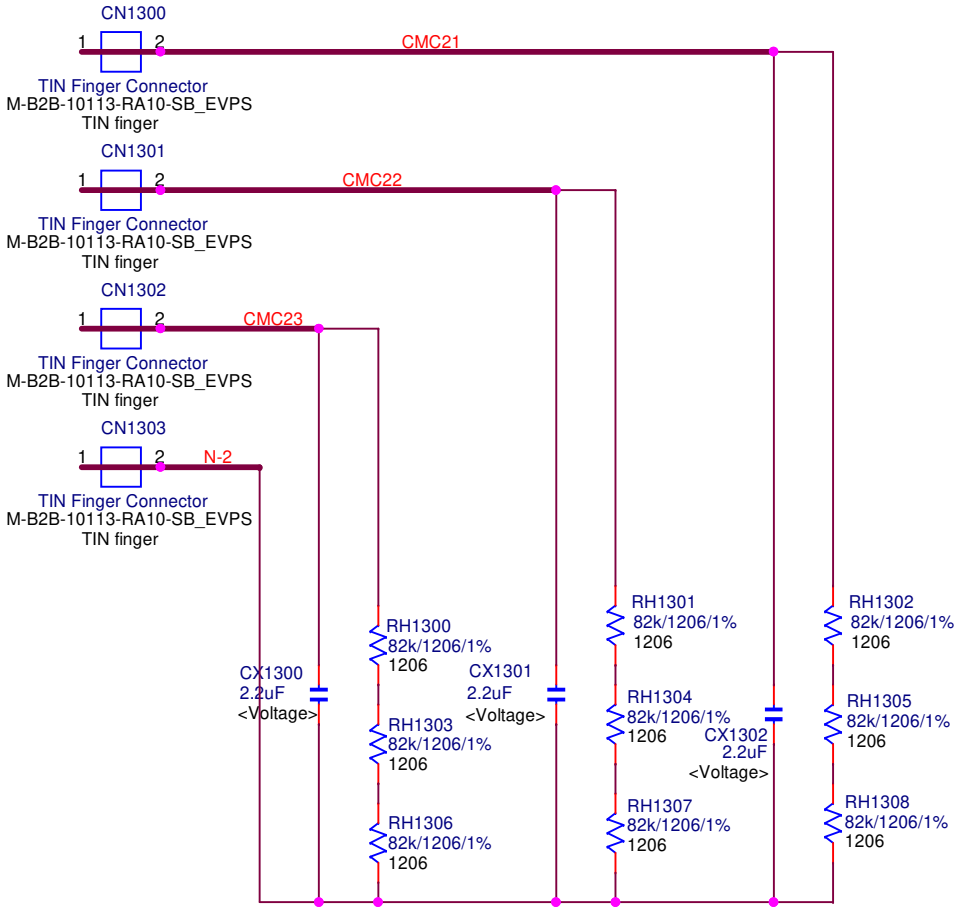
Title	S01-EMI cap1		
Size A3	Document Number <Doc>		Rev <RevCode>
Date: Monday, February 27, 2023	Sheet 22 of 39		

TO INPUT SIDE (NEAR FUSE)

TO OUTPUT SIDE (NEAR PFC CHOKE)



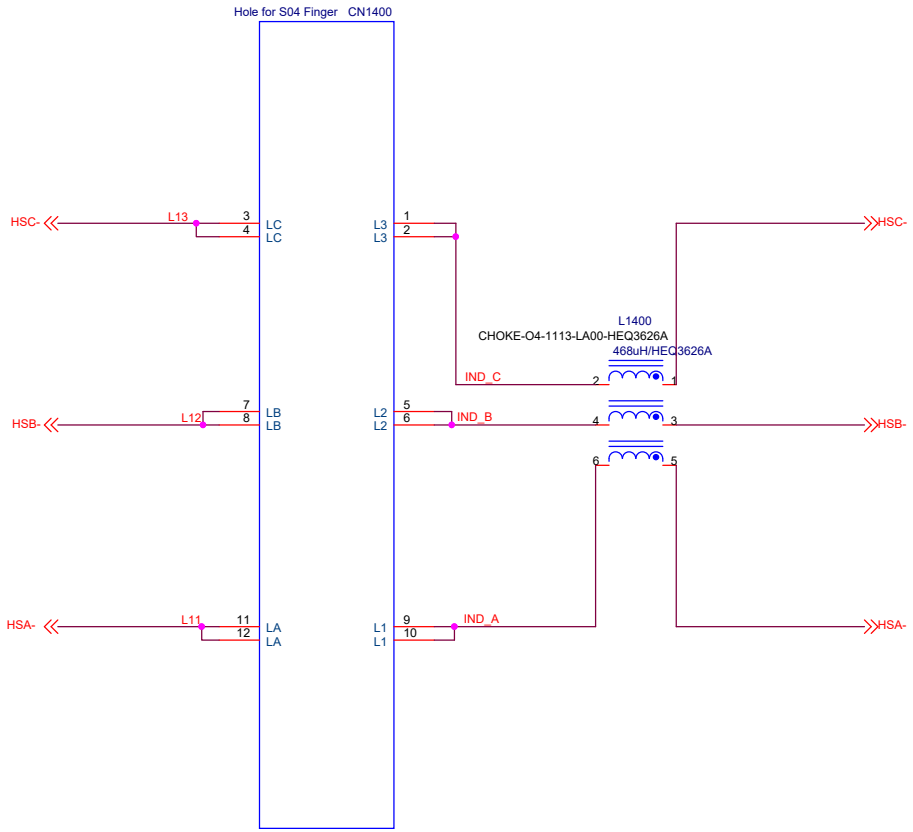
Title	S02-EMI Choke		
Size A3	Document Number <Doc>		Rev <RevCode>
Date: Thursday, March 02, 2023		Sheet 1 of 1	



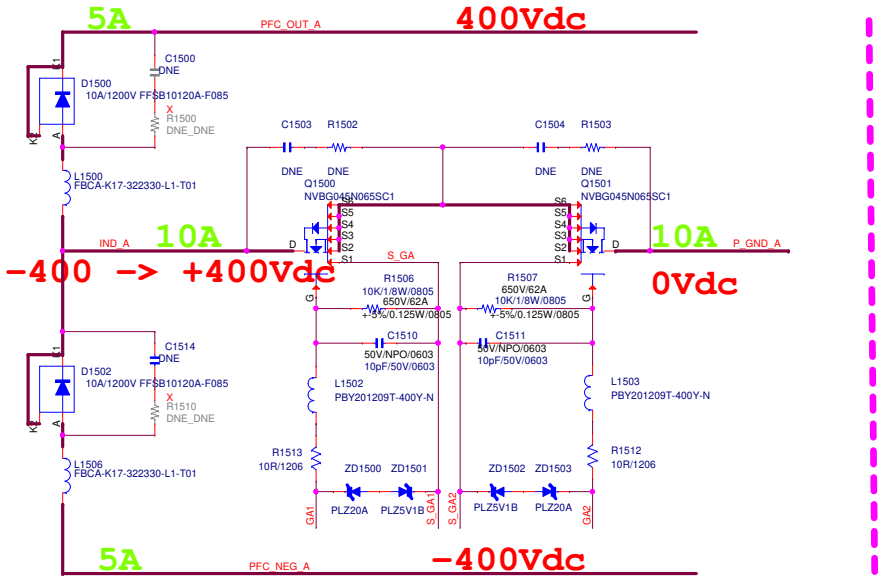
Title: S03-EMI cap2		
Size: A	Document Number: <Doc>	Rev: <RevCo
Date: Tuesday, February 28, 2023	Sheet 24 of 39	

TIN FINGER (TO MB)

TIN FINGER (TO MB)

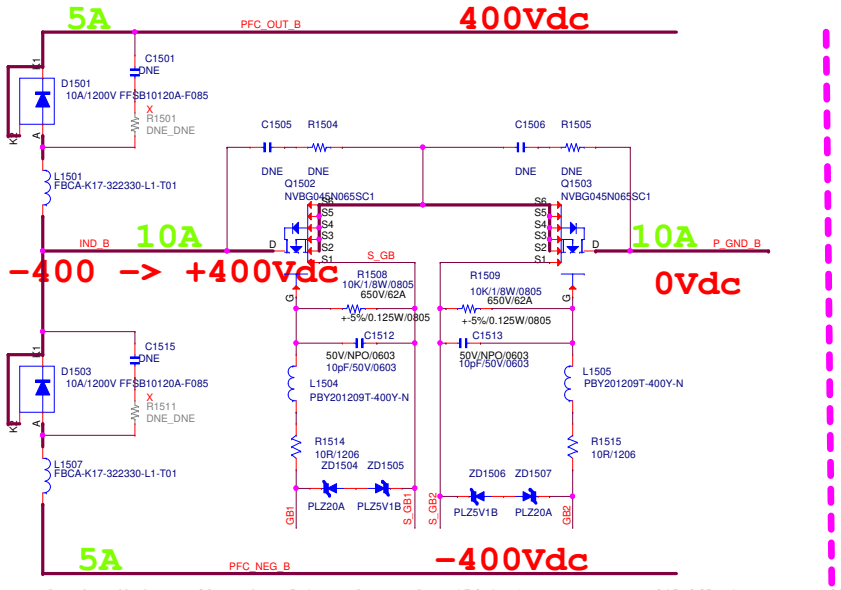


Title	S04-PFC Choke & Hall sensor	
Size A3	Document Number <Doc>	Rev <RevCode>
Date: Monday, March 13, 2023	Sheet 1 of 1	



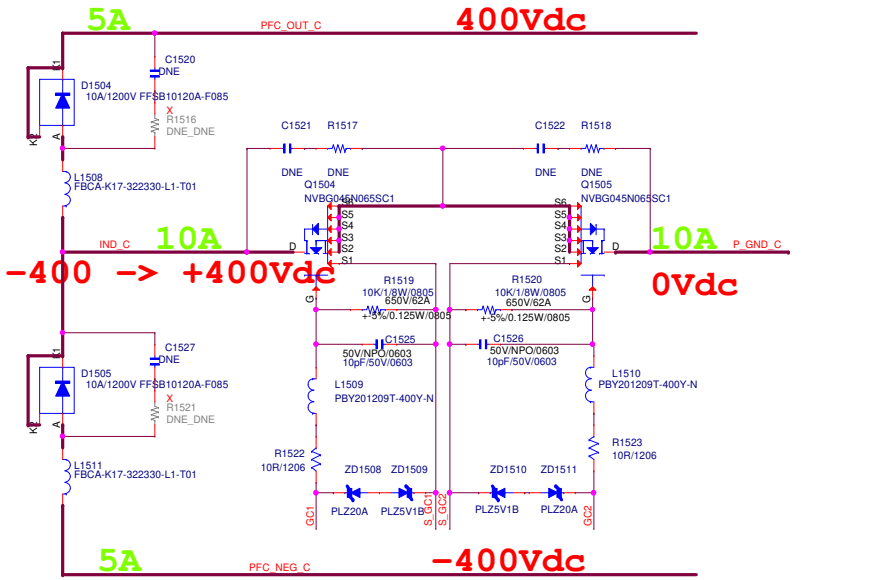
Clamping diodes PLZ20A and PLZ5V1B: only use for +17/-4V (PFC MOSFET: NVBG045N065SC1: Vgs_max=+22/-8)

Place each pare of MLCC nearest to MOS and DIO



Clamping diodes PLZ20A and PLZ5V1B: only use for +17/-4V (PFC MOSFET: NVBG045N065SC1: Vgs_max=+22/-8)

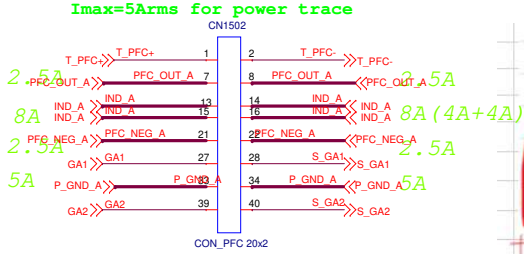
Place each pare of MLCC nearest to MOS and DIO

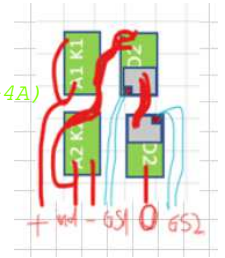


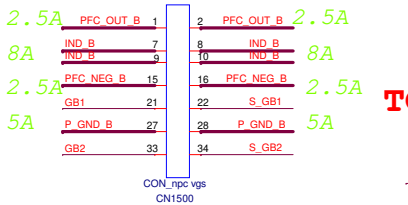
Clamping diodes PLZ20A and PLZ5V1B: only use for +17/-4V (PFC MOSFET: NVBG045N065SC1: Vgs_max=+22/-8)

Place each pare of MLCC nearest to MOS and DIO

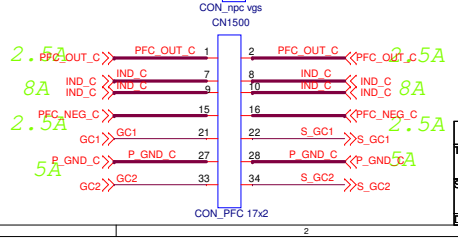
Imax=5Arms for power trace

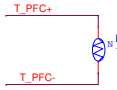




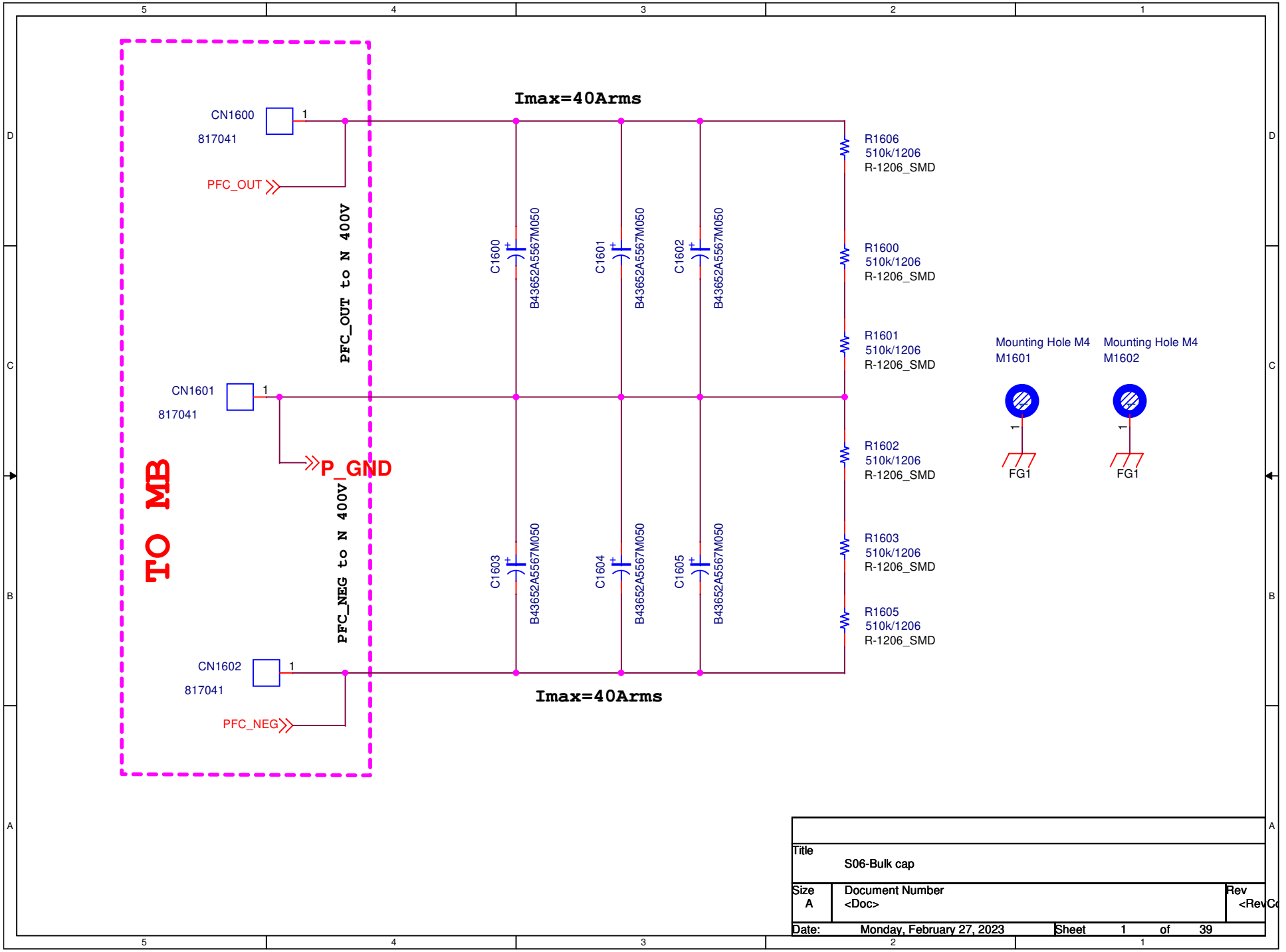


TO MAIN BOARD

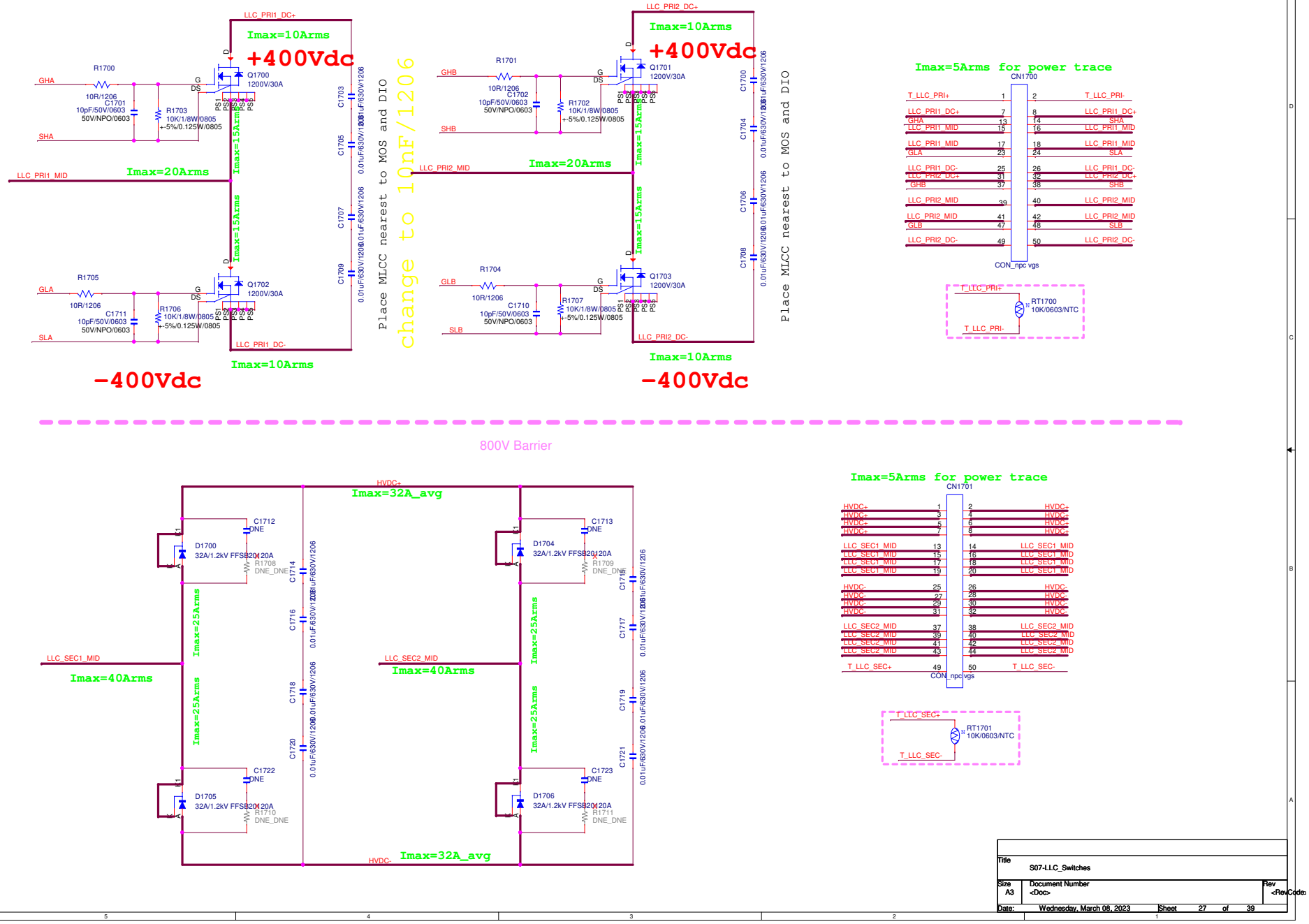


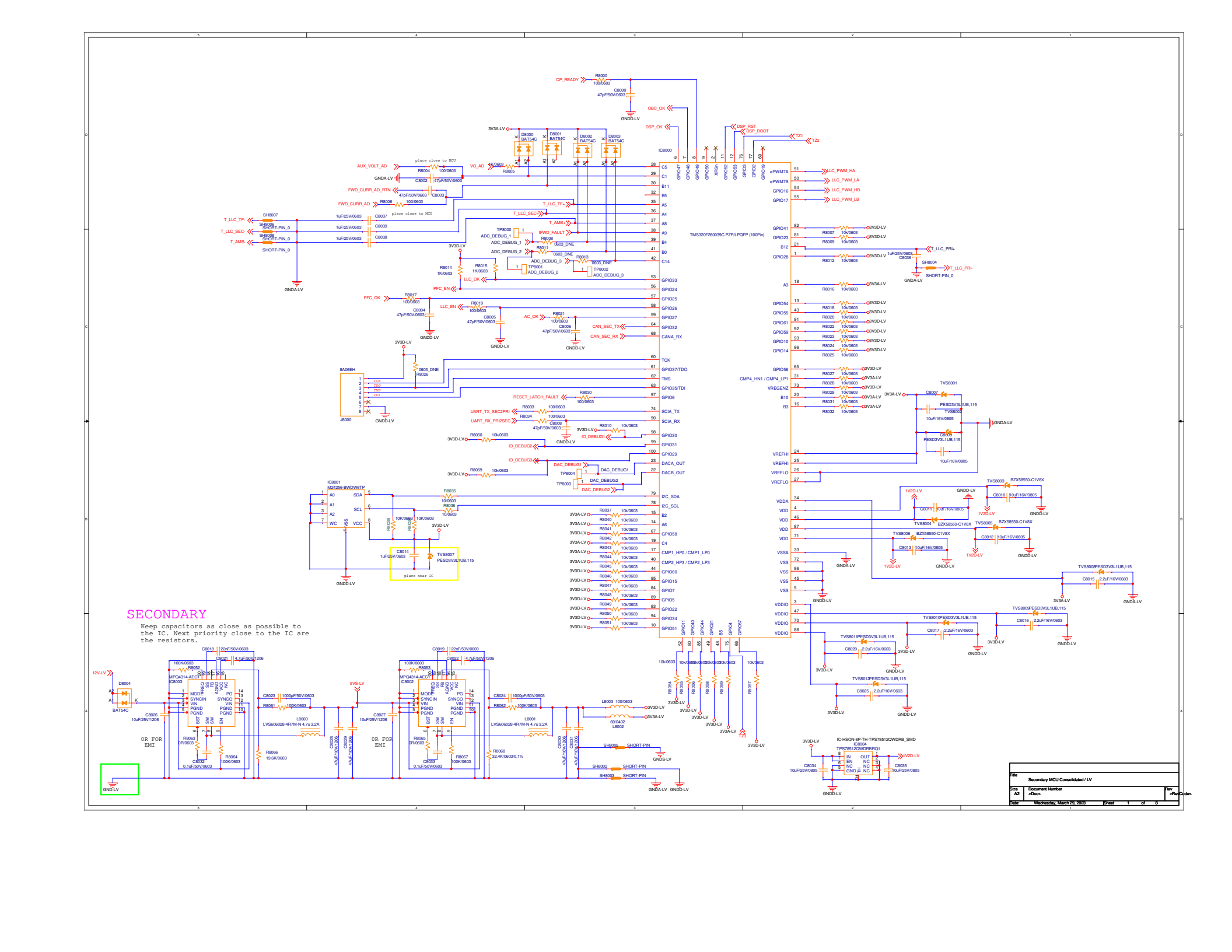


Title	S05-PFC_Switches	
Size A3	Document Number <Doc>	Rev <RevCode>
Date: Tuesday, February 28, 2023	Sheet 1 of 1	



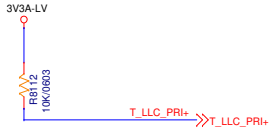
Title	S06-Bulk cap	
Size A	Document Number <Doc>	Rev <RevCo
Date: Monday, February 27, 2023	Sheet 1 of 39	


LLC_PRI1_DC+
Imax=10Arms
+400Vdc
R1700
GHA
10R/1206
C1701
10pF/50V/0603
50V/NPO/0603
R1703
10K/1/8W/0805
+-5%/0.125W/0805
Q1700
1200V/30A
SHA
LLC_PRI1_MID
Imax=20Arms
Imax=15Arms
Imax=15Arms
R1705
GLA
10R/1206
C1711
10pF/50V/0603
50V/NPO/0603
R1706
10K/1/8W/0805
+-5%/0.125W/0805
Q1702
1200V/30A
SLA
LLC_PRI1_DC-
Imax=10Arms
-400Vdc
C1703
C1705
C1707
C1709
0.01uF/630V/1206
Place MLCC nearest to MOS and DIO
change to 10nF/1206
LLC_PRI2_DC+
Imax=10Arms
+400Vdc
R1701
GHB
10R/1206
C1702
10pF/50V/0603
50V/NPO/0603
R1702
10K/1/8W/0805
+-5%/0.125W/0805
Q1701
1200V/30A
SHB
LLC_PRI2_MID
Imax=20Arms
Imax=15Arms
Imax=15Arms
R1704
GLB
10R/1206
C1710
10pF/50V/0603
50V/NPO/0603
R1707
10K/1/8W/0805
+-5%/0.125W/0805
Q1703
1200V/30A
SLB
LLC_PRI2_DC-
Imax=10Arms
-400Vdc
C1700
C1704
C1706
C1708
0.01uF/630V/1206
Place MLCC nearest to MOS and DIO
Imax=5Arms for power trace
CN1700
T_LLC_PRI+
T_LLC_PRI-
LLC_PRI1_DC+
GHA
LLC_PRI1_MID
LLC_PRI1_MID
GLA
LLC_PRI1_DC-
LLC_PRI2_DC+
GHB
LLC_PRI2_MID
LLC_PRI2_MID
GLB
LLC_PRI2_DC-
SHA
SHB
SLA
SLB
CON_npc vgs
T_LLC_PRI+
RT1700
10K/0603/NTC
T_LLC_PRI-
800V Barrier
HVDC+
Imax=32A_avg
C1712
DNE
D1700
32A/1.2kV FFSB2012
0A
R1708
DNE_DNE
C1714
C1716
C1718
C1720
0.01uF/630V/1206
LLC_SEC1_MID
Imax=40Arms
Imax=25Arms
Imax=25Arms
D1705
32A/1.2kV FFSB2012
0A
R1710
DNE_DNE
C1722
DNE
HVDC-
Imax=32A_avg
C1713
DNE
D1704
32A/1.2kV FFSB2012
0A
R1709
DNE_DNE
C1715
C1717
C1719
C1721
0.01uF/630V/1206
LLC_SEC2_MID
Imax=40Arms
Imax=25Arms
Imax=25Arms
D1706
32A/1.2kV FFSB2012
0A
R1711
DNE_DNE
C1723
DNE
Imax=5Arms for power trace
CN1701
HVDC+
HVDC-
LLC_SEC1_MID
LLC_SEC2_MID
T_LLC_SEC+
T_LLC_SEC-
CON_npc vgs
T_LLC_SEC+
RT1701
10K/0603/NTC
T_LLC_SEC-
Title
S07-LLC_Switches
Size
A3
Document Number
<Doc>
Rev
<RevCode>
Date:
Wednesday, March 08, 2023
Sheet
27
of
39

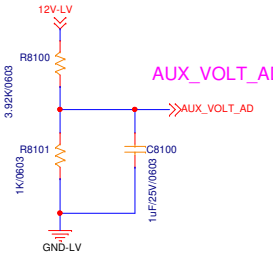

SECONDARY
Keep capacitors as close as possible to the IC. Next priority close to the IC are the resistors.
TMS320F28003C PZP/LPQFP (100Pin)
IC8000
J8000
IC8001
M24256-BWDW6TP
IC8002
IC8003
MPQ4314-AEC1
BAT54C
TPS78512QWDRBRQ1
IC-HSON-8P-TH-TPS78512QWDRB_SMD
Title
Secondary MCU Consolidated / LV
Size A2
Document Number <Doc>
Rev <RevCode>
Date: Wednesday, March 29, 2023
Sheet 1 of 8

Pri tank current RMS
HVDC voltage
HVDC current
Sec Rectifier temperature

HVDC CURRENT: CHECK MB PAGE 15



12V STANDBY VOLTAGE SENSE

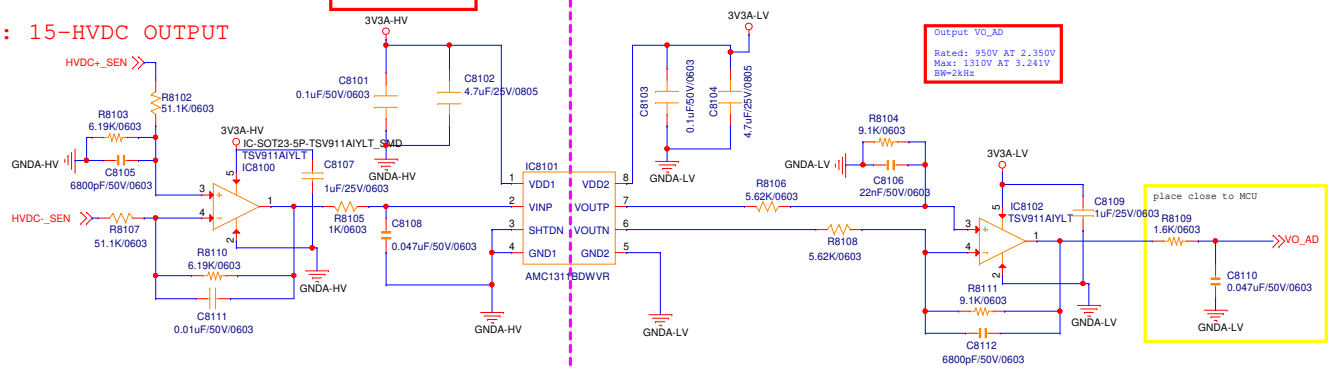


HVDC VOLTAGE SENSE

HVDC

LVDC

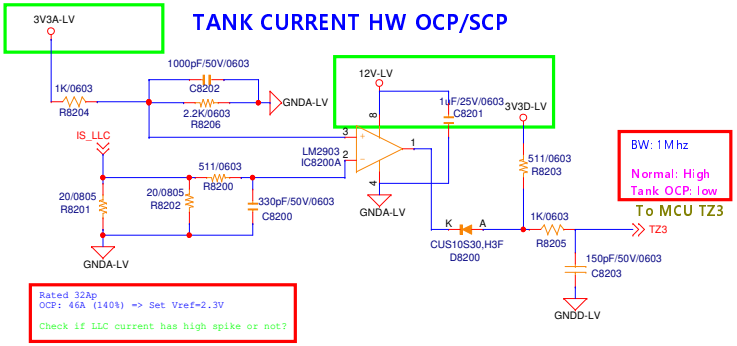
FROM MB: 15-HVDC OUTPUT



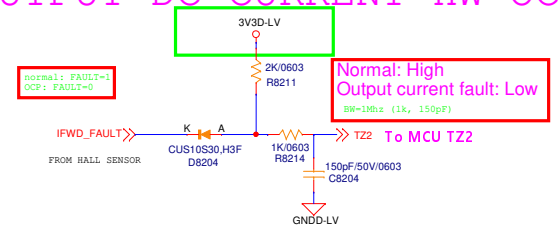
Increase filter cap to 0.1uF

Title	S08-Sec&Third Controller : 03 - Sec MCU LLC ADC	
Size A3	Document Number <Doc>	Rev <RevCode>
Date: Thursday, March 09, 2023	Sheet 2 of 8	

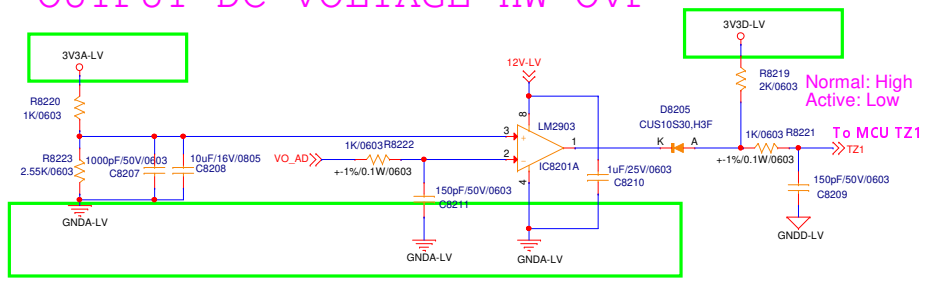
TANK CURRENT HW OCP/SCP



OUTPUT DC CURRENT HW OCP



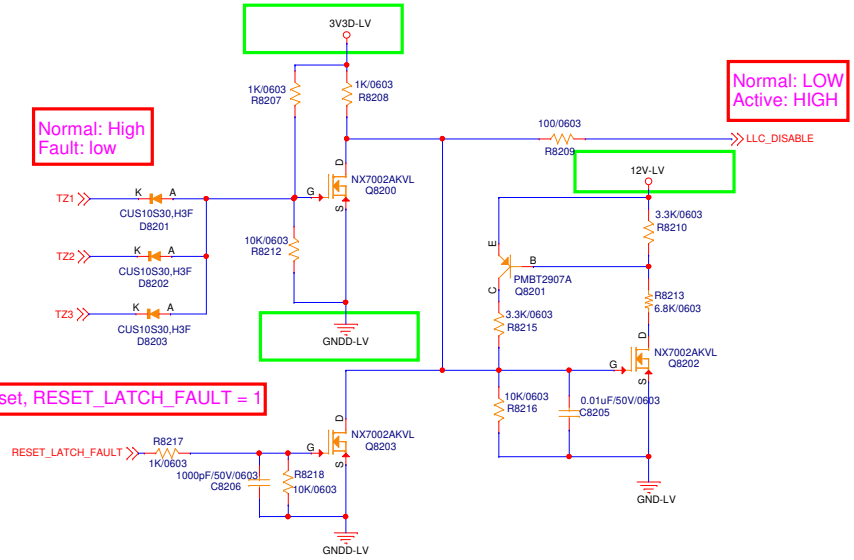
OUTPUT DC VOLTAGE HW OVP



Rated: 950V AT 2.350V
Max: 1310V AT 3.241V
BW=2kHz
OVP: 961V at 2.378V for PPT

Pri tank current OCP
HVDC OVP
HVDC OCP
Sec Rectifier OTP

HW LATCH CIRCUIT DRIVE DISABLE

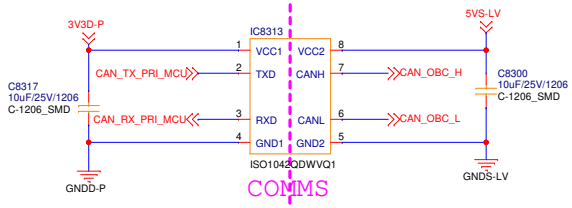


Title	S08-Sec&Third Controller : 04 - Sec MCU Protection	
Size A3	Document Number <Doc>	Rev <RevCode>
Date: Thursday, March 09, 2023	Sheet 3 of 8	

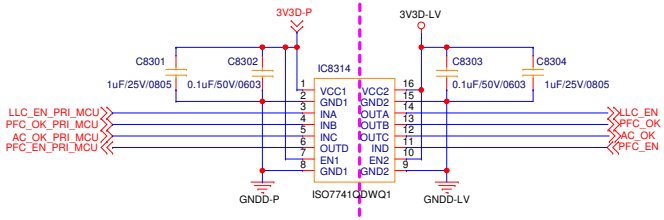
PRIMARY

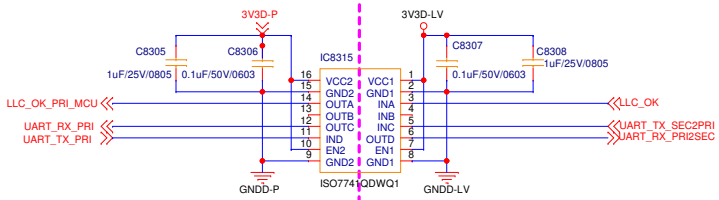
INTERNAL PRIMARY CAN

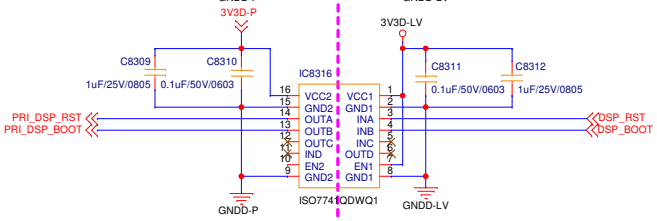
LVDC



COMMS





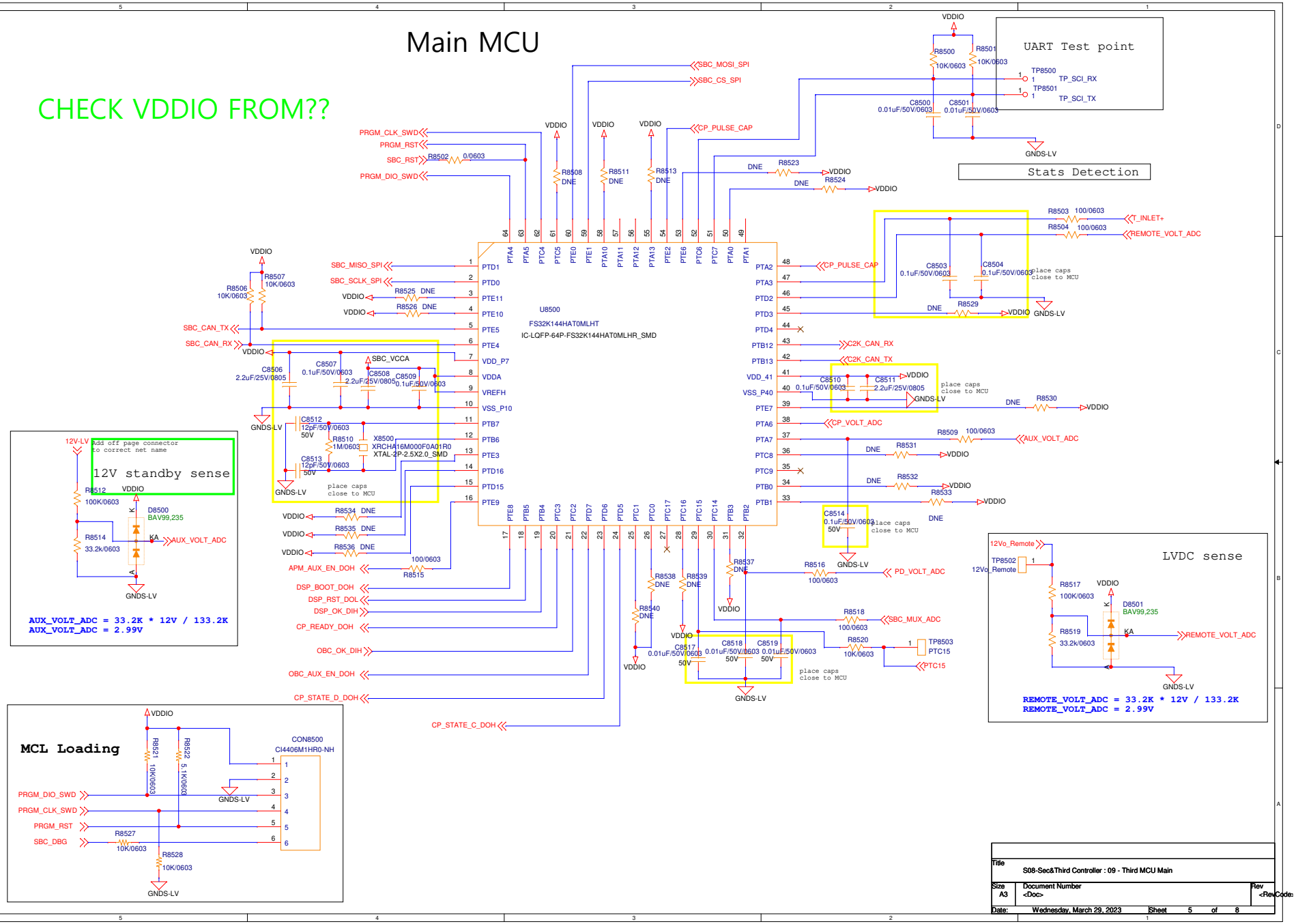


CHECK ALL SIGNAL NAME

Title	S08-Sec&Third Controller : 05 - Pri to Sec Comm	
Size A3	Document Number <Doc>	Rev <RevCode>
Date: Wednesday, March 29, 2023	Sheet 4 of 8	

Main MCU

CHECK VDDIO FROM??



Title	S08-Sec&Third Controller : 09 - Third MCU Main	
Size A3	Document Number <Doc>	Rev <RevCode>
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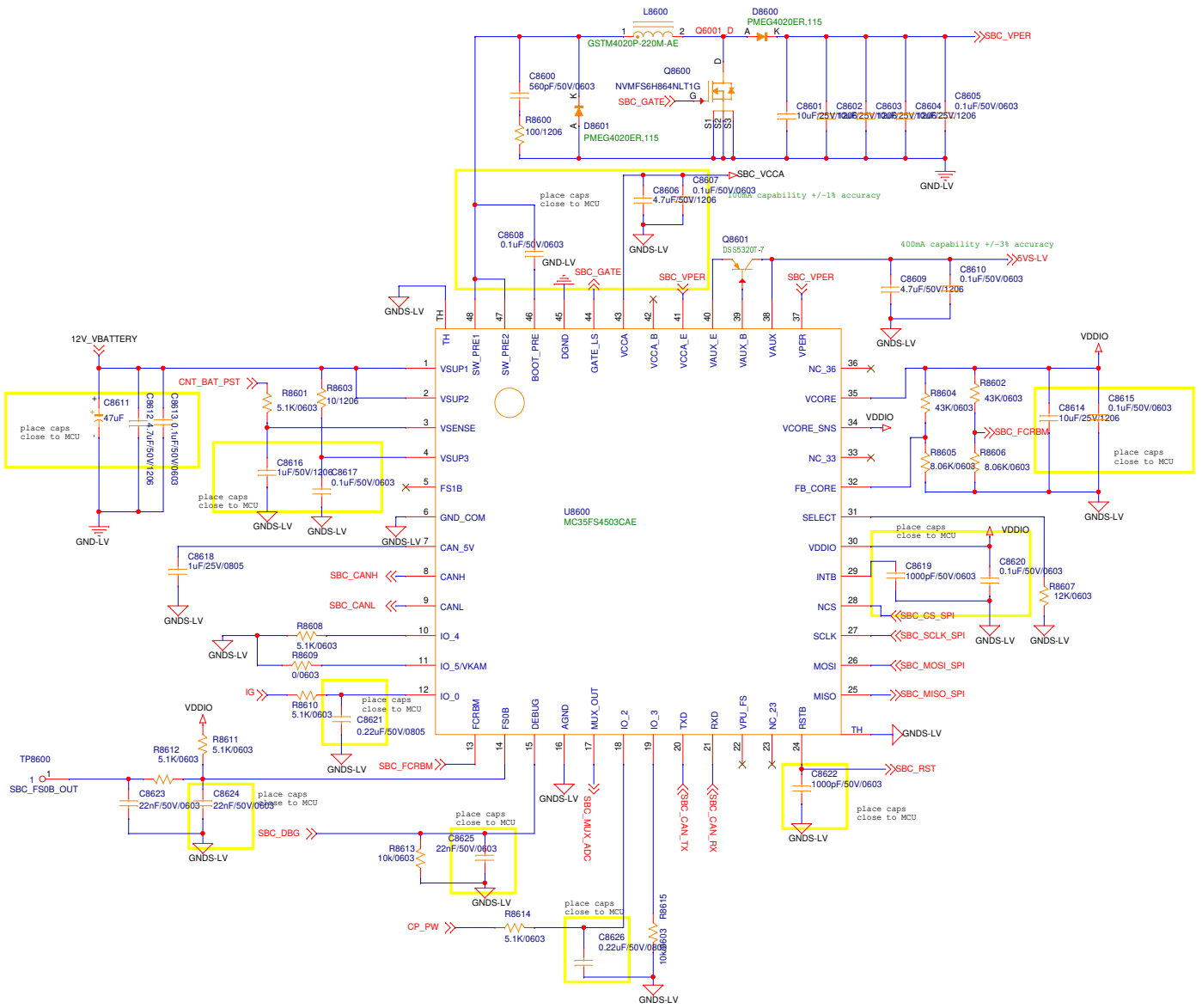
L8600
GSTM4020P-220M-AE
D8600
PMEG4020ER,115
SBC_VPER
Q6001_D
Q8600
NVMFS6H864NLT1G
SBC_GATE
C8600
560pF/50V/0603
R8600
100/1206
D8601
PMEG4020ER,115
C8601
10uF/25V/1206
C8602
C8603
C8604
C8605
0.1uF/50V/0603
GND-LV
SBC_VCCA
C8607
0.1uF/50V/0603
C8606
4.7uF/50V/1206
100mA capability +/-1% accuracy
place caps
close to MCU
C8608
0.1uF/50V/0603
GND-LV
GNDS-LV
Q8601
DS5532OT-7
400mA capability +/-3% accuracy
5VS-LV
C8609
4.7uF/50V/1206
C8610
0.1uF/50V/0603
12V_VBATTERY
C8611
47uF
C8612
4.7uF/50V/1206
C8613
0.1uF/50V/0603
CNT_BAT_PST
R8601
5.1K/0603
R8603
10/1206
C8616
1uF/50V/1206
C8617
0.1uF/50V/0603
C8618
1uF/25V/0805
SBC_CANH
SBC_CANL
R8608
5.1K/0603
R8609
0/0603
IG
R8610
5.1K/0603
C8621
0.22uF/50V/0805
VDDIO
R8611
5.1K/0603
R8612
5.1K/0603
TP8600
SBC_FS0B_OUT
C8623
22nF/50V/0603
C8624
22nF/50V/0603
SBC_DBG
R8613
10k/0603
C8625
22nF/50V/0603
CP_PW
R8614
5.1K/0603
C8626
0.22uF/50V/0805
R8615
100/0603
U8600
MC35FS4503CAE
TH
VSUP1
VSUP2
VSENSE
VSUP3
FS1B
GND_COM
CAN_5V
CANH
CANL
IO_4
IO_5/VKAM
IO_0
SW_PRE1
SW_PRE2
BOOT_PRE
DGND
GATE_LS
VCCA
VCCA_B
VCCA_E
VAUX_E
VAUX_B
VAUX
VPER
NC_36
VCORE
VCORE_SNS
NC_33
FB_CORE
SELECT
VDDIO
INTB
NCS
SCLK
MOSI
MISO
FCRBM
FS0B
DEBUG
AGND
MUX_OUT
IO_2
IO_3
TXD
RXD
VPU_FS
NC_23
RSTB
R8604
43K/0603
R8602
43K/0603
R8605
8.06K/0603
R8606
8.06K/0603
C8614
10uF/25V/1206
C8615
0.1uF/50V/0603
C8619
1000pF/50V/0603
C8620
0.1uF/50V/0603
R8607
12K/0603
SBC_FCRBM
SBC_CS_SPI
SBC_SCLK_SPI
SBC_MOSI_SPI
SBC_MISO_SPI
C8622
1000pF/50V/0603
SBC_RST
SBC_MUX_ADC
SBC_CAN_TX
SBC_CAN_RX
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S08-Sec&Third Controller : 10 - Third MCU SBC
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OBC--LVDC

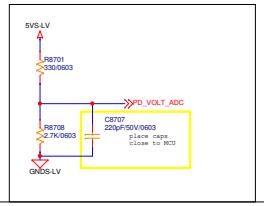
OBC LVDC SIDE

OBC--LVDC

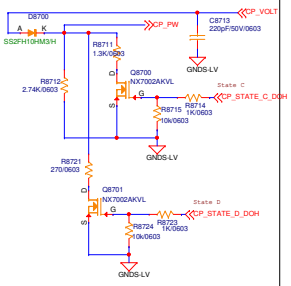
DSP debug COMM

TO 3RD MCU

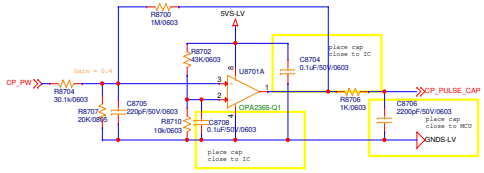
Proximity Detection circuit



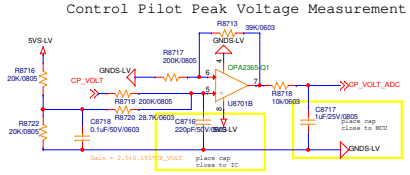
Control pilot circuit



Control Pilot Frequency Measurement



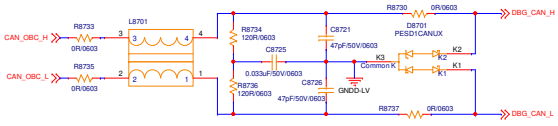
Control Pilot Peak Voltage Measurement



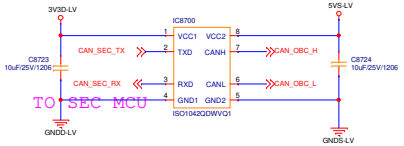
INTERNAL SECONDARY CAN

both side LV, sb no need isolator.
Need to check in PTT sample before removing for cost down

OBC CAN DEBUG SIGNALS

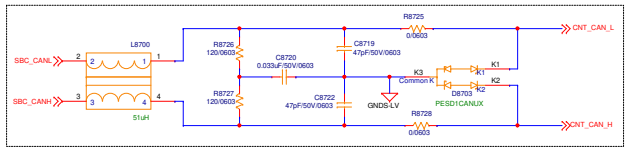


TO SEC MCU



CHANGE REF DES TO 8XXX

TO SBC MCU



CAN Signal

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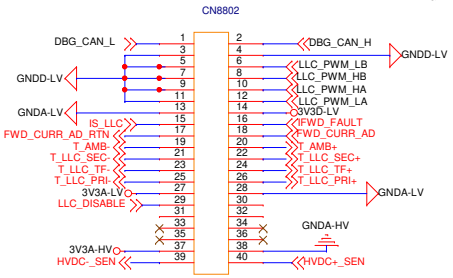
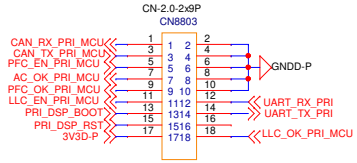
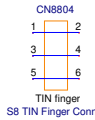
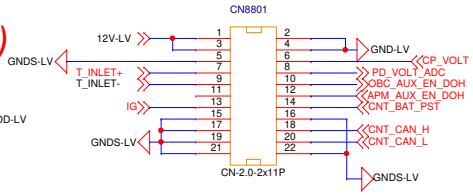
TO MB-14
(NEAR WATER
CHANNEL INLET)





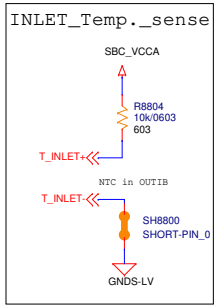


TO MB14 & AUX BOARD S9



BIAS 12V_LV
MAIN AUX COMM

ECU COMM



Title	S08-Sec&Third Controller : 12 - Third MCU Connector	
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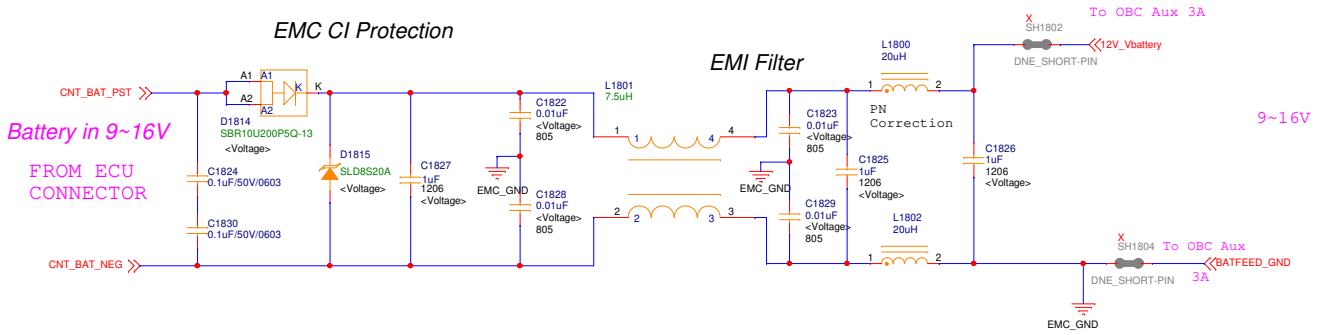

Title	S09-Main Aux : 01 - LV Batt EMI	
Size A3	Document Number <Doc>	Rev <RevCode>
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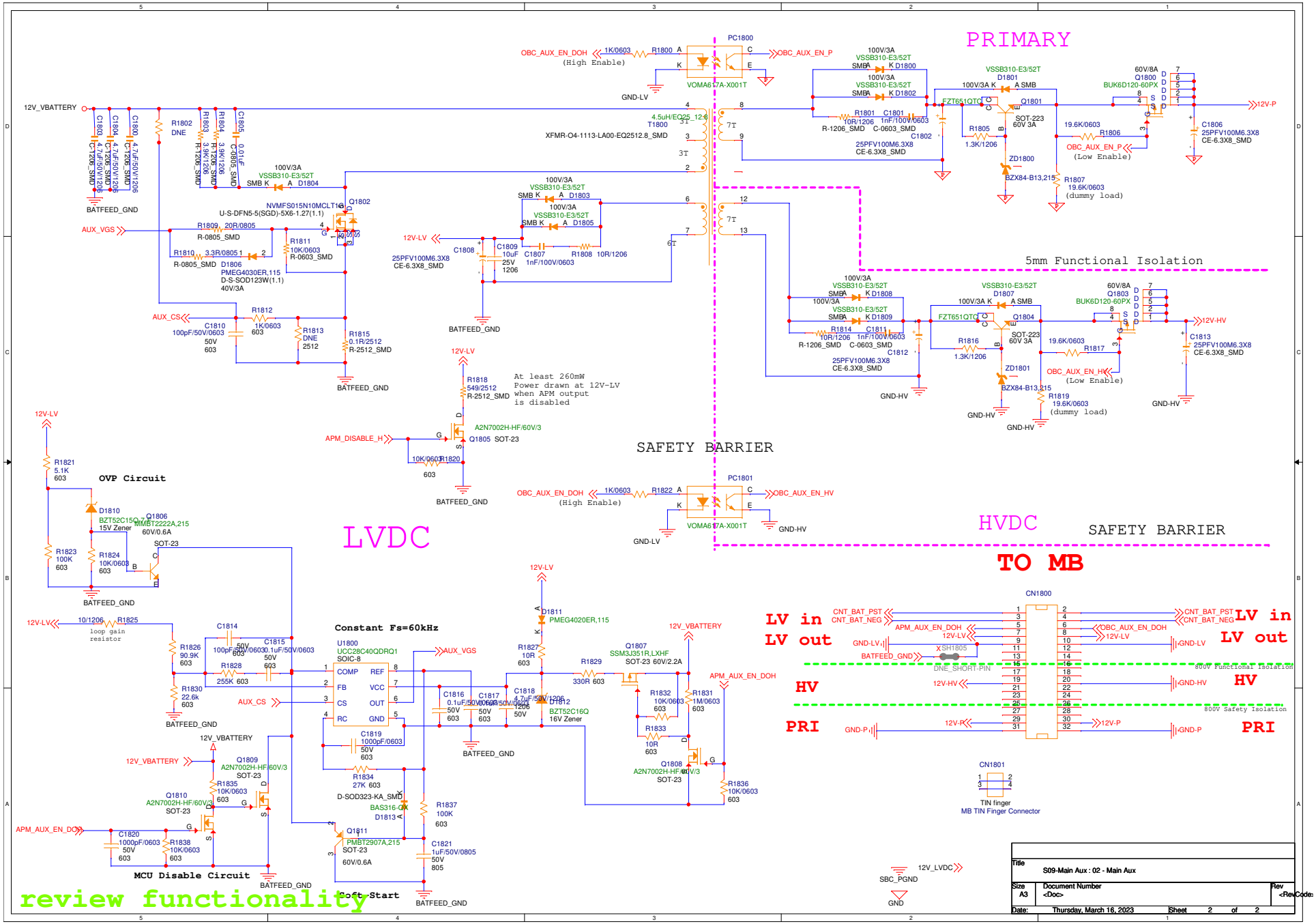
PRIMARY
SAFETY BARRIER
5mm Functional Isolation
LVDC
HVDC
SAFETY BARRIER
TO MB
OVP Circuit
Constant Fs=60kHz
MCU Disable Circuit
Soft Start
review functionality
At least 260mW
Power drawn at 12V-LV
when APM output
is disabled
LV in
LV out
HV
PRI
800V Functional Isolation
800V Safety Isolation
TIN finger
MB TIN Finger Connector
Title
S09-Main Aux : 02 - Main Aux
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A3
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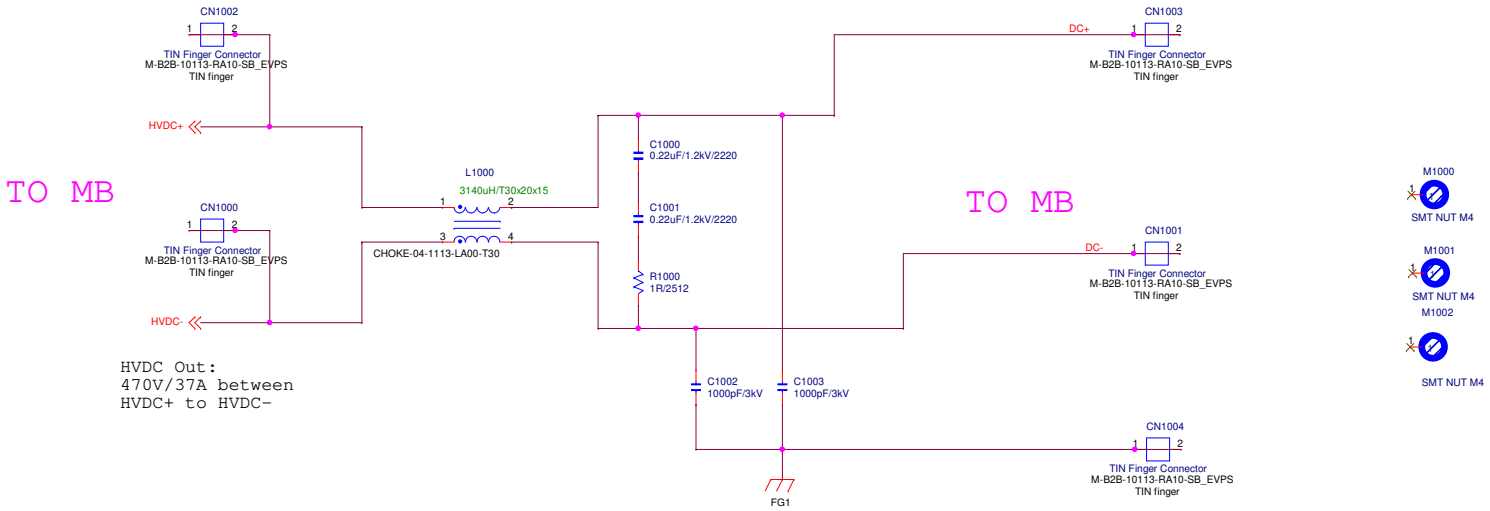

HVDC Out:
470V/37A between
HVDC+ to HVDC-

Title	S10-HVDC EMI Choke : HVDC EMI CHOKE	
Size A3	Document Number <Doc>	Rev <RevCode>
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