Top Level Schematic

DC BUS TERMINALS

PHASE TERMINALS

ENCODER

RESOLVER

CTRL PWR

CON2 — 39522-1003
1 +12V_INPUT
2 12V_IN_RTN
3 EARTH GROUND

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Connect Earth
Ground to Pin 3

12V_IN_RTN

PWR_SUP
Power_Supplies_References.SchDoc
+12V_INPUT
+12V_IN_RTN

MECH
MECHANICALS.SchDoc

FAN

CON3 — 0022232041
TP2

EXT FAN

CON4 — 0022232041
TP4

EXTERNAL I/O

CON6 — 0022232121
+3.3V
+5V
+15V

Digital Inputs: Active high, 3.3V signal
Open drain output: 24V 20mA max

EXT FUNCT

CON9 — 22-23-2061
+15V
+5V

PWM MONITOR

CON11 — 0022232101
LS_PWM4
HS_PWM4
LS_PWM3
HS_PWM3
LS_PWM2
HS_PWM2
LS_PWM1
HS_PWM1

PWM signals. Do not drive externally with control card plugged in.

CAN INTERFACE

P1
618009231221
GND_ISO
CAN_L
CAN_H
+5V_ISO
C5
100nF

CON24 — 22-23-2071
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RVS1
Remote Voltage Sense.SchDoc
V_EXT1+
V_EXT1-
V_EXT2+
V_EXT2-
V_EXT3+
V_EXT3-
V_EXT1_SNS_3V
V_EXT2_SNS_3V
V_EXT3_SNS_3V

WARNING: DO NOT DIRECTLY CONNECT TO HIGH-VOLTAGE NETS.

Voltage inputs, V_EXTxx must have 5MEG resistor in series between the high-voltage node and these inputs. Maximum voltage to be sensed is 1000VDC or 700VAC.

Designator
Controller_NXP.SchDoc
FAN_PWM
FAN_RTN
OPEN_DRAIN_OUT0
OPEN_DRAIN_OUT1
EXT_DIGITAL_IN0
EXT_DIGITAL_IN1
PWM_DB
PRECHARGE_RLY
TEMP_EXT
PWM_LS_4_5V
PWM_HS_4_5V
CAN_L
CAN_H
V_EXT1_SNS_3V
V_EXT2_SNS_3V
V_EXT3_SNS_3V
PWM_HS_1
PWM_HS_2
PWM_HS_3
PWM_LS_1
PWM_LS_2
PWM_LS_3
/GD_FAULT_1
/GD_FAULT_2
/GD_FAULT_3
TEMP_1
TEMP_2
TEMP_3
PWM_DISABLE
/FLT_RESET
/OC_FLT_PH1
/OC_FLT_PH2
/OC_FLT_PH3
I_1_SNS
I_2_SNS
I_3_SNS
/OC_FLT_BUS
I_BUS_SNS
V_1_SNS
V_2_SNS
V_3_SNS
V_BUS_SNS
ENC_A
ENC_B
ENC_Z
RSLV_PWM
SINE
COSINE

HS_PWM1
HS_PWM2
HS_PWM3
LS_PWM1
LS_PWM2
LS_PWM3
/FAULT1
/FAULT2
/FAULT3
TEMP1
TEMP2
TEMP3
/OC_FLT1
/OC_FLT2
/OC_FLT3
I_SNS1
I_SNS2
I_SNS3

HS_PWM
LS_PWM
/FAULT
TEMP

Repeat(DIFF,1,3)
Differential Interface.SchDoc
Repeat(HS_PWM)
Repeat(LS_PWM)
Repeat(/FAULT_OUT)
Repeat(TEMP)
PWM_DISABLE
Repeat(HS_PWM+)
Repeat(HS_PWM-)
Repeat(LS_PWM+)
Repeat(LS_PWM-)
Repeat(FAULT+)
Repeat(FAULT-)
Repeat(TEMP+)
Repeat(TEMP-)
Repeat(LOGIC_ENA)
Repeat(PS_ENA)

Repeat(CARDS,1,3)
Daughter Cards.SchDoc
Repeat(HS_PWM+)
Repeat(HS_PWM-)
Repeat(LS_PWM+)
Repeat(LS_PWM-)
Repeat(FAULT+)
Repeat(FAULT-)
Repeat(TEMP+)
Repeat(TEMP-)
Repeat(LOGIC_ENA)
Repeat(PS_ENA)
Repeat(/RESET)
+DC_BUS
-DC_BUS
Repeat(SW_NODE)

HS_PWM+
HS_PWM-
LS_PWM+
LS_PWM-
FAULT+
FAULT-
TEMP+
TEMP-
LOGIC_ENA
PS_ENA

+5V
R161
10k
0603
SW1
Gate Drive Reset Button
TP5
/RESET

H4 Card Guide
H5 Card Guide
H6 Card Guide
H27 Card Guide

DC_BUS+
R1 20k 1210
R2 20k 1210
R3 20k 1210
R4 20k 1210
R5 20k 1210
R6 20k 1210
R7 20k 1210
R8 20k 1210
R9 20k 1210
R10 20k 1210
R11 1.5k 0603
R12 20k 1210
R13 20k 1210
R226 20k 1210
R227 20k 1210
R228 20k 1210
R229 20k 1210
R230 20k 1210
R231 20k 1210
R232 20k 1210
R233 20k 1210
R234 20k 1210
R235 20k 1210
R236 20k 1210
R237 20k 1210
D1 MMSZ4697-TP 10V
DS1 150060RS75020
DC_BUS-

Provisional electrolytic capacitor bank - not populated
C83 C139 C143 C147 C149
C150 C151 C152 C153 C154
180µF 500V

CON1 — 8199
CON19 — 7701
CON20 — 7701
CON21 — 7701
CON22 — 7701
CON5 — 8199

CS4
Current Sensors.SchDoc
CURRENT_OUT
CURRENT_IN
LEM_OUT
ALLEGRO_OUT
/ALLEGRO_FAULT

Repeat(CS,1,3)
Current Sensors.SchDoc
Repeat(CURRENT_IN)
Repeat(CURRENT_OUT)
Repeat(LEM_OUT)
Repeat(ALLEGRO_OUT)
Repeat(/ALLEGRO_FAULT)
PHASE
LEM_OUT
ALLEGRO_OUT
/ALLEGRO_FAULT

PHASE1 — CON7 — 8199
PHASE2 — CON8 — 8199
PHASE3 — CON10 — 8199

Repeat(CC,1,3)
Current Conditioning.SchDoc
Repeat(/CUR_FAULT_3V3)
Repeat(CUR_SNS_3V3)
Repeat(/ALLEGRO_FAULT)
Repeat(ALLEGRO_OUT)
Repeat(LEM_OUT)
/OC_FLT
I_SNS

CC4
Current Conditioning.SchDoc
/CUR_FAULT_3V3
CUR_SNS_3V3
/ALLEGRO_FAULT
ALLEGRO_OUT
LEM_OUT

Vs1
Voltage Sense.SchDoc
V_SNS_3V
V_MEAS+
V_MEAS-
SW_NODE1
DC_BUS-

Vs2
Voltage Sense.SchDoc
V_SNS_3V
V_MEAS+
V_MEAS-
SW_NODE2
DC_BUS-

Vs3
Voltage Sense.SchDoc
V_SNS_3V
V_MEAS+
V_MEAS-
SW_NODE3
DC_BUS-

Vs4
Voltage Sense.SchDoc
V_SNS_3V
V_MEAS+
V_MEAS-
DC_BUS+
DC_BUS-

ENC1
Encoder.SchDoc
ENC_A_OUT
ENC_B_OUT
ENC_Z_OUT
ENC_A_IN+
ENC_A_IN-
ENC_B_IN+
ENC_B_IN-
ENC_Z_IN+
ENC_Z_IN-

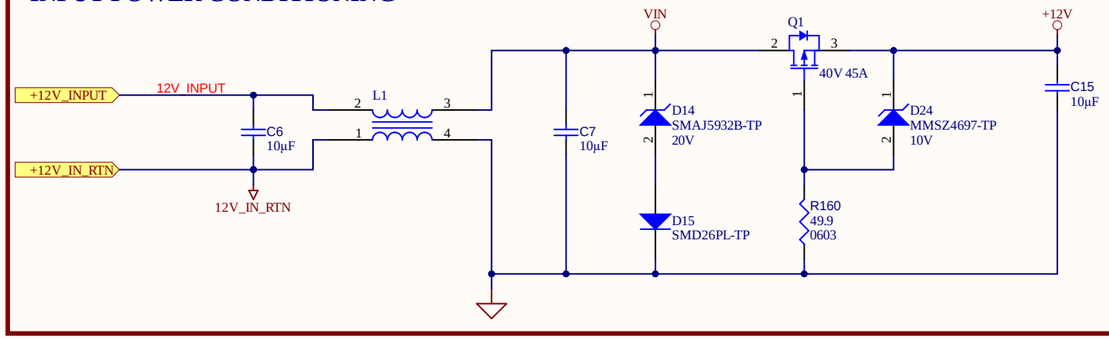
+5V
CON13 — 0022232081

RSLV1
Resolver.SchDoc
RSLV_PWM
Sine
Cosine
EXC_N
EXC_P
SIN_P
COS_P
COS_N
SIN_N

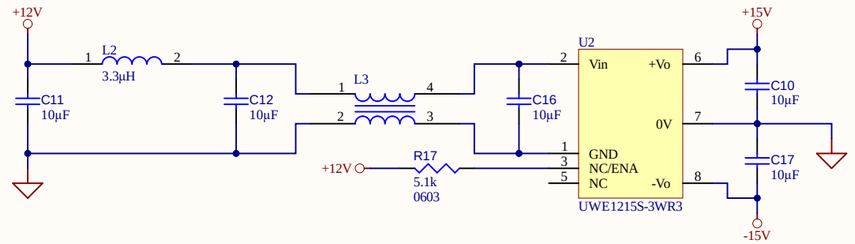
J6
EXC_P
SIN_P
COS_P
EXC_N
SIN_N
COS_N

Wolfspeed / Allegro	
Title:	Top Level Schematic
Drawing No:	MOD-MB-3P-0900V-40A_SCH
Date:	Jun. 2024
Size:	C
Revision:	2.0
Sheet:	1 of 12

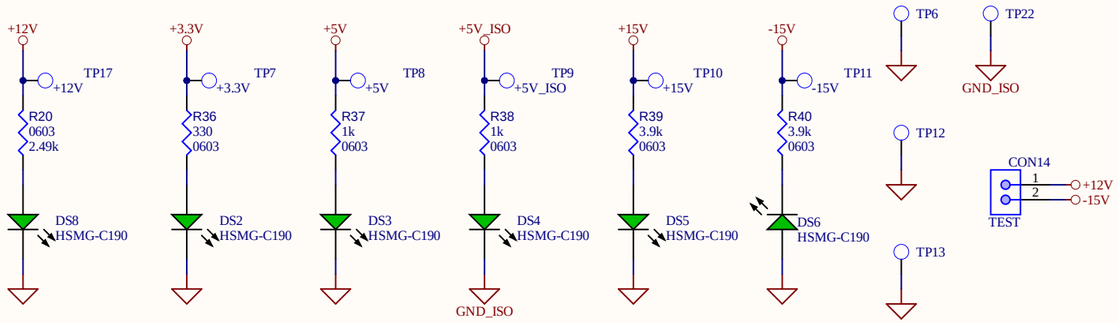
INPUT POWER CONDITIONING



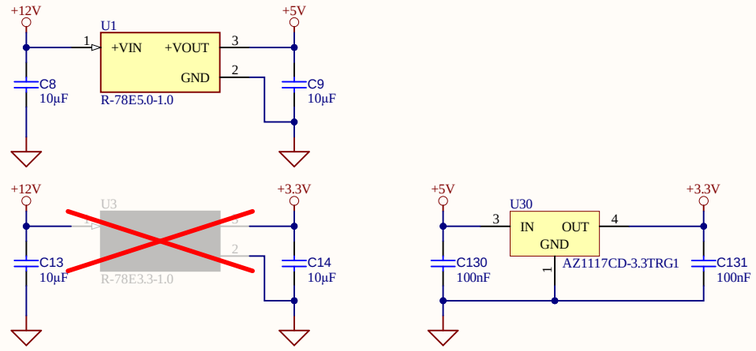
+/- 15V Supply



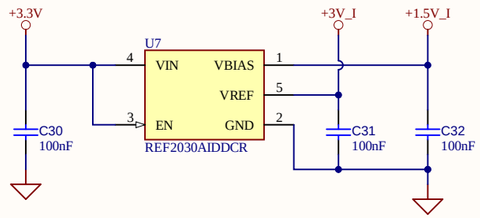
POWER LEDS



+3.3V AND +5V RAILS



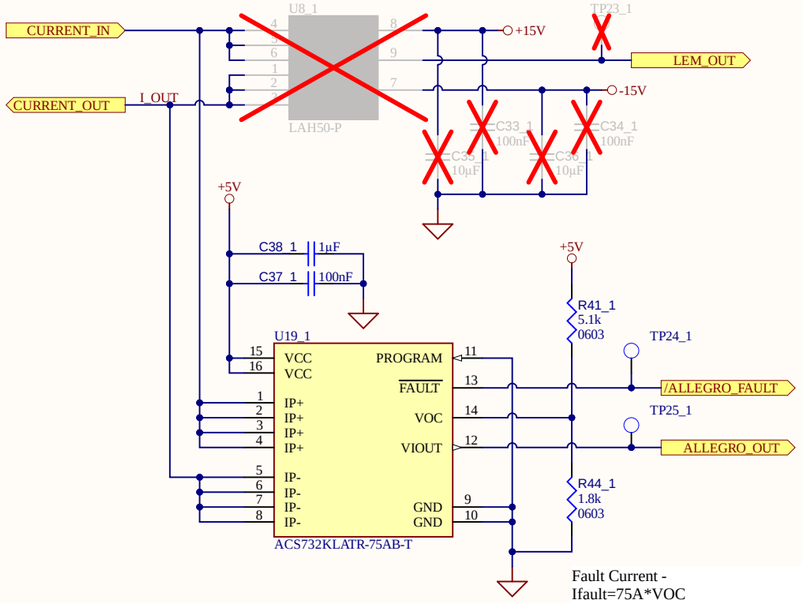
CURRENT REFERENCE RAILS



Wolfspeed® Allegro

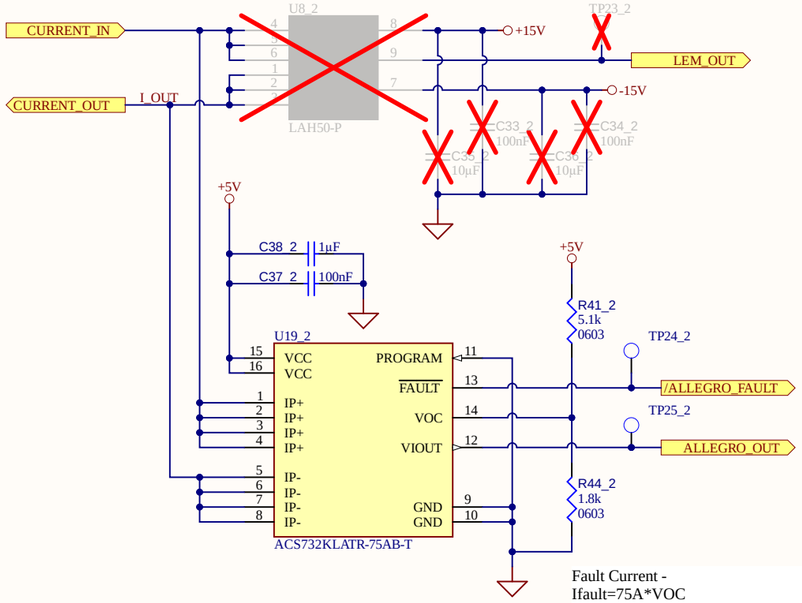
Title: Power Supplies				
Drawing No: MOD-MB-3P-0900V-40A_SCH				
Date: Jan. 2024	Size: B	Revision: 2.0	Sheet: 2 of 12	

CURRENT MEASUREMENT



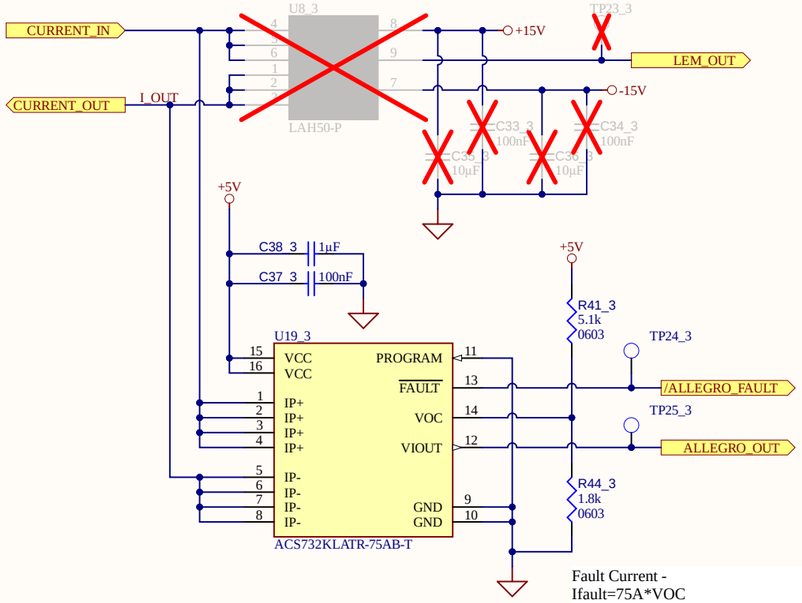
Wolfspeed / Allegro			
Title: Current Sense			
Drawing No: MOD-MB-3P-0900V-40A_SCH			
Date: Jun. 2024	Size: B	Revision: 2.0	Sheet: 3 of 12

CURRENT MEASUREMENT



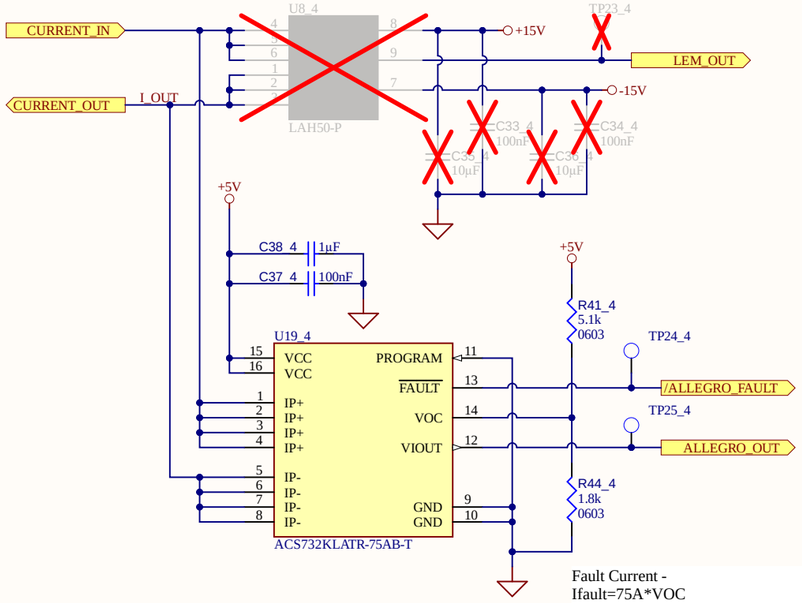
Wolfspeed / Allegro		
Title:	Current Sense	
Drawing No:	MOD-MB-3P-0900V-40A_SCH	
Date: Jun. 2024	Size: B	Revision: 2.0 / Sheet: 3 of 12

CURRENT MEASUREMENT

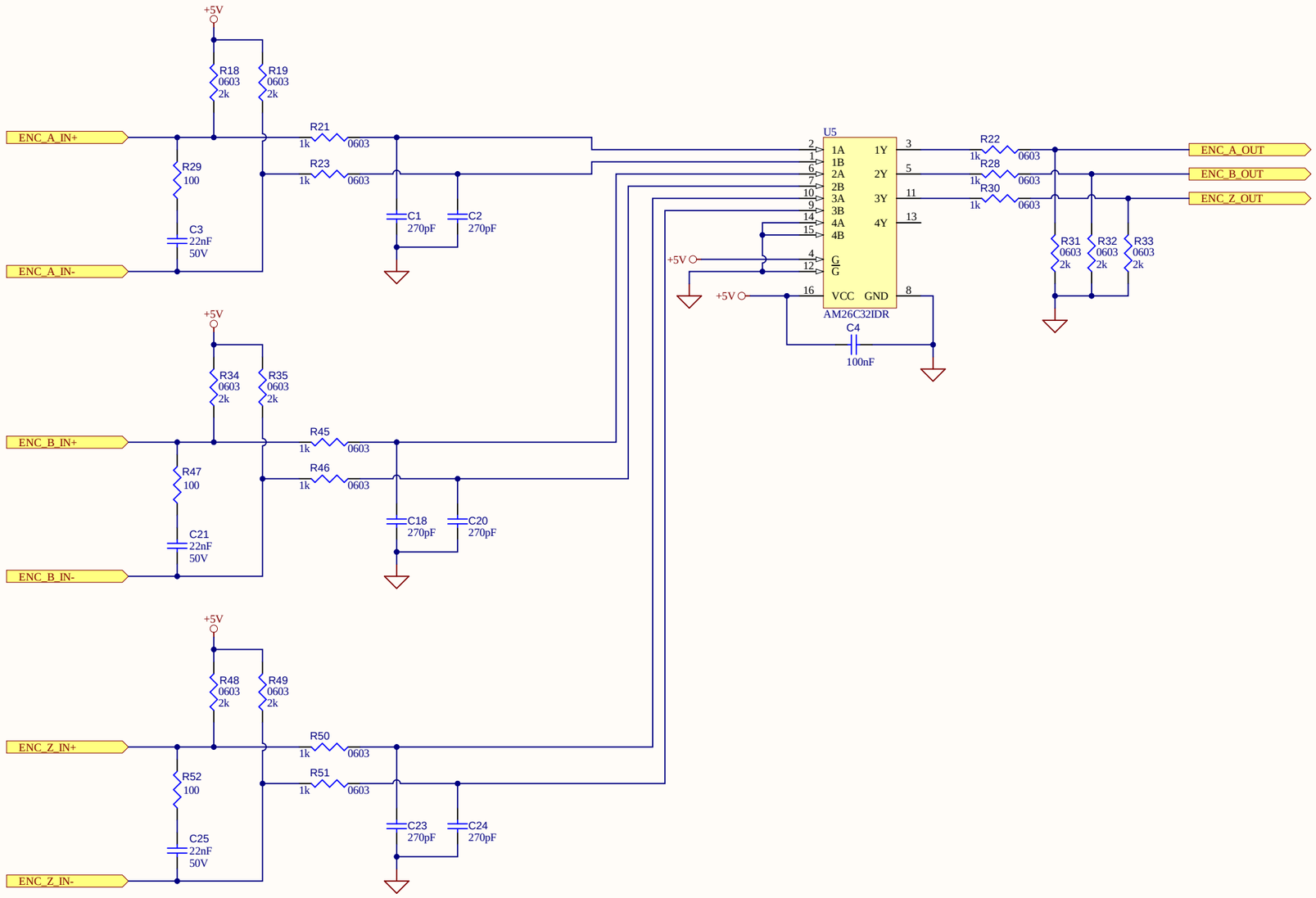


Wolfspeed / Allegro			
Title: Current Sense			
Drawing No: MOD-MB-3P-0900V-40A_SCH			
Date: Jun. 2024	Size: B	Revision: 2.0	Sheet: 3 of 12

CURRENT MEASUREMENT

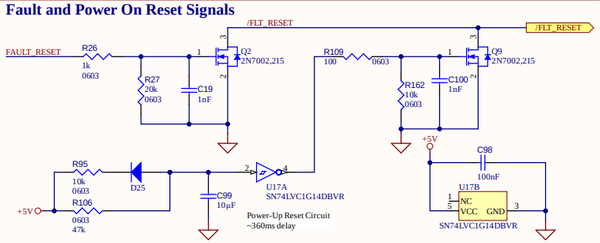


Wolfspeed / Allegro	
Title:	Current Sense
Drawing No:	MOD-MB-3P-0900V-40A_SCH
Date: Jun. 2024	Size: B / Revision: 2.0 / Sheet: 3 of 12

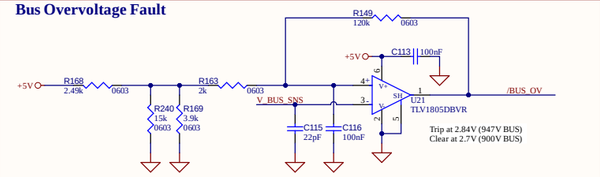


Wolfspeed / Allegro	
Title:	Encoder
Drawing No:	MOD-MB-3P-0900V-40A_SCH
Date: Jun. 2024	Size: B / Revision: 2.0 / Sheet: 4 of 12

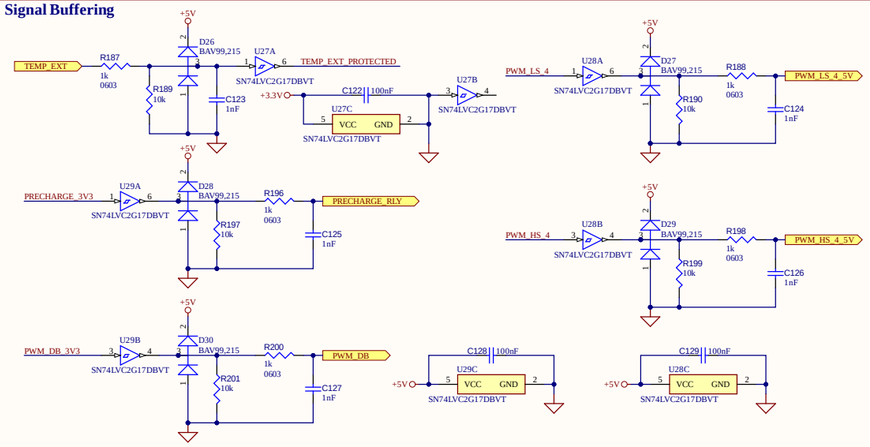
Fault and Power On Reset Signals



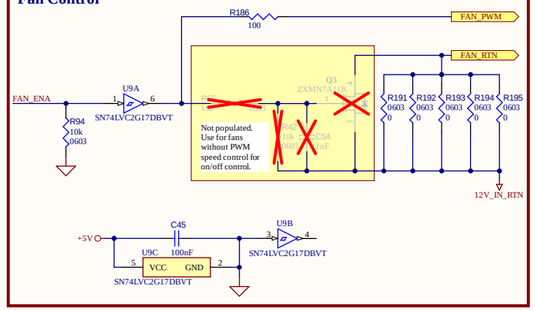
Bus Overvoltage Fault



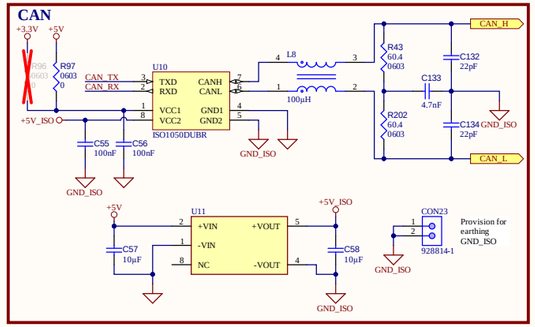
Signal Buffering



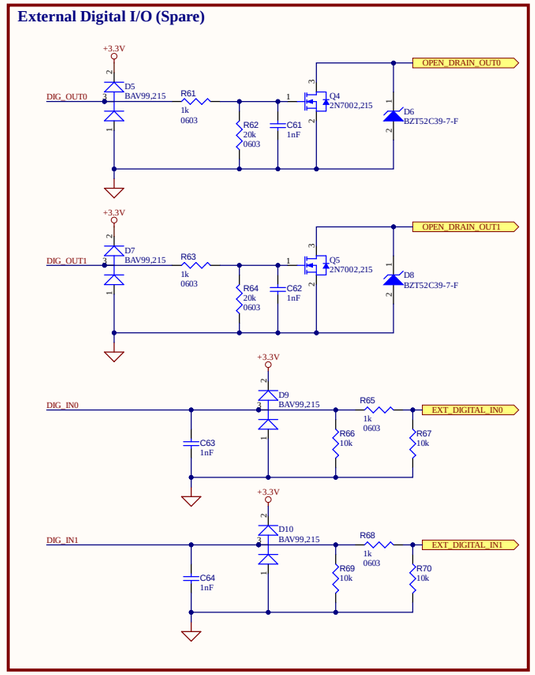
Fan Control



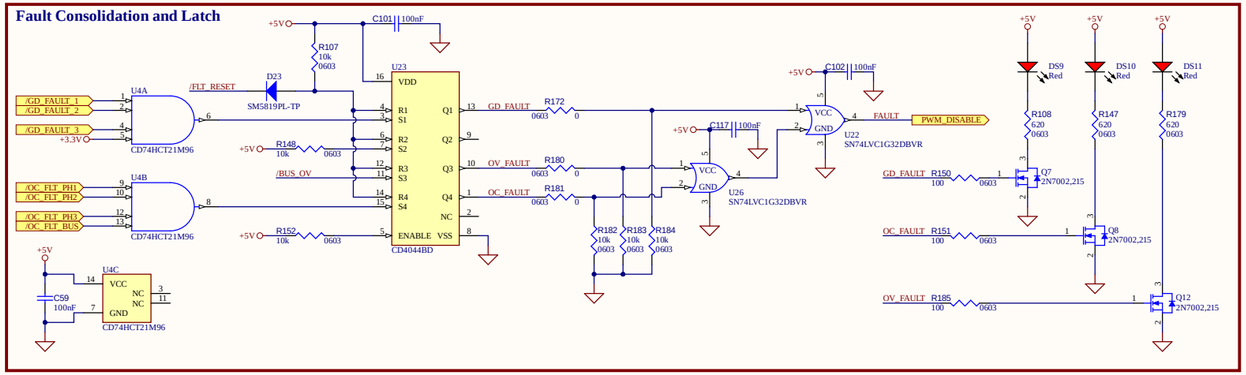
CAN



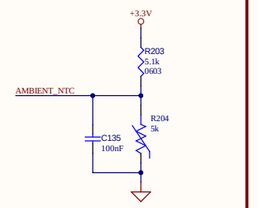
External Digital I/O (Spare)



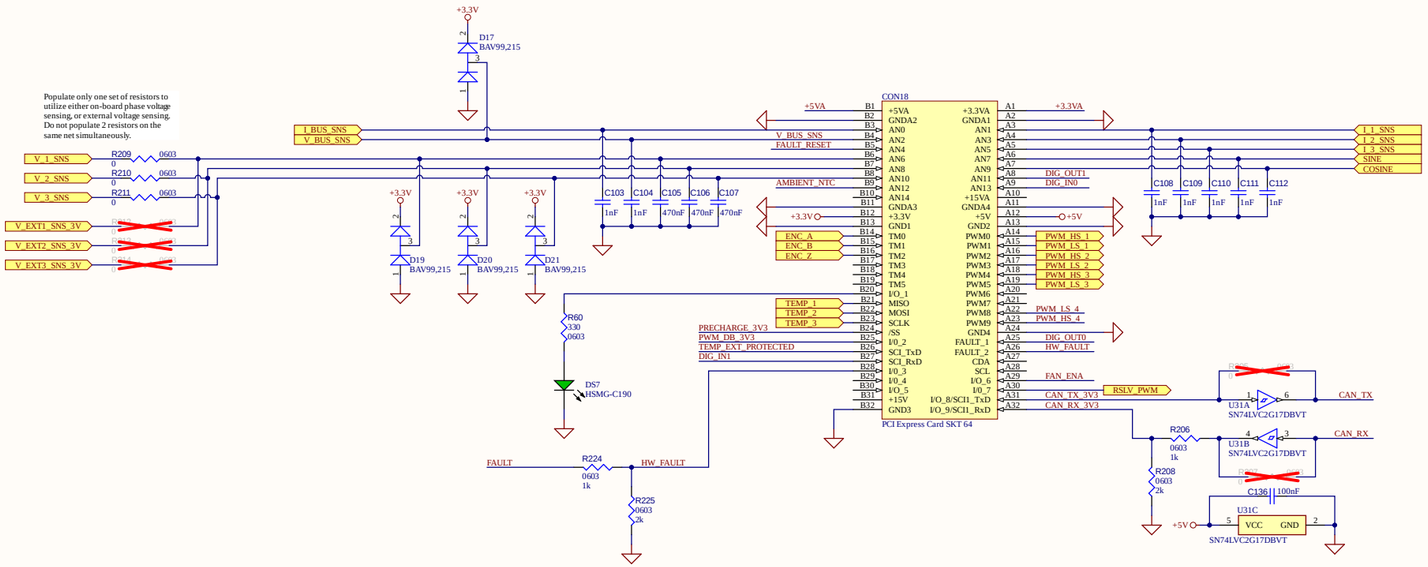
Fault Consolidation and Latch



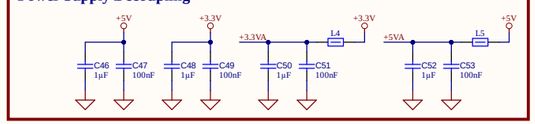
Ambient NTC



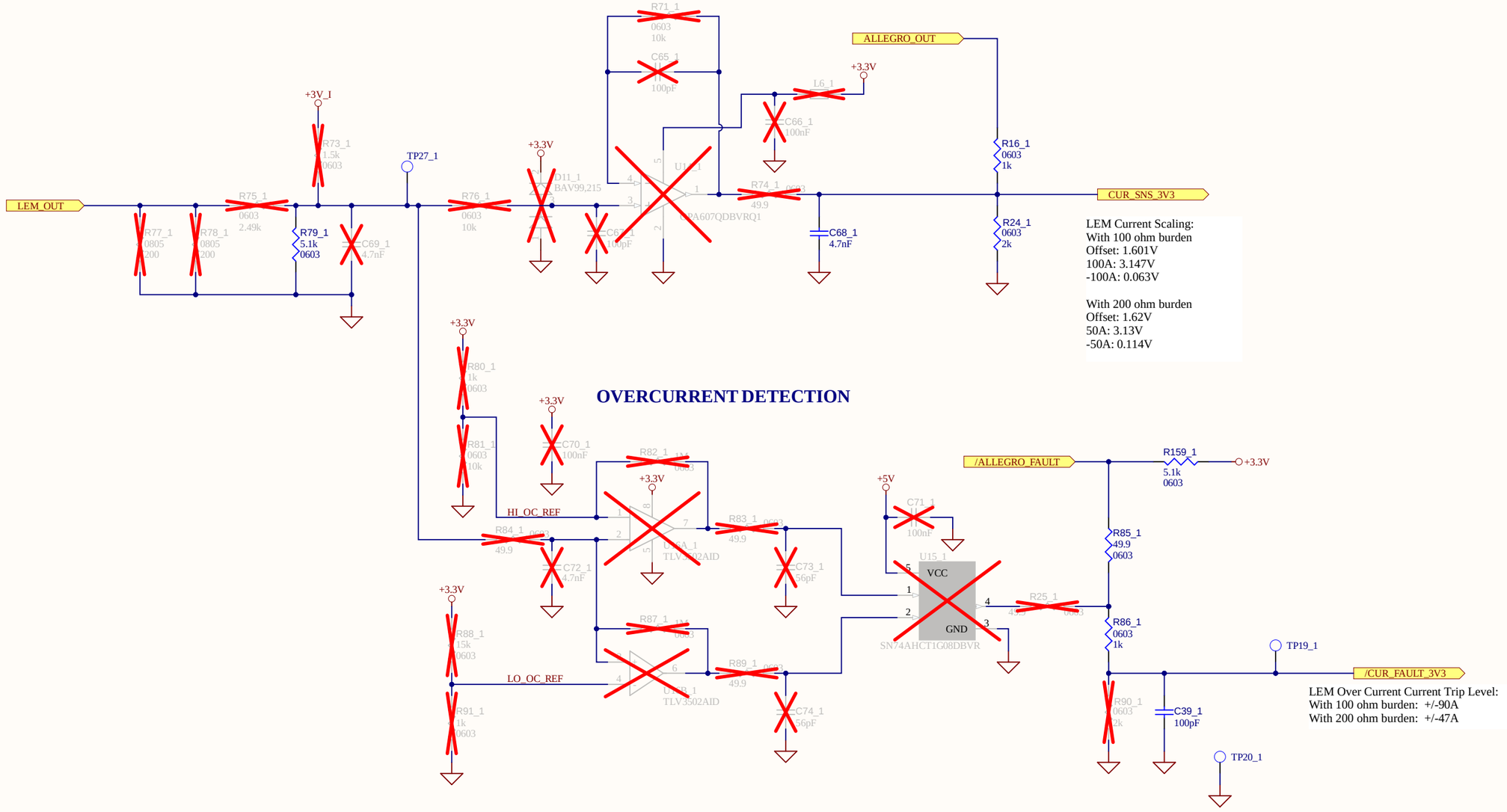
Populate only one set of resistors to utilize either on-board phase voltage sensing, or external voltage sensing. Do not populate 2 resistors on the same net simultaneously.



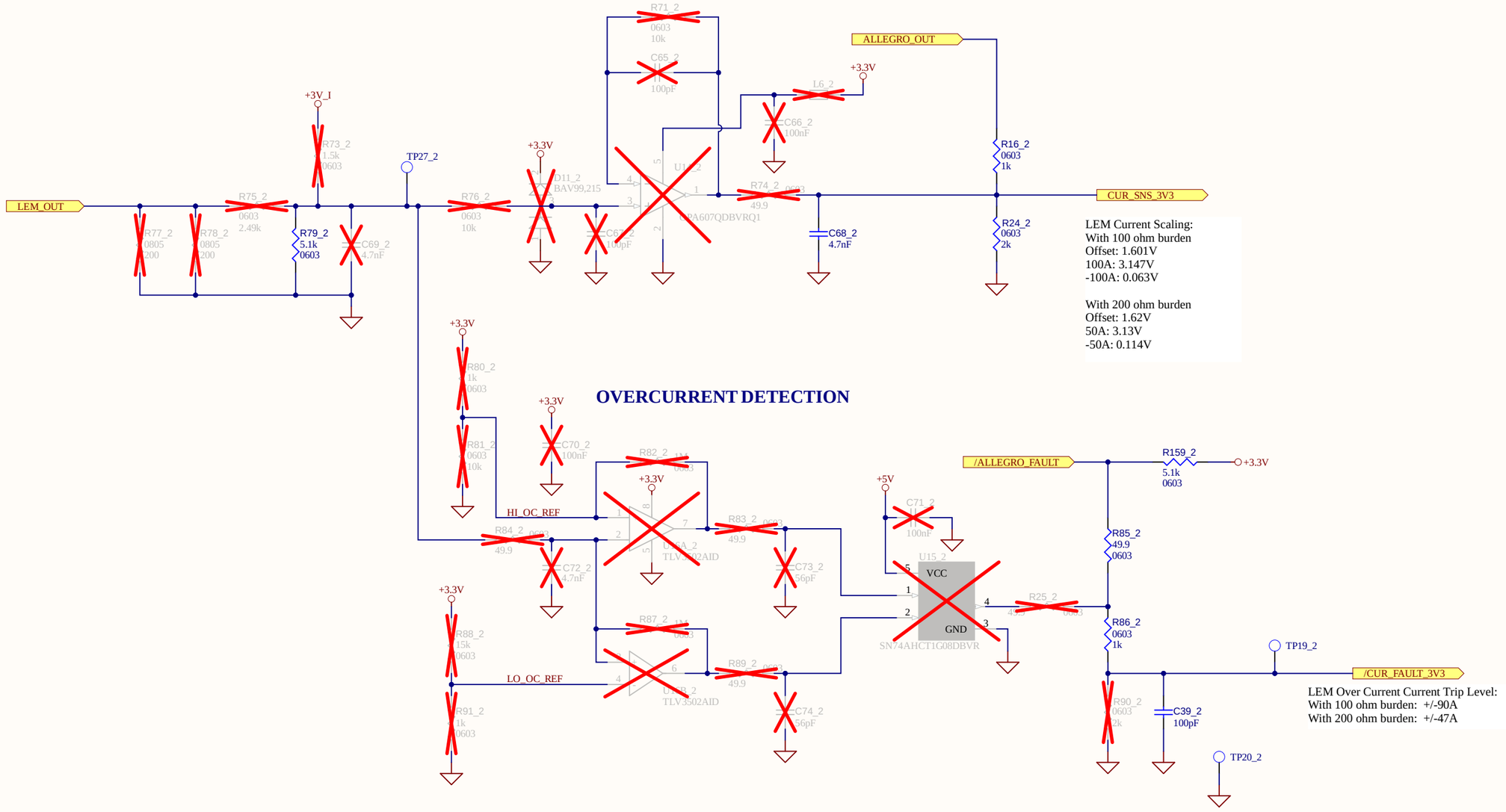
Power Supply Decoupling



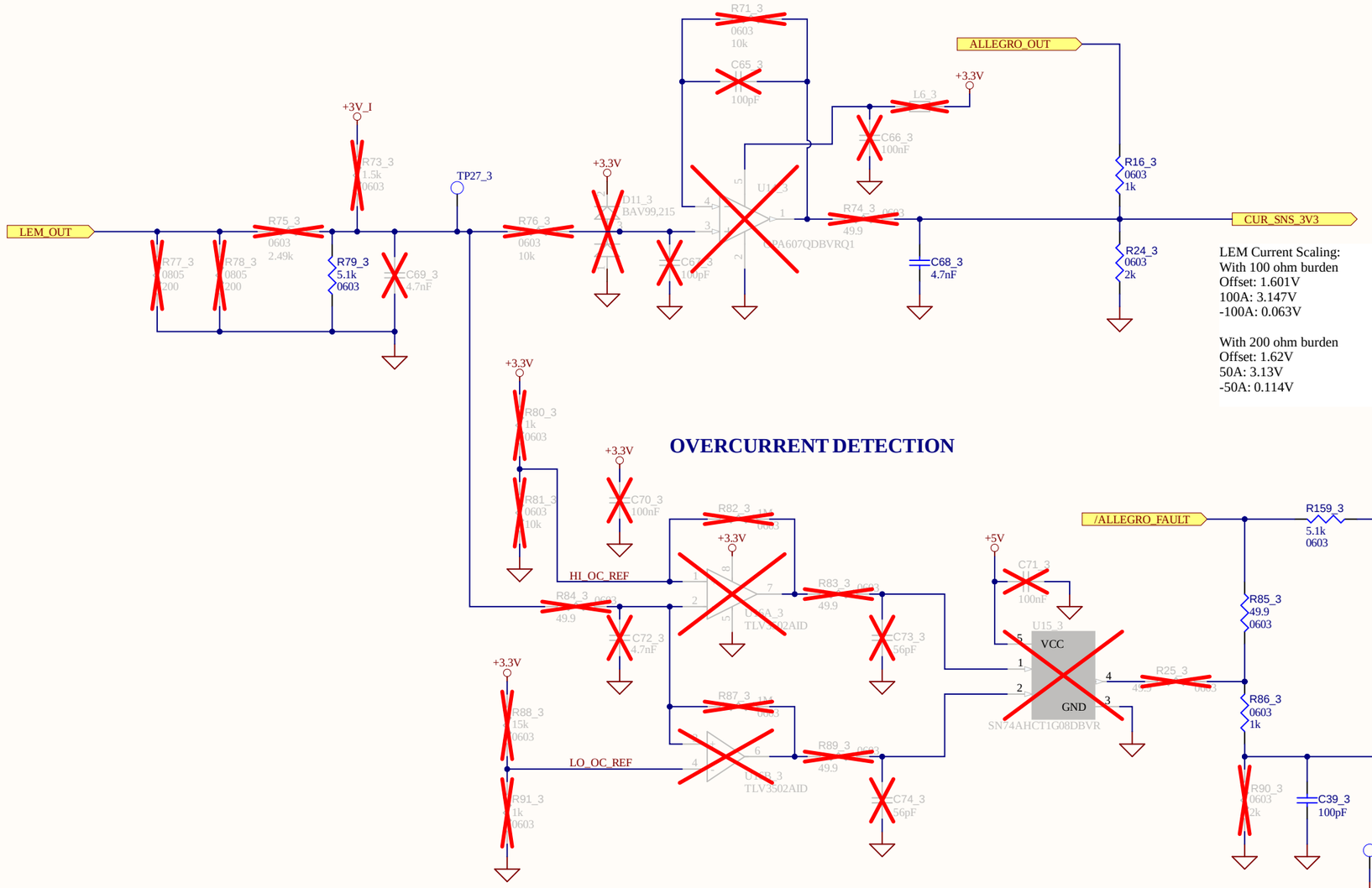
Wolfspeed			Allegro
Title: Controller NXP			
Drawing No: MOD-MB-3P-0900V-40A_SCH			
Date: Jun. 2024	Size: C	Revision: 2.0	Sheet: 5 of 12



Wolfspeed			Allegro
Title:	Current Conditioning		
Drawing No:	MOD-MB-3P-0900V-40A_SCH		
Date: Jun. 2024	Size: B	Revision: -	Sheet: 6 of 12



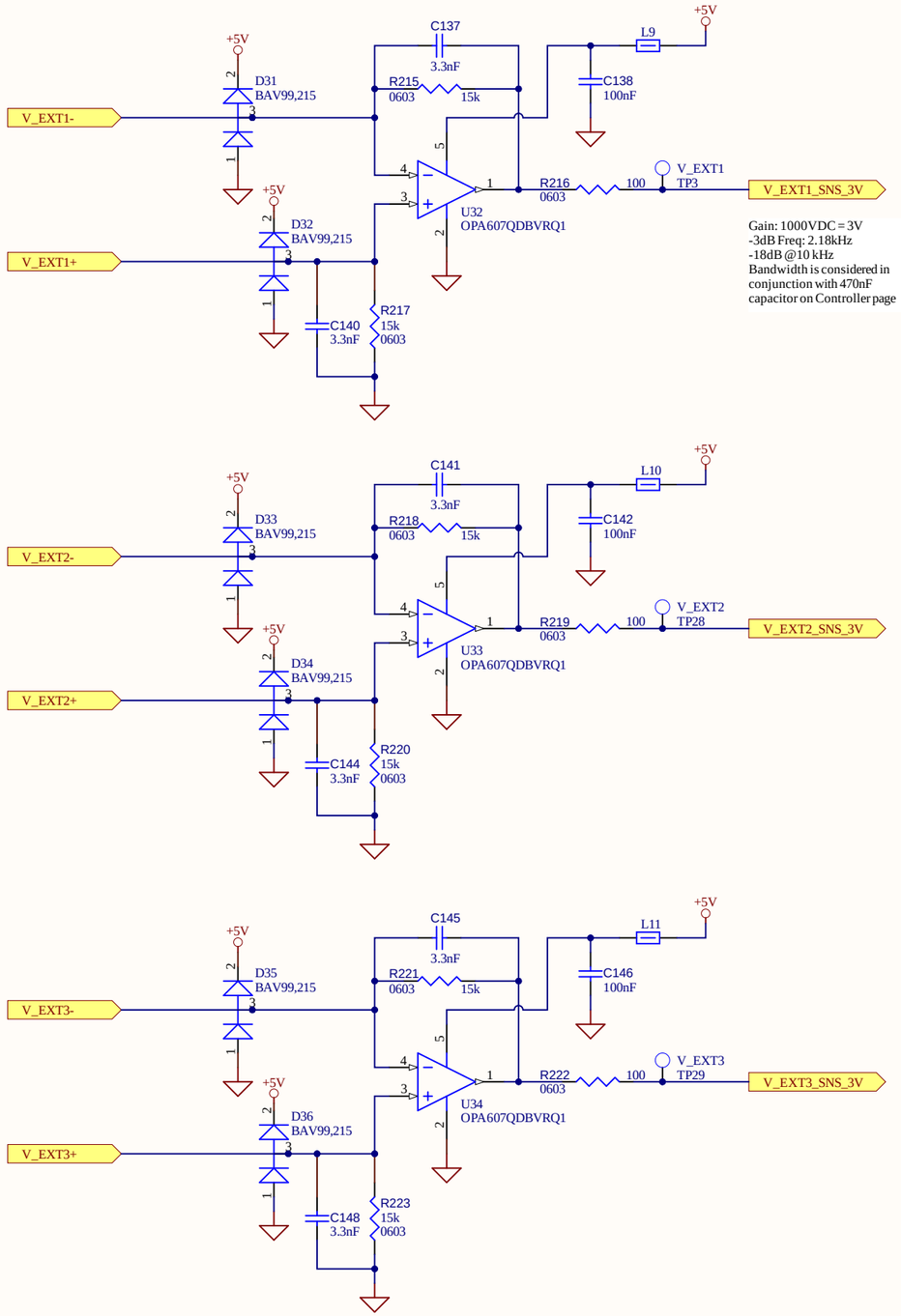
Wolfspeed			Allegro
Title:	Current Conditioning		
Drawing No:	MOD-MB-3P-0900V-40A_SCH		
Date: Jun. 2024	Size: B	Revision: -	Sheet: 6 of 12



Wolfspeed	Allegro
Title:	Current Conditioning
Drawing No:	MOD-MB-3P-0900V-40A_SCH
Date: Jun. 2024	Size: B / Revision: - / Sheet: 6 of 12

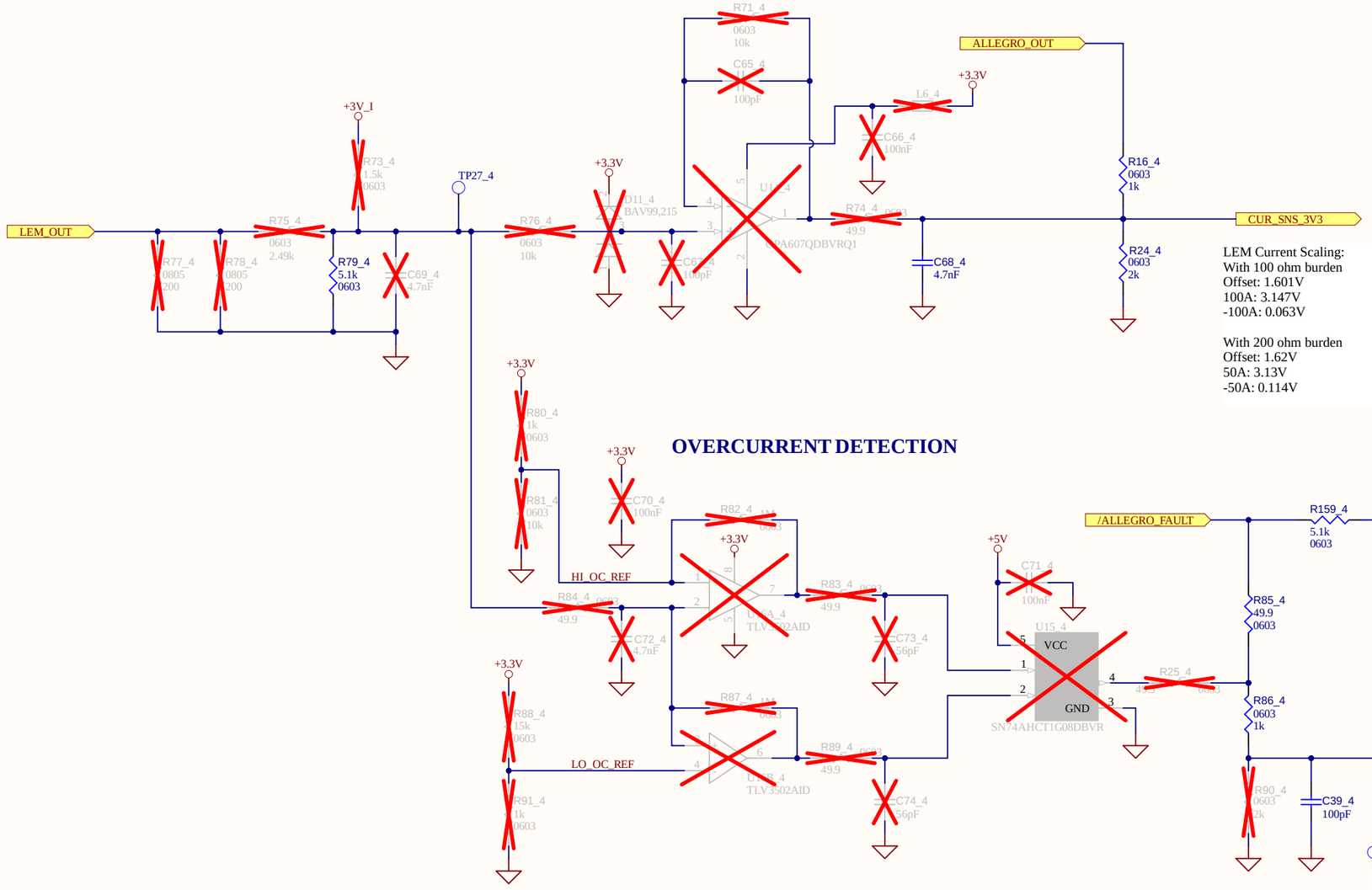
WARNING: DO NOT DIRECTLY CONNECT TO HIGH-VOLTAGE NETS.

Voltage inputs, V_EXTxx must have 5MEG resistor in series between the high-voltage node and these inputs. Maximum voltage to be sensed is 1000VDC or 700VAC.

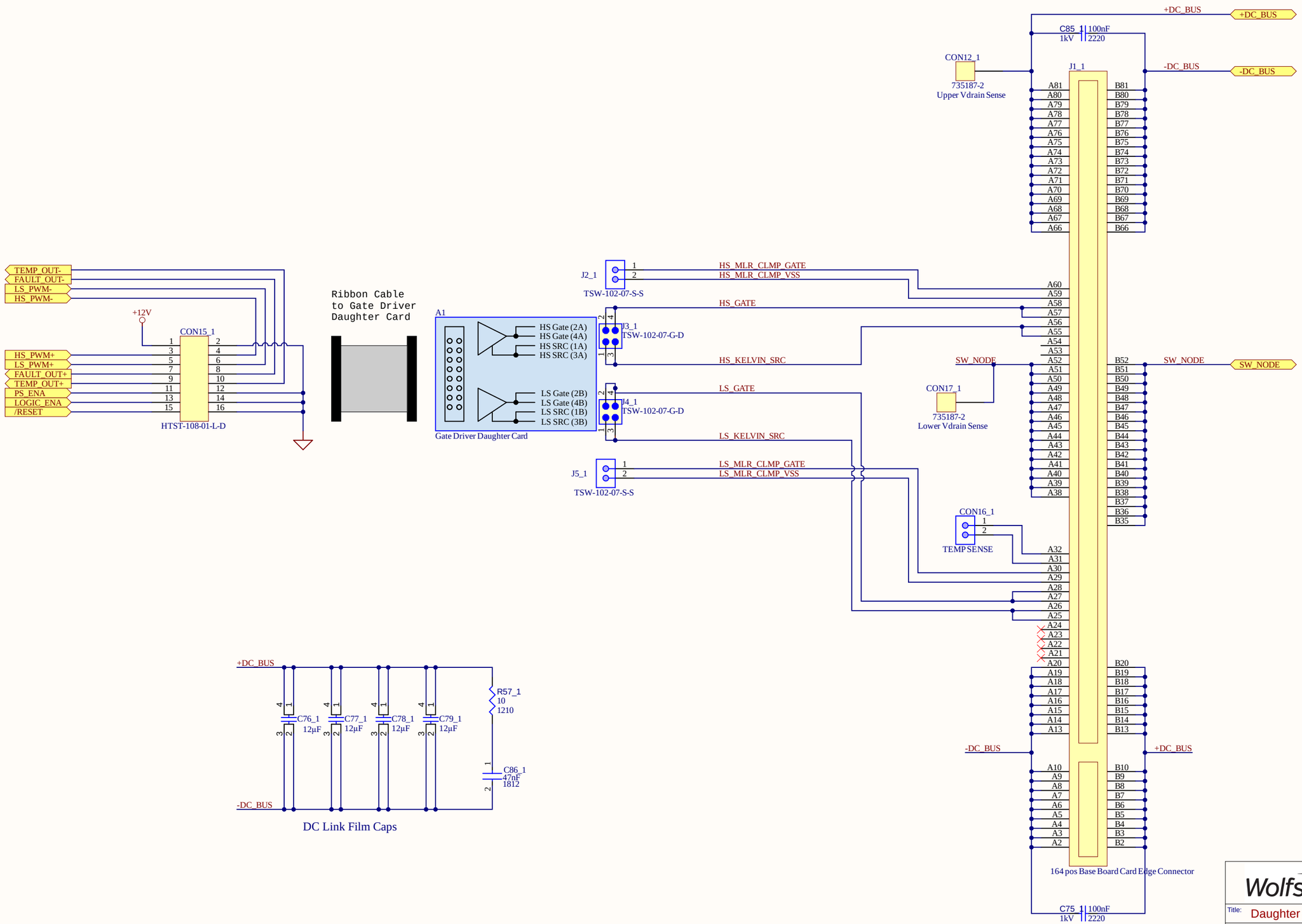


Gain: 1000VDC = 3V
-3dB Freq: 2.18kHz
-18dB @10 kHz
Bandwidth is considered in conjunction with 470nF capacitor on Controller page

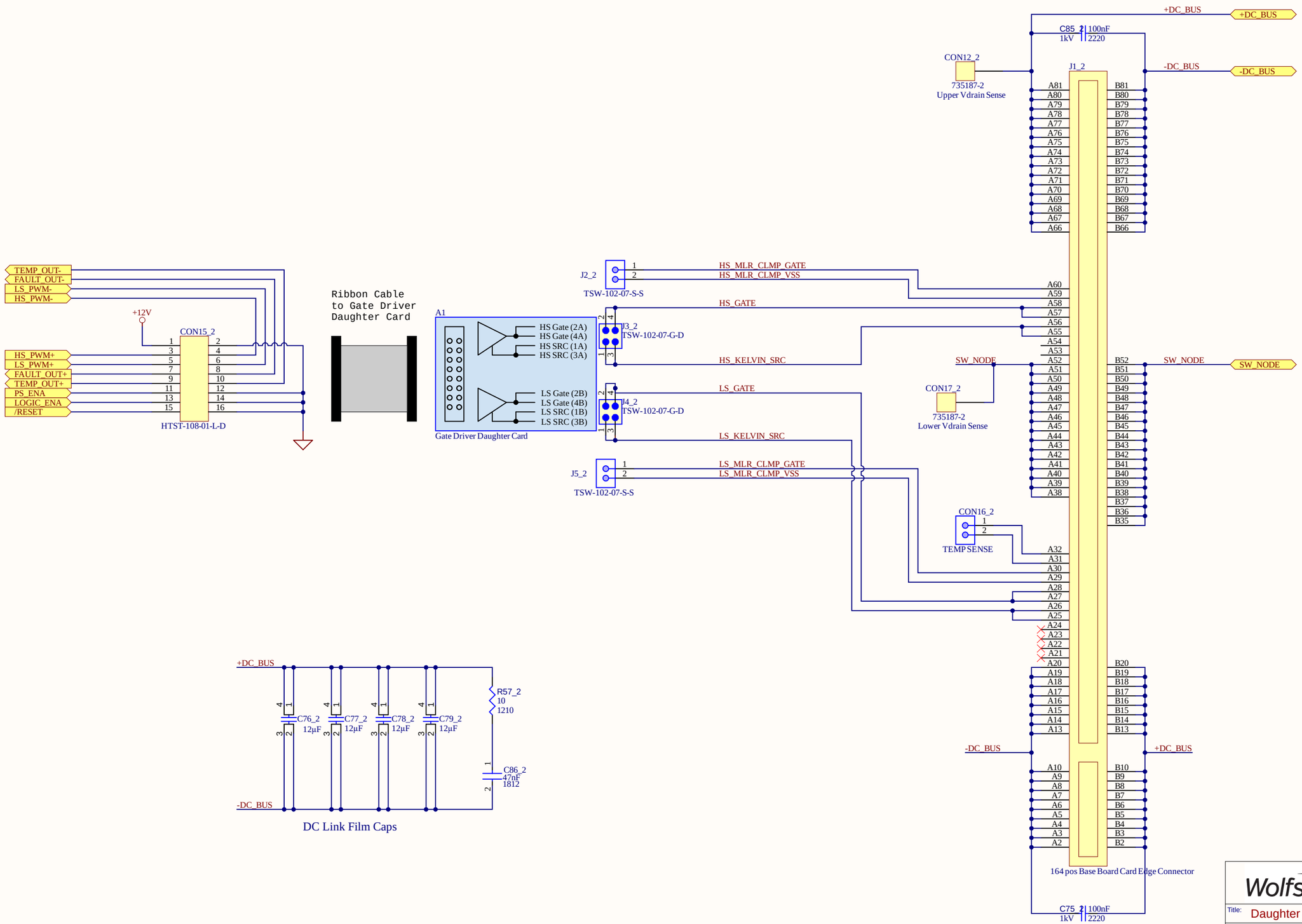
Wolfspeed / Allegro	
Title:	
Drawing No:	MOD-MB-3P-0900V-40A_SCH
Date: Jun. 2024	Size: B | Revision: 2.0 | Sheet: 12 of 12



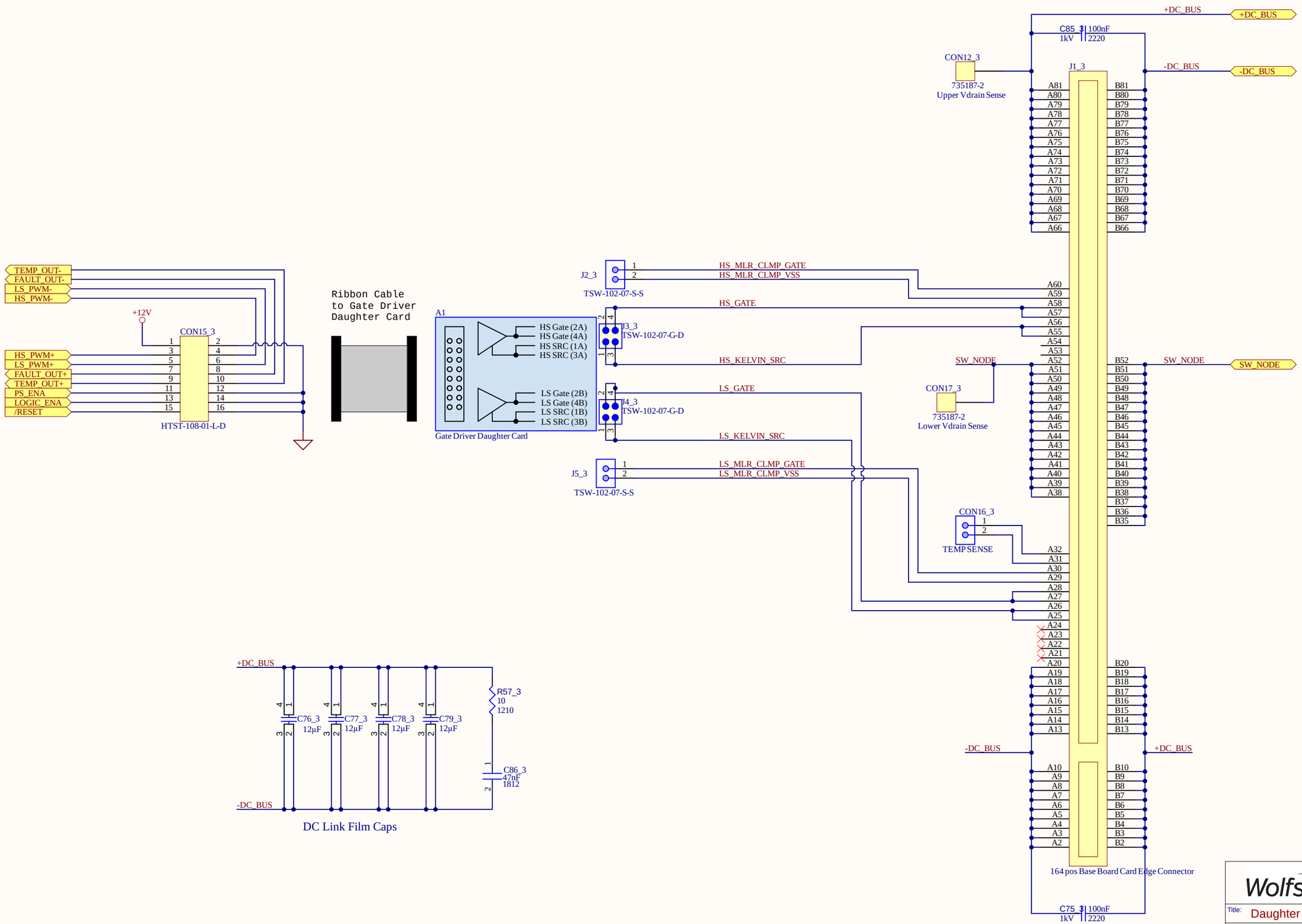
Wolfspeed			Allegro
Title:	Current Conditioning		
Drawing No:	MOD-MB-3P-0900V-40A_SCH		
Date: Jun. 2024	Size: B	Revision: -	Sheet: 6 of 12



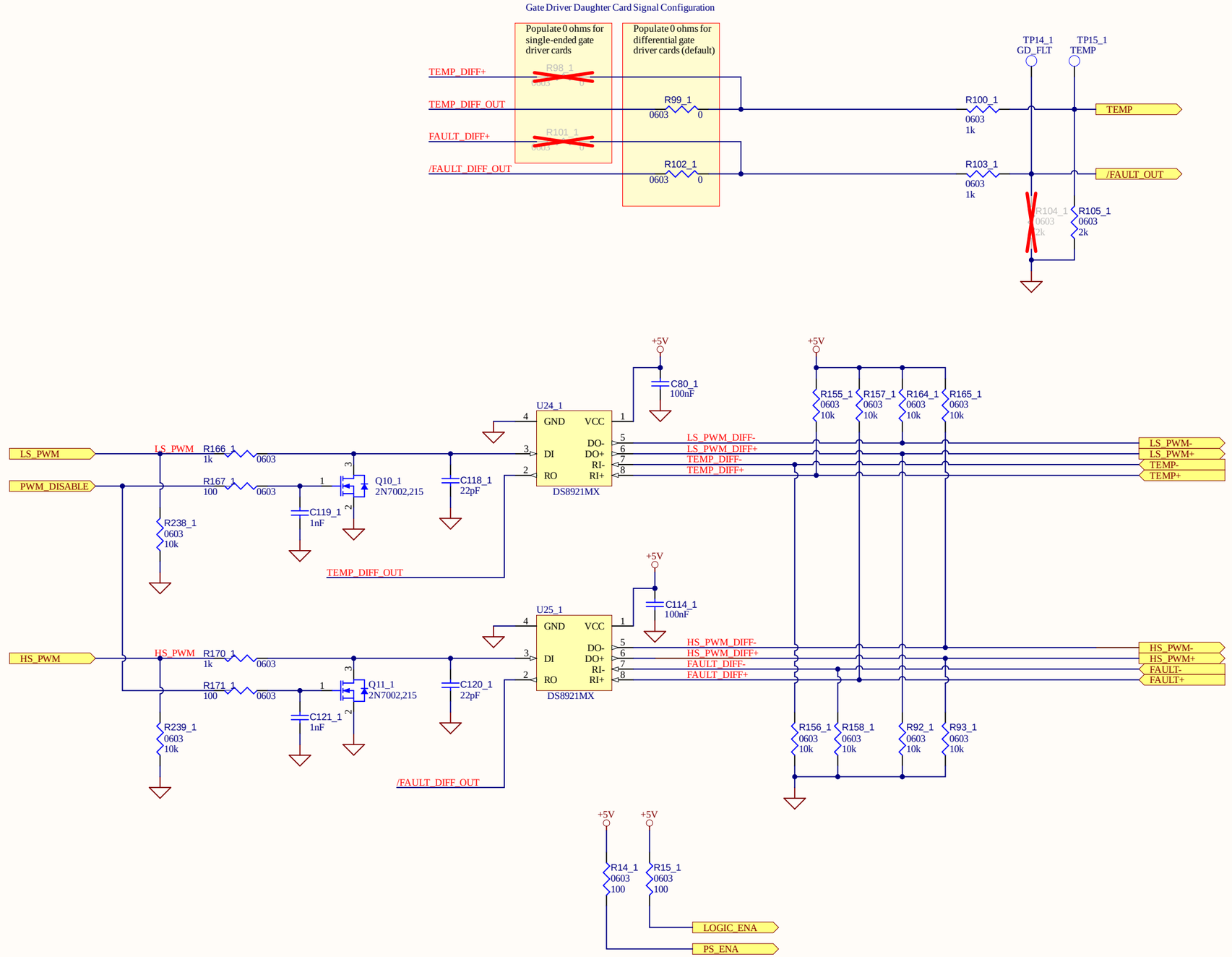
Wolfspeed	Allegro
Title:	Daughter Cards
Drawing No:	MOD-MB-3P-0900V-40A_SCH
Date: Jun. 2024	Size: B / Revision: 2.0 / Sheet: 7 of 12



Wolfspeed	Allegro
Title:	Daughter Cards
Drawing No:	MOD-MB-3P-0900V-40A_SCH
Date: Jun. 2024	Size: B / Revision: 2.0 / Sheet: 7 of 12



Wolfspeed.	Allegro
Title:	Daughter Cards
Drawing No:	MOD-MB-3P-0900V-40A_SCH
Date: Jun. 2024	Size: B / Revision: 2.0 / Sheet: 7 of 12



Wolfspeed. Allegro

Title: Differential Interface					
Drawing No: MOD-MB-3P-0900V-40A_SCH					
Date: Jun. 2024	Size: B	Revision: 2.0	Sheet: 8 of 12		

Gate Driver Daughter Card Signal Configuration

Populate 0 ohms for single-ended gate driver cards

Populate 0 ohms for differential gate driver cards (default)

TEMP_DIFF+ — R98_2 0603 0 (DNP)

TEMP_DIFF_OUT — R99_2 0603 0

FAULT_DIFF+ — R101_2 0603 0 (DNP)

/FAULT_DIFF_OUT — R102_2 0603 0

TP14_2 GD_FLT

TP15_2 TEMP

R100_2 0603 1k → TEMP

R103_2 0603 1k → /FAULT_OUT

R104_2 0603 2k (DNP)

R105_2 0603 2k

+5V

C80_2 100nF

U24_2 DS8921MX

GND, VCC, DI, RO, DO-, DO+, RI-, RI+

LS_PWM

PWM_DISABLE

R166_2 1k 0603

R167_2 100 0603

R238_2 0603 10k

C119_2 1nF

Q10_2 2N7002,215

C118_2 22pF

TEMP_DIFF_OUT

LS_PWM_DIFF-

LS_PWM_DIFF+

TEMP_DIFF-

TEMP_DIFF+

R155_2 0603 10k

R157_2 0603 10k

R164_2 0603 10k

R165_2 0603 10k

LS_PWM-

LS_PWM+

TEMP-

TEMP+

+5V

C114_2 100nF

U25_2 DS8921MX

HS_PWM

R170_2 1k 0603

R171_2 100 0603

R239_2 0603 10k

C121_2 1nF

Q11_2 2N7002,215

C120_2 22pF

/FAULT_DIFF_OUT

HS_PWM_DIFF-

HS_PWM_DIFF+

FAULT_DIFF-

FAULT_DIFF+

R156_2 0603 10k

R158_2 0603 10k

R92_2 0603 10k

R93_2 0603 10k

HS_PWM-

HS_PWM+

FAULT-

FAULT+

+5V +5V

R14_2 0603 100

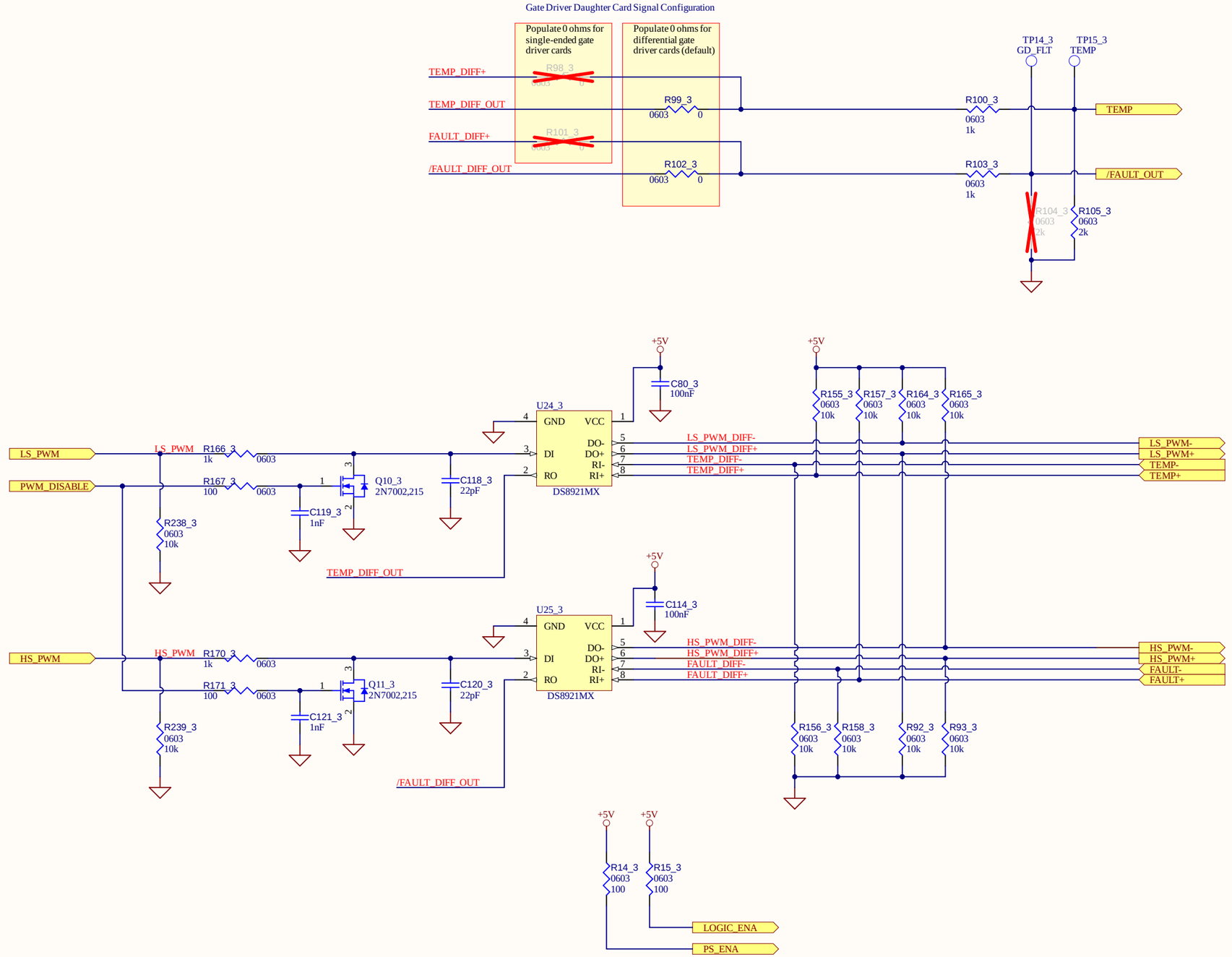
R15_2 0603 100

LOGIC_ENA

PS_ENA

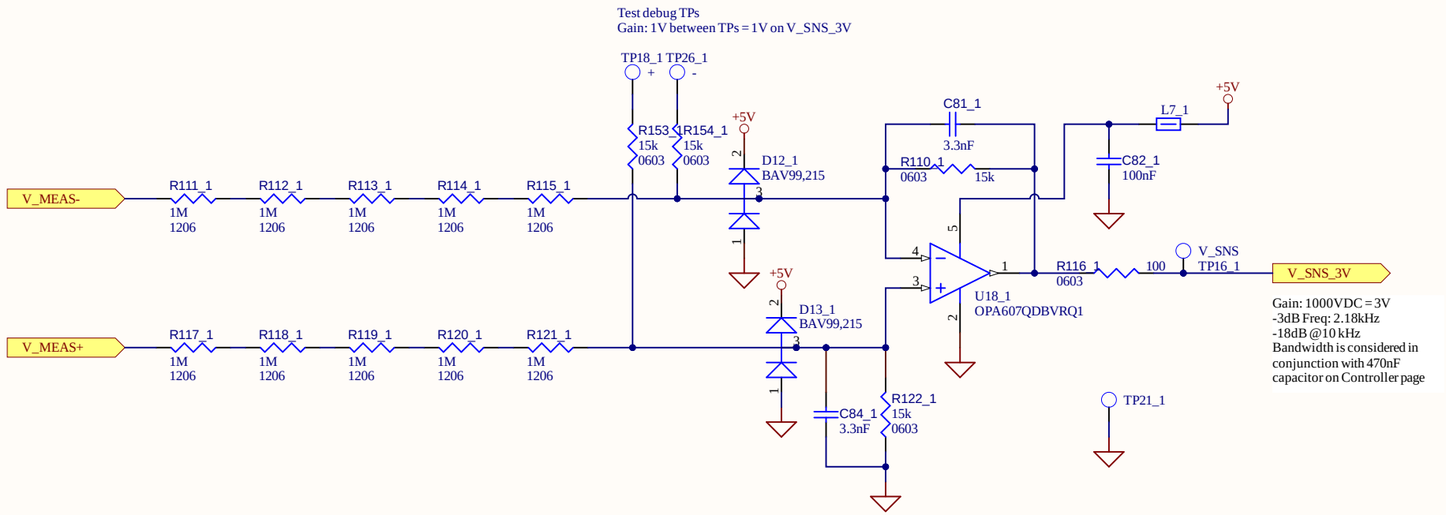
Wolfspeed. Allegro

Title: Differential Interface				
Drawing No: MOD-MB-3P-0900V-40A_SCH				
Date: Jun. 2024	Size: B	Revision: 2.0	Sheet: 8 of 12	

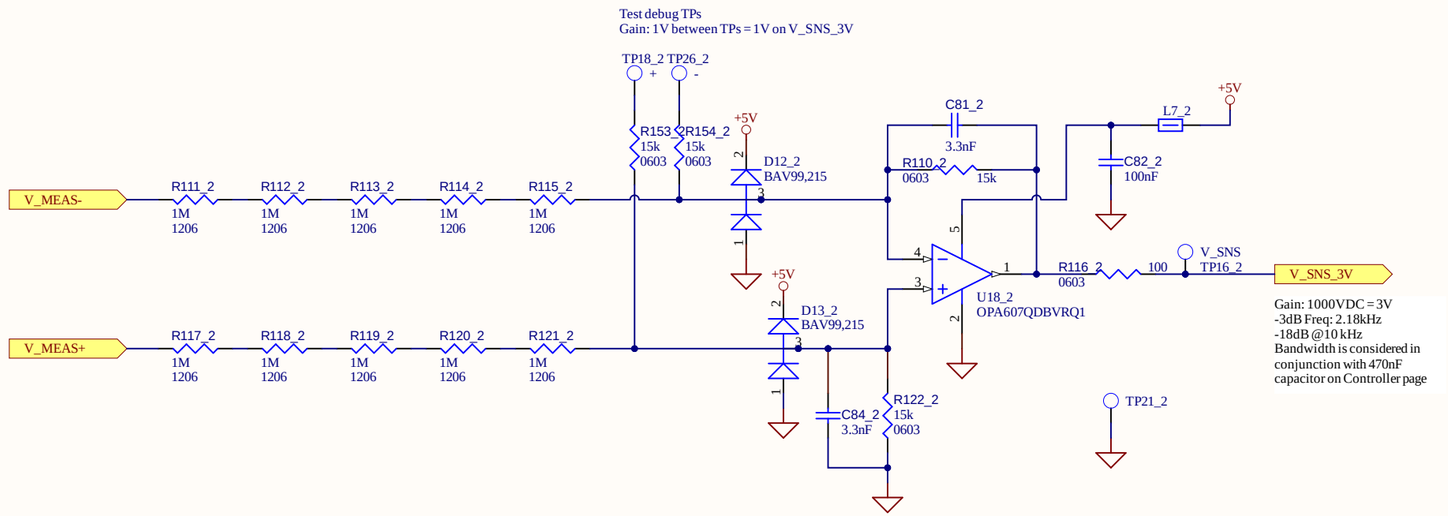


Wolfspeed. Allegro

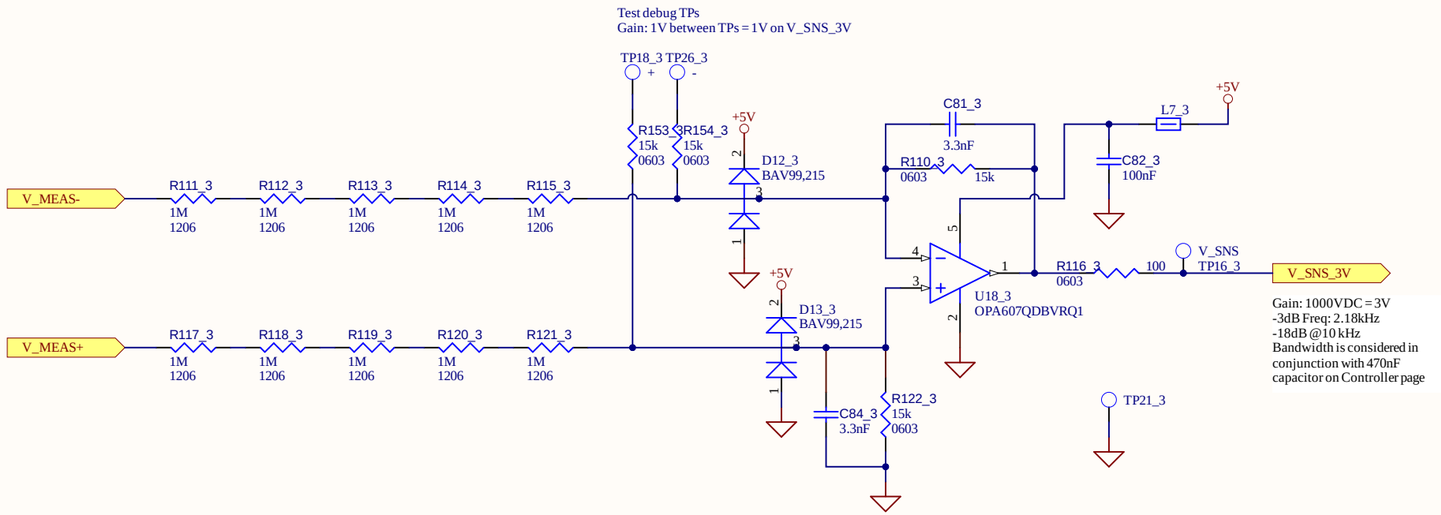
Title:	Differential Interface
Drawing No:	MOD-MB-3P-0900V-40A_SCH
Date: Jun. 2024	Size: B · Revision: 2.0 · Sheet: 8 of 12



Wolfspeed / Allegro			
Title: Voltage Sense			
Drawing No: MOD-MB-3P-0900V-40A_SCH			
Date: Jun. 2024	Size: B	Revision: 2.0	Sheet: 9 of 12



Wolfspeed / Allegro	
Title:	Voltage Sense
Drawing No:	MOD-MB-3P-0900V-40A_SCH
Date: Jun. 2024	Size: B / Revision: 2.0 / Sheet: 9 of 12



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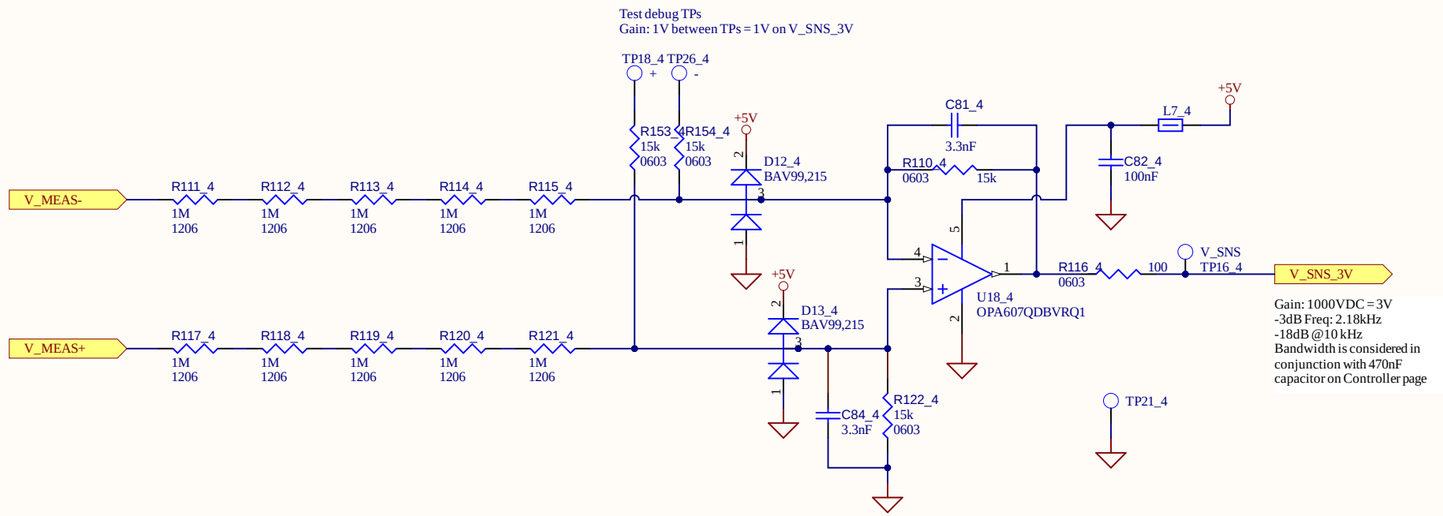
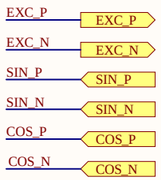
Allegro

Title:	Voltage Sense
Drawing No:	MOD-MB-3P-0900V-40A_SCH
Date: Jun. 2024	Size: B / Revision: 2.0 / Sheet: 9 of 12

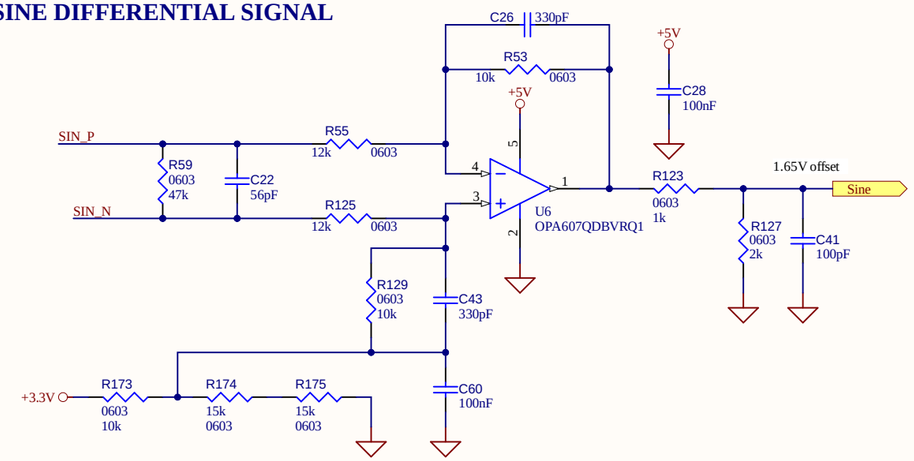


Wolfspeed			Allegro
Title:	Voltage Sense		
Drawing No:	MOD-MB-3P-0900V-40A_SCH		
Date: Jun. 2024	Size: B	Revision: 2.0	Sheet: 9 of 12

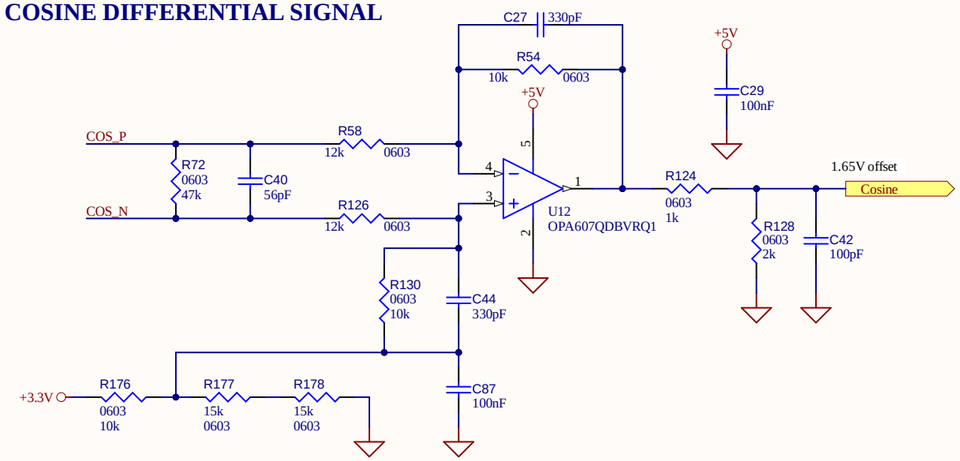
RESOLVER CONNECTIONS



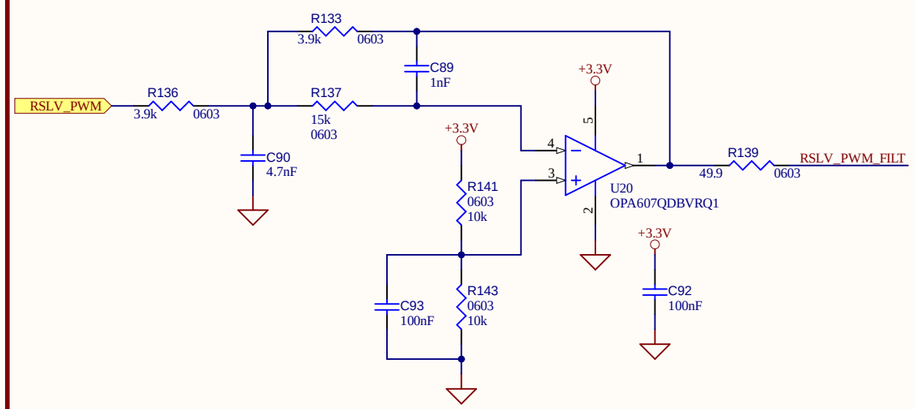
SINE DIFFERENTIAL SIGNAL



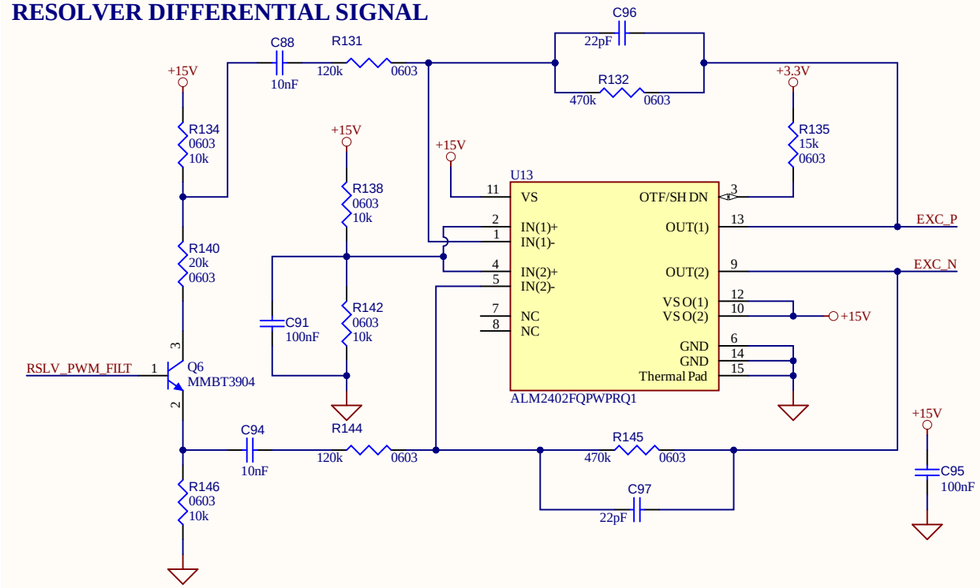
COSINE DIFFERENTIAL SIGNAL



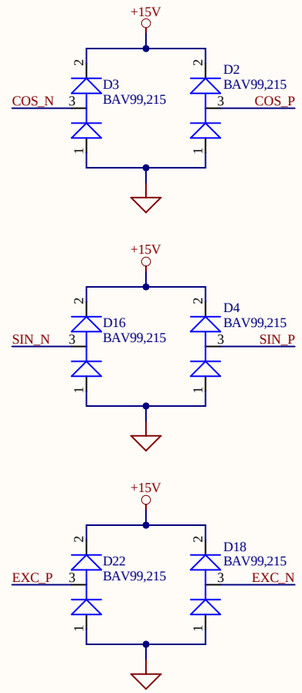
RESOLVER CONDITIONING



RESOLVER DIFFERENTIAL SIGNAL



PROTECTION



Wolfspeed / Allegro				
Title: Resolver				
Drawing No: MOD-MB-3P-0900V-40A_SCH				
Date: Jun. 2024	Size: B	Revision: 2.0	Sheet: 10 of 12	

Fan and Accessories

H1	FAN AXIAL 80X38MM 12VDC 4-WIRE	Wakefield-Vette	DC0803812V2B-BT0
H2	Crimp Terminal, 22-30 AWG, Hot Tin, Bag	Molex	0008500032
H3	Crimp Terminal, 22-30 AWG, Hot Tin, Bag	Molex	0008500032
H7	Crimp Terminal, 22-30 AWG, Hot Tin, Bag	Molex	0008500032
H8	Crimp Terminal, 22-30 AWG, Hot Tin, Bag	Molex	0008500032
H9	Connector Housing Receptacle 4 Position with Ramp 2.54mm	Molex	0022013047
H10	SpeedVal 3-phase MB Cooling Duct	Fabricated	CM-032824-01
H11	SpeedVal_80mm_fan_riser_brkt_v2	Fabricated	CM-031324-01
H12	FAN GUARD 80MM METAL	Qualtek	08172-02
H13	FAN GUARD 80MM METAL	Qualtek	08172-02
H14	M4x50mm_Steel Pan Head Phillips Screw	McMaster-Carr	92005A240
H15	M4x50mm_Steel Pan Head Phillips Screw	McMaster-Carr	92005A240
H16	M4x50mm_Steel Pan Head Phillips Screw	McMaster-Carr	92005A240
H17	M4x50mm_Steel Pan Head Phillips Screw	McMaster-Carr	92005A240
H18	High-Strength Steel Nylon-Insert M4 Locknut	McMaster-Carr	94645A101
H19	High-Strength Steel Nylon-Insert M4 Locknut	McMaster-Carr	94645A101
H20	High-Strength Steel Nylon-Insert M4 Locknut	McMaster-Carr	94645A101
H21	High-Strength Steel Nylon-Insert M4 Locknut	McMaster-Carr	94645A101
H22	Steel Pan Head Phillips Screw, M4 x 0.7 mm Thread, 8 mm Long	McMaster-Carr	92005A218
H23	Steel Pan Head Phillips Screw, M4 x 0.7 mm Thread, 8 mm Long	McMaster-Carr	92005A218
H24	Zinc-Plated Steel Washer, M4 Screw Size, 4.300 mm ID, 8 mm OD	McMaster-Carr	98688A114
H25	Zinc-Plated Steel Washer, M4 Screw Size, 4.300 mm ID, 8 mm OD	McMaster-Carr	98688A114
H26	Zinc-Plated Steel Washer, M4 Screw Size, 4.300 mm ID, 8 mm OD	McMaster-Carr	98688A114
H28	Zinc-Plated Steel Washer, M4 Screw Size, 4.300 mm ID, 8 mm OD	McMaster-Carr	98688A114
H29	Zinc-Plated Steel Washer, M4 Screw Size, 4.300 mm ID, 8 mm OD	McMaster-Carr	98688A114
H30	Zinc-Plated Steel Washer, M4 Screw Size, 4.300 mm ID, 8 mm OD	McMaster-Carr	98688A114
H31	Zinc-Plated Steel Split Lock Washer for M4 Screw Size, Standard	McMaster-Carr	91202A226
H32	Zinc-Plated Steel Split Lock Washer for M4 Screw Size, Standard	McMaster-Carr	91202A226
H63	Steel Pan Head Phillips Screw, M4 x 0.7 mm Thread, 8 mm Long	McMaster-Carr	92005A218
H64	Steel Pan Head Phillips Screw, M4 x 0.7 mm Thread, 8 mm Long	McMaster-Carr	92005A218

FD1
FID1X2R
FD2
FID1X2R
FD3
FID1X2R
FD4
FID1X2R

Board Standoffs

H33	Hex Standoff Threaded #8-32 Nylon 1.750"	Essentra	36832MF175	H34	Hex Nut 8-32 Thread .170 Height	Essentra	0400832HNS
H35	Hex Standoff Threaded #8-32 Nylon 1.750"	Essentra	36832MF175	H36	Hex Nut 8-32 Thread .170 Height	Essentra	0400832HNS
H37	Hex Standoff Threaded #8-32 Nylon 1.750"	Essentra	36832MF175	H38	Hex Nut 8-32 Thread .170 Height	Essentra	0400832HNS
H39	Hex Standoff Threaded #8-32 Nylon 1.750"	Essentra	36832MF175	H40	Hex Nut 8-32 Thread .170 Height	Essentra	0400832HNS
H41	Hex Standoff Threaded #8-32 Nylon 1.750"	Essentra	36832MF175	H42	Hex Nut 8-32 Thread .170 Height	Essentra	0400832HNS
H43	Hex Standoff Threaded #8-32 Nylon 1.750"	Essentra	36832MF175	H44	Hex Nut 8-32 Thread .170 Height	Essentra	0400832HNS
H45	Hex Standoff Threaded #8-32 Nylon 1.750"	Essentra	36832MF175	H46	Hex Nut 8-32 Thread .170 Height	Essentra	0400832HNS
H47	Hex Standoff Threaded #8-32 Nylon 1.750"	Essentra	36832MF175	H48	Hex Nut 8-32 Thread .170 Height	Essentra	0400832HNS
H49	Hex Standoff Threaded #8-32 Nylon 1.750"	Essentra	36832MF175	H50	Hex Nut 8-32 Thread .170 Height	Essentra	0400832HNS
H51	Hex Standoff Threaded #8-32 Nylon 1.750"	Essentra	36832MF175	H52	Hex Nut 8-32 Thread .170 Height	Essentra	0400832HNS
H53	Hex Standoff Threaded #8-32 Nylon 1.750"	Essentra	36832MF175	H54	Hex Nut 8-32 Thread .170 Height	Essentra	0400832HNS
H55	Hex Standoff Threaded #8-32 Nylon 1.750"	Essentra	36832MF175	H56	Hex Nut 8-32 Thread .170 Height	Essentra	0400832HNS
H57	Hex Standoff Threaded #8-32 Nylon 1.750"	Essentra	36832MF175	H58	Hex Nut 8-32 Thread .170 Height	Essentra	0400832HNS
H59	Hex Standoff Threaded #8-32 Nylon 1.750"	Essentra	36832MF175	H60	Hex Nut 8-32 Thread .170 Height	Essentra	0400832HNS
H61	Hex Standoff Threaded #8-32 Nylon 1.750"	Essentra	36832MF175	H62	Hex Nut 8-32 Thread .170 Height	Essentra	0400832HNS

Wolfspeed® Allegro

Title: Mechanicals

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