EV BLDC Driver

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Release Date:	
Designed By: APC	Date: 27-06-2019
Drawn By: APC	Date: 27-06-2019
Verified By: APC,ISHAN,H.Sheth	Date: 28-06-2019
Customer:	

System Level Solutions Inc.
Plot#32, Phase 1, Zone D/4,
G.I.D.C. Estate,
V.U.Nagar - 388121,
Gujarat, INDIA

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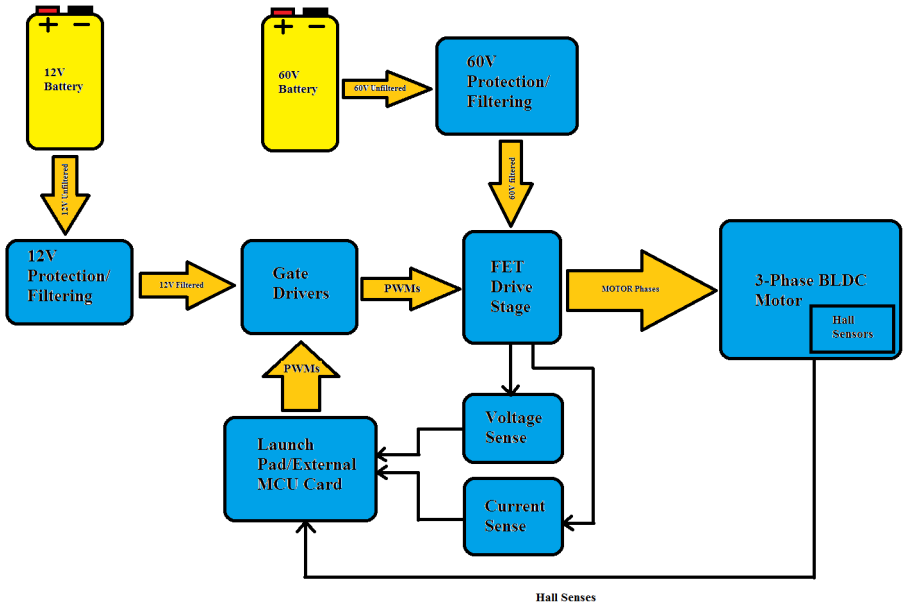
Title: EV BLDC Driver		
Size: A4	Document Number: PCB-BLDCDRVR-1926-1C-01	Rev: 1C
Date: 2019-06-29		Sheet: 1/12

Block Diagram



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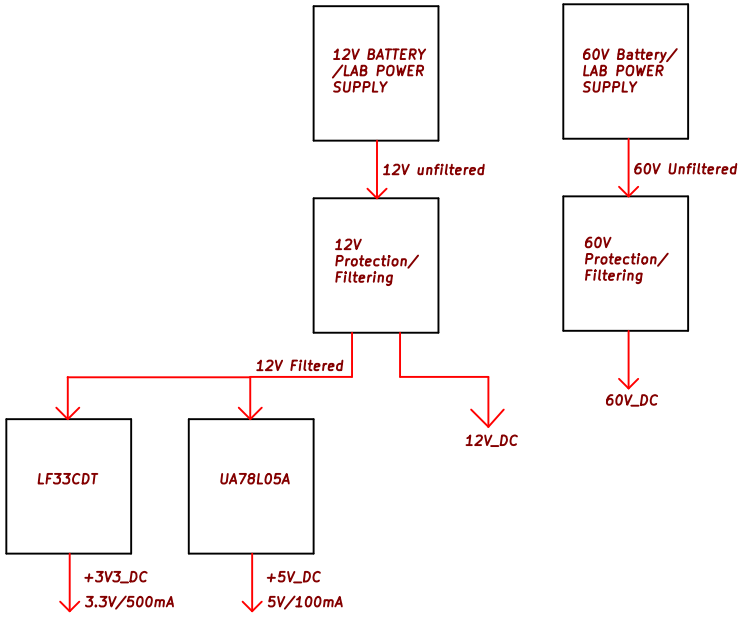
Sheet Name: /s_01_Block Diagram/		
Title: EV BLDC Driver		
Size: A4	Document Number: PCB-BLDCDRVR-1926-1C-01	Rev: 1C
Date: 2019-06-29		Sheet: 2/12

Power Tree



Note:
(1)+60V_DC will be used to Supply FET Drive stages.
(2)+12V_DC will be used to Supply Gate Driver ICs.
(3)+5V_DC will be used to Supply Hall Sensors of the motors.
(4)+3.3V_DC will be used for signaling purpose and Current sensing.

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Sheet Name: /s_02_Power Tree/		
Title: EV BLDC Driver		
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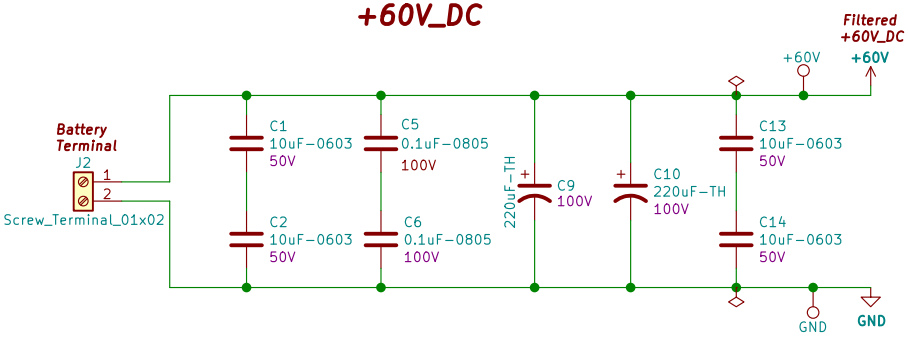
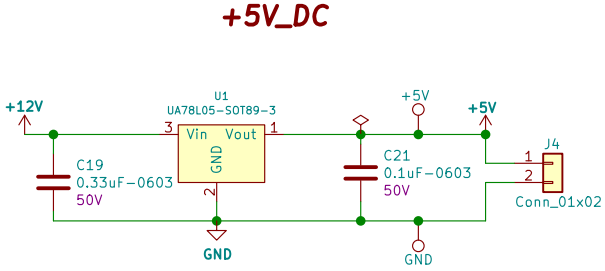
Date: 2019-06-29		Sheet: 3/12

Power

+60V_DC



+5V_DC



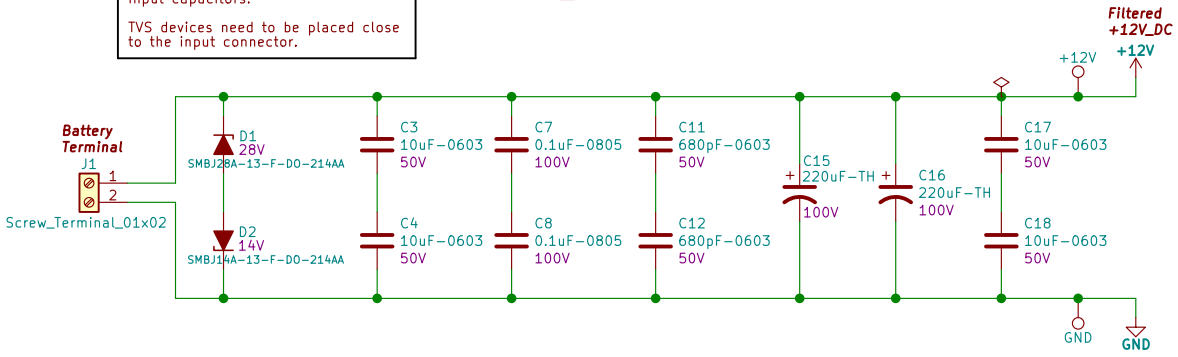
SMBJ28A-13-F will clamp the positive terminal to 40V typically.

SMBJ14A-13-F needs the lower clamp voltage. This is due to the 40V reverse voltage possibility, in addition to, dealing with a stored voltage on input capacitors.

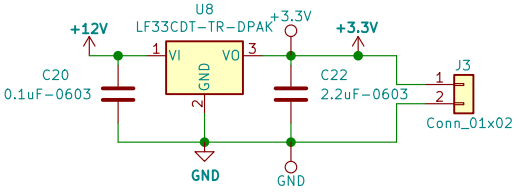
TVS devices need to be placed close to the input connector.

Note:
Ceramic input caps in series shall be placed in an "L" configuration. If the board bends, the ceramic caps may crack and cause a short. If one of the input caps shorts then the other cap in series (rotated 90 degrees on the board) will prevent a short on the power supply.

+12V_DC



+3V3_DC



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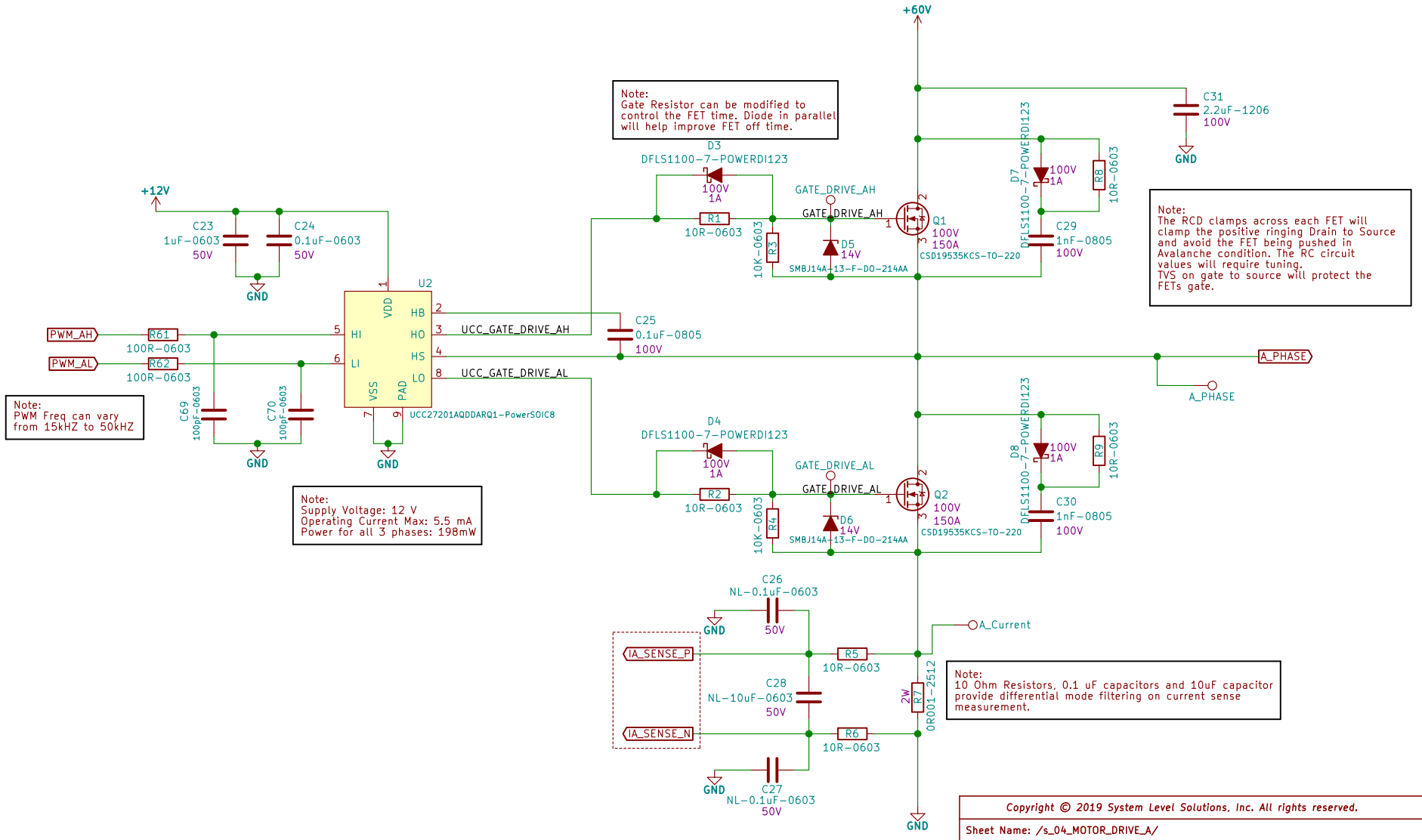
Sheet Name: /s_03_Power/		
Title: EV BLDC Driver		
Size: A4	Document Number: PCB-BLDCDRVR-1926-1C-01	Rev: 1C
Date: 2019-06-29		Sheet: 4/12

MOTOR DRIVE A



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Sheet Name: /s_04_MOTOR_DRIVE_A/		
Title: EV BLDC Driver		
Size: A4	Document Number: PCB-BLDCDRVR-1926-1C-01	Rev: 1C
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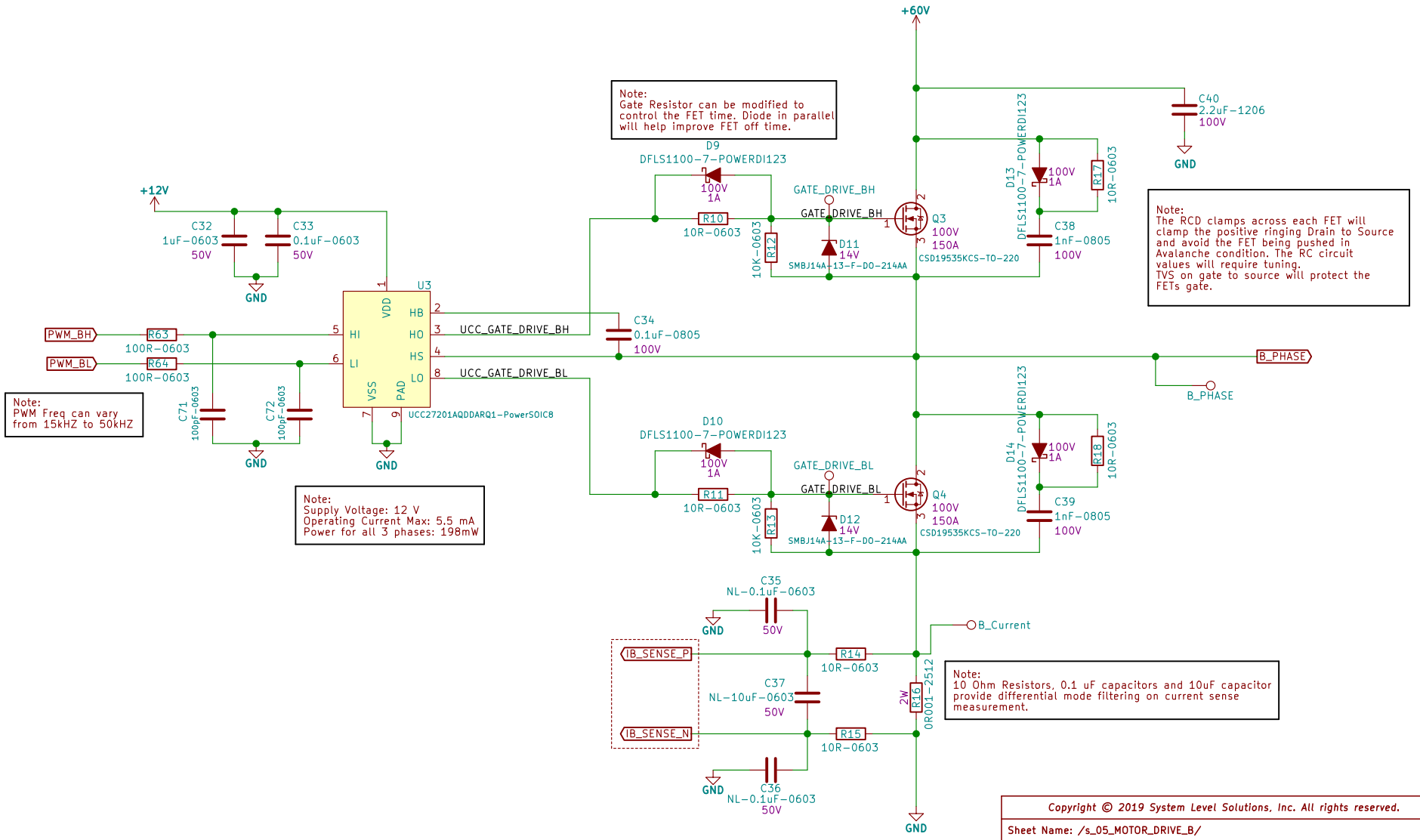
MOTOR DRIVE B



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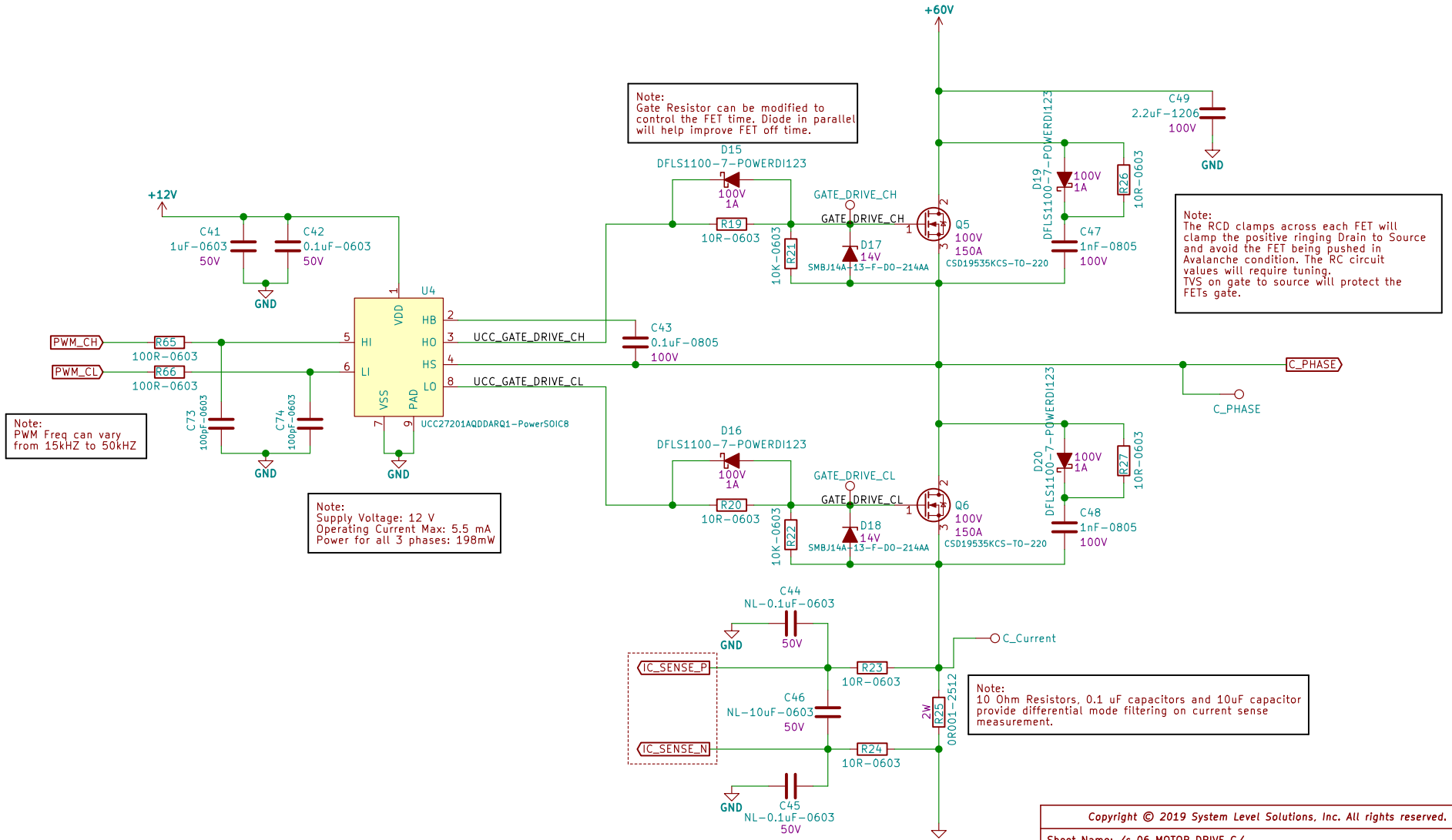
Sheet Name: /s_05_MOTOR_DRIVE_B/		
Title: EV BLDC Driver		
Size: A4	Document Number: PCB-BLDCDRVR-1926-1C-01	Rev: 1C
Date: 2019-06-29		Sheet: 6/12

MOTOR DRIVE C



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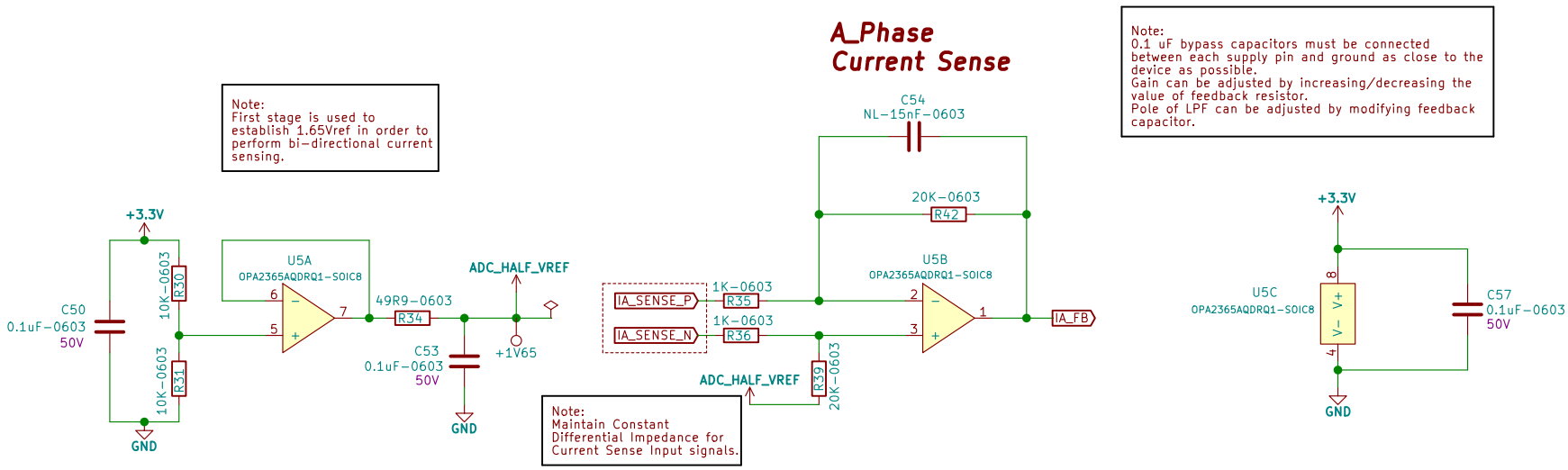
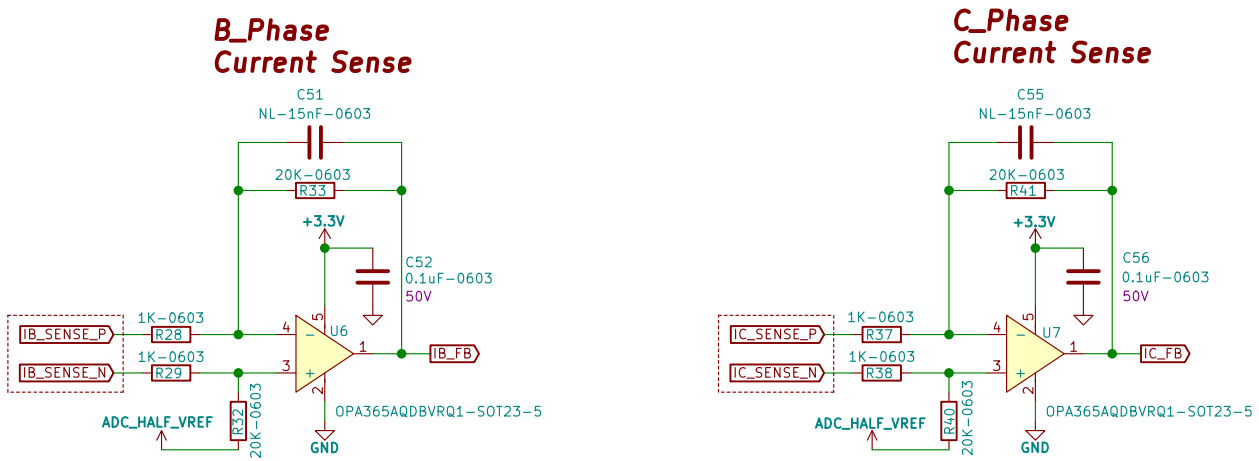
Sheet Name: /s_06_MOTOR_DRIVE_C/		
Title: EV BLDC Driver		
Size: A4	Document Number: PCB-BLDCDRVR-1926-1C-01	Rev: 1C
Date: 2019-06-29		Sheet: 7/12

Current Sense





Note:
Supply Voltage: 3.3V
Quiescent Current Per Amplifier Max: 5.3 mA
Total for all 4 Channels: 69.96 mW

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Sheet Name: /s_07_Current Sense/		
Title: EV BLDC Driver		
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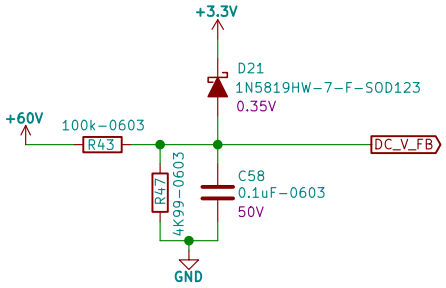
Date: 2019-06-29		Sheet: 8/12

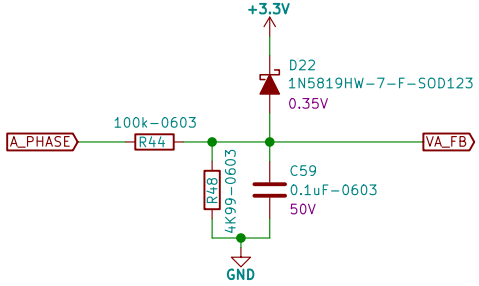
Voltage Sense

Note:
Voltage Divider to scale the maximum input of 70V to ADC range of 0V – 3.3V
LPF with –3dB at approximately 333 Hz

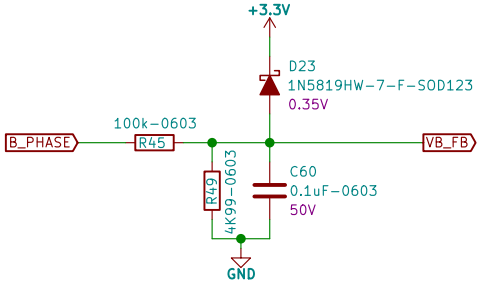
DC Battery Voltage Sense



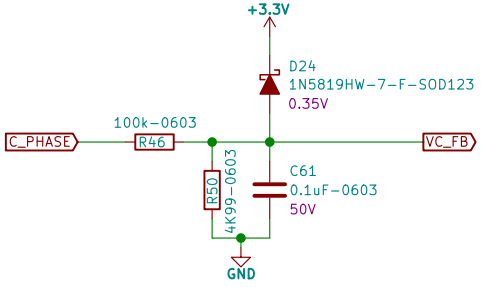
A_Phase Voltage Sense



B_Phase Voltage Sense



C_Phase Voltage Sense



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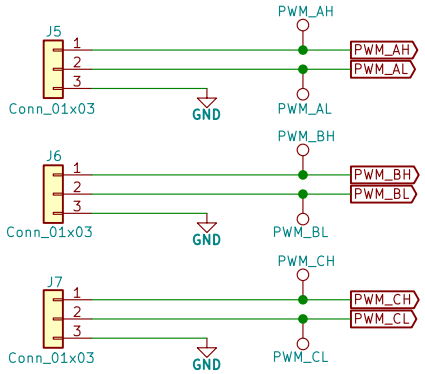
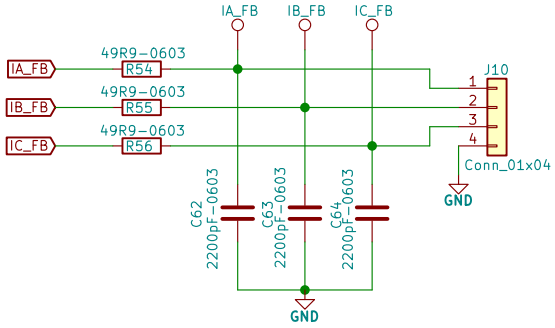
Sheet Name: /s_08_Voltage Sense/		
Title: EV BLDC Driver		
Size: A4	Document Number: PCB-BLDCDRVR-1926-1C-01	Rev: 1C
Date: 2019-06-29		Sheet: 9/12

Connectors

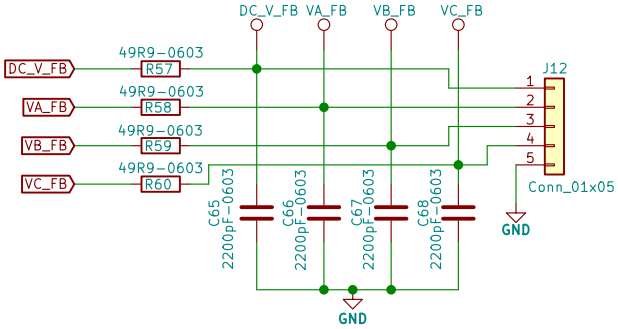
PWM Signals From Launch Pad



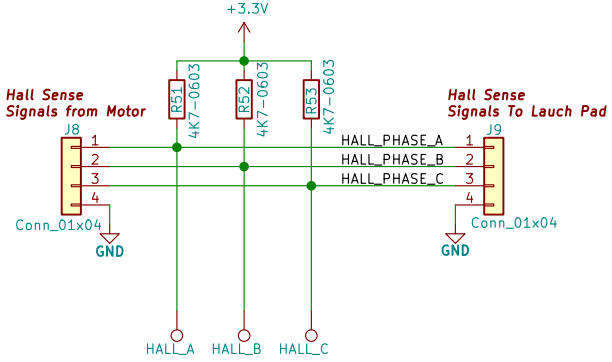
Current Sense Feedback Signals



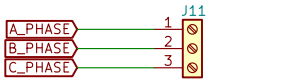
Voltage Sense Feedback Signals



Hall Sense Signals



Motor Phase Terminal



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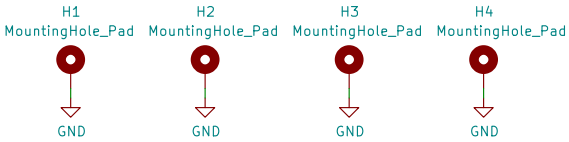
Sheet Name: /s_09_Connectors/		
Title: EV BLDC Driver		
Size: A4	Document Number: PCB-BLDCDRVR-1926-1C-01	Rev: 1C
Date: 2019-06-29		Sheet: 10/12

Miscellaneous

Fiducials

Mounting Holes



SLS LOGO

PRI Number

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Sheet Name: /s_10_Manufacturing/		
Title: EV BLDC Driver		
Size: A4	Document Number: PCB-BLDCDRVR-1926-1C-01	Rev: 1C
Date: 2019-06-29		Sheet: 11/12

Revision History

Sr. No.	Revision	Date	Description
1	REV1A	11th Feb,2019	Changes done as per the ECR documents.
2	REV1B	1st MAY,2019	(1)Changed MOSFETs from SMD/LOW Power to PTH(TO-220)/HIGH Power. (2)Added TVS diode across drain and source of Mosfets to protect against Back emf and voltage spikes. (3)Changed HALL Sensor Pull ups from 10k to 1K.
3	REV1C		Made REV1C board with help of TI reference design(TIDA-00281).

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Sheet Name: /s_11_Revision History/		
Title: EV BLDC Driver		
Size: A4	Document Number: PCB-BLDCDRVR-1926-1C-01	Rev: 1C
Date: 2019-06-29		Sheet: 12/12