1. Section 1: did you change design post packaging where you now have (5) sections with 14S3P, resulting in 70S3P, confusion based on Fig 52

2. Fig 2 does not match anything else in this document, I doubt you intend to route 3 wires/service plugs between each segment

2.1.2 and fig8, precharge coil drive shown in parallel with –AIR.. Needs to be discretely manipulated. Shutdown circuit does not appear to be fused.

3. Figure 8 how many amps do you predict will flow through your precharge resistor/fuse?

4. Fig 11 and 12, please explain the difference between the inertia switch and crash sensor, maybe some labels were mixed up on your figures.

5. Table 2.3 How does your IMD threshold level satisfy EV5.5.3? how does the output of IMD interface to shutdown circuit…if it drives a relay how is back EMF addressed?

6. Figure 2.2.2 IMD HV+/- need to be fused

7. Table 2.3.2 what is the range of operation for your crash senor, will a 1g impact open the circuit? How much current is required to power this device, how does it work?

8. 2.4.1 why is the current set point 16.6A, how did you determine this level?

9. 2.4.2 Where is your reset button for plausibility circuit, does it comply with EV5.1.4, does driver have access to it?

10. Fig 22 does not provide enough detail on the interlock, please provide a mechanization diagram, rather than schematic…something easy to comprehend

11. Fig 24 What does v+ and v- represent? Is there a HV fuse? It is unclear how the TSAL enable circuit interfaces with LED driver portion.

12. 2.8.1 Missing spec sheet in appendix for TSMP resistor…what power rating have you specified for a potential shorted TSMP?

13. 2.9.1 conflict with schematic, it depicts a 2kohm precharge resistor, but text states (2) 150ohm. Does the precharge relay ever turn off? Perhaps after Main + relay has been enabled? Side note: the purpose of precharge is to limit current into the capacitors of the traction system, as they appear, initially as a short due to low ESR (equivalent series resistance)…without current limit resistor(precharge) in series, these capacitors would enjoy a rapid current inrush, and perhaps be damaged.

14. 2.9.2 includes template instructions, remove please…

15. 2.9.2 Please append schematic with functional blocks explaining what each part of circuit does, what does LED7 indicate, what level of voltage is comparator looking for, how does it translate to HV bus value?

16. Figure 32 shows a precharge plot, please explain the contents of formula, not clear what resistance is used…previous text stated (2) 150 ohm resistors

17. 2.10.1 as sentence reads “It works by being a normally closed relay shorting the output of the accumulators and only opens when the precharge system activates and main AIRs open.” Perhaps the word “accumulators” should be changed with Motor Controller capacitors. Perhaps the main AIRs are “closed” when this circuit is open?

18. Fig 37 is unclear how precharge and main neg are discreetly controlled. Discharge relay is depicted as NO…is it supposed to be NC?

19. 2.12.1 is brake apply part of the startup process, how is EV4.10.2 satisfied?

20. 3.1.3 your description indicates a 12S3P configuration, but figure 43 shows 3 discrete 12S1P per segment.

21. 3.1.3 if cells are clamped back to back, how is EV6.1.4 satisfied?

22. Figure 44 does not show maintenance plugs in schematic, provide more detail, how are they removed?

23. 3.1.4 how many temperature sensors are used, how does this satisfy EV3.6.6?

24. 3.1.5 “At a minimum cell voltage of 3.8 and a maximum of 4.2, the BMS will take actions to bypass the affected cell(s)”..what do you mean by “bypass”? why would you bypass a cell at 3.8vdc? How long does this condition have to exist before you act on it? Is a zero volt cell, also consider an open sense lead? How are the sense leads fused?

25. 3.1.5 the schematic provided is not legible by zooming in, extract the subject areas of topic and elaborate, a mechanization diagram would be more helpful.

26. 3.1.6 you depict monitoring of the 1st and last AIR.. are there more in your design?

27. 3.1.6 you still have instructions from template, these need to be removed.

28. 3.1.6 only see provisions for optically isolated TSAL, where do you provide accumulator indicator?

29. 3.1.7 this area looks to comprehend more info on the tractions side wires, what terminals are used and how you hoop convey energy to the AIR and out of the accumulator to the inverter.

30. 3.1.9 looks like the fuse needs to be mounted somehow, don’t consider the fuse to be connected/bolted to a floating wire. This would not be acceptable.

31. 3.1.10 show a detailed diagram and include all mentioned attributes, as well as, your Estop per EV8.3.6.

32. 3.1.11 this configuration of cells does not match anything in this presentation, what is your final design?

33. 4.1 Incomplete… there is documentation on the meter, you should be able to show how this is integrated into your system, fusing, power, ect.

34. 5.1.1 how is EV2.2.7 satisfied?

35. 5.1.1 what gage size is the wire fed to motor? How are wire shields addressed when HV wires are attached to motor? How are wire shields addressed when HV wires are attached to AIR’s?

36. 6.1.2 good description, please show more detail on this, photos work, looking to comprehend strain relief/service loop.

37. 11 appendix needs some general cleanup, remove unnecessary content

*I will try to keep up with your responses, nice job, far. Note I would like to give you my full comments, but this portal does not allow formatted text, so anything I have edited with a crossed out response (meaning I accept your response) is not working out. So, if you see the item number disappear, it is good to go, and we can keep moving forward with remaining issues. Ok, so here we go:   
2.1.2 and fig8, precharge coil drive shown in parallel with –AIR.. Needs to be discretely manipulated. Shutdown circuit does not appear to be fused. 2.1.2 - I am not quite sure what you mean about this. When we turn on precharge relay that bypasses the top AIR with a resistor. At the same time we turn on the bottom AIR. After the timer passes, we turn on the top AIR. Figure 8 is a high level diagram and therefore shows no fusing. We do fuse the AIR system to 2A. (Slow blow). Alright, so you have no intentions to open the precharge relay…just bypass it, right?   
7. Table 2.3.2 what is the range of operation for your crash senor, will a 1g impact open the circuit? How much current is required to power this device, how does it work? 7. Your question confuses me. We follow EV 5.7. Schematic 2.1.2 shows crash sensor in in NO state, table 2.1 and text of 2.3.2 depict it as NC. This conflict is a simple schematic fix, but then I see you specified the use of high voltage wire on this low voltage parts…so I look for you to research, and explain the operation of how the sensor works, just to make sure we are on the same page.   
8. 2.4.1 why is the current set point 16.6A, how did you determine this level? 8. 16.6A comes from rule EV5.6. The rules state a 5kw level, did you perform a test and empirically arrive at 16.6 or is your value from a calculation?   
9. 2.4.2 Where is your reset button for plausibility circuit, does it comply with EV5.1.4, does driver have access to it? 9. As mentioned in our report, GLVMS is our reset. The reset button is unconnected (not installed) in our car. Last sentence of 2.4.2 leads me to believe there are 2 switches, GLVS and a reset button… so does the end of this sentence need to edit out the mentioning of “reset button”?   
10. Fig 22 does not provide enough detail on the interlock, please provide a mechanization diagram, rather than schematic…something easy to comprehend   
11. Fig 24 What does v+ and v- represent? Is there a HV fuse? It is unclear how the TSAL enable circuit interfaces with LED driver portion.   
12. 2.8.1 Missing spec sheet in appendix for TSMP resistor…what power rating have you specified for a potential shorted TSMP?   
14. 2.9.2 includes template instructions, remove please…   
15. 2.9.2 Please append schematic with functional blocks explaining what each part of circuit does, what does LED7 indicate, what level of voltage is comparator looking for, how does it translate to HV bus value? 15. The schematic only uses fundamental electronic components. The LED and test points are only for team testing and tuning. And will not be able to be viewed when installed in the car. The provided schematic does not provide the reader with sufficient “call outs” in order to comprehend intention of the circuit.   
16. Figure 32 shows a precharge plot, please explain the contents of formula, not clear what resistance is used…previous text stated (2) 150 ohm resistors   
17. 2.10.1 as sentence reads “It works by being a normally closed relay shorting the output of the accumulators and only opens when the precharge system activates and main AIRs open.” Perhaps the word “accumulators” should be changed with Motor Controller capacitors. Perhaps the main AIRs are “closed” when this circuit is open?   
18. Fig 37 is unclear how precharge and main neg are discreetly controlled. Discharge relay is depicted as NO…is it supposed to be NC? 18. It is NC, The diagram looks better with a NO switch (you tell it is a switch).. this is a safety circuit, needs to be depicted correctly, very serious topic the area of High Voltage.   
20. 3.1.3 your description indicates a 12S3P configuration, but figure 43 shows 3 discrete 12S1P per segment.   
21. 3.1.3 if cells are clamped back to back, how is EV6.1.4 satisfied?   
22. Figure 44 does not show maintenance plugs in schematic, provide more detail, how are they removed?   
24. 3.1.5 “At a minimum cell voltage of 3.8 and a maximum of 4.2, the BMS will take actions to bypass the affected cell(s)”..what do you mean by “bypass”? why would you bypass a cell at 3.8vdc? How long does this condition have to exist before you act on it? Is a zero volt cell, also consider an open sense lead? How are the sense leads fused?   
25. 3.1.5 the schematic provided is not legible by zooming in, extract the subject areas of topic and elaborate, a mechanization diagram would be more comprehendible.   
26. 3.1.6 you depict monitoring of the 1st and last AIR.. are there more in your design?   
27. 3.1.6 you still have instructions from template, these need to be removed.   
28. 3.1.6 only see provisions for optically isolated TSAL, where do you provide accumulator indicator? 28. We control that light from the same board. We will update the document. OK   
29. 3.1.7 this area looks to comprehend more info on the tractions side wires, what terminals are used and how you hoop convey energy to the AIR and out of the accumulator to the inverter.   
30. 3.1.9 looks like the fuse needs to be mounted somehow, don’t consider the fuse to be connected/bolted to a floating wire. This would not be acceptable.   
31. 3.1.10 show a detailed diagram and include all mentioned attributes, as well as, your Estop per EV8.3.6.   
32. 3.1.11 this configuration of cells does not match anything in this presentation, what is your final design?*

*33. 4.1 Incomplete… there is documentation on the meter, you should be able to show how this is integrated into your system, fusing, power, ect. 33. Fusing of the LV wires? Nope, the +HV sense lead.   
34. 5.1.1 how is EV2.2.7 satisfied? 34. That is controlled by the ECU. OK, does the inverter automatically restrict regen at speeds below 5kph, or did your team program a restriction?   
35. 5.1.1 what gage size is the wire fed to motor? How are wire shields addressed when HV wires are attached to motor? How are wire shields addressed when HV wires are attached to AIR’s? 35. Wire-EXRAD Shielded XLE 2 cable. The AIR's are in the accumulator. Therefore no grounding is necessary. The motor has a box around the leads. I will show the box in the ESF. There will be no traditional service loop but there will be no tension on the wire between the inverter and the motor. OK, I am really looking “not to see” mishandling of shield dressing on the High Voltage coax. Many times the shields are neglected because they don’t have a formal termination when they reach with AIR for example. What can happen, is if the shield isn’t stripped back from the internal conductor far enough, it can end up shorting HV to shield/chassis. So, long story short, please show that you have properly dealt with the shield and it will have no way of making contact with the internal conductor. Thankyou in advance.   
36. 6.1.2 good description, please show more detail on this, photos work, looking to comprehend strain relief/service loop.   
37. 11 appendix needs some general cleanup, remove unnecessary content*

*1 thru 9, 11 thru 15,17,18,19 21 thru 27, 33,34 =DONE… not bad, down to <12 remaining issues, very close to completion, keep it up.   
10. Fig 22, Looking for a diagram where it is clear how an open interlock will remove HV from traction system. Image is pretty fuzzy, not able to read labels when zoomed into 200%.   
16. Figure 32 shows a precharge plot, please explain the contents of formula, not clear what resistance is used…previous text stated (2) 150 ohm resistors 16. This formula is for %of voltage over time. I added a second formula to convert back to voltage over time. This area needs some work, your power estimates look to be a little off, what value of bus capacitance are you planning to precharge into?   
20. 3.1.3 your description indicates a 12S3P configuration, but figure 43 shows 3 discrete 12S1P per segment. 20. Updated…you now have a typo, IS:12s31p, S/B:12s1p   
28. 3.1.6 only see provisions for optically isolated TSAL, where do you provide accumulator indicator? 28. We control that light from the same board. We will update the document. OK 28. Updated, does this circuit detect for welded relay?   
29. 3.1.7 this area looks to comprehend more info on the tractions side wires, what terminals are used and how you hoop convey energy to the AIR and out of the accumulator to the inverter. Wow my typing was suffering on this one, sorry about that.. let me be more specific: Please include information on the high voltage traction wires. How are they terminated? What type of fasteners do you use to attach to AIR’s. Indicated what provisions have you taken to assure they stay connected.   
30. 3.1.9 looks like the fuse needs to be mounted somehow, don’t consider the fuse to be connected/bolted to a floating wire. This would not be acceptable. You can describe its mouting if you don’t have updated math data.   
31. 3.1.10 show a detailed diagram and include all mentioned attributes, as well as, your Estop per EV8.3.6.   
32. 3.1.11 this configuration of cells does not match anything in this presentation, what is your final design? If final is only 5 boxes, all the other diagrams/schematics need to follow this.   
35. 5.1.1 what gage size is the wire fed to motor? How are wire shields addressed when HV wires are attached to motor? How are wire shields addressed when HV wires are attached to AIR’s? 35. Wire-EXRAD Shielded XLE 2 cable. The AIR's are in the accumulator. Therefore no grounding is necessary. The motor has a box around the leads. I will show the box in the ESF. There will be no traditional service loop but there will be no tension on the wire between the inverter and the motor. OK, I am really looking “not to see” mishandling of shield dressing on the High Voltage coax. Many times the shields are neglected because they don’t have a formal termination when they reach with AIR for example. What can happen, is if the shield isn’t stripped back from the internal conductor far enough, it can end up shorting HV to shield/chassis. So, long story short, please show that you have properly dealt with the shield and it will have no way of making contact with the internal conductor. Thankyou in advance.   
36. 6.1.2 good description, please show more detail on this, photos work, looking to comprehend strain relief/service loop.   
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