**EMF Interference Considerations**

|  |
| --- |
|  |
| **Figure 1** |

All the electrical connections from outside the enclosure to components within the enclosure will need to travel between the two 120x120mm fans on the front panel. These connections include:

* 12V & 5V power
* Current sense differential signal (0 -> 75mV)
* Voltage sense differential signal (0 -> 250V)
* More than 6 thermistors
* Possibly earth connections
* Possibly 12V fan power
* Possibly contactor coil power
* Possibly rear user I/O signals

All these connections are susceptible to noise from the two 12V fans they are passing between. By far the most fragile signal here is the current sense, which is a differential signal less than 100mV. Thankfully, there are plenty of solutions for common-mode noise introduced to differential signals. Obviously, the wires will be shielded and twisted pairs. This alone essentially solves all the noise concerns here. It’s important to note that the thick aluminium enclosure will also greatly assist with shielding, essentially acting as a Faraday cage, providing that it is properly grounded.

The fans, ideally, will not use PWM control. Although this was a very appealing approach to ensure comfortable acoustic noise levels while maintaining cooling performance, the electrical noise issues they present could become problematic. This is combined with the fact that they could introduce significant current noise to the power rails. The PWM control can still be incorporated with the PCB, and simply set to 100% duty-cycle to disable the PWM and run the fans at their maximum speed.