**Output Filter Design**

According to our simulations, the inductance value of the filter is 100µH. To design filter inductor, we have checked the available cores in the laboratory. To decrease number of turns, we decided to use the core which has maximum inductance factor (AL). We also want to design inductor as small as possible. By considering these, we selected 55928A2 toroid core for our design. Important parameters of the selected core are given below:

Inductance Factor (AL) = 201nH/Turns2

Window Area (AW) = 156mm2

Volume = 4150 mm3

Then we have calculated the required number of turns for 100µH using equation (X). We found minimum number of turns as 23.

(X)

Since the output current is 4.8A in average, we decided to use 1.31 mm2 cross sectional area AWG#16 wire for inductor winding and current density is 3.66 which is in the acceptable range. Total area of the conductors become 30.13mm2 which results in k=0.193 fill-factor. Since we selected the smallest available core, low fill-factor is not problem for design.

In order to have 2% output ripple, we have selected output capacitance of the converter as 200µF. Cut-off frequency of the designed LC filter is found by equation (X). fc= 1137 Hz which is much lower than switching frequency.

(X)