1)

b)

Input voltage Vin = 48V

Output (full load) 24 V at 4.16 A

We chose:

Switching frequency 250 kHz

Assuming Magnetizing current ripple 4% of dc magnetizing current

Duty cycle D = 0.4

Turns ratio n1/ n2 = 1.33

Fill factor Ku = 0.3 is assumed.

Pcu=5W

Maximum flux density Bmax = 0.25 T is used. This value is less than the worst-case saturation flux density of the ferrite core material.

Components of magnetizing current, referred to primary:

∆IM=0.1044A

=0.072mH

The rms value of the primary winding current is found as follows (this equation taken from Fundamentals of Power Electronics 2nd edition Erickson appendix A eq. (A.6));

=3.3 A

The rms value of the secondary winding current is found as follows;

=5.37 A

The total rms winding current is equal to:

=7.33 A

We can now determine the necessary core size.

The smallest EE core listed in figure 3 that satisfies this inequality is the ETD29, which has kg= The dimensions of this core is as follows;

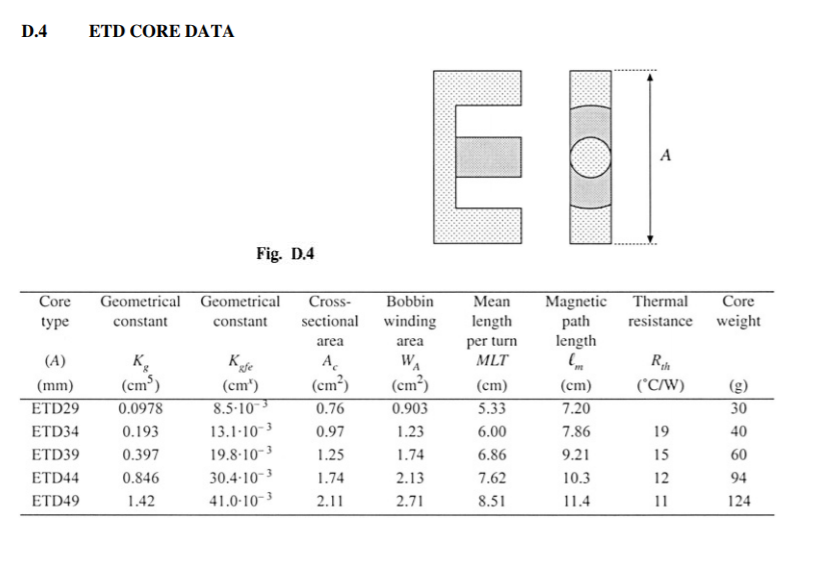


Figure 1.ETD Core Data( taken from taken from Fundamentals of Power Electronics 2nd edition Erickson appendix D)

The air gap length is chosen as follows;

The number of winding 1 turns is chosen as follows;

Since an integral number of turns is required, we round off this value to

To obtain the desired turns ratio, n2 should be chosen as follows:

We again round this value off, to

For the flyback transformer example, the peak ac flux density is found to be as follows;

c)

When average magnetization current equal to half of the ripple on magnetization current system goes DCM mode.

0.425 A is minimum current of load for working with without getting into the DCM.