Inductor Selection

Insights:

During choosing inductor there was a massive trade-off between precision and applicability. As we want to choose higher inductance values where we increase rise time and obtain more reliable data, we must increase resistance due to turn number. On the other hand, as we want to avoid it, we must use non-air cored inductors which easily saturate and causes a decrease in inductance. Note that if we want to use small valued inductor we have to increase DC voltage too much which results in an increase in current and also DC voltage becomes comparable to inductor voltage which is not desired due to approximations during the calculation. Also, self-resonance frequency is important since our operation frequency must be smaller than that.

Result:

As the GaN model, I used the GS66508B model. It is important since internal resistance of the semiconductor changes current and therefore Voltage values a lot. Since the air core's linear characteristic is a great advantage I chose an inductor with an air-core and also a one with a non-air core that has more appropriate inductance and resistance values but saturates.

1. Würth Elektronik 732-11716-ND(Can be provided from Digikey):

Even with 50mV DC it operates and it requires just a little bit current <1A at fully charged condition. It is with a ferrite core and even though it has a saturating charesteristics its operating point is at really safe area.

2. Würth Elektronik 732-11522-6-ND(Can be provided from Digikey):

Unfortunately it is the best that I could fould from digikey. It has 146nH inductance which is very low but it is the best inductor wich is able to simulate up to 650V but it can resist its own current. Nothe that for 150V application is is still great choose but for voltages after 500V ferrite cores are better.