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 Power electronic (EE3410E)  
  
  
  
Design converter with the parameters as following:**

* Input : 43.2 – 50.4 VDC
* Output : 12V ±1%, 5A
* Switching frequency: 100 kHz  
  Ω

|  |  |
| --- | --- |
| Input voltage source | 43.2-50.4VDC |
| Output voltage, current | 12±1%, 5A |
| Switching frequency | 100kHz |
| Current ripple | 20% |
| Voltage ripple | 2% |

\* Since range of input voltage is higher than output( [43.2 – 50.4] > 12 )   
=> Choose *Buck converter topology*  
A diagram of a circuit

Description automatically generated with low confidence  
 Consider input voltage:   
 *\* Basic Calculation* - We have Duty   
 - =>   
 +   
 +   
 +   
 - Current ripple on Inductor:  
 +   
 - Voltage ripple on Capacitor:  
 +   
 +   
  
  
 - MOSFET:A picture containing sketch, line, diagram, design

Description automatically generated

- DIODE:   
 +   
 + A  
 +   
*\*Choose devices*  
 - Capacitor   
 + C   
 +   
 - Inductor  
 +   
 +   
 - MOSFET and DIODE depend on cooling  
 + Since is so small => Choose natural cooling   
 +   
 +   
  
  
  
Consider input voltage   
  
\**Basic calculation* - We have Duty   
 - =>   
 +   
 +   
 +   
 - Current ripple on Inductor:  
 +   
 - Voltage ripple on Capacitor:  
 +   
 +   
  
  
 - MOSFET:A picture containing sketch, line, diagram, design

Description automatically generated

- DIODE:   
 +   
 + A  
 +   
*\*Choose devices*  
 - Capacitor   
 + C   
 +   
 - Inductor  
 +   
 +   
 - MOSFET and DIODE depend on cooling  
 + Since is so small => Choose natural cooling   
 +   
 +   
  
In conclusion, if range of input voltage is [ 43.2 – 50.4 ]   
   
   
   
   
*\*Confirm by simulation in PSIM* Choose , input voltage Vi= 45V, Duty D=0.27  
A picture containing text, diagram, line, plot

Description automatically generated   
 Schematic circuit  
  
A picture containing text, screenshot, line, plot

Description automatically generated  
 Simulation result