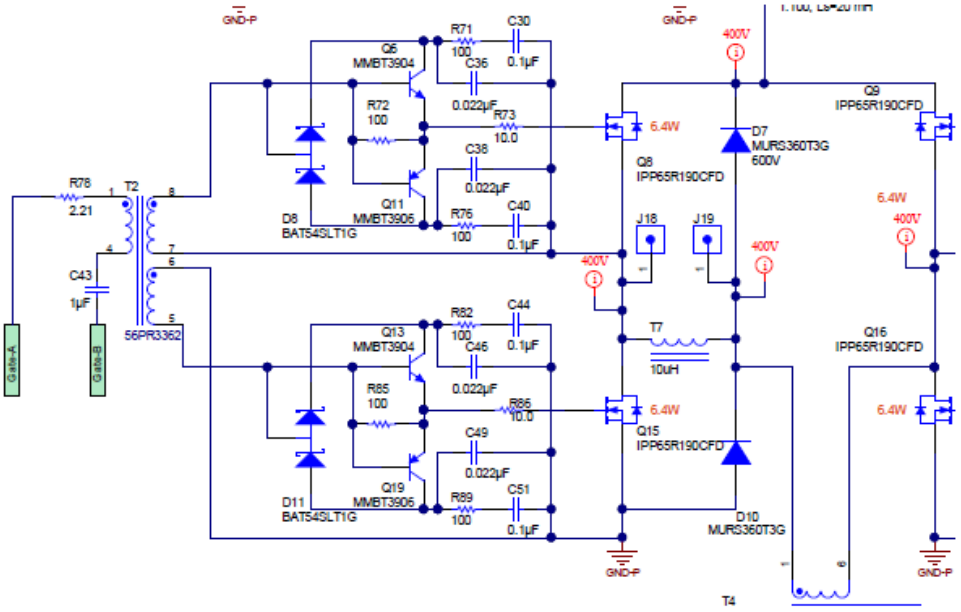
PMP8740 2KW Reference Design Queries

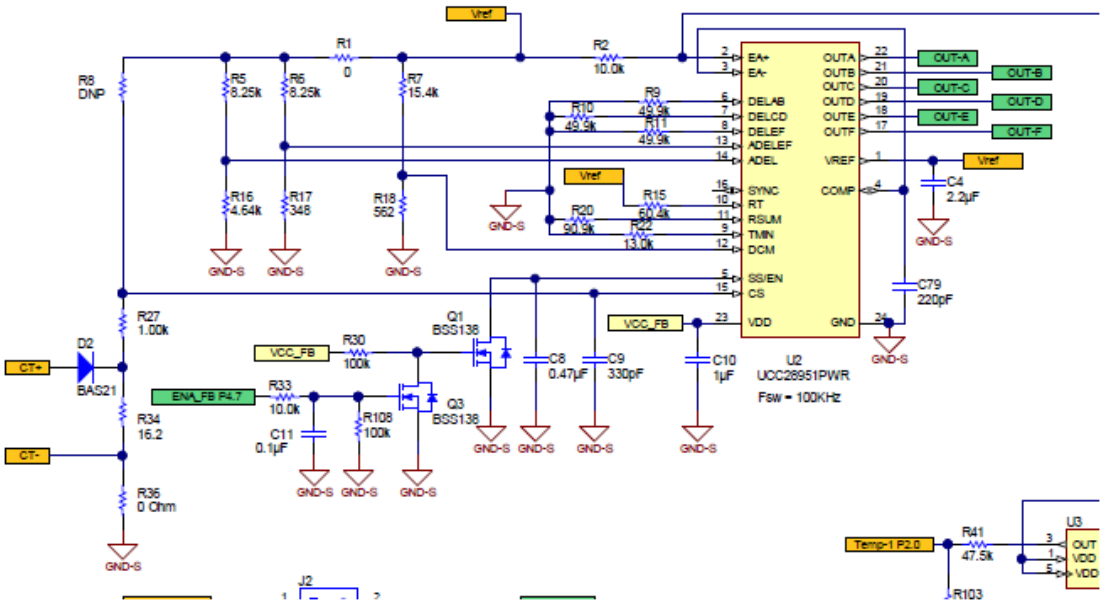


In the above network,

1. What is the Working principle.

2. how we are selecting components values and explain with Design calculations

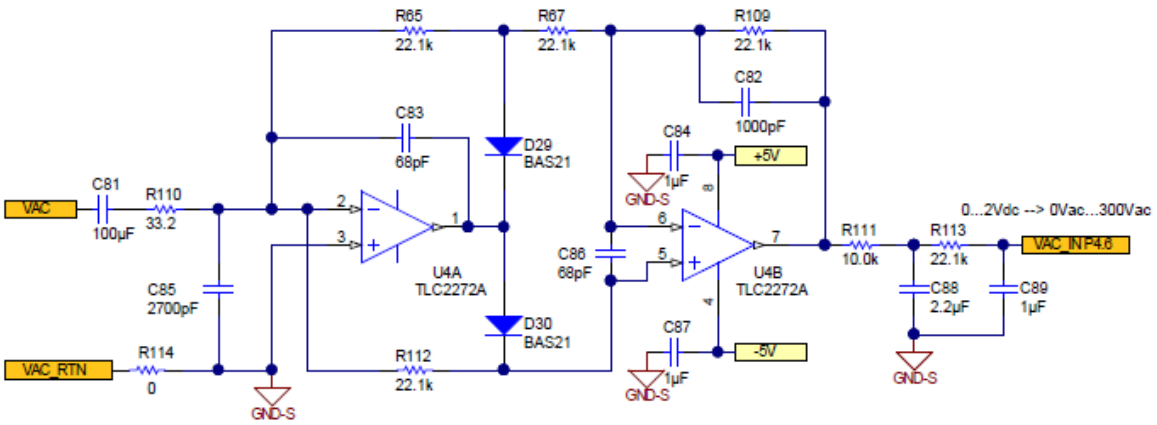
Please access the PMP8740 White Paper, on page 22



In the above Circuit,

1. What is the purpose of using Q1 and Q3. → Q3 shorts SS/EN pin to disable PWM generation from U2. Q2 is just an inverter, that takes the digital input from a microcontroller. During start up the microcontroller output ENA_FB P4.7 has three-state status and Q3 is kept off by the pull down resistor R108. Then in this condition, Q3 is off and the pull-up resistor R30 keeps Q1 conducting, therefore disabling the controller U2

2. Can we able to use Transistors as the replacement. → Yes, you can use transistors for this function

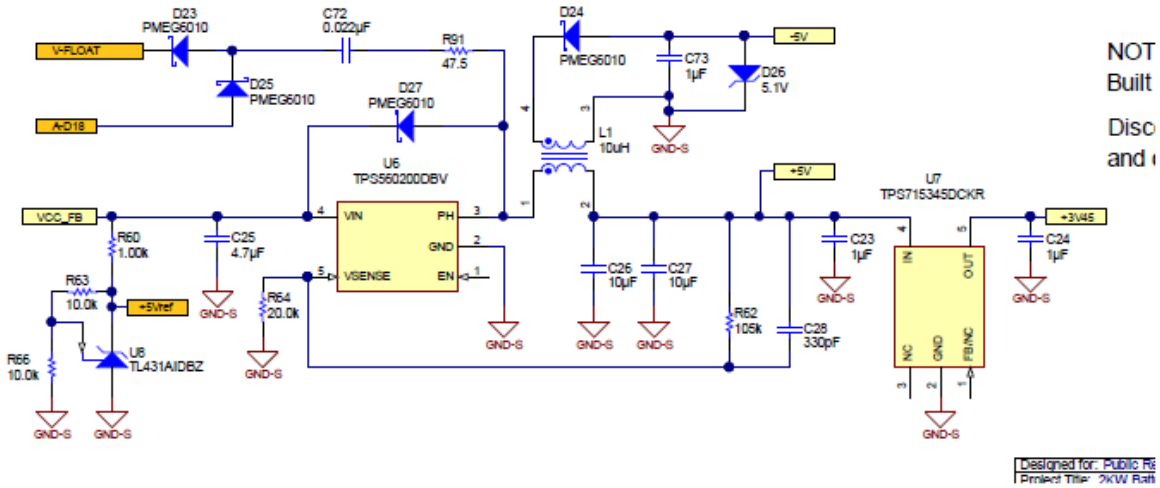


In the above network,

1. Please tell me about the Working principle and why 2 Op-amps are used.

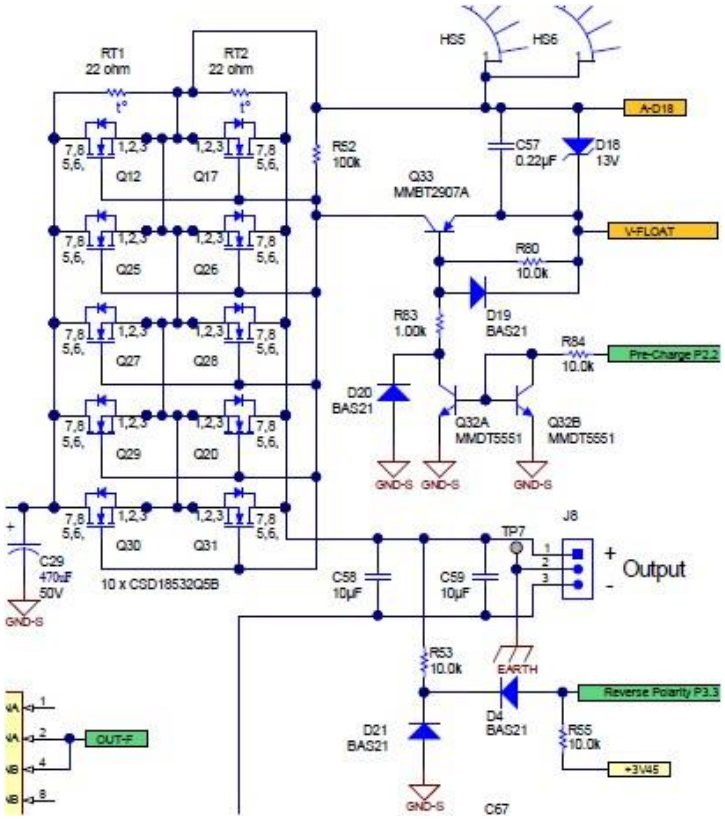
2. On what basis/points, we are selecting component values with Design considerations.

This circuit is a well known “ideal rectifier”: just google it on the WEB and you can find the working principle. A brief explanation is also included in the white paper of PMP8740, on page 17



In the above network,

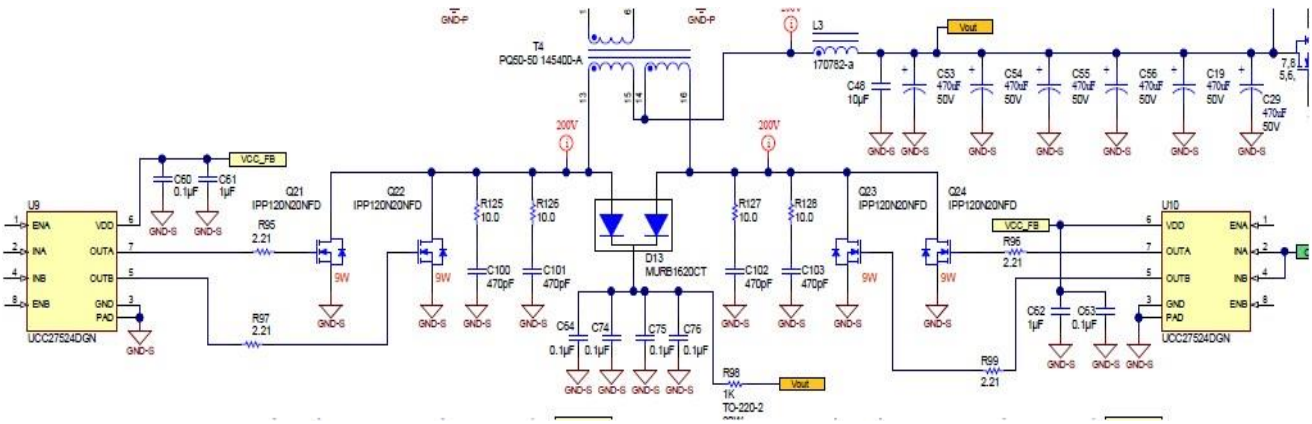
1. what is the voltage across the V-float and A-D18 at different stages
2. what is the purpose of connecting it to PH pin of U6 and explain how it is effecting and control of Pre-Charge Circuit
3. The node PH (pin 3 of U6) is switching with square wave at the frequency of U6 and with a peak -peak voltage = VCC_FB (which is 12V) Now C72 is removing the DC offset of net A-D18; this way D23 and D25 form a peak-peak rectifier, transferring the perak-peak voltage ojn PH pin directly to the capacitor connected between V-FLOAT and AD-18. More details are also included in the white paper on pages 28, 29 and 30.



In the above network,

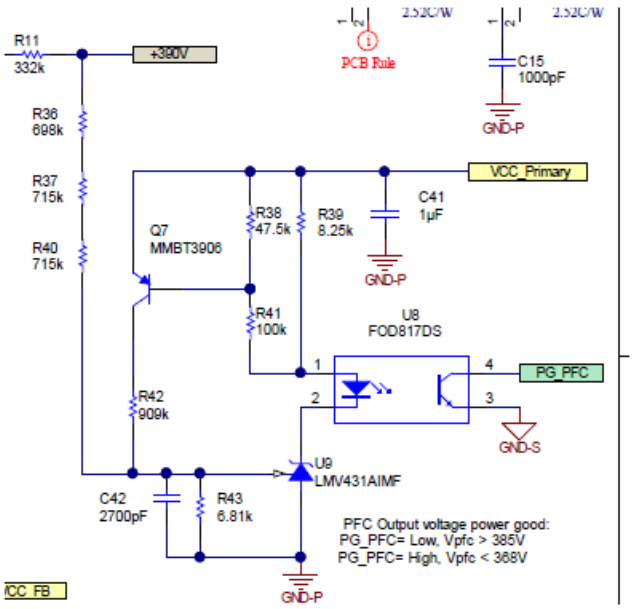
Brief about Working principal of the circuit

1. What is usage of this pre-charge circuit and how and when it needs to be activated? → This pre-charge circuit is used to avoid that when a battery is connected to output terminals, a very high current is flowing from the battery back to the output capacitors C53, C54, C55, C56, C19 and C29. This high current can create a spark in the connector, reducing its life time
2. How the components are selected. → More details included in the white paper on pages 28, 29 and 30.



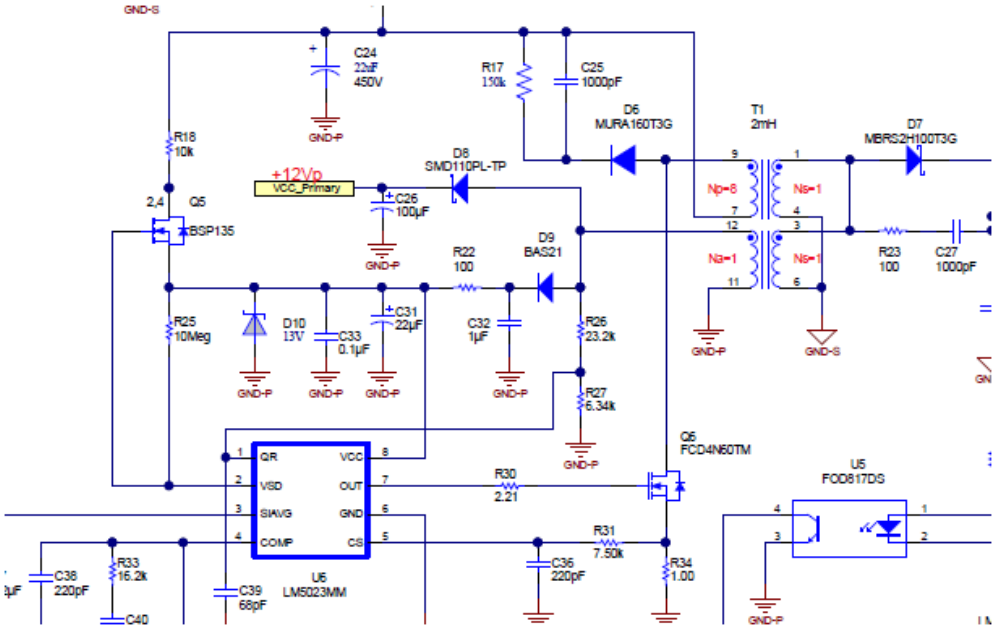
In the above network,

1. Why Diodes D13 is used and what is the purpose it is connected to Vout
2. What is the functionality of this network.
3. → The circuit defined by D13 and C64, C74, C75, C76 is a snubber (or better called clamp-circuit). It clamps the energy coming from leakage inductance of the transformer into these capacitors. It avoids igh voltage spikes on sync-FETs Q21, Q22, Q23 and Q24. The energy released into the clamp capacitors is then partially burned in R98 and partially recovered into the load, since it's connected to the output



In the above network,

1. Operation principal of the schematic
2. How the Component are selected
3. Is this circuit is mandatory?
4. → This is a simple "power good" signal generator; it tells the microcontroller that the voltage on PFC stage is > 385V. It is not mandatory, but I prefer to know when the PFC stage has reached nominal Vout, in order to proceed with the next status of the converter. Again, more details in the white paper.



In the above auxiliary circuit,

1. What is the purpose Q5 → This depletion mode FET is supplying and charging C31, needed to supply U6. After the converter starts, the pin VSD turns off Q5 and reduces the dissipation on it, improving stand-by loss. It is possible to use just simple resistors instead of Q5; in this regards, please have a look to U6 datasheet
2. Can we go for Quasi-resonant with opto-coupler and without the using Q5 →Yes, you can replace this controller with, for example, a UCC28740; at the time I designed this charger, we didn't have this part