Appendix F – Testing and Verification Table

Status	Notes	Building Stage	Requirements	Testing Procedures	Debugging Technique
☑	The final circuit was able to maintain a voltage ripple of ±1.7V. During the demonstration, this was not seen because main power trace on the PCB was damaged.	Rectifier Converter Output	The rectifier should provide a stable 108±2.16V/ 3±0.6A DC output.	1. Provide a stable 120 V AC power supply. 2. Provide rated load with HP Electronic Load 3. With a wattmeter to measure voltage and current across output. 4. Compare the measured values with requirements values.	1. Check: a. For correct components b. For correct circuit wiring c. Damaged chip with diode tester d. Correct conduction of single diode
☑	Potentiometers allowed for full range of control	Linear Regulators	The linear regulators should provide a stable 12V to the IC chips.	1. Wire designed circuit components 2. Provide a stable DC power supply 3. Provide rated load with HP Electronic Load 4. With a wattmeter to measure voltage and current across output. 5. Compare the measured values with requirements values.	1. Check: a. For correct components b. For correct circuit wiring c. Damaged chip
☒	Not used. PWM circuit was impliemented.	Flyback PFC Controller	Output should be variable duty ratio square wave, nominally 50%.	1. Wire designed circuit components 2. Provide V_{CC} power of 12V 3. Check output of the controlled with oscilloscope. The output should be a square wave with a nominal 50% ratio.	1. Check: a. For correct circuit wiring b. Supply power, ground, and enable 2. Vary resistor and capacitor set point values

Appendix F – Testing and Verification Table

Status	Notes	Building Stage	Requirements	Testing Procedures	Debugging Technique
☑	Implemented instead of PFC	Flyback PWM Controller	Output should be variable duty ratio square wave, nominally 50%.	1. Wire designed circuit components 2. Provide V_{CC} power of 12V 3. Check output of the controlled with oscilloscope. The output should be a square wave with a nominal 50% ratio.	1. Check: a. For correct circuit wiring b. Supply power, ground, and enable 2. Vary resistor and capacitor set point values
☑	Worked, but was removed to simplify circuitry. Not needed because FET was tied to the neutral of the circuit	Flyback Gate Driver	High current square wave with adjustable amplitude based on MOSFET source voltage	1. Wire designed circuit components 2. Provide V_{CC} power of 12V 3. Provide low-current switching frequency from function generator 4. Check output with oscilloscope. 5. Confirm	1. Check: a. For correct circuit wiring b. Supply power and ground 2. Confirm that Cboot voltage is constant
☑		Flyback Converter Output	The flyback should provide a stable 25±0.5V/ 8.2±0.164A output voltage.	1. Provide a stable 108V DC power supply. 2. Provide rated load HP Electronic Load 3. With a wattmeter to measure voltage and current across each output. 4. Observe voltage and current ripple with scope.	1. Check: a. MOSFET switching signal b. MOSFET signal ringing - snubber circuit c. MOSFET gate-source voltage d. For damaged parts e. For inductor saturation
☑		Low Buck Converter Output	The low power buck should provide a 5±0.1V/ 5±0.1A output.	1. Provide a stable 25V DC power supply. 2. Provide rated HP Electronic Load 3. With a wattmeter to measure voltage and current across each output. 4. Observe voltage and current ripple with scope.	1. Check: a. duty ratio set resistors b. enable pin c. capacitor size d. output ripple

Appendix F – Testing and Verification Table

Status	Notes	Building Stage	Requirements	Testing Procedures	Debugging Technique
☒	The circuit was only able to output a maximum of 9 A.	High Buck Converter Output	The high power buck should provide a 12±0.24V /15±0.3A output.	1. Provide a stable 25V DC power supply. 2. Provide a HP Electronic Load 3. With a wattmeter to measure voltage and current across each output. 4. Observe voltage and current ripple with scope.	1. Check: a. duty ratio and frequency set pins b. MOSFET switching signal c. MOSFET gate-source voltage Inductor size
☑		Load Regulation	The calculated load regulation value needs to be below 5% to be acceptable.	1. Using an electronic load in constant current mode, the circuit will be tested under full load and no load conditions. 2. Calculated the load regulation can compare with requirements.	1. Load regulation will be calculated from the buck control chips. $\% \, Load \, Reg = \frac{V_{out(\min load)} - V_{out(full \, load}}{V_{out(nominal)}}$
☑		Efficiency	The calculated efficiency value needs to be at least 85% to be expectable.	1. Connect a wattmeter to the input to measure the input power. 2. Connect another wattmeter to the output of measure the output power. 3. Compare the input and output power to calculate the efficiency.	1. Reduce length of connections 2. Place circuit on PCB 3. Check solder joints