

# PFC V1

This is a Simplis simulation model of a 90Vrms to 130Vrms input continuous mode Boost PFC. The PFC chip gets boost strapped by the main inductor. The output voltage is 400V and capable of up to 80W. The PFC controller IC is a made up example.

Note 1: In normal operation there is no steady state solution to a PFC so POP can not be used. There is for this is that there are two frequencies that are being used. One is the input line at 60Hz and the other is the PFC IC's switching frequency.

Note 2: The small signal AC response on a PFC will vary along the AC input because the operating point will vary. So to do a small signal AC response, DC input must be used and the appropriate load must be calculated to emulate the same input voltage and current for that operating point. Two examples are included to show this.

To better view the schematic, do the following from the SIMetrix command shell to set up the fonts for the text:

File → Options → Font → Schematic – user 1 → Arial,Bold,14

File → Options → Font → Schematic – user 1 → Times New Roman,Bold,22

The following are simulation circuits:

**PFC\_EMV\_Quick.sxsch** – This shows both the effects of the EMC filter and has initial values on components such that normal operation is quickly reached. Takes 55 sec to run on a 1Ghz machine.

**PFC\_AC\_45deg.sxsch** – This replaces the input AC source with a DC and sets the output load such that the input voltage and current is equivalent to a 45deg angle of a 120Vrms input. The steady-state operation through POP is found and then AC response is run. Takes 1 sec to run on a 1Ghz machine.

**PFC\_AC\_90deg.sxsch** – This replaces the input AC source with a DC and sets the output load such that the input voltage and current is equivalent to a 90deg angle of a 120Vrms input. The steady-state operation through POP is found and then AC response is run. Takes 1 sec to run on a 1Ghz machine.

**PFC\_Startup.sxsch** - This model shows how the converter starts up. Takes 4 min to run on a 1Ghz machine.

The following are required models to run the simulation circuits: The internal schematic can be viewed by highlighting the component, and clicking on Hierarchy → Descend Into

**PFC\_Con.sxcmp** - This is a component model the PFC controller IC.