

The Universal Four Leg V5.0

A 48Vdc smart half-bridge controller

Client:	<i>CASPOC Simulation Research in collaboration with The Hague University of Applied Sciences</i>	
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Introduction

Worldwide we use 230Vac (alternating current) for all the home appliances we use. When we look at the future we see the use of direct current getting more and more important. If we ever get a DC-grid in our house we also need household appliances that can operate on direct current. The Dutch NPR9090 (guideline for electric dc-installations, <https://www.nen.nl/NEN-Shop-2/Standard/NPR-90902018-nl.htm>) is a guideline of DC in a more practical way. The focus is on how a DC-Grid with a voltage level of 350Vdc should implemented. While we are busy with new circuits that are suitable for this new DC grid, we need to try out all of these new technics that a suitable for DC-Grids. Therefore we have the Universal Four Leg, this so called U4L can control four half bridges to act like a dc/dc-converter, dc/ac-inverter or as a grid manager. And all with a nominal voltage level of 48Vdc. Now it's time to take the U4L to a next level with a new PCB-design!

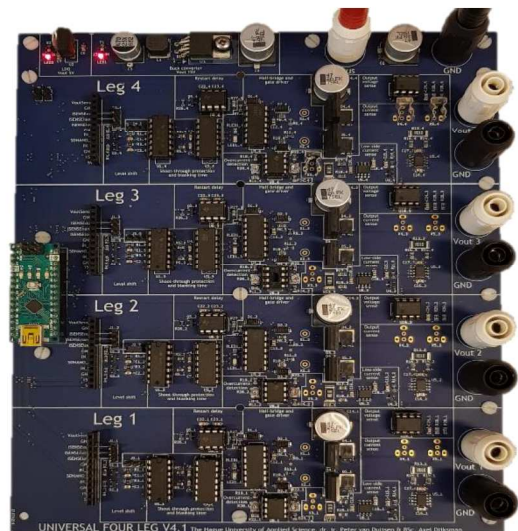


Figure 1 – Version 4.1 of the Universal Four Leg.

Topic

The Universal Four Leg can be used in many applications, it is mostly used as educational board. Here we can educate students to measure in power electronics. To reduce cost of the U4L we need the PCB to be smaller and change all THT components with SMD components. Also the Auxiliary Power Supply needs to be more efficient so that also needs a redesign. The U4L needs to be controlled with a Arduino Nano (5V) but also with the SMT32F303 (3.3V), for sensing and controlling. Additional modifications can be discussed while designing this new PCB, and as an Engineer you need to collect all the feedback of users of the U4L for all the recommendations to implement in this new design. And the end of this internship you will deliver a new U4L that eases to assemble, more efficient in power consumption and more robust for with additional circuit protection techniques.