

A Study of DC-AC Inverter by using Motor Drive Unit

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In recent years, environmental issues have become more serious. EVs and micro EVs have been introduced as a measure to address them. Micro EVs are vehicles which are more compact and environmentally friendly than EVs. With widespread use of EVs, it is hoped that batteries of EVs are used for G2V (Grid to Vehicle), V2G (Vehicle to Grid) and V2H (Vehicle to Home). However, it is necessary to installed DC-AC inverter on the ground.

We propose a method to obtain 100 VAC power from the battery on a micro EV by using only motor drive circuit without other equipment. When you can obtain 100 VAC power without other equipment, you will also connect EVs to another and charge a EV which has run out of power from a EV which can run. The proposed circuit is shown in Figure 1. When switch S_1 , S_2 and S_3 are turned on and switch S_4 is turned off, you can drive micro EV (Fig.2). When switch S_1 , S_2 and S_3 is turned off and switch S_4 are turned on, you can obtain 100VAC power (Fig.3). In order to provide 100 VAC power from the battery on a micro EV, the voltage is boosted up to 141 VDC by boost chopper as the first step. In this step, the W-phase high side FET is used as a diode on the turn-off state and the U-phase and W-phase wires of a drive motor are used as reactor. The boosted 141 VDC power is converted to 100 VAC by the PWM inverter. We simulated the proposed circuit assuming that input is stabilized power supply at 24 VDC power and output is 10~100W power. As a result, we confirmed that 100 VAC power was successfully obtained (Fig.4, 5).

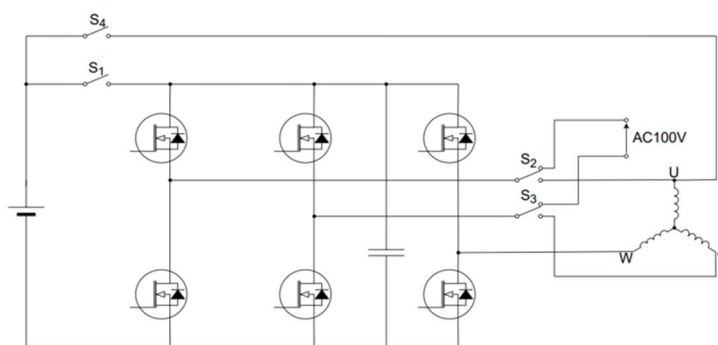


Fig.1 Proposed circuit configuration

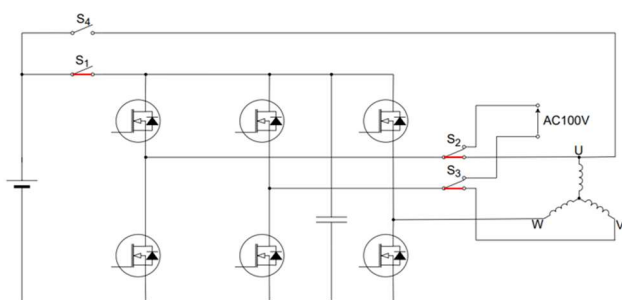


Fig.2 Motor Drive

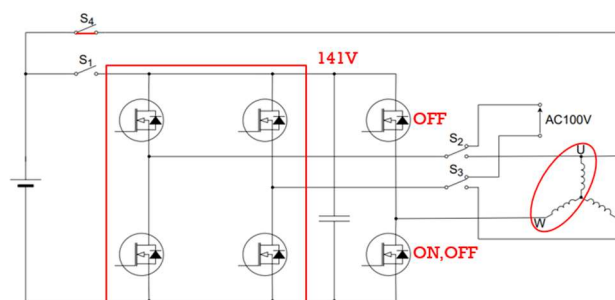


Fig.3 DC-AC inverter

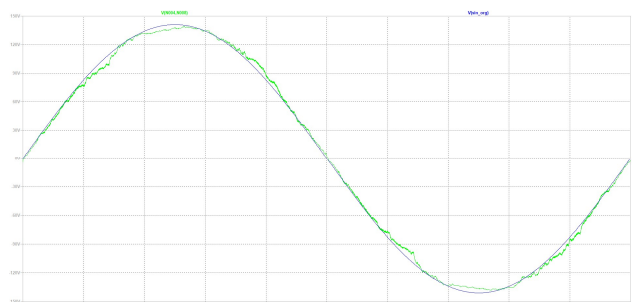


Fig.4 Output voltage waveform of DC-AC inverter at 100W

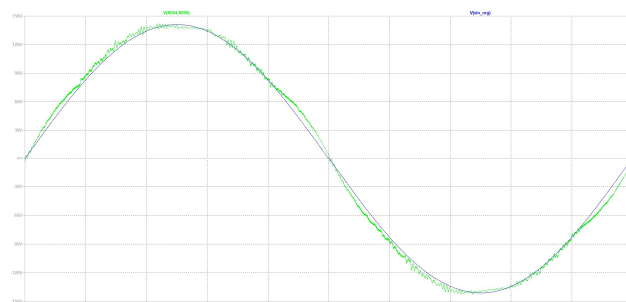


Fig.5 Output voltage waveform of DC-AC inverter at 10W