# Component Selection

## Bridge Rectifier

We decided to use 3 phase half-bridge rectifier module due to its size is smaller than the rectifier that we built it. In addition, this is a more economical solution.

From simulations, we decided to set variac voltage to 136V. However, we decided to choose a rectifier that can stand grid voltage. In simulations, we found peak current is 25,7 A. As a result, we decide that our rectifier can stand 30 A and 300V reverse voltage.

TableX: Bridge rectifier data

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| --- | --- | --- | --- |
| Product name | Bridge Output Current | Max repetitive reverse blocking voltage | Forward Voltage Drop |
| GUO40-12NO1 | 40A | 1200V | 1.28V |
| GUO40-16NO1 | 40A | 1600V | 1.28V |
| FUO50-16N | 50A | 1600V | 1.50V |

## IGBT

In simulations, we choose IGBT that have 30A collector current and 600V collector-emitter voltage. Then we observed that the peak collector current of IGBT is 26.11A. We decided that the IGBT must have a minimum 30A collector current capability and the IGBT in the laboratory has this property.

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Collector current | Collector-Emitter Voltage | Gate Charges |
| IXGH24N60C4D1 | 45A at 25C  39A at 100C | 600V | 167nC |
| FGW40N65WE | 56A at 25C  40A at 100C | 650V | 180nC |

## Diode

In simulations, we found that peak current is 20A and we applied 140V. However, this voltage can increase up to 180V. As a result, we decided to choose a diode with 25A current rate and 200V reverse blocking voltage.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Forward Current | Reverse Blocking Voltage | Reverse recovery time | Forward Voltage Drop |
| DSEI30-06A | 37A | 600V | 35ns (max 50ns) | 1.6V |
| DHG 30I600PA | 30A | 600V | 40ns (max 60ns) | 2.27V |
| MBR40200PT\_T0\_10001 | 40A | 200V | - | 0.9V |

## Capacitor

In simulation, we used 100mikroF capacitor and this gives a 22V ripple. In addition, it operates under 183.67V. However, we calculated that if we supply 170V to the motor with a 0.6 duty cycle, the capacitor operates on 283V. So we chose a capacitor with 100uF and 400V.

## Optocoupler

We decided to use Optocoupler between the PWM generator and IGBT and TLP250 is appropriate for our project.