**THERMAL ANALYSIS**

**IXFH30N60X Switching Mosfet**

**Conduction Loss**

Rds(on) = 155 mOhm

Imosfet(rms) = 8.72 A from the Simulink

Iout(rms) = 11.72 A from the Simulink

D = 53%

or

Both calculations gives almostly same result.

**Switching Loss**

Vds(rms) = 231.6 V from the Simulink

Iout(rms) = 11.72 A from the Simulink

trise = 43 ns

tfall = 33 ns

fswitching = 1 kHz

Then,

**Thermal Analysis**

* Let’s choose an ambient temperature as Tambient = 20 °C
* According to datasheet of the mosfet junction tempearure Tj can varies between -55 °C to 150 °C. We can choose Tj <= 100 °C for safety.
* Junction to case thermal resistance Rjc = 0. 25 °C/W at maximum from the datasheet of switching mosfet.
* Case to sink thermal resistance is Rcs = 0.25 °C/W typically from the datasheet.

Then,

**Heatsink Requirement**

* Thermal resistance of heatsink should be smaller than .
* The package of the mosfet is TO-247 from the datasheet of it.

**LSIC2SD065A16A SiC Diode**

**Conduction Loss**

Vforward = 0.81 V

Iforward(avg) = 5.45 A

from the simulation in the Simulink.

**Switching Loss**

Vreverse = 343.7 V from the Simulink.

fswitching = 1kHz

IRM = 0.63 A from the Simulink

However, trr is not given in the datasheet of Sic Diode since it is Schottky Diode. Therefore, we could ignore the switching loss for SiC Schottky Diode.

**Thermal Analysis**

* Let’s choose an ambient temperature as Tambient = 20 °C again.
* According to datasheet of the diode junction tempearure Tj can varies between -55 °C to 175 °C. We can choose Tj <= 100 °C for safety.
* Junction to case thermal resistance Rjc = 1.2 °C/W at maximum from the datasheet of SiC Diode.
* Case to ambient thermal resistance is not given in the datasheet of the diode.