# Power losses

The output current of the PWM-inverter can be assumed to be sinusoidal with a peak value

where is the phase-angle difference between output voltage and current, is the phase angle of the voltage.

The conduction loss of one IGBT is

where is the forward voltage of the IGBT and D is the duty cycle

The conduction loss of one bootstrapping diode is

where is the forward voltage of the bootstrapping diode

The duty cycle at a given can be obtained by

where is the peak of the output phase voltage and VDC is the DC link voltage

Eventually, the conduction losses is given by

Assume

The switching energy losses L of the IGBTs and diodes can be calculated using the linear equations

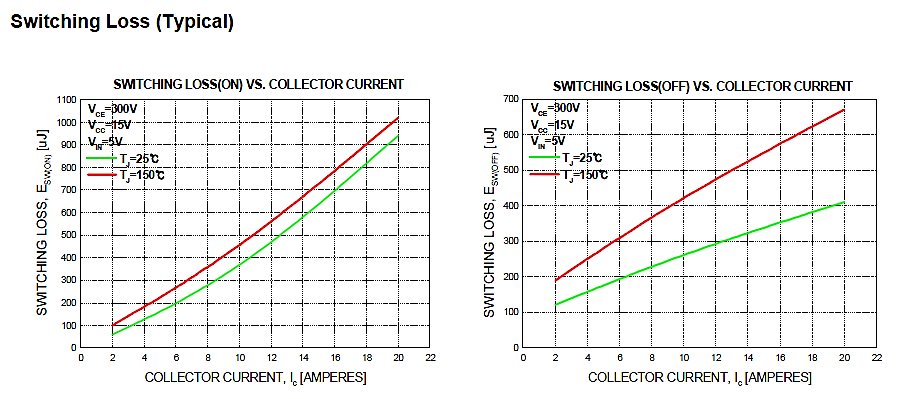
where, Eon is the switching loss (on) characteristic and Eoff is the switching loss (off) characteristic of the semiconducting devices.

The conduction loss of one IGBT and one diode is

where fsw is the switching frequency

By integration, we have

The values of the switching loss characteristics can be found in the datasheet



where is the maximum value of the counter