Introduction

The efficiency of wireless charging is still considerably low. Electromagnetic induction is technically more mature, but is limited to a relatively short operation distance. Frequency regulation is currently not commercially available, but with an advantage of using a feedback system to control the transmitter. Generally speaking, it is difficult to generate a sensible current for charging, when is using a direct current (DC) source. In this project, I found that the transmission efficiency of wireless chargers can be greatly improved, when the power transmission is coupled in the operation frequency to the receiver.

The Design

◎ Basic design:

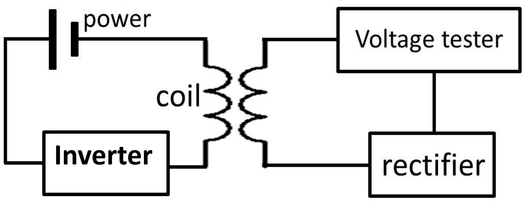

Fig. 1. Layout of the design.

Power: DC at less than 30 volts.

DC to AC inverter: this design.

AC to DC rectifier: this design.

Multi-core coil: multiply cores in series.

◎ The coil

The skin effect from mutual induction is greatly reduced by pestering serval cores to form a multi-core coil (Fig. 2).

Fig. 2. Image of the multi-core coil.

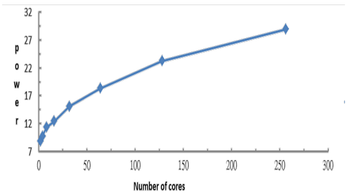

Fig. 3. Effects of number of coils on the output power.

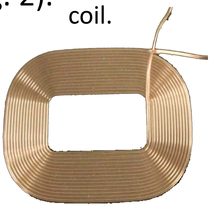

Fig. 4. The thin flat-core coil.

- The skin effect results in a non-linearly increase of the output power with the numbers of core in the coils (Fig.3).
- In reducing the capacitor-effect generated between two cores, a thin flat-core coils with low resistance should be used (Fig.4).

◎ Full-frequency reflect board

- In enhancing the EM wave in the emitting end and in the receiving end, a thin Fe_3O_4 plate is attached to one side of the coil.

Fig.5. The full-frequency reflect board.

- The reflector not only re-direct the EM wave to focus on one side of the coil, but also acts as a safety board to reduce the chances of the EM wave being absorbed by other components.
- Energy saving: Using a solenoid valve switches to avoid unnecessary loss of power. Power is supplied only when a receiver is present.