No Strings Attached: An Investigation into Wireless Charging

Goodwin, Hayden

Wireless charging is convenient, yet not the most effective way of charging devices. Using coils of enamel wire this experiment aimed to improve the general coil to coil efficiency by finding what arrangement of transmitting and receiving coils was best. This experiment investigated the effect the AC frequency of the transmitting coil(s) had on the efficiency of the transfer power to the receiving coil. It is also investigated the effect the amount of magnetic flux and the distribution of the flux within the receiving coil had on the efficiency of power transfer to the receiving coil using the optimum efficient frequency. A magnetometer was used to map the 3D vector field strength of the coil variations to help gauge visually what was occurring and make predictions. The different variations of coils were connected to an oscilloscope and frequency generator, and the voltage measured. The coils were connected to an amplifier connected to the frequency generator and after rectifying the AC of the receiving coil with a diode bridge, the current was measured. It was found that: (1) an increase in frequency was linked and directly proportional to an increase of efficiency, (2) the most efficient current frequency was slightly off the resonant frequency, (3) an increase in received magnetic flux increased efficiency and (4) an even distribution of the flux increased efficiency. This research could improve the efficiency of the existing wireless charging technologies by decreasing the power consumption and reducing the cost needed to recharge, also allowing for faster charging of mobile devices.

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