







delivering 50 watts of power to a load, the voltage across the load is almost the same in both cases. Table 2 shows the input power, output power, and efficiency for each case.

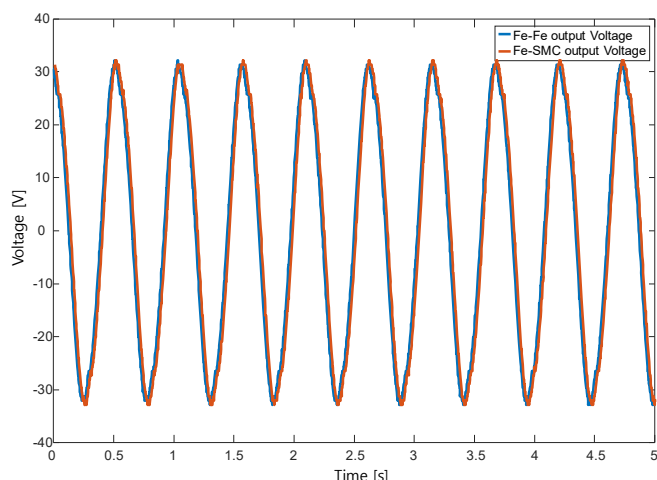


Fig. 9. Voltage waveform delivered to a load

TABLE I. PARAMETER VALUES OF COILS AND COMPENSATION CIRCUITS

parameters	Rx side magnetic material	
	Conventional ferrite	Developed SMC
Input power	84.47 W	82.82 W
Output power	50.76 W	51.05 W
Efficiency	60.08 %	61.64 %

TABLE II. PARAMETER VALUES OF COILS AND COMPENSATION CIRCUITS

parameters	Rx side magnetic material	
	Conventional ferrite	Developed SMC
System operating frequency	19kHz	19kHz
Tx coil inductance	44.9 $\mu$ H	44.9 $\mu$ H
Tx compensation capacitor	1.533 $\mu$ F	1.533 $\mu$ F
Tx resonance frequency	19.18 kHz	19.18 kHz
Rx coil inductance	42.84 $\mu$ H	41.5 $\mu$ H
Rx compensation capacitor	1.61 $\mu$ F	1.61 $\mu$ F
Rx resonance frequency	19.16 kHz	19.47 kHz
Mutual inductance	14.27 $\mu$ H	13.58 $\mu$ H
Coupling coefficient	0.325	0.315

The results show that the developed SMC and conventional ferrite have little difference in WPT characteristics. The same Rx coil voltage was induced at almost the same transmission current. At the same time, the same power was transferred and the efficiency of the system was almost similar.

## 4 Conclusion

In this paper, the performance of developed SMC for UAV's WPT system in the magnetic core part is identified. From the free fall test, it is found that developed SMC has outstanding mechanical characteristic compared to conventional ferrite. It should be noted that the magnetic core material included drone's components requires good robust mechanical properties. With WPT system for drones, we successfully evaluated developed SMC as magnetic core compared to the conventional magnetic material. It was demonstrated that the power efficiency of WPT system based on developed SMC was 1.02% greater than conventional ferrite. Based on this experimental results, it can be confirmed that developed SMC is suitable magnetic material for magnetic core in drone's wireless charging system.

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