PLUGLESS™ Level 2 EV Charging System (3.3 kW) by Evatran Group Inc.

Results from Laboratory Testing off-board the vehicle

Description / Specifications [1]

System Input Voltage operating Voltage	208 to 240	VAC
Circuit Breaker Rating	30	A
Nominal gap between coils	100	mm
Rated maximum power output	3300	watts
Parking Pad (Primary Coil system)		
Shape	Approximately Circular	
Size	559 dia. x 470 long	mm
Vehicle Adapter (Secondary Coil system)		
Shape	Rectangular	
Size	762 long x 457 wide	mm

Measured System Parameters during nominal, steady state conditions [2]

Input Power		
Input Voltage	208	VAC
Input Current RMS	28	Amps RMS
Power Factor	0.60	
Voltage Total Harmonic Distortion (THD)	3	%
Current Total Harmonic Distortion (THD)	132	%
Wireless Power Transfer Operation		
Operating Frequency (kHz)	18 - 20	kHz (variable)
DC Output Power (into programmable DC electronic load)		
Output Voltage	215	VDC
Output Current	13.9	Amps
Output Voltage Ripple Factor	0.75	%
Operating Temperature		
Parking Pad: Max observed surface temperature	51	°C
Vehicle Adapter: Max observed surface temperature	48	°C

[1] Manufacturer's Specifications: http://www.pluglesspower.com/wp/wp-content/uploads/2014/02/Plugless_Tech_Specs.pdf

[2] Test conducted at nominal conditions (3.0 kW output, 100mm coil gap, coils aligned) unless otherwise specifie

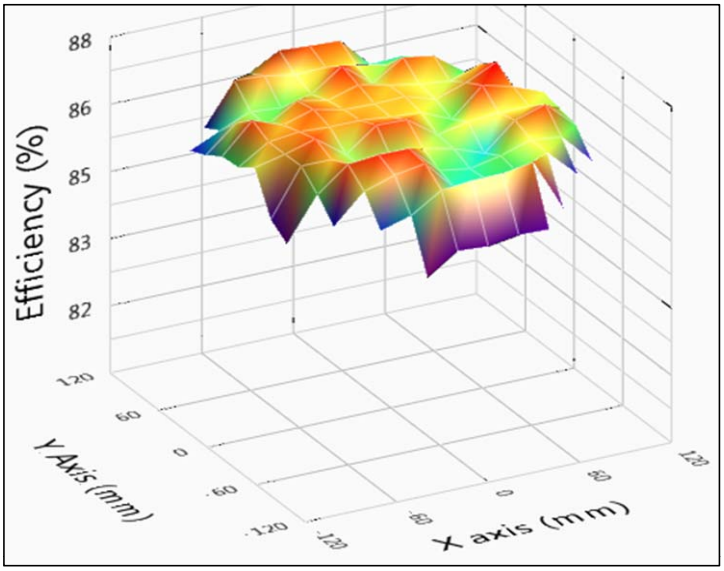
Measured System Efficiency

Definition: Wireless Charging System Efficiency

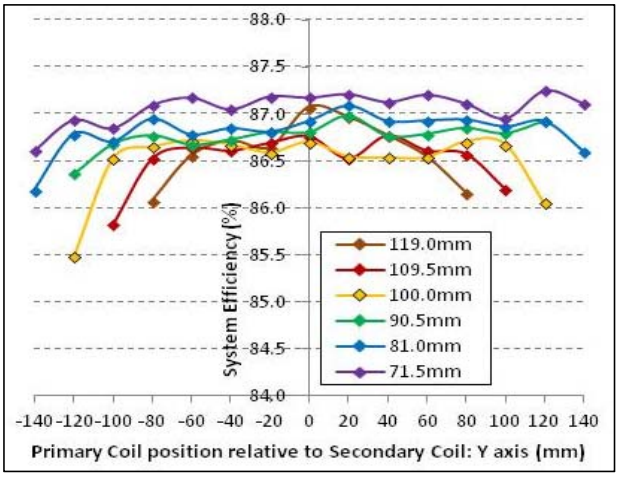
$$\text{System Efficiency} = \frac{\text{Energy out of PLUGLESS}^{TM}\text{ Vehicle Adapter into programmable DC Load}}{\text{Energy into PLUGLESS}^{TM}\text{ Control Panel from 208 VAC}}$$

System Efficiency variation with coil misalignment[2]

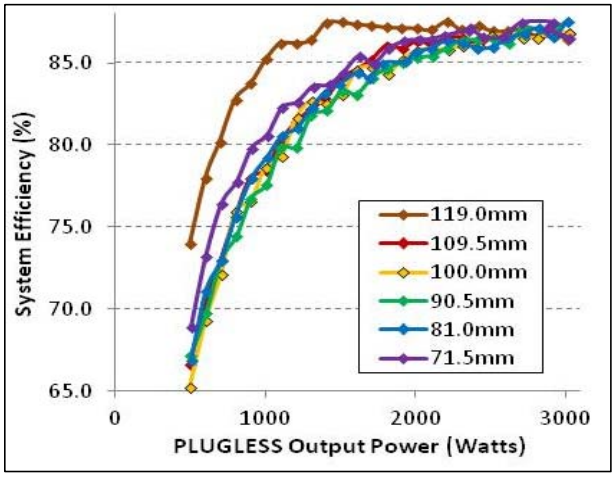
		Primary Coil position relative to Secondary Coil (mm)
Maximum Efficiency (%)	87.3%	(80,20)
Efficiency when aligned(%)	86.9%	(0,0)



Impact of Coil Gap on System Efficiency[2]

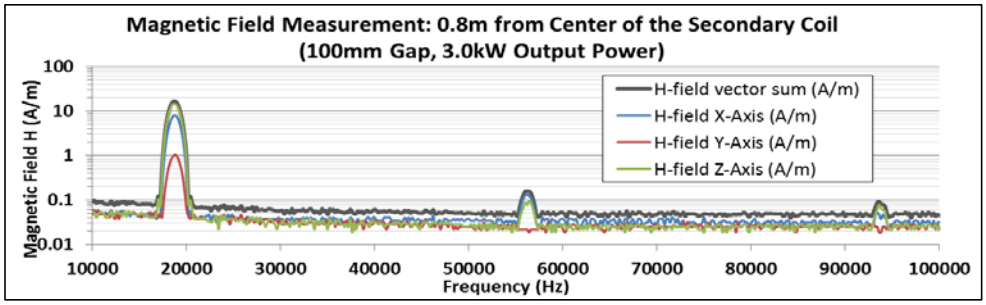


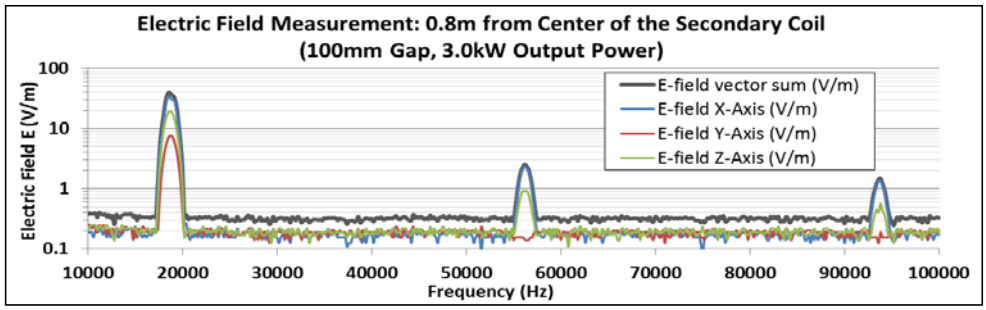
System Efficiency at Various Output Power[2]



Measured Magnetic and Electric Field

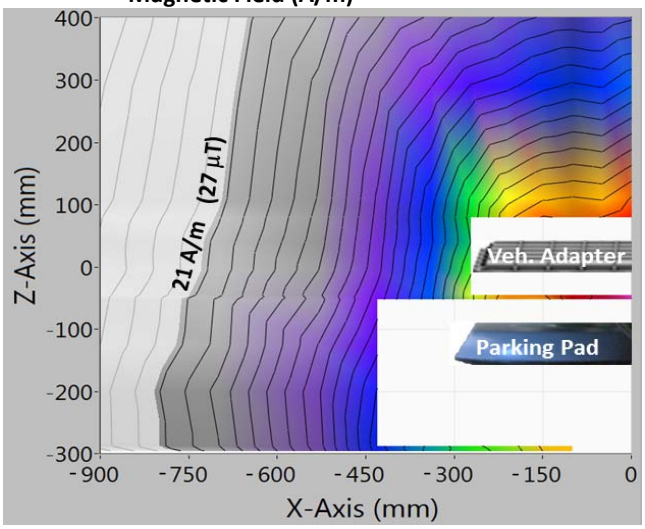
Magnetic and Electric field Frequency Scan measurement (coils aligned)[2,3]



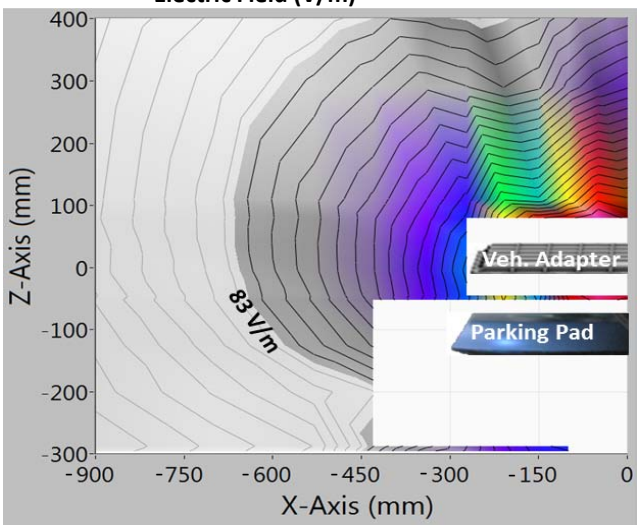


Scan of the Magnetic & Electric fields around the rear side of the PLUGLESS system[2]

Magnetic Field (A/m)



Electric Field (V/m)



EM Field measurements[2]			EM Field meter position (X,Z)	
Maximum measured H-field	1587 A/m	(1994 μT)	(0,-50)	between coil centers
Maximum measured E-field	6833 V/m		(-50,80)	above the vehicle adapter
H-field 0.6m from coil center	42.7 A/m	(53.7 μT)	(-600,-50)	at rear of system
E-field 0.6m from coil center	101.5 V/m		(-600,-50)	at rear of system

[3] EM field measurement is centered between the gap (50mm below secondary coil) 0.8m from Secondary Coil Center along X-axis