

Secondary System: Receiver structure

Overview /introduction

The power transfer from the transmitters on the charging line needs to be caught by the vehicle. This task is done by the receiver. The receiver structure is composed of the receiver coil, the compensation capacitor, the rectifier, the protection circuit and the DC-DC boost converter. The DC-DC converter is a key element in the identification of the vehicle and the power regulation. The nine-phase interleaved boost converter has been chosen due to the fast dynamic response, low battery current ripple and higher current capability.

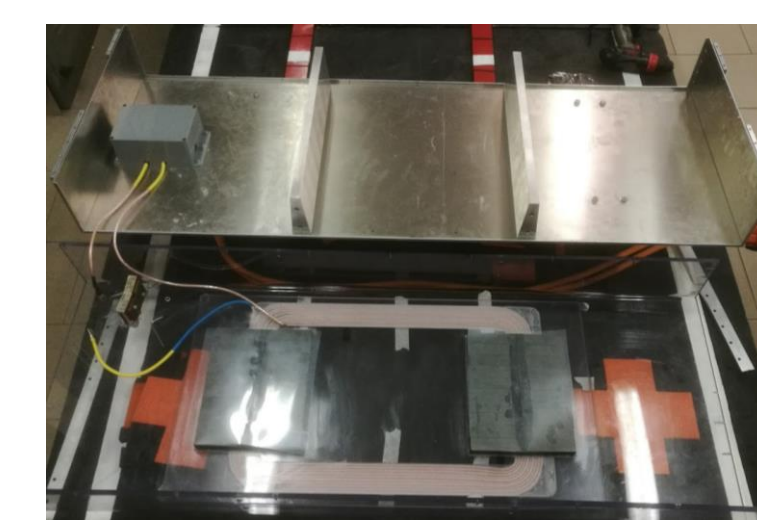
Partners involved



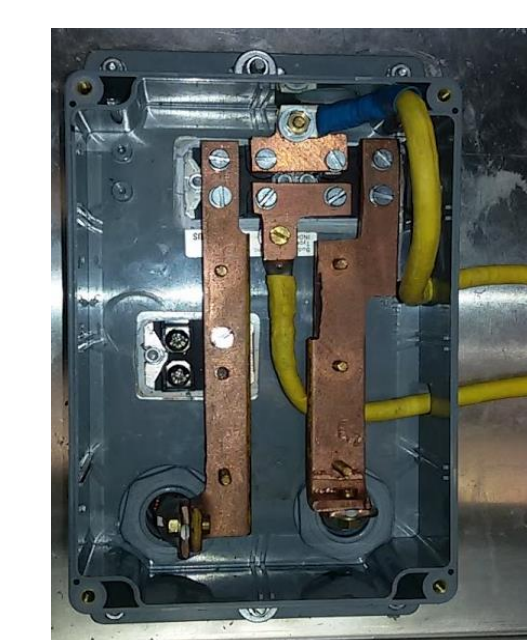
**POLITECNICO
DI TORINO**

Receiver Objectives

In the receiver, ferrite bars have been added in order to increase the mutual coupling and to shape the magnetic field. An aluminum shield has been added in order to limit the magnetic stray field that could invest people in the proximity of the working system. A protection circuit has been added in order to solve a safety problem that can occur for a series-series compensated IPT system. This problem is related to the equivalent current source behavior of the receiver side in presence of an unpredicted load disconnection. A pure analog hardware system able to manage this fault protecting the filtering elements of the system has been implemented.



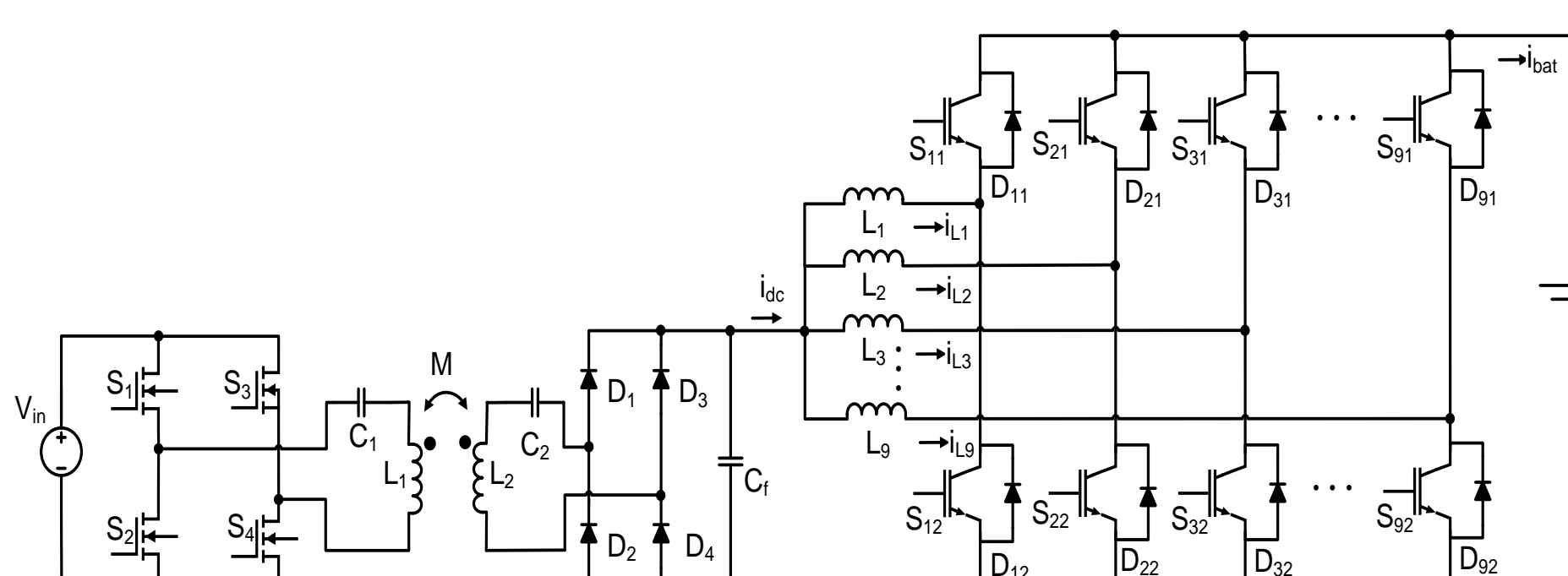
Receiver structure



**Diode bridge
rectifier**



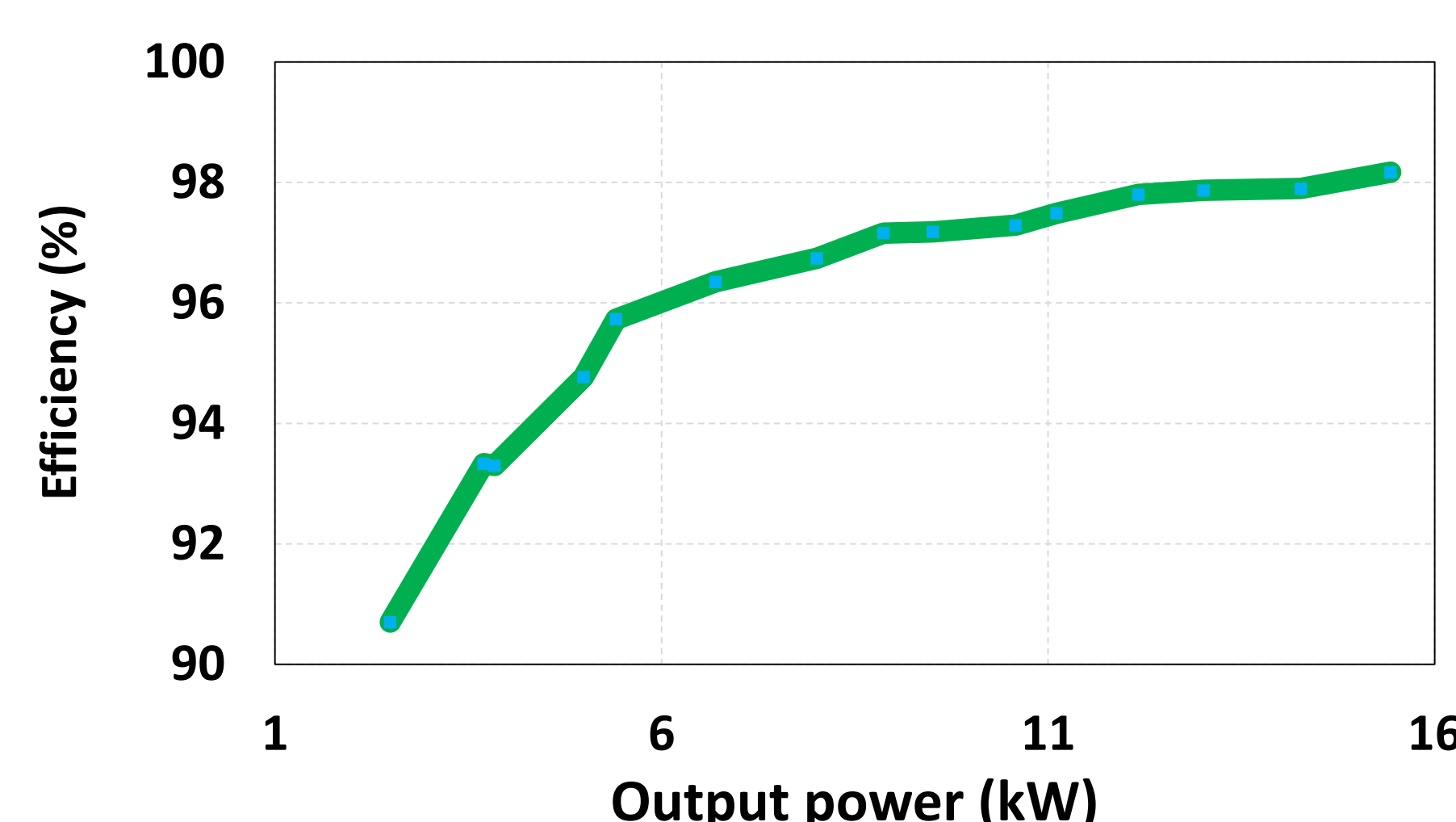
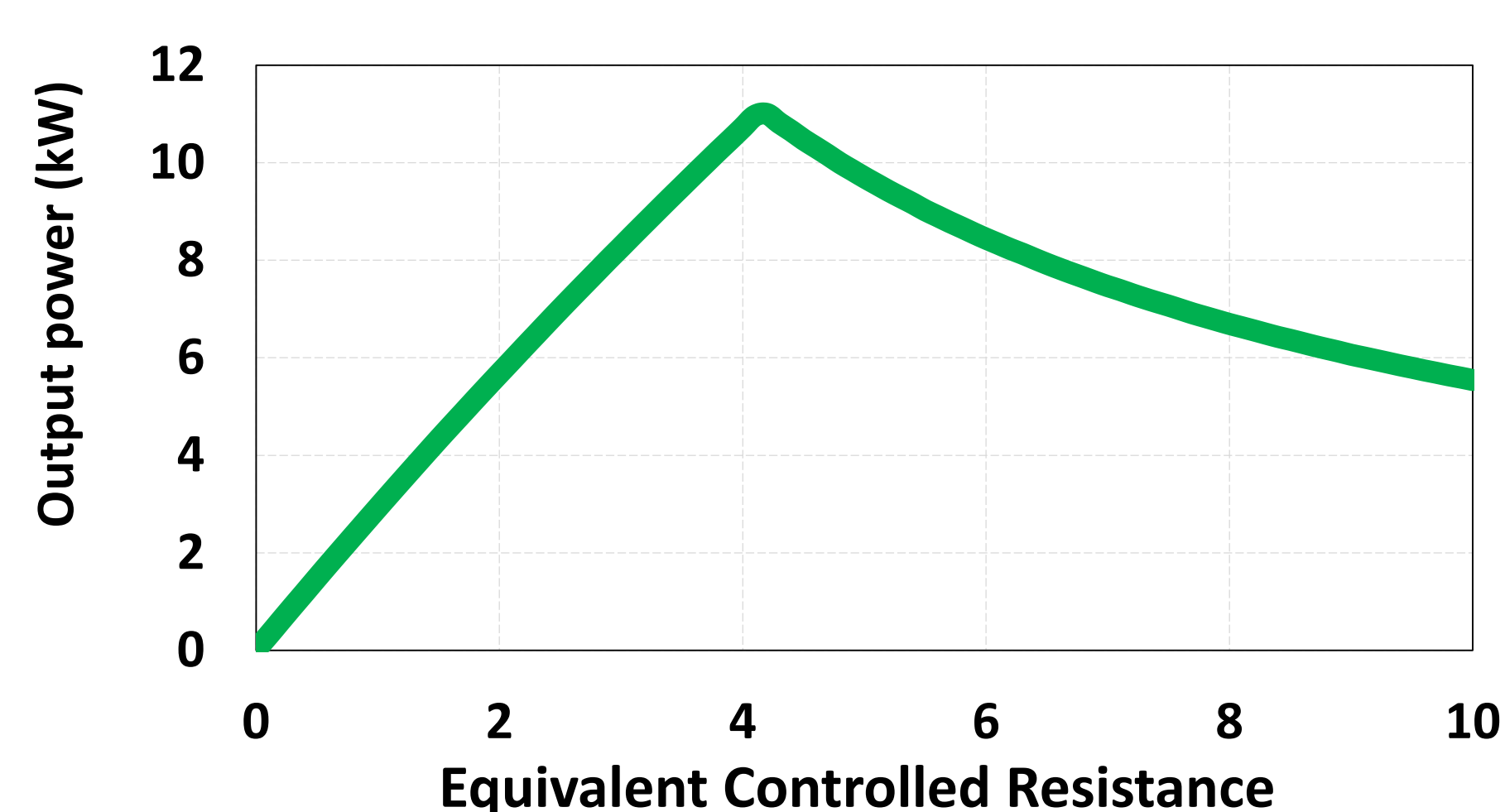
**Filter
Capacitors**



DC-DC converter configuration

The DC-DC converter is used for two purposes: identification and power regulation. The identification process is performed by maintaining all the lower switches closed and maintaining the receiver short circuited.

The battery power is regulated by controlling the equivalent resistance at the input of the DC-DC converter. The resistance reference value is received from the vehicle control unit. The same control unit monitors the battery state of charge through CAN communication.



R_2	0.3Ω
L_2	120uH
C_2	29.2nF
Coil external Length	60cm
Coil external width	40cm
Coil number of turns	10

Receiver Parameters

$V_{battery}$	400V
$I_{receiver}$	90A
$f_{switching}$	20kHz
P_{max}	34kW
$V_{auxiliaries}$	12V
$I_{auxiliaries}$	1.5A

DC-DC Parameters



Identification process: Red (Receiver Current), Green (Transmitter Current)

Achievements

A nine-phase DC/DC converter for power control and identification process has been designed, built and tested. It can operate as power controller for the WPT receiving structure.

Final Event & Demonstration | 21-22 June 2018 Italy

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Consortium



Supported by:



Project facts



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