

1S-15



A Wireless Power Receiver with a 3-Level Reconfigurable Resonant Regulating Rectifier for Mobile-Charging Applications

Lin Cheng, Wing-Hung Ki, Chi-Ying Tsui

Department of ECE,

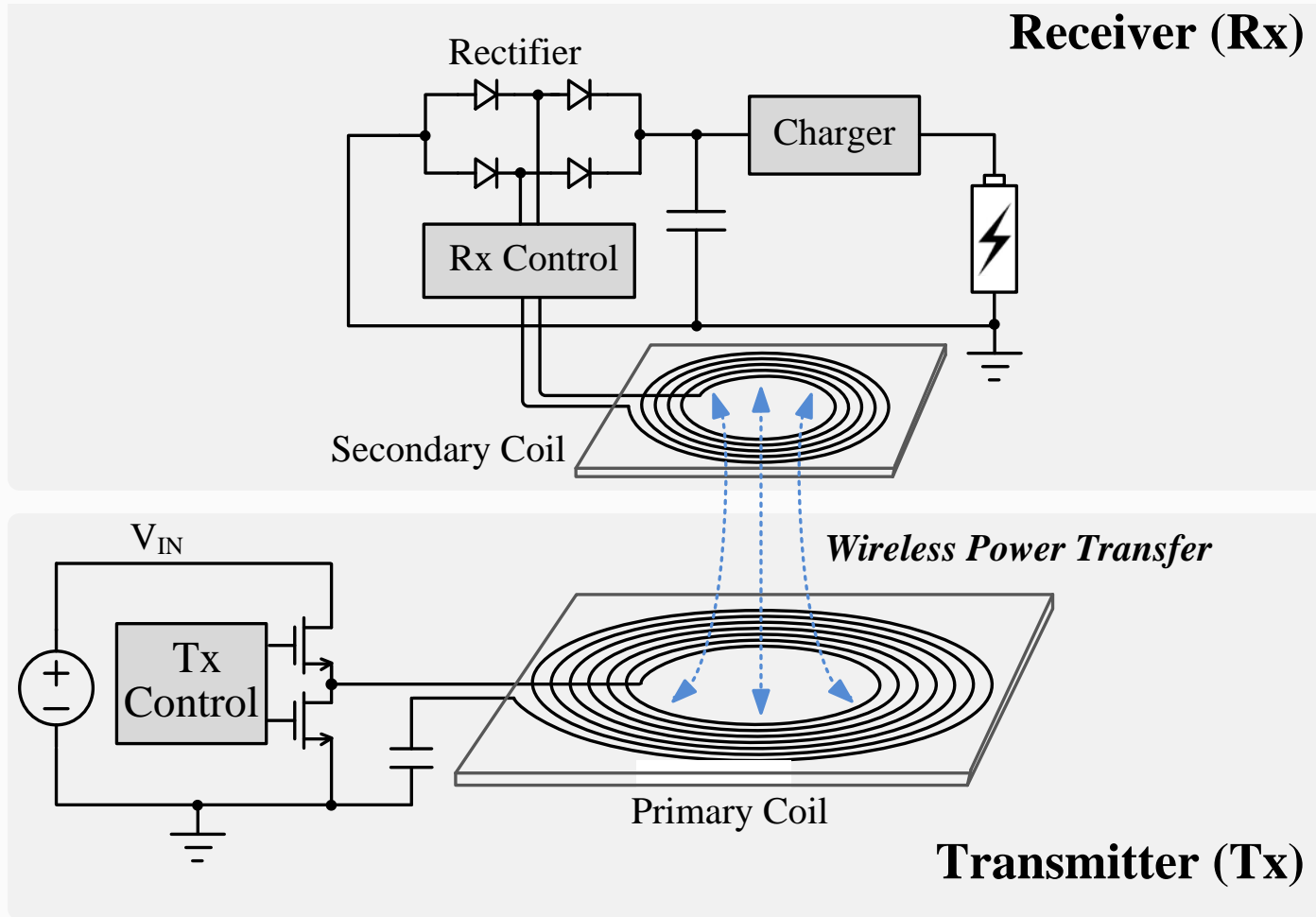
The Hong Kong University of Science and Technology

Wired vs. Wireless Charging



Wireless charging is **cutting the last wire**

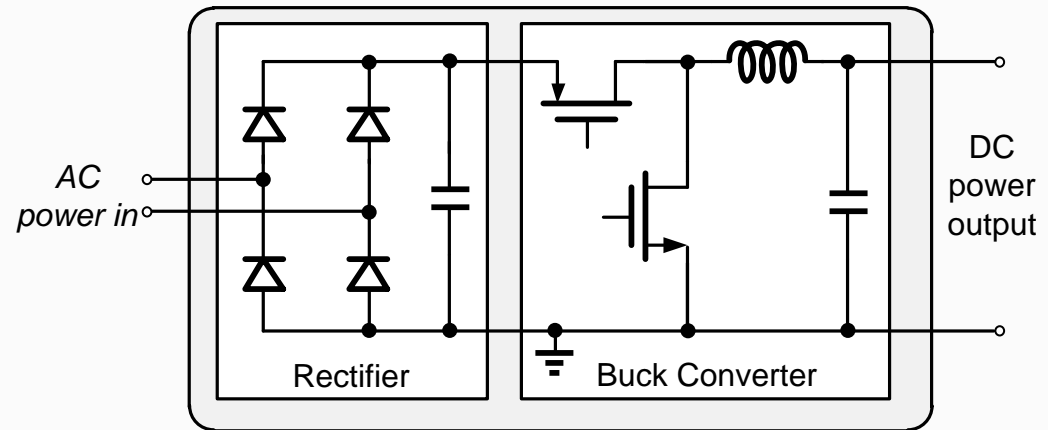
Wireless Power Transfer



- Resonance frequencies: 6.78 MHz or 13.56 MHz (ISM band)

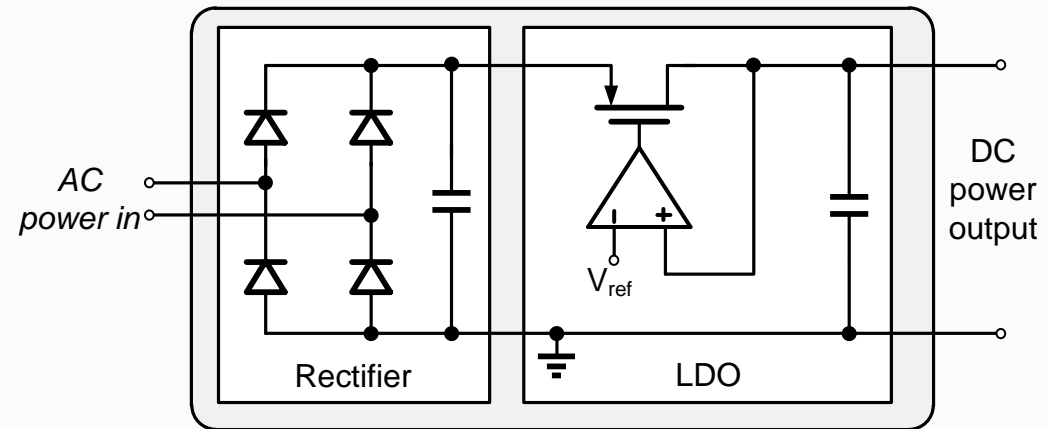
Existing Receiver Solutions

- Rectifier + buck
 - Additional inductor/capacitor
 - Increased chip area
 - Degraded efficiency



[Moh, ISSCC 2015]

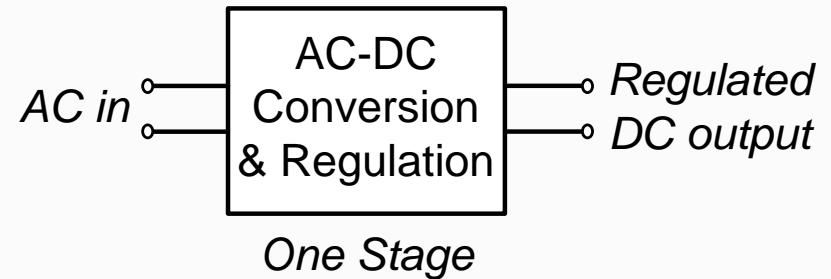
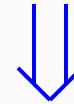
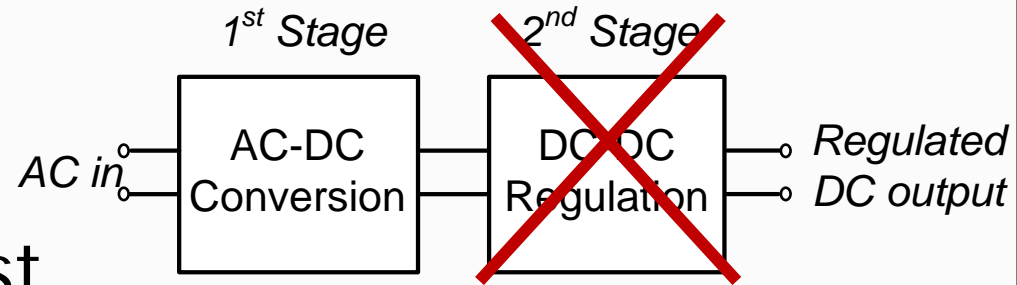
- Rectifier + LDO
 - Additional capacitor
 - Increased chip area
 - Poor efficiency



[Kiani, ISSCC 2015]

Design Goals

- High efficiency
 - Peak efficiency > 90%
- Small volume & Low cost
 - Small chip area
 - Few off-chip components
- Simple control method
 - Full load range (0-6W)



3-Level R³ Rectifier

- One-stage Topology
- Only 4 on-chip switches & 1 off-chip capacitor
- Resonate at 6.78 MHz
- Support 6 W output power

