Why Wireless Power?

- Charging Anywhere and Everywhere, without Cords and Wires for Laptops, Mobile Phones, Tablets, e-Readers, and Media Players
- Simply place device on charging mat or wireless power enabled surface
- Alternative to Carrying Collection of Device-Specific Chargers
- >800 Million wireless power transmitters and Receivers Forecast for 2015 (iSuppli)
- $24B market size in 2015 (iSuppli)
- Samsung, Motorola, LG, HTC, Fujitsu, NEC and Sharp All Have Qi-Compatible Mobile Phones
Industry-Accepted Standardization

- Standardization increases consumer confidence and demand
- Qi "气" (Chee: “Vital Energy” in Asian Philosophy - An Intangible Flow of Power无形的能量)
- Industry standard developed by Wireless Power Consortium (WPC)
- Rapid industry-wide adoption (100+ Members by Oct. 2011)
Wide Range of Applications

Wide Range of Mobile Devices
- Mobile Phone
- Tablet
- Camera
- MP3 Player
- MID (Mobile Intelligent Device)
- Battery charging, or other suitable loads

Wide Range of Locations
- Office
- Residential (bedroom, kitchen, family area, bathroom...)
- Hotels
- Coffee Shops
- Public Waiting Areas
- Educational (schools, universities, libraries....)
- Airports
- Aircraft Seats
- Medical
- Automotive
- Theaters
- Restaurants
Application Solution Examples
Inductive Wireless Power Transfer

- Power Transfer via Inductive Coupling at Short Distances (mm)
- Transmitter (Tx) and Receiver (Rx) Coils are Inductively Coupled Coils
  - AC current in Tx coil generates magnetic field, which induces a voltage in Rx coil. Rx voltage may be used to power a mobile device or charge a battery
- Magnetic Field Concentrated in Small Volume Between Tx/Rx
- User Exposed to Leakage Fields Only, which are Minimized by Shielding
- Improve Coupling between Coils by
  - Matching coil sizes
  - Flat interface surface to keep the distance small.
  - Shielding and aligning coils
Wireless Power System

Transmitter (Tx)
- Drives Coil with AC current
- Receives Digital Messages
  - From the Receiver chip
  - Through AC load modulation
- Adjusts Power Output Level
  - At request of the Receiver
  - Maintains a stable system

Receiver (Rx)
- Recovers AC current from Coil
- Sends Messages to Transmitter
  - Identification, Up/Down Power
  - By modulating Load impedance
- Controls Received Power
  - Matching mobile device needs
  - To maintain an efficient system
IDTP9030 Wireless Power Transmitter (Tx)

WWW.WIRELESSPOWERBYIDT.COM
IDTP9030 Wireless Power Transmitter

- Industry’s First Single Chip Solution for Wireless Power Consortium (WPC) compliant power transmitters
- Up to 7.5W Power in Proprietary Mode
- 10V to 20V Operating Input Voltage
- Programmable option for added security and encryption up to 64 bit
- Advanced Foreign Object Detection (FOD) for safety
- Proprietary Base to Mobile Communication for 2-Way Secure Authentication
- Highest Total System Efficiency (~73%) when used with IDTP9020 Power Receiver IC
- Over Temperature/Voltage/Current Protection
- Packages:
  - 6x6-48 VFQFN

<table>
<thead>
<tr>
<th>Dual Mode IDTP9030</th>
<th>WPC Mode</th>
<th>IDT Proprietary Customizable Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Range</td>
<td>18 V – 20 V</td>
<td>10 V – 20 V</td>
</tr>
<tr>
<td>Control Algorithm</td>
<td>PID</td>
<td>Proprietary</td>
</tr>
<tr>
<td>Authentication</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>FODs</td>
<td>1, 2</td>
<td>1, 2, 3, 4</td>
</tr>
<tr>
<td>Secure Link</td>
<td>OFF</td>
<td>ON, during initial verification</td>
</tr>
</tbody>
</table>
# Competitive Analysis: Transmitter IC

<table>
<thead>
<tr>
<th>Feature</th>
<th>IDTP9030</th>
<th>Leading Competitor (2nd Gen)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Chip Tx</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Power Transmission</strong></td>
<td>Up to 7.5W*</td>
<td>Up to 5W</td>
</tr>
<tr>
<td>Embedded uC</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Multilingual Operation</strong></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Multi-Layered FOD</td>
<td>Yes</td>
<td>Not as many levels</td>
</tr>
<tr>
<td>Back Channel Comm</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2-way Authentication</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>External BOM</td>
<td>30</td>
<td>91</td>
</tr>
<tr>
<td>Total IC’s Req’d</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Board Space</td>
<td>360mm²</td>
<td>1800mm²</td>
</tr>
</tbody>
</table>

*Proprietary Mode*
**IDTP9030 Tx vs Competitor 2\textsuperscript{nd} Gen Tx**

**Application Area**
- Competitor: \(~1800 \text{ mm}^2\)
- IDT: 360 \text{ mm}^2
  - \(~80\%\) reduction in area

**No. of Components**
- Competitor: 91 w/9 IC’s
- IDT: 30 (1 IC)
  - 67\% Reduction in Component Count
  - 8 fewer ICs than competitor

**50\% Savings in Solution BOM Cost!**
IDTP9020 Wireless Power Receiver

- Fully integrated single chip solution for Wireless Power Consortium (WPC) receiver with 5V regulated output up to 7.5W
- Integrated high efficiency synchronous buck converter
- Highest total system efficiency (~73%) when used with IDTP9030 power transmitter IC
- Integrated USB adaptor switches
- Embedded micro controller
- Security authentication (Optional)
- Advanced Foreign Object Detection (FOD)
- Programmable option for added security and encryption up to 64 bit
- Supports proprietary back channel Communication
- Over Temperature/Voltage/Current Protection
- Packages:
  - 7x7-56 TQFN
  - WLCSP Option

www.IDT.com
## Competitive Analysis: Receiver IC

<table>
<thead>
<tr>
<th>Feature</th>
<th>IDTP9020</th>
<th>Leading Competitor (2nd Gen)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Chip Rx</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Embedded uC</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Power Capability</td>
<td>Up to 7.5W*</td>
<td>5W</td>
</tr>
<tr>
<td>Multilingual Operation</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Multi-Layered (4 levels) FOD</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>High Eff. Buck Converter</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Back Channel Comm</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2-way Authentication</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Integr. Current Limiter</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Integrated USB Switches</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

*Proprietary Mode*
**Industry’s First True Single Chip Tx (IDTP9030)**
- Up to 7.5W power delivery (Proprietary Mode)
- One IC vs. leading competitor’s nine ICs
- 80% reduction in board size
  - 67% reduction in component cost
- 50% solution BOM cost savings
- Multilingual capability
- >90% DC/AC efficiency

**High-Power, Multilingual Single Chip Rx (IDTP9020)**
- Up to 7.5W power delivery (Proprietary Mode)
- Multilingual capability
- Industry-leading efficiency (>90% AC/DC, >90% DC/DC)
- Integrated USB switches
IDTP9020/IDTP9030 Synergy

- 50% more power (7.5W) for faster recharging time
- Four levels of Foreign Object Detection (FOD) for maximum safety
- Back channel/Two-way communication
- Secure authentication options