Wireless chargers are expected to become ubiquitous in hotels, airports, cafes, and other public places as they enable topping charging of portable and wearable devices without any cables.

ST has a wide range of wireless charger IC solutions, including transmitters and receivers providing low standby power, accurate foreign object detection (FOD) and reverse charging features for personal electronics, industrial and medical applications.

HOW DOES IT WORK?

In a wireless battery charging system, power is transferred by electromagnetic induction (inductive power transfer) between a transmitting pad (TX) and a battery-powered device (RX) such as, smartphones, smartwatches, portable medical devices or home robots.

The power transmitter unit controls the current in the transmitting coil to transfer the correct amount of power as required by the receiver unit, which continuously provides this information to the transmitter by modulating the transmitter carrier frequency through controlled resistive or capacitive load insertion. Generating the correct amount of power guarantees the highest level of end-to-end energy efficiency and helps limit the device’s operating temperature.

Typical block diagram of wireless charging

KEY BENEFITS
• Convenient charging without the need to plug in your device
• Sustainable solution: eliminates the dependency on power cords and connectors
• Interoperability: Qi compliance ensures a safe and reliable user experience with other Qi certified devices
• Sealed design: devices can be free of external openings improving water and dust-resistance
• Motion flexibility: cable-less connection supports 360-degree rotations.
KEY FEATURES

- **Qi Wireless Charging**: Qi standard compliance ensures a consistent, safe, and simple user experience with other Qi certified products

- **Foreign Object Detection (FOD)**: FOD provides detection accuracy and helps avoid overheating during charging

- **Spatial Freedom**: Proprietary adaptive rectifier configuration (ARC) mode enhances the detection distance by up to 50% in all directions

- **Fast Charging**: Extended power profile (EPP) speeds up charging time by up to three times

- **High Efficiency**: Excellent energy efficiency with built-in power management

- **Protection Features**: Protections include on-chip thermal management, and overvoltage and overcurrent protection to prevent overheating

- **Reverse Charging Mode**: Receivers can operate as a wireless transmitter without any change in hardware design

- **Reduced BOM Count**: Simplifying wireless power transmitter systems with less discrete components.

- **Communication interfaces**: Inbuilt I²C, UART, SPI, and GPIO interfaces simplify parameter configuration
## ST WIRELESS CHARGING ICs AT A GLANCE

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<td>12 V</td>
<td>20 V</td>
<td>20 V</td>
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<tr>
<td><strong>Core</strong></td>
<td>32-bit, 64 MHz Arm® Cortex® M0+</td>
<td>32-bit, 64 MHz Arm® Cortex® M3</td>
<td>32-bit, 64 MHz Arm® Cortex® M0+</td>
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<tr>
<td><strong>Memory</strong></td>
<td>32kB RAM, 16 KB SRAM, 64kB R0M</td>
<td>16KB FTP, 16KB RAM, 80KB R0M</td>
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<td><strong>Reverse charging</strong></td>
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<tr>
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<td>24 V</td>
</tr>
<tr>
<td><strong>Core</strong></td>
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<td>32-bit, 64 MHz Arm® Cortex® M0+</td>
</tr>
<tr>
<td><strong>Memory</strong></td>
<td>8KB SRAM, 8KB FTP</td>
<td>128 KB flash memory, 32KB SRAM</td>
</tr>
<tr>
<td><strong>Interfaces</strong></td>
<td>I2C, GPIO</td>
<td>UART, I2C, SPI, GPIOs</td>
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WIRELESS CHARGING ICS PORTFOLIO OVERVIEW

![Output Power](chart)

- **STWLC38**
  - 15 W Rx
  - 5 W Tx mode
  - Qi 1.3 EPP compatible reference design

- **STWLC98**
  - 70 W Rx
  - 15 W Tx mode

- **STWLC99**
  - 100 W Rx
  - 25 W Tx mode

- **STWBC2-HP**
  - Limitless high-power with external full bridge
  - 15 W Qi EPP
  - Qi 1.3 with STSAFE secure MCU
  - MP-A2 topology

- **STWBC86**
  - 15 W Tx
  - 5 W Tx reference design with A11a topology
  - Monolithic with integrated full bridge

APPLICATION EXAMPLES

- **Personal Electronics**
  - Earbuds and headsets (TWS), smartphones, tablets and eReaders, wearables

- **Medical and Healthcare**
  - Ultrasound imaging, patient monitoring, drug delivery

- **Industrial Application**
  - Industrial tools, metering, pool cleaners, home robots
GLOSSARY

A11A - A11a topology as defined in the Qi specification for power transmitter design
ARC - Adaptive rectifier configuration (to enhance spatial freedom)
BPP - Baseline power profile
EPP - Extended power profile
FOD - Foreign object detection
GPIO - General-purpose input/output port
I2C - Inter-integrated-circuit, a two-wire, low-speed, serial data connection IC bus used to run signals between integrated circuits, generally on the same board
MP-A2 - Medium Power (MP), MP-A2 is a Qi standard power transmitter reference design in the extended power profile
POWER RECEIVER (RX) - Power receiver subsystem
POWER TRANSMITTER (TX) - Power transmitter subsystem
QI - An interface standard for wireless power transfer using inductive charging
REVERSE CHARGING - The capability for the receiver to operate as a transmitter
SPI - Serial peripheral interface communication interface specification
STSAFE - A highly secure solution that acts as a secure element providing authentication and data management services to a local or remote host
ST CHARGE - ST proprietary protocol to enable fast-charging
TWS - True wireless stereo
UART - Universal asynchronous receiver-transmitter communication protocol
VFQFPN - Very thin Quad flat package (QFP) package
WLCSP - Wafer level chip scale package

For more information, visit us on www.st.com/wirelesscharging