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Wireless charging quick reference guide



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.

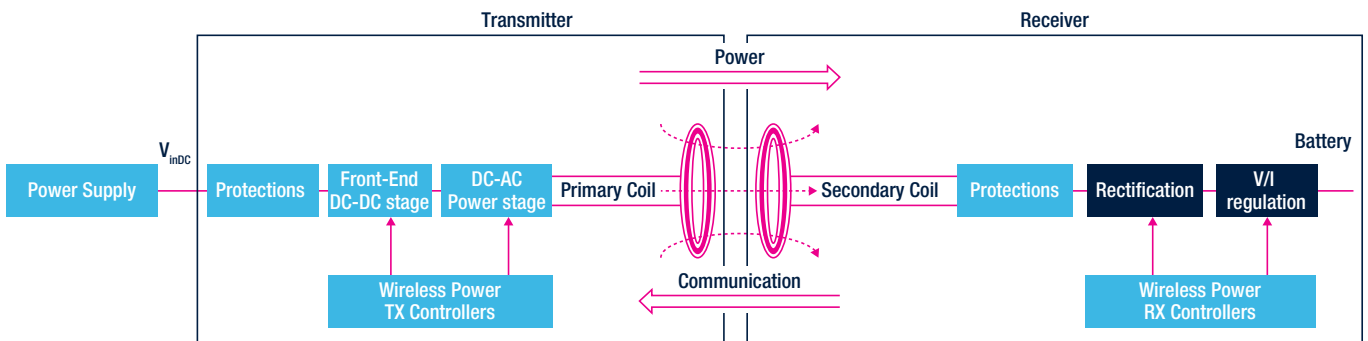


HOW DOES IT WORK?

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.



ST WIRELESS CHARGING PRODUCT PORTFOLIO

ST fully covers wireless charging applications with dedicated ICs for both transmitter and receiver. The wireless charging ecosystem consists of the transmitter family, receiver family, application boards, reference designs and supporting firmware.




The innovative proprietary ST Super Charge (STSC) protocol enables fast charging up to 100 W.

Function mode	Wireless charging ICs	Application boards*	Reference designs	Firmware
Transmitter	STWBC86 STWBC2-HP	STEVAL-WBC86TX STEVAL-WBC2TX50 STEVAL-WBC2TX70	STDES-50W2CWBC	STSW-50W2CWBC
Receiver	STWLC38 STWLC98 STLWC99	STEVAL-WLC38RX STEVAL-WLC98RX STEVAL-WLC99RX	STDES-70WRXWLC	STSW-70WRXWLC


*Application Boards available Q3 2023

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




Qi Wireless Charging




Power management



Fast charging



Reverse Charging



Thermal protection

ST WIRELESS CHARGING ICs AT A GLANCE

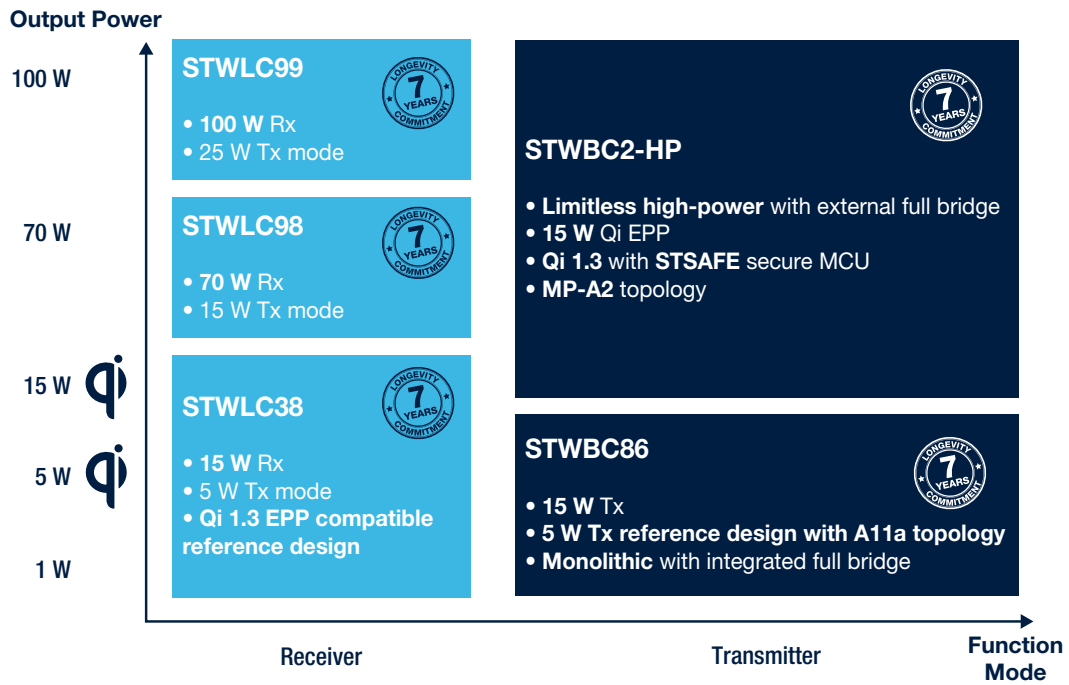


	STWLC38	STWLC98	STWLC99
Function mode	Receiver	Receiver	Receiver
Communication protocol	Qi 1.3	Qi 1.3	Qi 1.3
Package	WLCSP40	WLCSP90	WLCSP121
Output power	15 W	70 W	100 W
Output voltage (max)	12 V	20 V	20 V
Core	32-bit, 64 MHz Arm® Cortex® M0+	32-bit, 64 MHz Arm® Cortex® M3	32-bit, 64 MHz Arm® Cortex® M0+
Memory	32kB RRAM, 16 KB SRAM, 64kB ROM	16KB FTP, 16KB RAM, 80KB ROM	12KB FTP, 8KB RAM, 48KB ROM
Reverse charging	Up to 5W in Tx mode	Up to 15W in Tx mode	Up to 25W in Tx mode
ARC mode	Supported	Supported	Supported
Interfaces	I2C, GPIOs	I2C, SPI, GPIOs	I2C, GPIOs



	STWBC86	STWBC2-HP
Function mode	Transmitter	Transmitter
Communication protocol	Qi 1.2.4	Qi 1.3
Package	WLCSP72	VFQFPN68
Output power	5 W	100 W
ST Super Charge	-	Supported
Input voltage (max)	20 V	24 V
Core	32-bit, 64 MHz Arm® Cortex® M0+	32-bit, 64 MHz Arm® Cortex® M0+
Memory	8KB SRAM, 8KB FTP	128 KB flash memory, 32KB SRAM
Interfaces	I2C, GPIO	UART, I2C, SPI, GPIOs

WIRELESS CHARGING ICS PORTFOLIO OVERVIEW



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



Order code: **BR23046PWICHG**

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