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**China Passenger Car
Mobile Phone Wireless
Charging Research
Report, 2023**

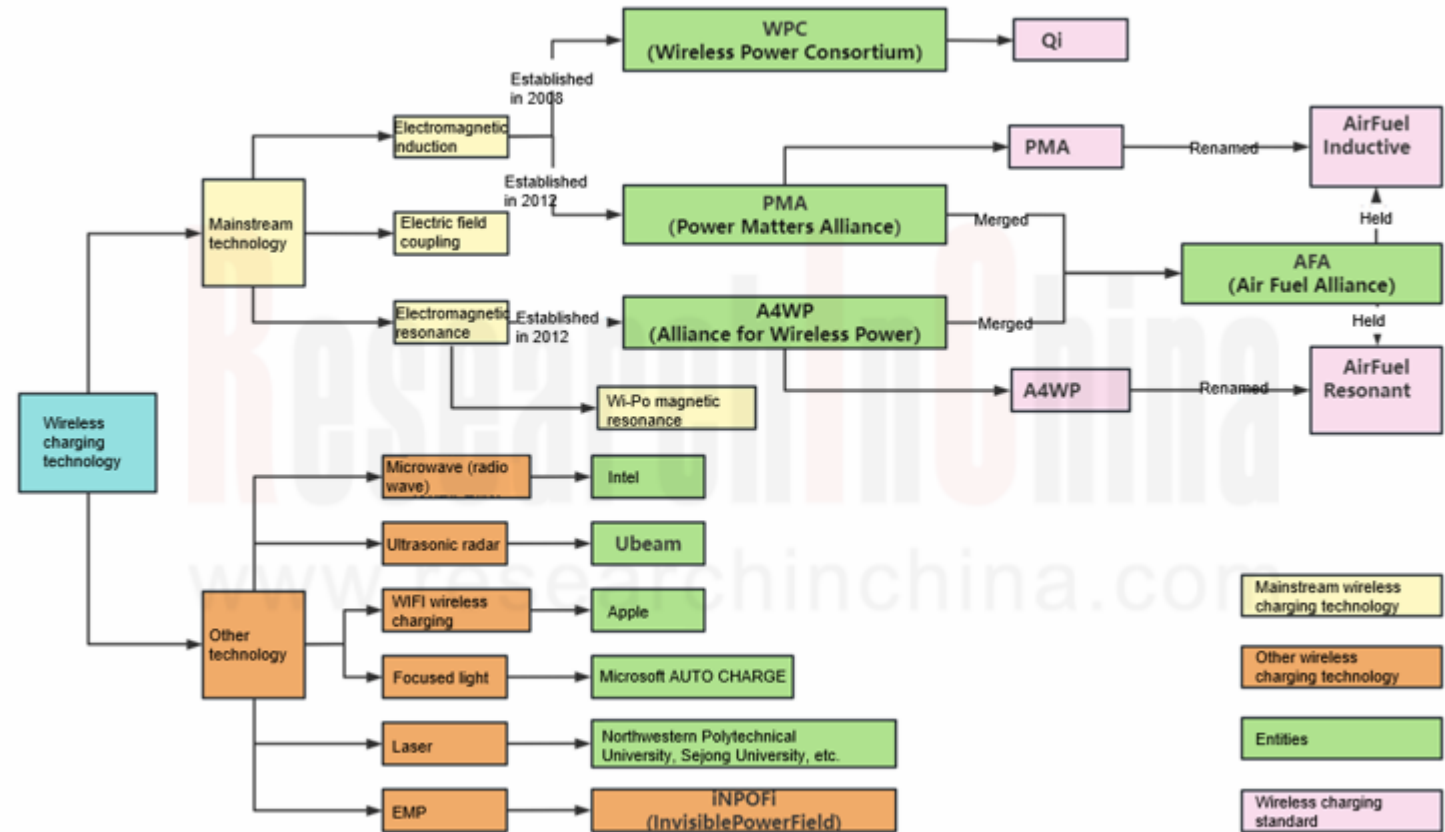
June 2023

Automotive Wireless Charging Research: high-power charging solutions will lead the trend, with the installations to hit more than 10 million units in 2026.

Technology Trend: Qi2 Standard

The automotive mobile phone wireless charging module is an integrated device that uses wireless charging technology to charge a mobile phone in the vehicle. The mainstream wireless charging technologies include electromagnetic induction, electromagnetic resonance and electric field coupling. At present, mainstream mobile phone wireless charging solutions use electromagnetic induction technology to charge a mobile phone as per the Qi Standard created by the Wireless Power Consortium (WPC). Since 2017, electromagnetic resonance-based mobile phone wireless charging solutions have appeared on the market, but their application scope is far narrower than electromagnetic induction-based ones.

Popular Wireless Charging Technologies on the Market



Source: ResearchInChina

The automotive mobile phone wireless charging modules has been a standard configuration for most mid-to-high-end models. It is often installed near the center console in line with the Qi Standard, with the general charging power range of 5W-15W. To improve the charging efficiency, some models cooperate with mobile phone vendors (Xiaomi, Huawei, OPPO, Apple, etc.) and adopt private protocols with the charging power ranging at 40W-50W. In the future, more models will be equipped with high-power wireless charging modules, and wireless charging solutions for continuous and stable charging during driving.

Following the launch of the logo of the Qi2 in January 2023, the WPC released the Qi2 Standard in April, with corresponding adjustments to the certification for mainstream automotive mobile phone wireless charging modules. The WPC developed Magnetic Power Profile (MPP), a magnetic attraction feature added to wireless charging modules.

Difference between Qi and Qi2

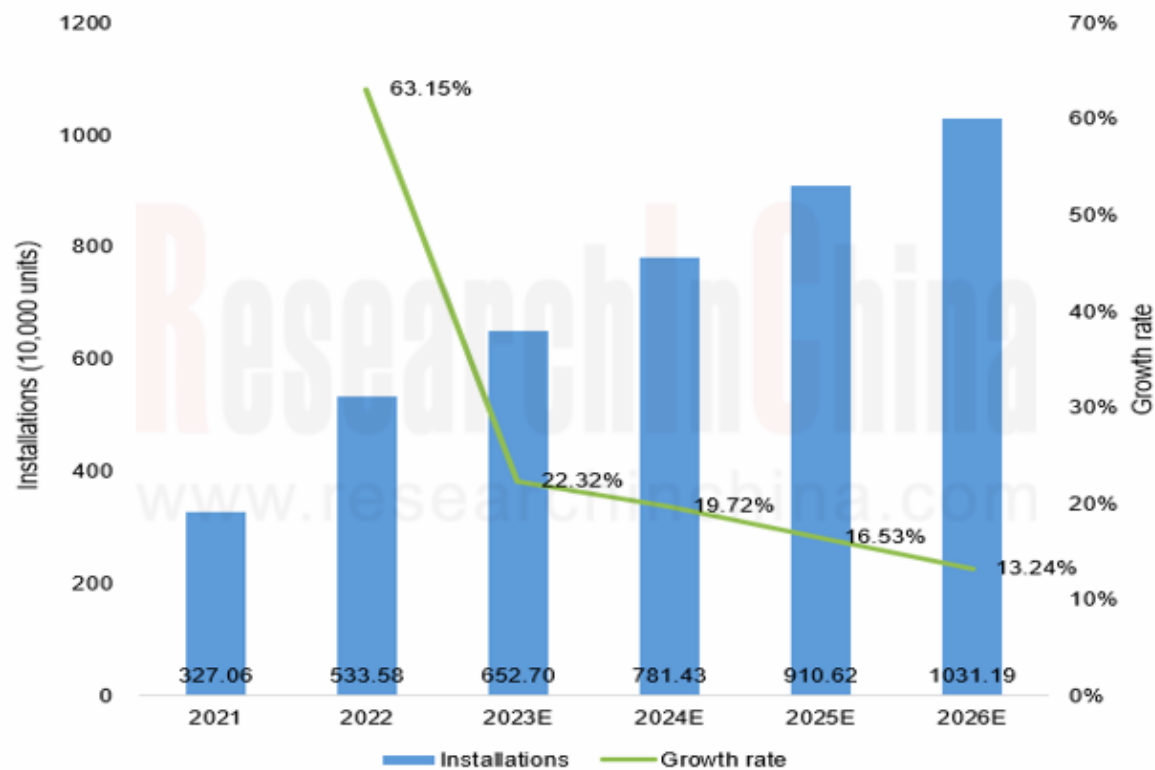
Type	Qi	Qi2
Certification	BPP, EPP	EPP, MPP , compatible with BPP
Coil Reference	√	×
Magnetic Attraction	×	√

Source: ResearchInChina

Market Size: the installations of automotive wireless charging modules are expected to hit more than 10 million units in 2026.

From 2021 to 2026, the installations of automotive mobile phone wireless charging modules will sustain steady growth, expected to exceed 10 million units in 2026.

Installations of Automotive Mobile Phone Wireless Charging Modules and Growth Rate, 2021-2026E



Source: ResearchInChina

Competitive landscape: there is still scope for localization.

The main vendors in the automotive wireless charging industry chain are as follows:

Main Vendors in Automotive Wireless Charging Industry Chain (in no particular order)



Source: ResearchInChina

Types of Common Components in Automotive Mobile Phone Wireless Charging Modules in China

Types of Common Components in Automotive Mobile Phone Wireless Charging Modules in China (Partial)

Foreign vendors like NXP and Renesas Electronics can design automotive mobile phone wireless charging solutions and provide chip products. Chinese vendors such as InvisPower, ADAYO and Sunway Communication can manufacture modules and provide automotive wireless charging solutions leveraging the key components from foreign vendors, such as NXP's main control chip, TI's voltage regulator chip, and AOS' MOS tube. The widely used wireless charging chip solutions in China are those from ConvenientPower and Southchip.

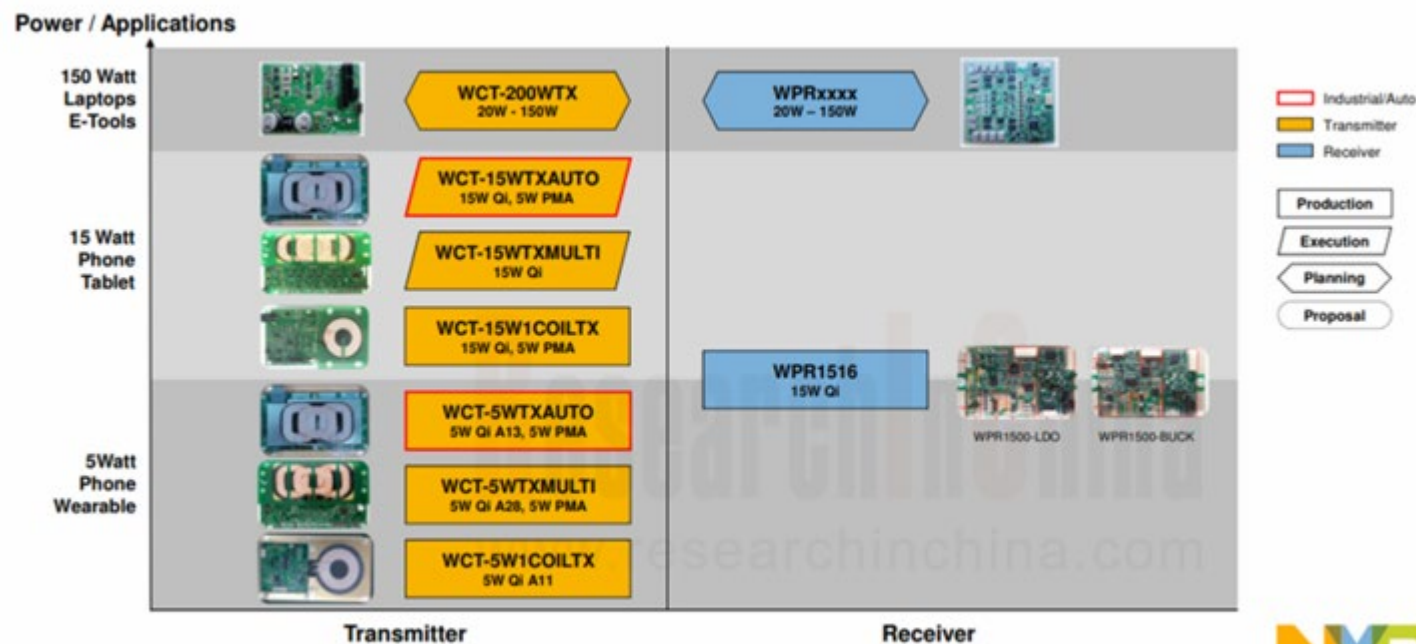
Component	Typical Model
Master MCU	FS32K142H/MWCT1013AVLH/MWCT1213AVLH (NXP), R5F10PLHLFB (Renesas)
Main control chip	CPSQ8100 (Convenient Power), MWCT1003AVLH (NXP)
Synchronous buck-boost control chip	SC8701 (Southchip), LM5175 (TI)
Integrated power chip	NU8040Q (NuVolta)
Buck chip	MP2456/MP2451/MPQ4470(MPS), LMR34215-Q1 (TI)
Voltage regulator chip	MPQ8904 (MPS), TLV70033 (TI)
CAN bus transceiver	TJA1043T (NXP), TCAN1042V (TI)
MOS tube	AON7264E(AOS), BUK9M7R2-40E (Nexperia), IPG20N10S4L-22A (Infineon), NVTFS5820NL (OnSemi)

Source: ResearchInChina

NXP

Among NXP's main wireless charging solutions, WCT-15WTXAUTO and WCT-5WTXAUTO are the most widely used, with respective power of 15W and 5W. The platforms are specially designed for AUTOSAR-compliant automotive wireless charging application. They use automotive-grade components, and AUTOSAR software and drivers, and conform to the latest Qi Standard.

NXP's Main Wireless Charging Solutions

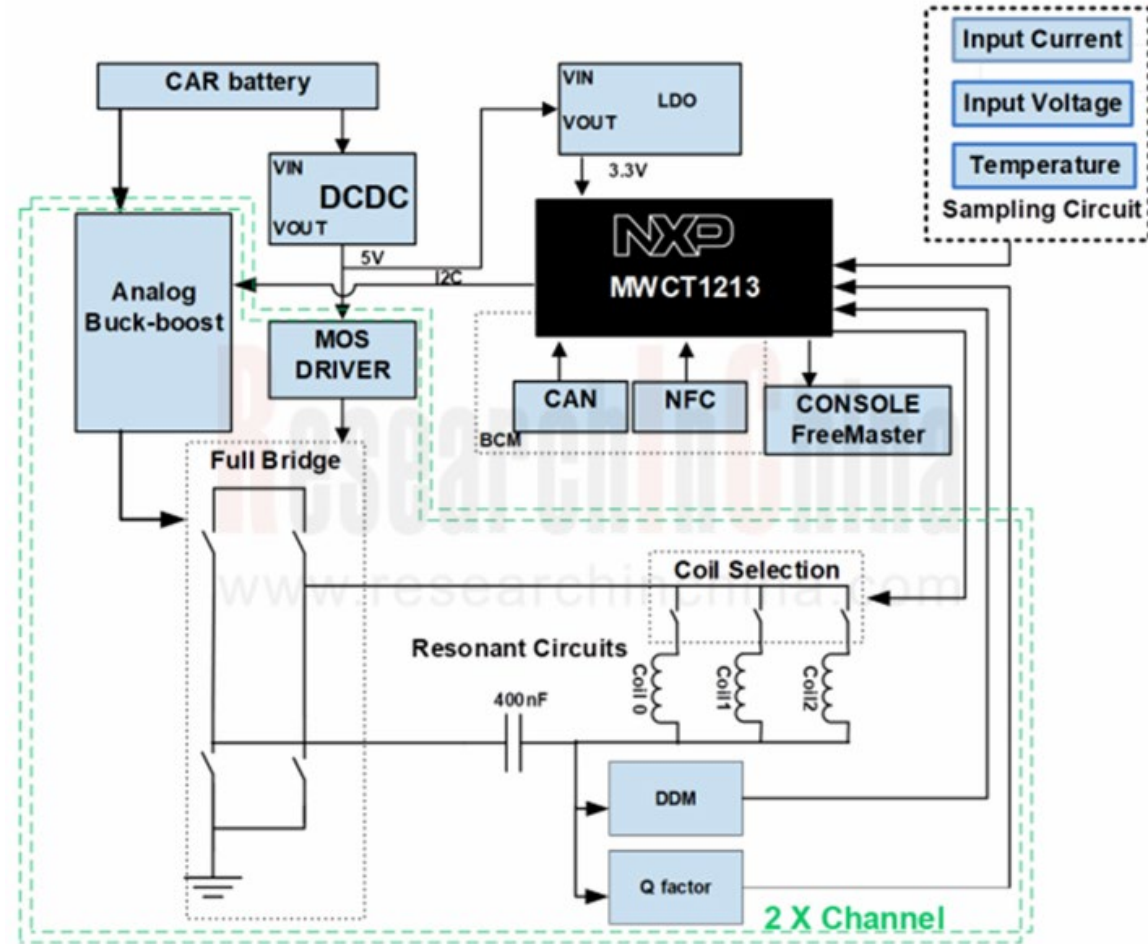


Source: NXP



Among multiple MCUs, the MWCT1x1xA family is the most popular, for example, in the MWCT1213A solution, the system supports dual-channel transmitter control and manages overall system state, with the power of 15W.

Schematic Diagram of MWCT1213A Solution



Source: NXP

Strategy of automakers: pursue high-power solutions and independently develop heat dissipation technology

At present, the Qi Standard-certified electromagnetic induction charging solutions are the mainstream automotive mobile phone wireless charging solutions. In terms of structure, SOC solutions with built-in full-bridge MCUs and built-in power tubes have a serious problem of heating.

The mainstream automotive mobile phone wireless charging solutions have the following three shortcomings: 1. Severe heating problem; 2. Slow charging and low module transmitting power; 3. Vulnerable to interference, e.g., metal and NFC key.

Upgrade Strategy of Mainstream Automotive Mobile Phone Wireless Charging Solutions

To Be Improved	Solution	Vendor
Heat dissipation	Fan	ADAYO
	Architecture change: half-bridge solution	Visteon
	Architecture change: external chip and MOS tube	iSmartWare
Low charging efficiency	Power increase	ADAYO (50W)
Foreign body interference	Foreign object detection	Most integrators
	NFC anti-interference	NXP, Microchip
	NFC integrated	Continental

Source: ResearchInChina

To solve the above problems, OEMs have begun to independently develop corresponding technical solutions. They have developed such technologies as air cooling, intelligent voice prompt, NFC integration, and detachable wireless charging modules.

Wireless Charging Module Technical Solutions of OEMs (Partial)

OEM	Technical solution	Launch Time	Features
Chery	Cold air wireless charging structure	Mar. 2023	Cooling by cold air conditioning
	Wireless charging control system with intelligent voice reminder	Dec. 2022	Voice prompt when mobile phone is forgotten
Changan	Multi-function detachable automotive wireless charging system	Jan. 2023	Detachable and removable in the vehicle
Seres	Heat dissipation control for wireless charging	Oct. 2022	NFC recognition + cooling board
JAC	Automatic heat dissipation control for wireless charging	Aug. 2022	The drive motor prompts the cooling components to move according to the set track
Voyah	Lifting automotive wireless charging system	Jul. 2022	Gesture recognition + intelligent monitoring
Human Horizons	Wireless charging module with NFC key authentication	Jun. 2022	Integrated NFC key authentication

Source: ResearchInChina

The wireless charging board of Li L series models (L7-L9) lies in the center console, and is supplied by Luxshare Precision. It features slow charging, adopts the Qi Standard and supports both Android and Apple phones. The charging power of Android phones is 50W. In 2022, Li L series introduced the MFM-certified MagSafe wireless charging board, raising the charging power of Apple phones to 15W.

In the IM L7, the intelligent lifting wireless charging panel uses the gravity sensing function to detect the mobile phone completely placed on the module, then automatically tilts and sinks before the system starts charging; when a non-metallic device is placed on it, the panel will remain still.

Intelligent Lifting Wireless Charging Panel of IM L7



Source: SAIC IM Motors

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Beijing Headquarters

TEL: 010-82601561, 82863481
FAX: 010-82601570



Chengdu Branch

TEL: 028-68738514
FAX: 028-86930659

Website: [ResearchInChina](http://ResearchInChina.com)

WeChat: Zuosiqiche

