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# China Passenger Car Brake-by-Wire and AEB Market Research Report, 2022

July 2022

# Brake-by-wire research: with an astonishing growth in installation rate, One-Box has commanded much more of the market

In new energy vehicles, especially intelligent vehicles, the brake-by-wire technology plays an irreplaceable, important role in regardless of intelligent driving systems or various control systems. Brake-by-wire system that replaces vacuum booster with electronic booster is a solution to the lack of stable vacuum sources in new energy vehicles, and is capable of recovering energy, a crucial function to increase the cruising range of new energy vehicles. As autonomous driving technologies gain ever greater popularity, brake-by-wire becomes more superior in quick response and precise execution, and is serving as a key factor to facilitate electrified and intelligent upgrades of vehicles.

In current stage, brake-by-wire is still in its infancy, still with a low overall penetration. Yet the installation rate of brake-by-wire in new energy vehicles is relatively high. According to our statistics, the installation rate of brake-by-wire in passenger cars in China reached 8.6% in 2021 compared with 2.6% in 2019. The soaring EV sales in China drove the installation rate of brake-by-wire to 13.7% in the first five months of 2022.

## Installations of Passenger Car Brake-by-Wire in China, 2019-2022

	2019	2020	2021	2022 (Jan.-May)
Brake-by-wire installations (10,000 sets)	50.7	84.2	174.1	95.7
Installation rate	2.6%	4.5%	8.6%	13.7%

Source: ResearchInChina

As well as brake-by-wire, AEB and AUTOHOLD, the other two functions related to Braking System, also boasted surging installation rates. In the first five months of 2022, the penetration rate of AEB in China's passenger car market reached up to 44.3%.

## Installations of Passenger Car AEB in China, 2019-2022

	2019	2020	2021	2022 (Jan.-May)
AEB installations (10,000 sets)	416	630	781	310
Installation rate	21.1%	33.5%	38.5%	44.3%

Source: ResearchInChina

In the first five months of 2022, the penetration rate of AUTOHOLD in China's passenger car market hit 75.6%.

## Installations of Passenger Car AUTOHOLD in China, 2019-2022

	2019	2020	2021	2022 (Jan.-May)
AUTOHOLD installations (10,000 sets)	991	1,204	1,413	529
Installation rate	50.2%	64.0%	69.6%	75.6%

Source: ResearchInChina

# Bosch takes a lion's share, and Chinese suppliers are expanding their shares

Our statistics shows that Bosch swept 91.5% of China's passenger car brake-by-wire market in 2021, a figure edging down to 89.4% in the first five months of 2022. The market shares of Tongyu Automotive, ZF, Mando and NASN Automotive Electronics all rose.

## China's Passenger Car Brake-by-wire Market Structure, 2021-2022

	2021	2022 (Jan.-May)
Bosch	91.5%	89.4%
Tongyu Automotive	3.5%	4.3%
ZF	1.0%	1.5%
Mando	0.3%	1.3%
NASN Automotive Electronics	0.6%	0.8%
Others	3.1%	2.7%

Source: ResearchInChina

# Two-Box still prevails in the brake-by-wire market, and One-Box gathers pace.

The Two-Box solution with independent electronic booster and ESP/ABS features lower integration and higher price. In the One-Box solution, the integration of electronic booster and ESP/ABS leads to high complexity and potential safety hazards, so an RBU (Redundant Brake Unit) needs to be added to meet the redundancy requirements.

## Comparison of One-Box and Two-Box Solution in China's Passenger Car Brake-by-Wire Market

	One-Box	Two-Box
Definition	Integrated: EHB integrates with ABS/ESP	Separate: EHB and ABS/ESP are independent
Composition	1 ECU, 1 braking unit	2 ECUs, 2 braking units
Cost	High integration, relatively low cost	Low integration, relatively high cost
Complexity and safety	High. Need to retrofit the pedal. The pedal is just used to input signals and does not act on the master cylinder, so the pedal feel needs to be adjusted by software, which may cause potential safety hazards.	Low. With no need to retrofit the pedal, the driver can intuitively feel the changes in the braking system, and the attenuation of the brake pad through the ABS feedback force, thus reducing safety hazards.
Energy recovery	High recovery efficiency, the deceleration of regenerative braking up to 0.3g-0.5g	Average recovery efficiency, and the maximum deceleration of regenerative braking below 0.3g
Autonomous driving	Need to be paired with RBU to meet the redundancy requirements of autonomous driving	Meet the redundancy requirements of autonomous driving

## Shares of One-Box and Two-Box in China's Passenger Car Brake-by-Wire Market, 2021-2022

	2021	2022 (Jan.-May)
ONE-BOX	20.5%	34.6%
TWO-BOX	76.6%	62.8%
Others	2.9%	2.5%

Source: ResearchInChina

Our data indicate that Two-Box is still a mainstay in the brake-by-wire market, but its market share fell from 76.6% in 2021 to 62.8% in the first five months of 2022, while the share of One-Box jumped from 20.5% to 34.6%.



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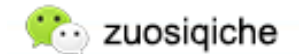
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