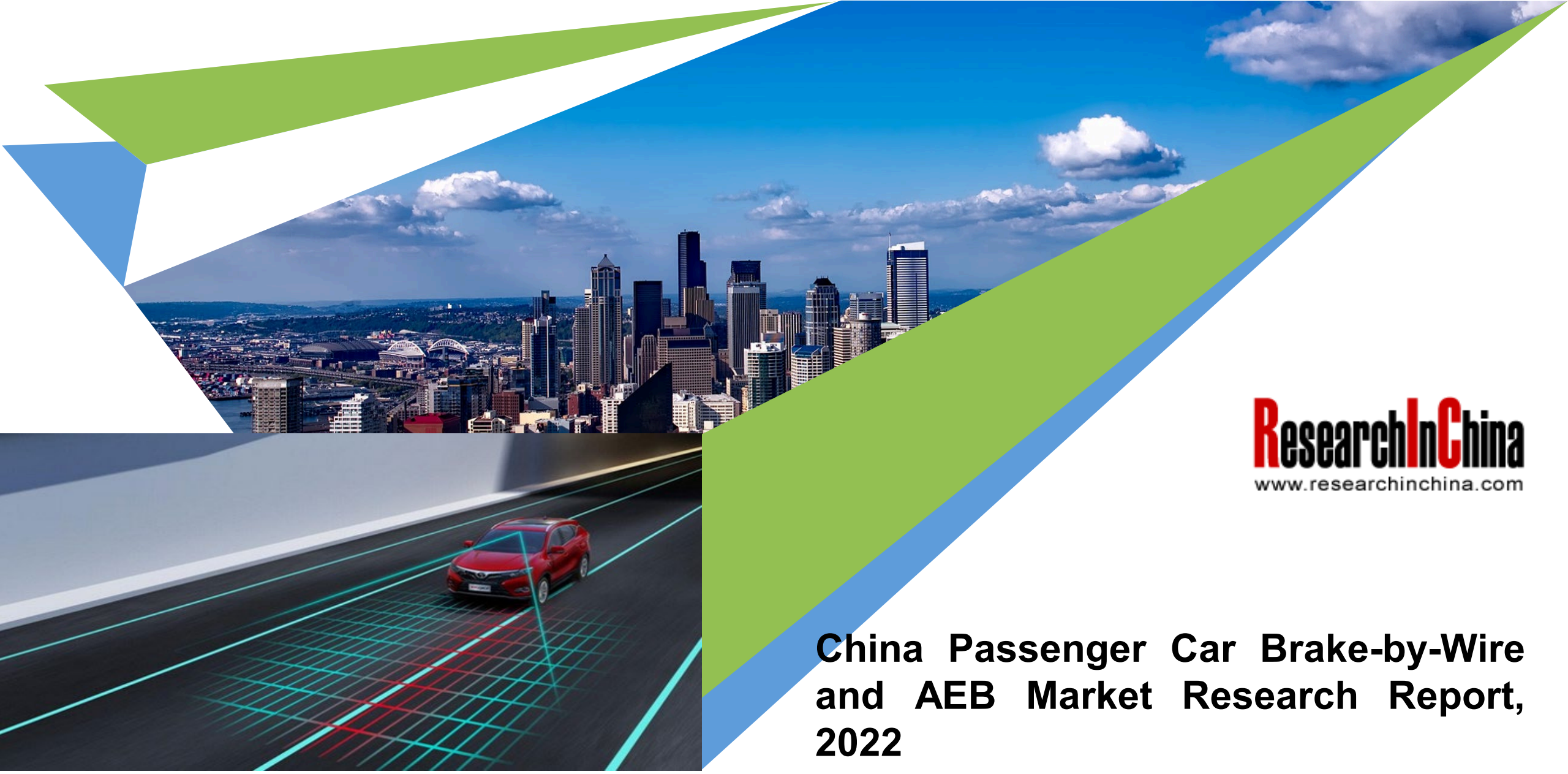

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# China Passenger Car Brake-by-Wire and AEB Market Research Report, 2022

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 bake-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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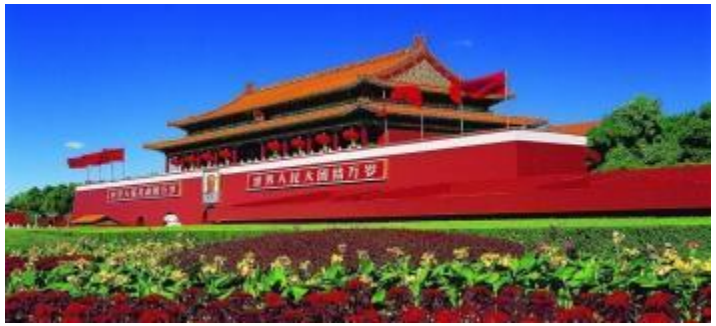


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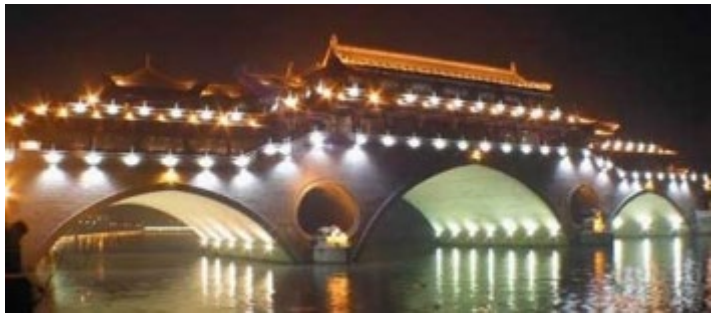


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