

It is hard for a 400V platform to enable >200KW fast charge under current E/E architectures, while the upgrade to the 800V platform allows much smaller fast charging current at 200KW, making it more likely to achieve >350KW fast charge.

In the case of the same charging power, under the 800V fast charging architecture the high voltage wiring harness boasts smaller diameter and costs less, and the battery dissipates less heat, which makes thermal management easier and optimizes the overall cost of the battery.

Already, most OEMs have made aggressive inroads into the 800V high voltage platform since it serves as an efficient solution to the replenishment anxiety.

In 2021, BYD, Geely, Great Wall Motor, Xpeng Motors and Leapmotor among others have announced their 800V high voltage technology deployment plans; Li Auto, NIO and the likes are preparing for related technologies as well. Through the lens of start of production, major OEMs will roll out their new vehicles based on 800V solution beyond 2022.

OEM	Voltage	Power	Current	Endurance	SOP
Great Wall SL	800V	400KW	600A	A 10-minute charge enables an endurance of 800km	Mecha Dragon Limited Edition is to be delivered in H1 2022
BYD	800V	228KW		A 5-minute charge enables an endurance of 150km	ocean-x to be launched in 2022
Dongfeng Voyah	800V	360KW	600A	A 10-minute charge enables an endurance of 400km	
GAC Aion	1000V	480KW	600A	A 5-minute charge enables an endurance of 200km	First available to AION V
Geely	800V	360KW	-	A 5-minute charge enables an endurance of 120km	
Lotus	800V		-	80% SOC in 20 minutes	Type 132 will be unveiled in 2022 and delivered worldwide in 2023
BAIC ARCFOX	800V	U	-	A 10-minut <mark>e c</mark> harge enables an endurance of 196km	αS is delivered in small batch at end of December 2021
Xpeng	800V	480KW	670A	A 5-minute charge enables an endurance of 200km	G9 delivery expected in 2022Q3
Li Auto	800V				After 2023
Leapmotor	800V	400KW		A 5-minute charge enables an endurance of 200+ km	Q4 2024
Porsche	800V	350KW		80% SOC in 5 minutes	Taycan has been spawned Macan will be launched in 2023
Hyundai	800V	220KW		80% SOC in 14 minutes	IONIQ 5 is launched in 2021, and Chinese edition will be mass-produced and delivered in 2022

Major OEMs' Plans for Mass Production of High Voltage Platforms

Source: ResearchInChina



Hyundai: at the Auto Shanghai 2021, Hyundai introduced IONIQ5, the first IONIQ BEV model developed on the E-GMP. The Chinese edition will be spawned in 2022. IONIQ5 highlights the following:

- It takes just 18 minutes to rise state of charge (SOC) from 10% to 80%;
- 800V high voltage architecture
- The rear wheel drive integrates a HV booster that converts 400V to 800V.

From the 800V architecture diagram of IONIQ 5, it can be seen that almost all high voltage devices have been upgraded to 800V; the front wheel drive is a 75kW three-in-one drive, while the rear one is a 155kW five-in-one drive, with a 400V to 800V converter designed for wider scenarios of fast charge.



Source: Hyundai IONIQ 5 The new benchmark for mid-sized sports utility electric vehicles

Great Wall: in November 2021, Great Wall SL unveiled Mecha Dragon, its first model that packs proprietary Dayu battery delivering capacity of 115kWh and CLTC range of 802km. Besides, Mecha Dragon uses 800V charging technology, enabling a 401km endurance by a 10-minute charge and 545km by a 15-minute charge, with peak current up to 600A.

Great Wall also endeavors to deploy 800V high voltage components, such as 800V dual-motor vector control module, 800V SiC controller, and 800V~1000V 250A ultrahigh voltage wiring harness systems.

Xpeng: in November 2021, Xpeng released Xpeng G9, a production vehicle based on the 800V high voltage SiC platform. The new car can travel more than 200km by a 5-minute super charge. Its maximum charging current also exceeds 600A, electric drive efficiency is as high as 95%, and overall system efficiency is close to 90%.

All components on Xpeng G9 are 800V ones, meaning they support the high voltage of 800V. In addition, Xpeng G9 reduces the resistance of each high voltage linkage, and also offers safety protection in special circumstances. The maximum charging current of over 600A enables super charge in a real sense.

Leapmotor: in July 2021, Leapmotor announced its Future Strategy 2.0, specifying a clear-cut plan for 800V high voltage technology. The carmaker is scheduled to mass-produce the 800V ultrahigh voltage electrical platform in the fourth quarter of 2024, which allows 400KW ultrafast charge and brings a 200km endurance by a 5-minute charge. Moreover, Leapmotor also projects mass-production of a high-performance high-power silicon carbide (SiC) controller in late 2023 to replace the current IGBTs. This product in support of 800V fast charge can lift the power of motors to 300KW, with a 4% rise in efficiency.



Vehicles equipped with 800V high voltage platforms charge on existing common charging piles that allow just lower-than-expected charging speed and fall short of ultrafast charging in real terms. The onboard 800V high voltage platform therefore cannot exert itself fully without super charging piles. It grows a trend for 800V vehicle high voltage platform and super charging pile to be combined.

At present, models based on 800V platforms is in readiness for production, and the deployment of super charging piles is also progressing steadily. As well as cooperating with operators to deploy charging networks, OEMs also work to build their own. The high voltage technology is an important development trend regardless of self-built or cooperative charging networks.

Automaker	Power	High Voltage Value	Charging Pile Layout				
Geely	240KW-360kW	_	In 2021, Geely has deployed its own charging network in 10 cities including Beijing, Shanghai, Guangzhou, Shenzhen, Hangzhou, Ningbo, Xi'an, Changsha, Wuhan and Chengdu.				
GAC	480kW-600KW	1000V	In 2021, GAC has built 100 charging piles independently. It is expected that by 2025, GAC will construct 2,000 super charging stations in 300 cities across China.				
BAIC	180KW-360KW	arci	In 2021, BAIC invested in the construction of 24 exclusive super charging stations, 16 destination stations, 84 certified stations, and 267 recommended stations in Beijing, Shanghai, Shenzhen, Guangzhou, and Suzhou.				
Xpeng	480KW	e ^{800v} ch	As of October 2021, 439 Xpeng brand super charging stations have become operational, covering 121 cities.				
Tesla	250KW	400V	Tesla boasts more than 25,000 super charging piles worldwide, and has opened 800 super charging stations in China, with over 6,300 super charging piles.				
Volkswagen	_		The flexible energy storage and fast charging pile project co-funded by Volkswagen Group Components and Shanghai DU-POWER New Energy Technical Co., Ltd. settled in Suzhou, with total investment of €110 million.				

of Main OEMa in East Charging

Source: ResearchInChina



GAC: in August 2021, GAC AION launched an A480 super charging pile, which is compatible with 800V high voltage platform-based models. This pile enables 6C high-rate charge, that is, 0% to 80% charge in 8 minutes, and 30% to 80% charge in 5 minutes.

GAC AION has built its first super charging station at Guangzhou Donghong International Plaza and has brought it into operation, with a plan to build 2,000 super charging stations in 300 cities by 2025.

Xpeng: Xpeng's super energy replenishment system is implemented at vehicle, charging pile and station simultaneously. At the vehicle end, the production models with 800V high voltage SiC platforms will be deployed. As concerns the pile, the 480kW charging high voltage supercharging piles will be first built. In the charging station, the self-developed energy storage and charging technologies will be applied, with energy storage at a time meeting the needs of 30 vehicles for uninterrupted high power super charge. As of October 2021, there have been 439 Xpeng brand supercharging stations in 121 cities.

Xpeng 800V High Voltage SiC Platform + 480kW High Voltage Super Charge



ResearchInChina

Automotive SiC Ushers in a Boom, and Suppliers Expedite their Layout

On the 800V high voltage platform, the withstand voltage of system components also needs to be leveled up to 800V, so do the corresponding components and materials. And under the high voltage architecture, battery pack, electric drive, PTC, air conditioner, on-board charger, etc. all require being re-selected as well.

As for the vehicle, high voltage technologies such as electric drive, fast charging battery, PTC, and DCDC have been production-ready. In fast charging battery's case, in April 2021, Honeycomb Energy Technology under Great Wall Motor launched an all-new fast charging battery and corresponding battery cells. The 1st-Gen 2.2C fast-charging battery features cell capacity of 158Ah and energy density of 250Wh/kg, and enables 20%-80% SOC in 16 minutes. It is to be mass-produced in the fourth quarter of 2021. The 2nd-Gen 4C fast-charging battery boasts typical charging capacity of 165Ah and energy density of >260Wh/kg, and enables 20%-80% SOC in 10 minutes. Its mass production is arranged in Q2 2023.

The foundation of vehicle high-voltage parts supply chain has been established, and the industry can achieve mass production in 2021

To meet the needs for fast charge, the key components of the high voltage architecture must be reselected



SiC features good voltage withstand, high stability, better frequency than silicon-based IGBTs, and small size, in the process of upgrading 800V high voltage platform components. It has drawn widespread attention in the industry.

In new energy vehicles, SiC is largely used in vehicle power supplies and motor controllers. Though still priced high in a relative sense and the inevitable higher cost by massive adoption in a single vehicle, the use of SiC devices can deliver a longer mileage range and slash the battery cost. The cost of a single vehicle is actually lower after offsetting the cost rise caused by SiC devices.

In the long run, the price of SiC devices will edge down. In China, silicon-based IGBTs are monopolized by foreign vendors, while in the SiC field Chinese suppliers like Huawei, Shinry Technologies and Zhuhai Enpower Electric have made successful deployments. Chinese players may outrun and replace their foreign peers in the race. The cost of SiC devices will drop further if localized.



The high voltage technology is available to be mass-produced in 2021 The mass production of 800V high voltage platforms breathes new life into the development of SiC. Influential suppliers compete to expand SiC production capacity to satisfy the growing demand.

The 800V High Voltage Platform Research Report, 2022 highlights the following:

- Introduction to 800V high voltage platform and its advantages, vehicle high voltage platform standards, charging pile high voltage platform standards, high voltage platform market size and competitive landscape, etc.;
- 800V high voltage platform's impacts on the upstream industry chain (battery, electric drive, thermal management, etc.), electrical architecture design of the 800V high voltage platform, status quo of the downstream new energy vehicle sector, etc.;
- Development stages of 800V high voltage platform, its availability on vehicles, and its use in charging piles, etc.;
- Merits of SiC applied in 800V high voltage platform, its application at the vehicle end, its application in charging piles, status quo of SiC industry, etc.;
- Deployments of OEMs and suppliers in 800V high voltage technology.

Supplier	SiC Capacity Expansion Layout			
Bosch	Bosch intends to expand its production capacity for SiC power semiconductors to a unit volume running into the hundreds of millions. With this in mind, the company has already started expanding the clean- room space at its Reutlingen plant. In parallel, work is also being done on the second generation of SiC chips, which will be even more efficient and should be ready for volume production as of 2022.			
Toshiba	Toshiba will increase the output of SiC power semiconductors at its Himeji Semiconductor factory to 3 times that of 2020 in 2023 and 10 times in 2025.			
	Invest JPY50 billion to expand the capacity of SiC power semiconductors to more than 5 times the current capacity by 2025.			
ROHM Semiconductor	In October 2021, ROHM Semiconductor and Zhenghai Group established a joint venture—HAIMOSIC committing itself to design and manufacture of SiC power modules.			
HAIMOSIC	HAIMOSIC plans to start small-batch production of SiC power modules at ROHM's plant in Japan in 2022 and large volume production at the plant in Minhang District, Shanghai in 2023.			
San'an Optoelectronics	China's first SiC full-industry chain production line the company built in Hunan became operational in June 2021, covering crystal growth, wafer and epitaxy to chip, R&D, packaging & testing. The next step is to prioritize OBC, DC-DC and host drive for PV, new energy and vehicles.			

SiC Capacity Expansion Plans of Major Suppliers

Source: ResearchInChina



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