Silicon Mobility Recognized for

2021

Technology Innovation Leadership

European Semiconductors Industry

Excellence in Best Practices

FROST & SULLIVAN

Best Practices Criteria for World-Class Performance

Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each award category before determining the final award recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company. Silicon Mobility excels in many of the criteria in the semiconductors space.

Operational Efficiency and Technology Incubation

Original equipment manufacturers (OEMs) and tier suppliers are challenged with adapting to the stringent CO2 emission and fuel consumption standards proposed by regional governments. Traditional semiconductor manufacturers only offer generic solutions for internal combustion engine (ICE) vehicles and have not caught up to the growing unique needs of the electric vehicle (EV) industry. In addition, these generic solutions face severe blockages, such as limitations in real-time data processing capabilities and real-time control loop frequency, because the software is not augmented for high efficiency, which can result in an overall drop in efficiency and thus less vehicle range. A highly efficient solution, therefore, is needed at both the hardware and software level. Silicon Mobility offers a new-generation semiconductor with programmable algorithms that can increase vehicle range and lower the charging time.

> *"Silicon Mobility offers an end-to-end solution that includes semiconductors and software to control the operation of an electrified powertrain, addressing the top challenges faced by EV manufacturers and tier suppliers."*
>
> ***- Sujith Unnikrishnan, Senior Research Analyst***

The top three challenges faced by EV market participants include mitigating range anxiety, decreasing the charging time, and reducing costs. Silicon Mobility, with its innovative tech solutions, has addressed these challenges and their applications by drastically improving the efficiency of an electrified powertrain. The company's advanced solution portfolio can increase the range of EVs up to 30% and

lower the powertrain weight and cost. In addition, Silicon Mobility offers better software control, enhances efficiency, and reduces losses with an improved modulation strategy called Angle-based Pulse Width Modulation (PWM) Control (APC). This APC is provided with OLEA® APP INVERTER HE, a control application that runs on OLEA Field Programmable Control Unit (FPCU), the only semiconductor that can support such software. Simulations on the worldwide harmonized light vehicles test procedure (WLTP) emission test cycle show that the OLEA APP INVERTER HE improves the efficiency of the electrical powertrain by 20% and by an additional 12% when using a variable voltage DC-DC converter in real-world driving conditions, compared to microcontroller-based solutions, directly increasing the vehicle range by 30% with the same battery capacity. OLEA APP INVERTER HE, therefore, can improve performance and overcome the above challenges by providing customers with a high-efficiency inverter.

Growth Potential and Commitment to Innovation

Silicon Mobility was a finalist in the 2019 Top Ten Automotive Startups at AutoMobility LA, presented by Plug and Play and Michigan Economic Development Corporation's (MEDC) mobility initiative. According to Terri Toennies, President of the LA Auto Show and AutoMobility LA, "The finalists for this year's Top Ten competition have developed solutions with real potential for optimizing transportation and positively impacting society. From leveraging research and analytics to scaling and innovating end-user mobility services, these startups represent an ever-growing mobility industry."

Silicon Mobility targets auto manufacturers, equipment manufacturers, and service companies in the electrification and hybridization EV market segment. In addition, the company is already in contact with nearly 80% of these participants and has signed distribution agreements in Asia.

> *"Silicon Mobility is completely committed to electrification, and its semiconductor solution can potentially address the key challenges in the EV industry, such as range anxiety, longer charging time, and cost."*
>
> ***- Sujith Unnikrishnan, Senior Research Analyst***

Silicon Mobility, a fabless manufacturing company and software company, plans to unveil the industrialization of its solutions with contractors in Singapore as a part of its expansion in the Asian market. In 2019, the company, which has offices in Munich and Silicon Valley, opened subsidiaries in Shanghai, China, and Tokyo, Japan, to provide support for local customers.

Silicon Mobility offers a flexible, powerful, and safe architecture to control key elements, such as speed and torque of the motor and DC voltage, and improve the performance of electric and hybrid powertrains. By executing a complex powertrain control algorithm in the hardware instead of the software, the company proves that increased battery life and substantial energy savings can be achieved using its solutions. The company raised $10 million from Capital-E and Cipio Partners in 2018 and has been using these funds to industrialize its technology to increase the autonomy of EVs and reduce the charging time. These funds have allowed the company to buy assets, gain over 25 patents, and acquire Scaleo Chip in December 2015, which had been researching the same technology.

Commercialization Success and Customer Acquisition

Traditional software-based semiconductors pose significant limitations in efficiency and performance as hybrid EVs (HEVs) and EVs enter mass-market adoption. Designed for ICE vehicles that run on legacy

technology, traditional semiconductors are challenged with achieving smarter power control and faster data processing, thus impacting the charging time and leaving the unexploited potential for EVs and HEVs to go farther and have a greater impact on environmental sustainability.

Silicon Mobility is a pioneer in smart semiconductor technology and has developed future-ready semiconductor architecture specifically for both current and future EVs and HEVs, releasing the true and untapped processing potential and power. Unlike competing solutions that have no real-time data processing capacity and have limitations in hard real-time control loop frequency, Silicon Mobility's solutions have 40 times the acceleration of real-time data processing capabilities and 20 times faster hard real-time control loop frequency. The company's OLEA FPCU and its entire suite of supporting products (e.g., OLEA COMPOSER, OLEA LIB and OLEA APP) delivers huge performance benefits, compared to traditional semiconductors. The processing times of the company's OLEA FPCU are independent of CPU load, compared to conventional architecture semiconductors whose processing times vary based on subject load, thereby making Silicon Mobility's semiconductors superior.

Tier I companies and OEMs can dramatically increase the energy efficiency of their electrified and hybrid powertrains up to 30% and reduce the bill of materials by a factor of two, allowing the company to scale up this disruptive solution and meet the growing market demand. According to CEO Rainer Kallenbach, Silicon Mobility, "With OLEA APP INVERTER OEMs and their, Tier 1s can have a quick start to build differentiated and powerful EV/HEV systems."

Silicon Mobility's OLEA APP INVERTER can be used as a standalone powertrain control or extend the capability of the existing system to make it future ready because it is on a modular open platform. The company provides OEMs and suppliers with a proof of concept, system design, and evaluation kit, including a generic inverter and eMotor control board, evaluation licenses, and user documentation for the OLEA APP INVERTER and OLEA COMPOSER development frameworks. The company's global team offers support services, including training, customized engineering, and application development support for customers. With the aim of minimizing the impact of carbon emitted by transport, Silicon Mobility, with the support of Valeo, started a GMG-EHL (integrated control for gear motor-driven generator and electronics for mild hybrid electric vehicles (MHEVs)) project in 2015, issued by ADEME (French Environment and Energy Management Agency). The project was based on the 2l/100km vehicle technology program from PFA (French Automotive Supply Chain Association). The GMG-EHL project, which was on powertrain electrification, was announced successful in May 2019. Results from this project demonstrate that OLEA solutions strengthen functional safety, lower carbon emissions, improve energy efficiency, and reduce the cost of the electronics system control of MHEVs.

According to Guillaume Devauchelle, vice-president of Group Innovation and Scientific Development at Valeo, "Silicon Mobility has perfectly addressed the needs of hybridization systems by developing an efficient control solution."

Collaborating with Valeo has provided Silicon Mobility with accelerated solution industrialization, showcasing its energy and economic benefits. The company's current use cases include passenger vehicles, commercial vehicles, and two-wheeler vehicles; however, it plans to develop high-end semiconductors for flying cars, jets, and electric ships in the future. At present, Silicon Mobility has more than 40 customer engagements with EV and HEV global leaders in Europe, China, Japan, and the United

States; is undertaking more than 17 system integration developments with global OEMs and tier suppliers; and has received more than four Tier I-approved certifications.

Conclusion

Silicon Mobility is a technology leader that delivers semiconductor solutions to reduce pollutant emissions and increase energy efficiency and that are flexible, safe, and capable of optimizing a large number of real-time in-car functions. OEMs use Silicon Mobility's technologies to reduce the vehicle's weight, size, and cost and to increase EV range and durability.

Silicon Mobility's technology drives the powertrain electrification and deployment of smarter and more efficient driverless vehicles for OEMs. The company offers a complete solution of hardware and software applications to control the electrified powertrain, potentially translating into cost savings and improved performance.

With its strong overall performance, Silicon Mobility has earned Frost & Sullivan's 2021 Technology Innovation Leadership Award in the European semiconductors industry.

What You Need to Know about the Technology Innovation Leadership Recognition

Frost & Sullivan's Technology Innovation Award recognizes the company that has introduced the best underlying technology for achieving remarkable product and customer success while driving future business value.

Best Practices Award Analysis

For the Technology Innovation Leadership Award, Frost & Sullivan analysts independently evaluated the criteria listed below.

Technology Leverage

Commitment to Innovation: Continuous emerging technology adoption and creation enables new product development and enhances product performance

Commitment to Creativity: Company leverages technology advancements to push the limits of form and function in the pursuit of white space innovation

Stage Gate Efficiency: Technology adoption enhances the stage gate process for launching new products and solutions

Commercialization Success: Company displays a proven track record of taking new technologies to market with a high success rate

Application Diversity: Company develops and/or integrates technology that serves multiple applications and multiple environments

Business Impact

Financial Performance: Strong overall financial performance is achieved in terms of revenues, revenue growth, operating margin, and other key financial metrics

Customer Acquisition: Customer-facing processes support efficient and consistent new customer acquisition while enhancing customer retention

Operational Efficiency: Company staff performs assigned tasks productively, quickly, and to a high-quality standard

Growth Potential: Growth is fostered by a strong customer focus that strengthens the brand and reinforces customer loyalty

Human Capital: Commitment to quality and to customers characterize the company culture, which in turn enhances employee morale and retention

About Frost & Sullivan

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The Growth Pipeline Engine™

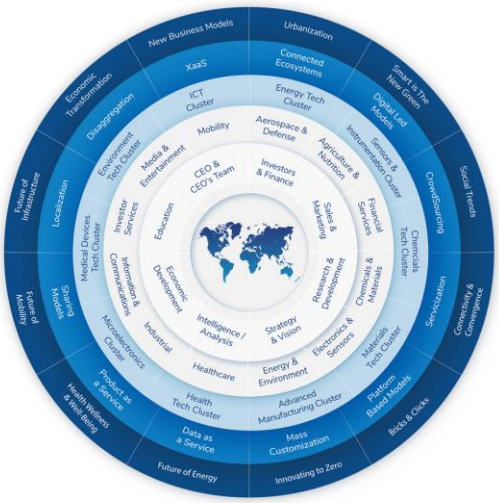
Frost & Sullivan's proprietary model to systematically create on-going growth opportunities and strategies for our clients is fuelled by the Innovation Generator™. Learn more.

Key Impacts:

- **Growth Pipeline:** *Continuous flow of Growth opportunities*
- **Growth Strategies:** *Proven Best Practices*
- **Innovation Culture:** *Optimized Customer Experience*
- **ROI & Margin:** *Implementation Excellence*
- **Transformational Growth:** *Industry Leadership*

The Innovation Generator™

Our six analytical perspectives are crucial in capturing the broadest range of innovative growth opportunities, most of which occur at the points of these perspectives.



Analytical Perspectives:

- Mega Trend (MT)
- Business Model (BM)
- Technology (TE)
- Industries (IN)
- Customer (CU)
- Geographies (GE)