

• **A P T I V** •

**20
25** | **PRODUCT
LEADER**

*Advancing the Product Portfolio to Match
the Full Range of Customer Needs*

*RECOGNIZED FOR BEST PRACTICES IN THE
GLOBAL AUTOMOTIVE
ASSISTED PARKING INDUSTRY*

F R O S T & S U L L I V A N

Best Practices Criteria for World-class Performance

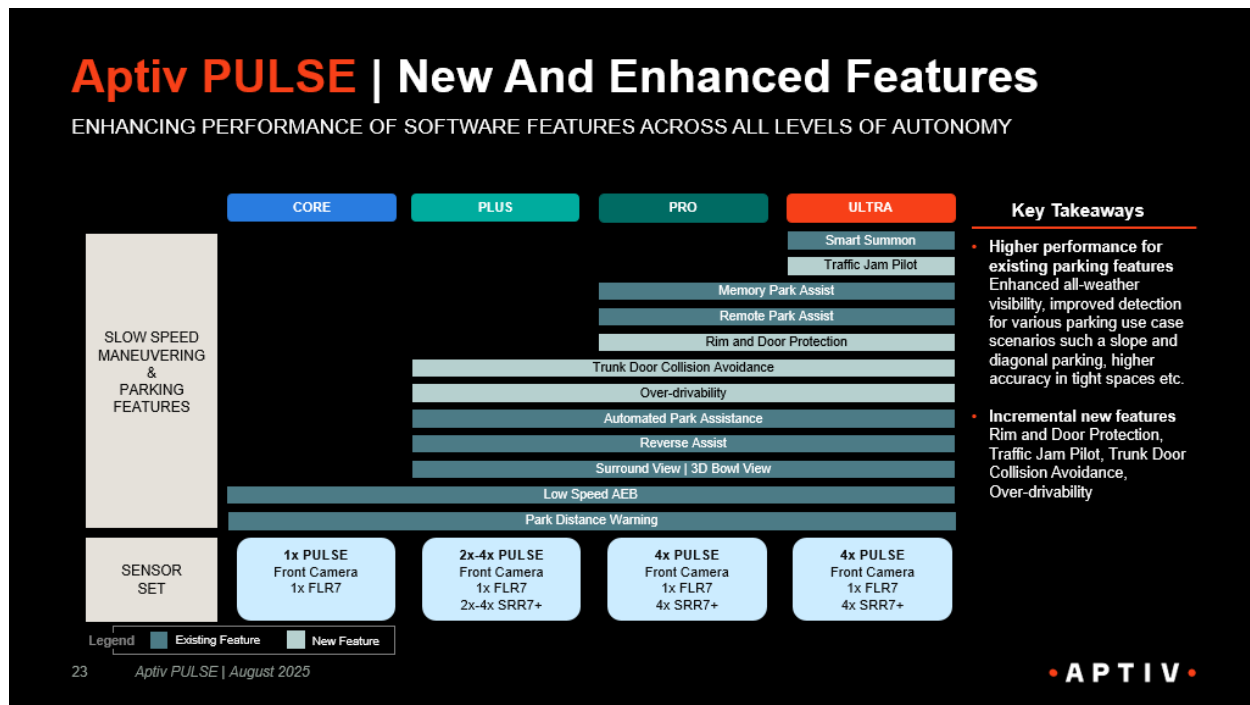
Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each recognition category before determining the final recognition recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company. Aptiv excels in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

RECOGNITION CRITERIA	
<i>Business Impact</i>	<i>Product Portfolio Attributes</i>
Financial Performance	Match to Needs
Customer Acquisition	Reliability and Quality
Operational Efficiency	Product/Service Value
Growth Potential	Positioning
Human Capital	Design

The Transformation of Parking and Navigating Dense Urban Scenarios

The evolution of advanced driver assistance systems (ADAS) and automated driving technologies is reshaping how vehicles detect and respond to their environment. As urbanization intensifies, the need for intelligent, reliable, and cost-effective perception systems has grown - especially in dense urban and parking scenarios where precision and safety are critical. Traditional sensor configurations, such as ultrasonic arrays, are increasingly inadequate due to limited range, noise sensitivity, and integration complexity.

Aptiv PULSE (Parking, Urban, Localization and Surround Enhancement) Sensor addresses these challenges by integrating an ultra-short-range radar and surround-view camera into a compact, dual sensing unit. This technology enhances environmental awareness, improves detection accuracy in all conditions, and reduces system complexity and cost. It enables original equipment manufacturers (OEMs) to advance automation in applications like parking assistance and low-speed maneuvering while maintaining sleek vehicle designs. With this innovation, Aptiv is transforming urban mobility and strengthening its leadership in next-generation ADAS technology.



Engineered for Demand: Meeting the Market Where It Is Headed

Aptiv developed the PULSE Sensor based on a deep understanding of customer needs and changing market dynamics. As automation increases, especially in low-speed and urban environments, OEMs are

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Principal Consultant – Mobility
Advisory Practice

demanding perception systems that offer greater accuracy and robustness, easier integration, and lower cost. Traditional ultrasonic sensors, while seemingly inexpensive, suffer from noise interference, limited range, and integration complexity, often requiring up to 12 sensors, multiple wiring harnesses, and dedicated electronic control units (ECUs). These limitations hinder scalability and raise production complexity.

The PULSE Sensor's integrated radar and camera technologies replace multiple ultrasonic sensors,

reduce component count, simplify vehicle architecture, and enhance perception accuracy and performance. To ensure the product evolves with future ADAS requirements, Aptiv embeds robust feedback mechanisms into its development process. Through early request for quotations (RFQs), close OEM collaboration, and iterative prototyping, the company continuously refines the sensor. It also leverages insights from full-system ADAS deployments with major OEMs to anticipate future needs. This agile, customer-centric approach keeps the PULSE sensor aligned with the trajectory of urban automation and parking innovation.

Built to Trust: Engineering Reliability for Real-world Complexity

Reliability is a cornerstone of Aptiv's design philosophy, and the PULSE Sensor exemplifies this commitment. Aptiv's integrated radar and camera technology reduces failure points and ensures robust operation in low light, rain, snow, and partial obstruction. The radar natively estimates distance and height precisely, while the camera accurately classifies obstacles—together offering a comprehensive perception solution.

This dual sensing approach reduces false positives and boosts driver confidence, particularly in automated parking and low-speed maneuvering. Aptiv anticipates this reliability to drive OEM trust, accelerate adoption, and strengthen its market position. Unlike competitors pairing separate sensors, Aptiv's compact, co-located design ensures innovative packaging efficiency and cleaner aesthetics.

Value Unlocked: Performance, Cost, and Scalability in One Compact Solution

The PULSE Sensor delivers exceptional value by addressing 3 critical OEM priorities: performance, cost, and scalability. By replacing many ultrasonic sensors (and its dedicated ECU), surround view cameras and wiring, it reduces system cost up to 15-20% while improving perception accuracy and coverage. This enables OEMs to offer advanced features - such as rim and door protection, trunk door collision avoidance, and low-speed emergency braking - at a lower total cost of ownership. These features not only enhance safety but also create new revenue opportunities through feature-based monetization, a growing trend in the automotive industry.

As adoption scales, Aptiv's cost-effective modular design allows for deployment across vehicle platforms, from entry-level to premium, and accommodates both basic and advanced configurations which ensures long-term relevance.

Smart by Design: Compact and Seamlessly Integrated

Aptiv developed the PULSE Sensor with a clear focus on compactness, modularity, and seamless integration - key priorities in modern vehicle design. Measuring just 35x35x38mm, the sensor fits into tight spaces such as side mirrors and trunk lids, allowing OEMs to reuse existing packaging - particularly for surround-view cameras - without compromising aesthetics or aerodynamics. The result is a sleek, unobtrusive solution that enhances both form and function.

Aptiv's design emphasizes scalability and flexibility. OEMs can use a single rear-mounted unit for entry-level systems or deploy a full 360° coverage for premium models, enabling a wide range of ADAS features and autonomy levels. By eliminating the need for visible ultrasonic sensors and bumper perforations, the PULSE also supports clean exteriors—improving design and reducing drag in line with modern EV and premium vehicle trends.

Driving Adoption Through Differentiated Value

Aptiv's customer acquisition strategy for the PULSE Sensor centers on delivering differentiated value and solving real-world OEM challenges. By addressing long-standing pain points - such as the complexity and noise of ultrasonic sensors - the PULSE Sensor offers a compelling upgrade for automakers enhancing their ADAS offerings. Early OEM engagement has already generated strong interest, with RFQ processes underway and production targeted for 2027. This proactive approach

positions Aptiv to capture early market share and establish the PULSE Sensor as a foundational component in next-generation parking systems.

To drive adoption and retention, Aptiv leverages long-standing relationships with a wide range of leading global OEMs, supporting them across multiple vehicle generations. These collaborations rely on trust, performance, and shared innovation goals. Its agile development model allows for rapid customization and integration, meeting customer needs throughout the lifecycle. As the PULSE Sensor gains traction, Aptiv expects to outperform competitors in customer acquisition, driven by the sensor's unique performance, cost-efficiency, and design elegance. This strengthens Aptiv's role as a technology leader and trusted partner in the evolving ADAS ecosystem.

Powered by People: Culture, Expertise, and the DNA of Innovation

Aptiv's strength in ADAS innovation stems from its culture and human capital. As the first Tier 1 supplier to deploy radar on vehicles, Aptiv draws on decades of experience in perception technologies. Cross-

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functional collaboration between engineering, product management, and R&D fosters continuous learning and rapid innovation. This environment empowers teams to identify market gaps, prototype quickly, and deliver transformative products like the PULSE Sensor.

What sets Aptiv apart is its product-oriented mindset. By investing in dedicated product management and expanding early-stage R&D, the company drives proactive - not reactive - innovation. This approach allows Aptiv to shape OEM roadmaps and influence the future of mobility. The PULSE Sensor reflects this

cultural strength, combining technical excellence with a clear focus on solving customer problems. As ADAS evolves, Aptiv's people, processes, and innovation mindset will remain key drivers of its success.

Conclusion

The sensor sets a new benchmark for intelligent perception in complex parking and urban environments. By integrating radar and camera into a single unit, Aptiv offers a technically advanced and commercially scalable solution. The PULSE Sensor demonstrates how Aptiv is shaping the future of urban mobility. Its modular design supports seamless integration across vehicle platforms, while Aptiv's agile customer acquisition strategy drives early OEM engagement and long-term adoption. Aptiv's cross-functional innovation - through collaboration among engineering, product management and R&D - underpins this success. With its strong overall performance, Aptiv earns Frost & Sullivan's 2025 Product Leadership Recognition in the global automotive assisted parking industry for its PULSE Sensor.

What You Need to Know about the Product Leadership Recognition

Frost & Sullivan's Product Leadership Recognition is its top honor and recognizes the market participant that exemplifies visionary innovation, market-leading performance, and unmatched customer care.

Best Practices Recognition Analysis

For the Product Leadership Recognition, Frost & Sullivan analysts independently evaluated the criteria listed below.

Product Portfolio Attributes

Match to Needs: Customer needs directly influence and inspire the product portfolio's design and positioning

Reliability and Quality: Products consistently meet or exceed customer expectations for performance and length of service

Product/Service Value: Products or services offer the best value for the price compared to similar market offerings

Positioning: Product serves a unique, unmet need that competitors cannot easily replicate

Design: Product features an innovative design that enhances both visual appeal and ease of use

Business Impact

Financial Performance: Strong overall business performance is achieved in terms of revenue, 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: Leveraging innovative technology characterizes the company culture, which enhances employee morale and retention

Best Practices Recognition Analytics Methodology

Inspire the World to Support True Leaders

This long-term process spans 12 months, beginning with the prioritization of the sector. It involves a rigorous approach that includes comprehensive scanning and analytics to identify key best practice trends. A dedicated team of analysts, advisors, coaches, and experts collaborates closely, ensuring thorough review and input. The goal is to maximize the company's long-term value by leveraging unique perspectives to support each Best Practice Recognition and identify meaningful transformation and impact.

VALUE IMPACT			
STEP		WHAT	WHY
1	Opportunity Universe	Identify Sectors with the Greatest Impact on the Global Economy	Value to Economic Development
2	Transformational Model	Analyze Strategic Imperatives That Drive Transformation	Understand and Create a Winning Strategy
3	Ecosystem	Map Critical Value Chains	Comprehensive Community that Shapes the Sector
4	Growth Generator	Data Foundation That Provides Decision Support System	Spark Opportunities and Accelerate Decision-making
5	Growth Opportunities	Identify Opportunities Generated by Companies	Drive the Transformation of the Industry
6	Frost Radar	Benchmark Companies on Future Growth Potential	Identify Most Powerful Companies to Action
7	Best Practices	Identify Companies Achieving Best Practices in All Critical Perspectives	Inspire the World
8	Companies to Action	Tell Your Story to the World (BICEP*)	Ecosystem Community Supporting Future Success

*Board of Directors, Investors, Customers, Employees, Partners

About Frost & Sullivan

Frost & Sullivan is the Growth Pipeline Company™. We power our clients to a future shaped by growth. Our Growth Pipeline as a Service™ provides the CEO and the CEO's growth team with a continuous and rigorous platform of growth opportunities, ensuring long-term success. To achieve positive outcomes, our team leverages over 60 years of experience, coaching organizations of all types and sizes across 6 continents with our proven best practices. To power your Growth Pipeline future, visit Frost & Sullivan at <http://www.frost.com>.

The Growth Pipeline Generator™

Frost & Sullivan's proprietary model to systematically create ongoing 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 6 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:

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

