Treo Analog and Mixed-Signal Platform Launch (BCD65)
Embargo: November 11, 2024

Background

On November 11, 2024, onsemi will introduce the Treo Platform, an analog and mixed signal platform built with Bipolar-CMOS-DMOS (BCD) process technology on an advanced 65nm node. The platform provides the foundation for a wide range of power and sensing applications including high-performance and low-power sensing, high-efficiency power management, and purpose-built communications devices.

Products built on the Treo Platform can achieve significant improvements in accuracy, performance and efficiency such as better obstacle detection in advanced driver assistance systems (ADAS), more accurate measurements in continuous glucose monitoring systems (CGMs), and improving energy efficiency in AI data centers. By using this single, scalable solution, customers can customers can simplify and accelerate product development for existing applications, and rapidly respond to emerging market opportunities in automotive, medical, industrial and AI data centers.

The launch of the Treo platform marks a technology leadership milestone for onsemi in the analog and mixed-signal semiconductor space – putting onsemi at the forefront of the innovation required for the automotive, industrial, AI/data center and medical markets.

Usage Guidelines:
This Q&A is intended to guide any response to external inquiries regarding the technology announcement. This document is not to be shared externally.

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Key Messages

- The Treo Platform is an analog and mixed signal platform built on Bipolar-CMOS-DMOS (BCD) process technology on an advanced 65nm node, that supports the industry's widest voltage range of 1- 90V and operating temperatures up to 175° C.

- The Treo Platform features a modular architecture with a robust set of ever-evolving IP building blocks that make up the compute, power management, sensing, and communications subsystems.

- The platform provides the foundation for a wide range of power and sensing applications including high-performance and low-power sensing, high-efficiency power management, and purpose-built communications devices with multiple product families sampling now.

- Using this single, scalable solution, customers can simplify and accelerate product development for existing applications, and rapidly respond to emerging market opportunities in automotive, medical, industrial and AI data centers.

- Products built on the Treo Platform can achieve significant improvements in accuracy, performance and efficiency that result in an improvement in function, safety and overall quality of life.

Treo Platform Q&A

Q: What is the Treo Platform?

- The Treo Platform is the industry's most advanced analog and mixed signal platform built with Bipolar-CMOS-DMOS (BCD) process technology on an advanced 65nm node.

- It supports the industry's widest voltage range of 1-90V and operating temperatures up to 175° C, which allows customers to integrate a range of low-to-high power functionality.

- The platform features a modular, SoC-like architecture with a robust set of ever-evolving IP building blocks that make up the compute, power management, sensing, and communications subsystems.
- These building blocks provide the foundation for a wide range of power and sensing applications including high-performance and low-power sensing, high-efficiency power management, and purpose-built communications devices.

Q: Why did onsemi create this product? What industry/market problem does it solve?

- There are two driving forces behind the need for this platform.
    - First, the automotive, industrial, and AI data center markets are experiencing a significant increase in power needs in parallel with stricter environmental regulations. This is driving the need for greater energy efficiency. At the same time, the end applications for these industries are requiring greater performance and functionality.
    - Secondly, low power devices such as medical wearables are becoming more sophisticated, requiring more intelligence and better efficiency to improve personal care and reduce device costs.
- These factors are creating a need for highly integrated, advanced power and sensing solutions capable of delivering greater intelligence while simultaneously delivering greater energy efficiency across the entire power spectrum.
- The Treo Platform is uniquely positioned to address these growing needs offering superior performance and features, while supporting the industry's widest voltage range on a leading node.

Q: What are the key benefits of the Treo Platform to customers?

- The Treo Platform is a single, scalable solution that allows customers to simplify product development, achieve faster time-to-market, and a higher return on investment for next-generation applications in automotive, medical, industrial and AI data centers.

- Additionally, the features and capabilities integrated into the platform will allow customers to significantly improve the accuracy, performance and efficiency in their applications.
- More specifically, the advanced digital processing capabilities and better analog IP performance allow for delivery of local intelligence and compute. And by supporting a wide voltage range of 1-90V and operating temperatures of up to 175 C, customers can integrate a range of low-to-high power functionality.

Q: What are some of the types of applications that benefit from using this platform?

- Products built on the Treo Platform can achieve significant improvements in accuracy, performance and efficiency that result in an improvement in function, safety and overall quality of life. For example:
  - **Automotive:** (better obstacle detection) High-performance ultrasonic sensors can improve accuracy by a factor of two, meaning they can detect objects that are much closer to the vehicle than before in park assist applications. With the ability to detect objects at closer distances, the park assist system can provide better collision avoidance and improve overall safety by helping drivers avoid obstacles more effectively when parking.
  - **Healthcare:** (more accurate measurements) Ultra-low-power Analog Front Ends (AFEs) for continuous glucose monitoring (CGM) devices can more accurately measure very small electrical currents, down to the nanoampere (nA) level. This precision is crucial for detecting the tiny signals generated by glucose sensors, ensuring accurate glucose readings. By integrating multiple functions into a single, compact chip, the platform is able to cut the required footprint in half and extend the battery life to several weeks. This means the overall CGM device can be smaller and more comfortable for the patient to wear with fewer replacements to save on healthcare costs.
  - **Data Centers:** (reduced total cost of ownership) The Treo Platform will enable more compact onsemi smart power stages, contributing to efficiency improvements in power delivery to GPUs and CPUs. This can lead to reduced cooling requirements and substantial energy savings, resulting in lower operational costs and a smaller, more sustainable environmental footprint.
  - **Industrial:** (improved productivity) Using integrated compute enabled through high density digital, inductive position sensors can enable real-time positioning for more accurate autonomous mobile robots, providing safer functionality in human/machine co-working environments

Q: What are the types of products that onsemi will bring to market on the platform?

- This platform provides the foundation for a wide range of power and sensing solutions from onsemi including high-performance and low-power sensing, high-efficiency power management, and purpose-built communications devices.
- We are already sampling initial product families including voltage translators, ultra-low-power AFEs, LDOs, ultrasonic sensors, multi-phase controllers, and single-pair Ethernet controllers.

- Through 2025, we expect to deliver an even broader array of product families including: high performance sensors, DC-DC converters, automotive LED drivers, electrical safety ICs, connectivity, and more.

Additional Product Details:

Multi-Customer Products Sampling now (can disclose in specificity):

Product	Segment	Value Prop
Voltage Translators (4x)	Compute - AI, Auto ADAS, Industrial (multi)	High speed/performance at low voltage
LDOs (4x)	Industrial (multi), Mobile, Camera Modules, Tablets	Leading Transient Response, Low dropout voltage
Bus Switches (4x)	Industrial (multi)	Low Iq, Highest Bandwidth
Multi-phase Controller	Compute (Client)	Low Power, Advanced Features, Simplified design
10BASE-T1S Controller	Automotive Zonal, Industrial Ethernet	Advanced Features, Performance

Single-Customer Products Sampling now (can disclose in generally only):

Product	Segment	Value Prop
LDOs (3x)	Mobile	Leading Transient Response, Low dropout voltage
Mixed-Signal ASIC	Industrial	Digital integration for test and instrumentation
Low Power AFE ASIC	CGM	Ultra-low-power, Precision
Ultrasonic Sensor Interface ASIC	Automotive ADAS (park assist)	Analog Performance

Q: Can you provide some examples of where the products built on this analog mixed signal platform will be used?

- The Treo platform covers a wide range of applications in many different industries. For example, power management integrated circuits (ICs) go into AI data center racks, zonal architectures in EVs, automotive lighting and desktop/laptop computers.

- Sensor interface products can be used in medical devices, park assist systems and factory automation as well and communications devices such as single-pair ethernet like 10BASE-T1S and LIN connectivity can be used for in-vehicle networking and industrial connectivity

- Additionally, the platform can produce standard products for mass-market industrial and mobile applications.

Q: Can this platform be used in AI applications?

- Yes, multiple product families derived from the Treo Platform solve critical problems for AI data center applications.

- For example, the Treo Platform will enable more compact onsemi smart power stages, contributing to efficiency improvements in power delivery to GPUs and CPUs. This can lead to reduced cooling requirements and substantial energy savings, resulting in lower operational costs and a smaller, more sustainable environmental footprint.

Q: Who are your customers for this platform?

- Given the breadth of product portfolio already existing built on the Treo Platform and to come, we have active design wins with a broad range of customers.
- Examples include top automotive tier ones and OEMs for ultrasonic sensing in ADAS, leaders in the medical device segment for continuous glucose monitoring, leaders in industrial test and instrumentation and a high-volume consumer company for LDOs.
- However, we are not naming any specific customers at this time.

Q: What are the advantages of using the 65nm node for the platform?

- By using the 65nm process node, we are able to offer more superior performance, enhanced functionality, and lower power consumption on a single chip without having to sacrifice on efficiency and thermal performance.

- Unlike other offerings that rely on older process nodes, this platform allows us to create a higher density, feature-rich, single-chip solution that can support high-voltage capabilities up to 90 volts.

- This allows customers to create more sophisticated, highly integrated solutions on a single platform that enhances performance and accuracy while also reducing the need for multi-chip modules. This helps to simplify the design process, reduces the required footprint and saves on time and costs.

- The end result is a more streamlined, versatile and efficient solution for applications in automotive, energy, data centers, and medical.

Q: How does the Treo Platform compare to competitive BCD platforms?

- Unlike other offerings that rely on older process nodes, this platform allows us to create a higher density, feature-rich, single-chip solution that can support high-voltage capabilities up to 90 volts.

- This allows customers to create more sophisticated, highly integrated solutions on a single platform that enhances performance and accuracy while also reducing the need for multi-chip modules. This helps to simplify the design process, reduces the required footprint and saves on time and costs.

- The end result is a more streamlined, versatile and efficient solution for applications in automotive, industrial, data centers, and medical
- *If pushed, answers on specific competitors:*
  - Global Foundries BCD 55nm, up to 120V (not announced): We have not seen a public announcement about this yet, though we are sampling and have design wins on products on the Treo Platform now. We have not seen any appreciable performance/features difference between being on 55nm and 65nm, and the market at 120V is very niche.
  - STMicro BCD 40nm (5 – 50V) (on web as in development): This has been under development for some time it seems, and is a more limited voltage range than the Treo Platform. We are already sampling 10+ products on the Treo Platform with design wins, leveraging our 65nm technology process
  - TI BCD 90nm (30 – 65V) (not announced): We have not seen a public announcement about this yet, though we are sampling and have design wins on products on the Treo Platform now, and Treo supports a wider voltage range (1 – 90V), on a smaller technology process (65nm) enabling better analog performance, higher density digital integration and smaller footprint.

Q: Who are your competitors in this space?

- Cirrus Logic, Infineon, Renesas, ST Micro, and Texas Instruments all have a BCD offering as well.

Q: Where will products built on the Treo Platform be manufactured?

- Products built on the Treo Platform will be manufactured in the onsemi 300mm Fab located in East Fishkill New York. This Fab is capable of 65nm technologies and below.
- The fab has toolsets that enable the diverse processes it takes to manufacture BCD, image sensors, and discrete power devices.
- *Reactive Only (if pushed on a second source): Should we need an additional source, we have one identified and are working through the qualification process.*

Q: How will this platform contribute to onsemi's strategic priorities or growth?

- The Treo platform will allow us to much more quickly address the growing power, performance and functionality needs our customers are facing in our key markets of automotive, industrial and AI data centers.
- Additionally, by providing a highly integrated, optimized foundation for the power, sensing and communications systems we will not only be able to speed up the design process but also reduce costs. While we meet these needs for our customers, the solution will also enable us to capture more share of wallet by making our customers lives easier.

Q: What is the market opportunity for this platform?

- With this platform, we are able to address the $36B TAM of the analog and mixed-signal market, growing at an approximately 8% 5-Year CAGR.

Q: Will this platform improve product gross margin?
- The products based on Treo will likely have gross margin up to 70%, which is accretive to our target gross margin of 53%.
- These products will be highly differentiated and will have the best performance in the industry.

General Questions

Q: What is analog and mixed signal technology?

- Analog and mixed-signal semiconductors involves integrating both analog and digital circuits on a single chip and reduce the need for multiple separate components.
- This means we are able to process continuous signals along with discrete signals in a single chip.
- With this ability, analog and mixed-signal products are able to implement for example audio data and a microcontroller in the same chip.
- This integration leads to smaller, more efficient, and cost-effective designs.

Q: Can you provide some examples of where analog and mixed signal technologies are used?

- Analog and mixed-signal technologies are all around us.
  - Automotive: Mixed-signal technology is used for infotainment, navigation, and advanced driver-assistance systems (ADAS).
  - Healthcare: Equipment such as MRI machines, pacemakers, and diagnostic tools use mixed-signal ICs for precise signal processing and data conversion.
  - Industrial: Mixed-signal technology is used in automation, robotics, and sensor systems to ensure accurate data acquisition and control.

Q: Why are analog and mixed-signal technologies used so broadly?

- Because analog and mixed-signal technologies can handle both analog and digital signals they are extremely versatile and offer flexibility in design to optimize performance, power consumption and cost according to specific application needs. This makes them ideal for a wide range of applications.
- They are crucial for converting analog signals (like sound and light) into digital data that can be processed by digital devices.
- They also consume less power compared to purely digital circuits, which is vital for improved power efficiency and battery life.
- Additionally, they enable high-performance signal processing, which is necessary for applications requiring precise and reliable data handling.

- These are all essential capabilities for automotive systems, medical equipment, industrial automation and AI data center power management.

Q: Can you explain what a BCD process technology is?

- BCD is short for Bipolar-CMOS-DMOS, is a semiconductor process technology that integrates three types of transistors onto a single chip in order to make devices more efficient and compact.
- Bipolar transistors are used for precise analog signal control, CMOS allows for digital logic and control, and DMOS transistors handles power and high-voltage elements.

Q: What are the benefits of BCD technology?

- By integrating the three process technologies into a single chip, we are able to reduce the need for multiple components and optimize power management for designing complex, efficient, and compact electronic systems.