

# ASE, Inc. Boosts Yield and Efficiency with Dragonwing's Powerful Edge AI Capabilities

Early Defect Detection, Operational Safety Compliance, and Agentic AI



CASE STUDY

## Overview/Background

ASE (Advanced Semiconductor Engineering, Inc.), a leading provider of outsourced semiconductor assembly and test (OSAT) services, serves high-growth industries like IoT, automotive, and AR/VR. To accelerate its progress in smart manufacturing vision, ASE developed a GenAI-powered maintenance support tool (internally called aMA). It selected the Qualcomm Dragonwing™ AI On-Prem Appliance Solution with Qualcomm® Cloud AI 100 Ultra cards to deliver scalable, high-performance edge AI across its cleanroom operations.

## The Challenge

Semiconductor manufacturing facilities face complex challenges in reducing downtime, promoting safety practices, maintaining high level output quality, and increasing yield, without compromising security or operational efficiency.

In cleanroom environments, traditional GPU systems are energy-hungry, bulky, and thermally inefficient. Cloud AI models can also pose risks to security and add latency to processes. ASE required a scalable, high-performance On-Premise AI solution for real-time defect detection, PPE compliance, factory automation, and GenAI copilots across lines and locations.

The high-stakes environment demanded:

- **Real-time responsiveness** for wafer inspection, defect detection, and equipment monitoring
- **Superior security features**, ruling out cloud-based AI solutions
- **Hardware compatibility with cleanroom environments**, where space, heat, and power are tightly controlled
- **Scalability** to support dozens of production lines and facilities worldwide

## Key Statistic\*

**4.4×** higher performance per watt than leading GPU alternatives for computer vision workloads (based on ResNet-50)

## Snapshot

**Customer:** ASE, Inc.

**Industry:** Semi Manufacturing

**Application:** Industrial HMI

\*Based on MLPerf™ 2.1 benchmark results comparing Qualcomm Dragonwing Cloud AI100 solution to competitor's A100 for computer vision (ResNet-50)

## The Solution

ASE deployed the Dragonwing AI On-Prem Appliance with Qualcomm Cloud AI 100 Ultra cards to run vision and language inference workloads directly at the edge. This cleanroom-optimized appliance integrates with ASE's IT and manufacturing stack to automate inspection, documentation, and onsite safety compliance tasks, without relying on the cloud.

The solution includes:

- **Real-time vision inference at scale:** Each Qualcomm Cloud AI 100 Ultra card packs 64 AI cores and delivers up to 870 TOPS (INT8) and 288 TFLOPS (FP16), enabling high-throughput for real-time wafer defect and PPE detection.
- **Generative AI on the edge:** Locally run Large Language Models power the ASE Maintenance Copilot (aMA), enabling maintenance documentation and inspection report summaries without cloud latency.
- **Industrial-grade thermal efficiency:** 150W TDP with passive cooling delivers 3.8× better performance-per-watt than NVIDIA A100 in factory environments.
- **Scalable, multi-user deployment:** Supports 1–2 AI cards per appliance and up to 40 concurrent users, ideal for global factory rollouts.
- **MES and ERP integration:** Containerized AI and standard APIs for easy integration with ASE's factory systems, enabling automated workflows and unified operations across sites.

Check out the Generative AI support here: [ASE Maintenance Support Tool \(aMA\)](#).



## Business Outcome

- Reduced downtime with faster maintenance and fewer unplanned outages through On-Prem AI diagnostics
- Predictive maintenance improved uptime and reduced equipment servicing costs per wire bonder
- Improved defect accuracy with high-throughput CV inference
- Lowered total cost of ownership by eliminating recurring cloud inference costs
- Enhanced compliance with cleanroom protocols with real-time safety monitoring
- Faster, local decision-making and root-cause analysis with On-Prem LLMs and vision copilots

Want to build smarter, faster, and more resilient systems?

- Contact us at [sales@qualcomm.com](mailto:sales@qualcomm.com)
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