EVSE NEXT GENERATION

Focus Solution for Integration Support

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THE CHALLENGE of Next Generation EVSE

Integration

Having too many controllers increases the difficulty of manufacturing and maintenance.

Scalability

Providing future-proof capacity to enhance user satisfaction and generate commercial value.

Manageability

Managing large-scale equipment remotely requires substantial manpower and there is a lack of real-time capability.

Cybersecurity

There is a networking devices necessity for remote control of EV charger assets to mitigate the risk of cyberattacks.

Advantech EVSE-Focused Solution for Integration Support

- Integrated EVSE Controller & SECC Design
- Enhanced Manageability via Out-of-Band Capacity
- Scalable in Computing and AI Capacity for Future-Proofing
- Design-in Service for Security

Integrated EVSE Controller & SECC Design

Currently, most EV chargers (EVSE) are designed as building blocks, integrating function like control, HMI, retail services, EV communication, payment, and power board interface. This design approach offers flexibility but also introduces complexity to system design, integration, production, and maintenance.

Advantech's EV-focused platform aims to offer a highly integrated solution, streamlining compatibility so that equipment builders can be unencumbered with their designs, thus creating more possibilities for ID design and enhancing the user experience.

An EV charger is a composite system in which the computing unit not only serves as an HMI but also acts as a central controller to communicate with various devices from different domains, thereby increasing complexity. It consists of a controller, HMI system, payment & billing, power meter, AC/AC or AC/DC power delivery, and additional parking lockers or camera systems.

Achieving such a system design may require additional LAN switches, I/O expanders, and protocol converters, resulting in a complex and cumbersome system that is challenging to manufacture and maintain. The Advantech EV charger platform combines essential components onto one board, making system design easier. You can now connect to all parts of the system using 3 Ethernet ports, 2 CAN bus connections, 4 RS-232/422/485 ports, 6 USB ports, an internal USB 3 port, and even optional PoE for camera connections.

Additionally, there are 3 M.2 sockets for various wireless connections and storage options. Moreover, it's adaptable for expansion to J1772 and PLC (power-line-communication) compatibility, which follows HPGP/HPAV standards for plug-and-charge functionality and future service enhancements.

- ✅ **x86 & Arm-based platform**

- ✅ **Multiple I/O options**

- ✅ **HPGP/HPAV communication interfaces**

- ✅ **Compliant with ISO15118 and main protocols**
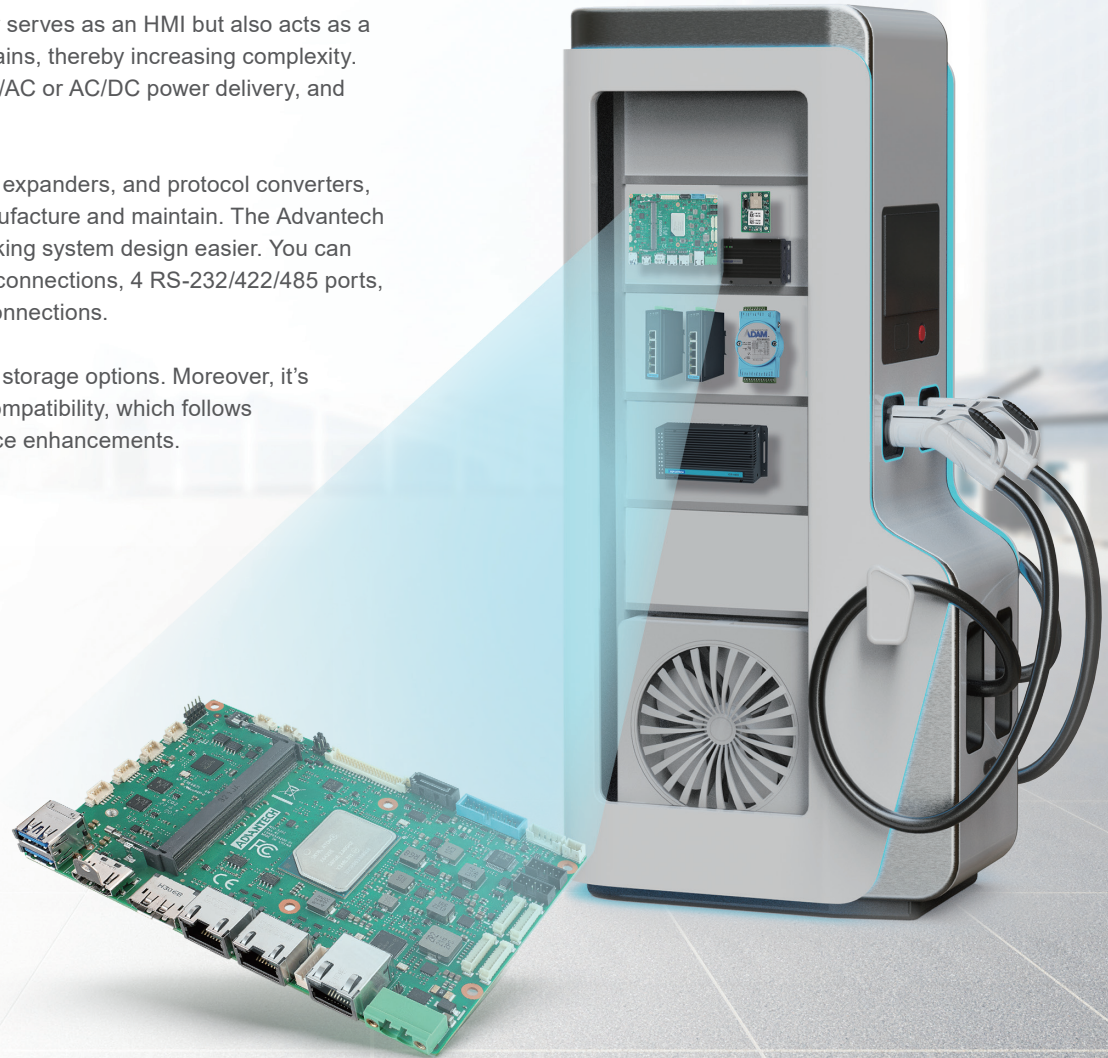
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Enhanced Manageability via Out-of-Band Capacity

In the context of the rapid deployment of EV charging infrastructure, challenges emerge in maintaining network systems. The in-band remote control primarily be triggered above the OS and application layer resulting in cybersecurity concerns.

Advantech presents a new solution called EdgeBMC. This solution introduces out-of-band (OOB) manageability, enabling monitoring and control on a hardware-level system.

EdgeBMC

EdgeBMC – Manage Anytime, Anywhere, Under Any Conditions

Out-of-band management (OOB) involves a direct network connection at the hardware and firmware layers. Unlike traditional in-band management through applications and OS layer, OOB often uses separate components like an MPU, Arm-based/RISC-V-based MCU, or embedded controller. These components work independently from the main processor and deliver essential and reliable functionalities.

While an In-Band connection is unresponsive or out of service, EdgeBMC will utilize predefined rules to initiate a connection from hardware to the BIOS, allowing it to recover from interruptions during firmware OTA updates and prevent unauthorized firmware modifications.

Furthermore, EdgeBMC serves as an industrial-grade embedded controller, integrating various I/O buses like CANbus, I2C, I3C, and high-speed UART to design features like physical buttons, gesture or light sensors, and remote control methods. These functionalities can activate the system, services, and maintain the system in a low-power state during idle modes to enhance power usage efficiency.
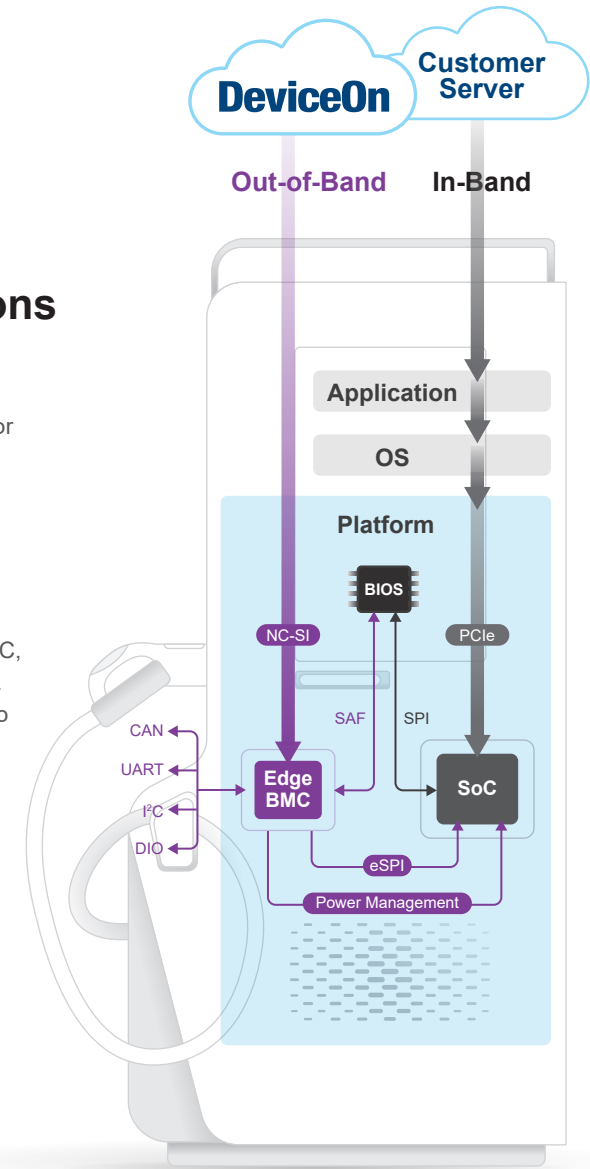
Through OOB management, EdgeBMC enhances manageability by creating a fail-safe and redundant system, leading to an improved MTBF (Mean Time Between Failures) and faster MTTR (Mean Time To Repair) services. Additionally, Advantech provides user-friendly APIs to simplify integration. Users can easily integrate with their own cloud servers or choose to utilize the Advantech DeviceOn service for a more seamless and ready-to-use platform service.

Remote Out-of-Band Connection
Maximize System Control

Versatile Industrial I/O Interface
Under System Drivers or Standalone Use Cases

Control & Monitor with Security
Power Management & BIOS SAF, Root-of-Trust

Fast Integration of Cloud Services
WISE-DeviceOn Ready with API for Developers

DeviceOn — Customer Server

Out-of-Band — In-Band

Application
OS
Platform
BIOS
NC-SI — PCIe
SAF — SPI
CAN
UART
I²C
DIO
Edge BMC — SoC
eSPI
Power Management

Scalable in Computing and AI Capacity for Future-Proofing

The growth of EV infrastructure is reshaping traditional business models, requiring innovative approaches to maintain profitability while providing enhanced services to EV users. Traditional gas stations primarily rely on customer traffic for revenue. As the electric vehicle (EV) market keep growing, EV owners tend to charge their vehicles at home to reduce charging costs. This shift also impacts the future revenue streams of traditional and EV charging stations. Additionally, a variety of power sources (including charging grid, renewable energy with energy storage) lead to discussions about workload balancing and electricity management to achieve the most effective return on investment.

Considerations for Next-Level Expansion Technologies of EV Chargers:

- Workload Balance
- Generation of Revenue Streams
- Intelligent Route Planning and Charging Optimization

Expanding charging station features with Kiosk & Retail options is the future trend of charging station development to generate revenue streams. By using smart digital displays or signage with AI inference and camera detection, the station can show tailored ads, services, and sales offers based on user profiles and memberships. This keeps users are willing to stay longer, benefiting station owners by increasing revenue, addressing high installation and maintenance costs, thus potentially improving energy efficiency through workload balancing. For example, users could view ads for e-commerce or order food from nearby restaurants while charging, thus extending their stay to boost potential revenue and indirectly contribute to enhanced workload balancing in power usage for the charging station.

Furthermore, intelligent route planning enhances EV charging efficiency and workload balance by offering optimized charging plan. Users can plan their travel routes in advance, and the charging site will allocate parking with reserved spots. Upon arrival, the cameras will identify members and license plates, automatically releasing the designated space. This creates a more flexible power facility infrastructure and enhances profitable site management.

Advantech's next generation EVSE solution provides multiple, high-quality displays in company with PoE & internal USB3 interfaces to ease camera integration. With the build-in scalable computing, multi-stream hardware media transcoding, graphics rendering, and AI framework, it brings the huge possibility to implement innovative services hence benefit whole value chain.

Ease Camera I/O
PoE Extension, Internal USB3

AI Computing
Silicon Supported AI Framework

Content Display & Rendering
• Multiple 4K/8K Displays
• HEVC/H.264 Multi-Streams HW Acc.
• 3D Rendering Acc. on DirectX & OGL

Revenue Stream Generating

Workload Balancing

Charging now to get **15%** OFF

Embedded Software & Security Solutions

As the demand for computation and communication grows, EV charging systems (EVSE) become increasingly susceptible to a single point of attack, which could lead to widespread failures in the electrical grid.

Regulators around the world have been demanding comprehensive security protection for critical EV infrastructure. The ISA/IEC 62443 standard serves as the guiding framework for this security. Leveraging 40 years of embedded computing expertise, Advantech provides practical tools and services to strengthen security measures and guide your EVSE toward compliance with these standards.

Advantech Solutions

- Boot Management with TPM
- 10-Year Long-Term Support: Ubuntu and Windows IoT
- Secure, Zero-Touch Onboarding and Provisioning
- Data Transportation during Daily Operation
- System Recovery and Failover

Security Stack for IEC 62443 Requirements

Life cycle management	**DeviceOn**	• Secure State and Life Cycle Management • Anomaly Detection and Reaction	• Secure Communication (Protocols) • Compliance and Auditing	**IEC 62443-3-3** SR1.1/ SR1.2/ SR1.3/ SR1.8/ SR1.11/ SR2.8/ SR2.9/ SR2.11/ SR3.3/ SR4.1/ SR4.3/ SR7.3

Security Application

	Trellix	**Embedded Security Solution** • Configuration Toolkit • Whitelist Protection • No Need Virus Code	**Windows UWF and Ubuntu OverlayFS** • Software Isolation • Reliable Control Transfer	**IEC 62443-4-1** SR-2: Threat Model SD-2 Defense in Depth Design SI-1: Secure Implementation Review SI-2: Secure Coding Standards SVV-3 Vulnerability Testing SUM-4: Security Update Delivery
	Acronis	**Backup & Recovery Solution** • Whole System Backup • Runtime Incremental Backup • One Key Recovery	**Windows' Bitlocker and Ubuntu's LUKS** • Full Disk Encryption • Secure Key Management • Centralized Management and Recovery • Data Integrity and Authentication	

Operation System

Advantech SUSI API

Windows **ubuntu** • Secure Update Mechanisms • Secure Policy Compliance • 10 years long-term support

IEC 62443-4-1

Component Requirement (CR)

CR 1.2.x/ CR 1.5.x/ CR 1.8.x/ CR 1.9.x/ CR 1.14.x/ CR 2.4.x/ CR 2.12.x/ CR 3.1.x/ CR 3.4.x/ CR 3.8.x/ CR 3.9.x/ CR 3.10.x / CR 3.11.x/ CR 3.12.x/ CR 3.13.x/ CR 3.14.x/ CR 4.1.x/ CR 4.2.x/ CR 4.3.x/ CR 7.3.x

BIOS Bootloader

• Secure Boot   • Trust Zone hardware architecture and Arm Secure Boot
• Boot Guard   • Failover-dual boot

HW (Longevity)

TPM 2.0
SQFlash
EdgeBMC

• Cryptographic Operations
• Cryptographic Key and Certificate Store
• Cryptographic Key Generation and Injection

• Residual Information Purging
• Secure (Encrypted) Storage

Embedded Device Requirement (EDR)
Host Device Requirements (HDR)

DR 2.4.x/ DR 3.10.x/ DR 3.11.x/ DR 3.12.x/ DR 3.13.x/ DR 3.14.x

Advantech Versatile Resolution Package

Advantech provides a total solution offering comprehensive and convenient package components, including the brain-like EVSE Controllers to handle advanced computing for sophisticated functionalities, ruggedized HMI/Signage Displays, versatile Unmanaged Ethernet Switches, WLAN Communication Modules with OCPP, efficient data-processing Edge Gateways, robust RTD Ethernet I/O Modules, and high-speed 5G/LTE Routers.

These holistic solutions offer reliable integrated services and maintenance to clients, effectively assisting them in obtaining optimal solutions as they navigate the dynamically evolving market.

A EVSE + SECC

AFE-E350 3.5" SBC

- Integrated PLC, CAN, LAN, UART
- EdgeBMC OOB Manageability
- DC 12~24V, -40C~85°C Op.
- Conformal coating service
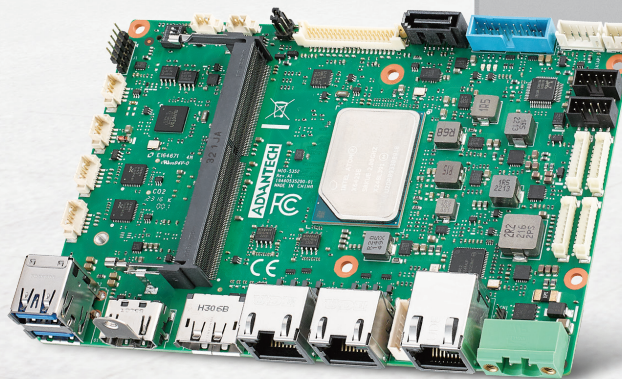
B Unmanaged Ethernet Switch

EKI-2525I
- 5/8 Fast Ethernet auto MDI
- V_{DC} 12~48V & P-Fail relay
- Wide temp. -40~85°C

C High Bright Display

IDK-2115
- 15" 1024x768 resolution
- 1200nits delivers superior sunlight readability
- Thermal solution improve reliability

D Signage Display

DSD-3055
- 55" UHD resolution 3840 x 2160
- 178/178 view angle, SPKR 10W x2, VGA/HDMI/DP
- Backlight lifetime 50,000 hr
- 5~45°C, 500nits, 4000:1

E Communication Module

BB-WLNNA
- ARM9 600MHz/128MB DDR
- OpenWrt support
- Serial / UART / Ethernet to Dual Band Wi-Fi
- OCPP v1.6J/2.0.1 compatible
- Wide operating temperature -30 ~ 85°C

F Edge Gateway

EPC-R3220
- TI Sitara AM3352 Cortex-A8
- 6x DIO, 2x RS232/485
- USB OTG, 2x LAN, MicroSD
- V_{DC} 12~24V, -20~70°C

G RTD Ethernet Remote I/O

ADAM-6015
- 7-channel RTD
- Protocols: Modbus TCP, RESTful API, ASCII
- GCL to perform basic logic control rules
- Peer-to-Peer function for I/O status mapping
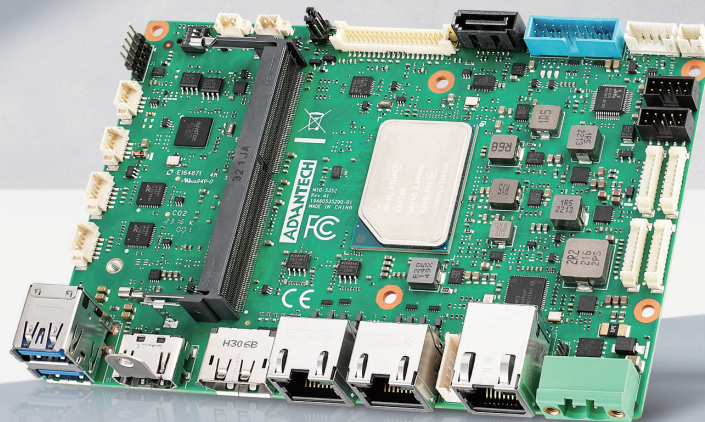
H 5G/LTE Router

ICR-4461
- 5G NR, Sub-6GHz, global band
- Dual SIM, eSIM ready
- Open platform allows custom scripts
- Free Router APPs with containers for security, protocol conversion and remote monitoring

INSPIRE

The Next Level of EVSE

AFE-E350

3.5" SINGLE BOARD COMPUTING

11th Gen. Intel® Core i7/i5/i3/Celeron® 3.5" SBC

- LVDS, HDMI2.0, DP1.4, 3-independent displays
- 2x CAN/-FD, 4x RS-232/422/485, 3x Ethernet, 2x Extend PLC
- 3x M.2 E-Key, B-Key, M-Key for WiFi, cellular, and storage
- Wide 12-24V, Extended -40~85C Operating Temperature
- EdgeBMC out-of-band manageability and software API
- Intel Atom x6000E processor series
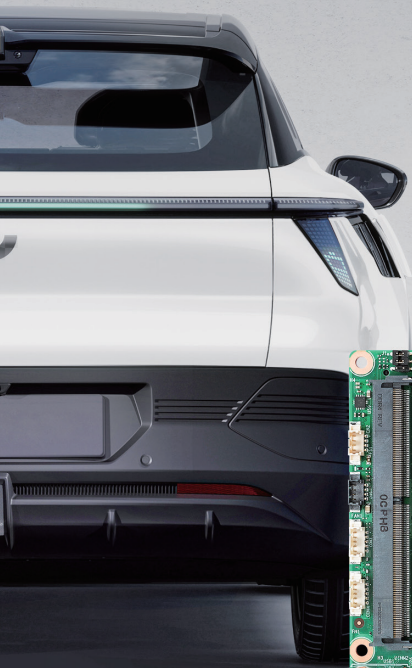
MIO-5376
3.5" SINGLE BOARD COMPUTING

MIO-5377
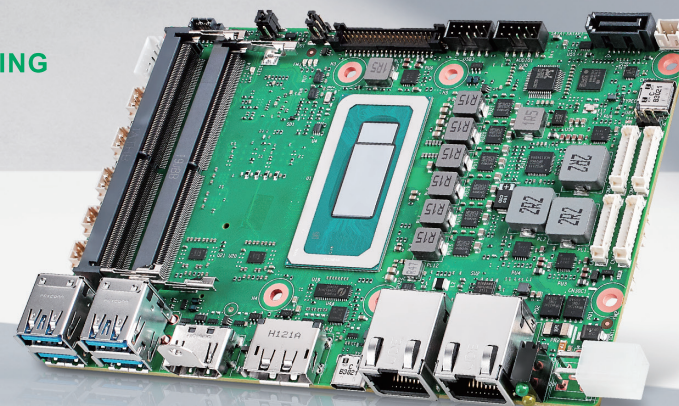### 3.5" SINGLE BOARD COMPUTING
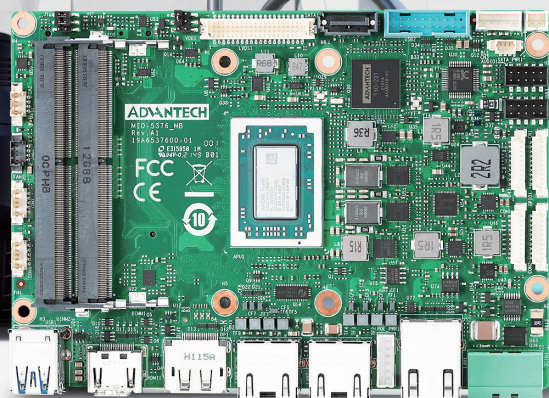
AMD Ryzen™ Embedded R2000 Series 3.5" SBC

- AMD Ryzen Embedded R2000 Processor with Quad Cores, TDP 15W/ 28W
- Dual Channel DDR4-2667 up to 32GB
- 3 simultaneous displays: LVDS/HDMI/DP
- 3 GbE, support optional PoE PSE Dual port 15.4W (Module: MIOe-PSE)
- Expansion: M.2 E-Key/ B-Key/ M-Key (supports NVMe)
- Supports iManager & Software APIs, WISE-DeviceOn

12th Gen. Intel® Core i7/ i5/ i3 P-series 3.5" SBC

- 12th Gen. Intel® Core™ Processor up to 12 Cores, TDP 28/15W
- Dual Channel DDR5-4800 up to 64GB
- 4 simultaneous displays: LVDS/ HDMI/ DP/ USB-C Alt. DP
- 2 GbE, 6 USB, USB4/ TBT4, 4 UART, 2 CANBus, 3 I2C
- 3 Expansions: M.2 E-Key, B-Key, M-Key (support NVMe)
- Supports iManager & Software APIs, WISE-DeviceOn

Why Advantech

Advantech is a leading provider of innovative products, services, and solutions. We offer comprehensive system integration, hardware, software, customer-centric design services, embedded systems, and global logistics support. We work closely with our partners to provide complete solutions for a wide range of applications in different vertical segments.

ADVANTECH
Enabling an Intelligent Planet

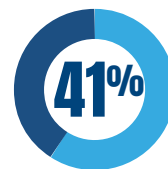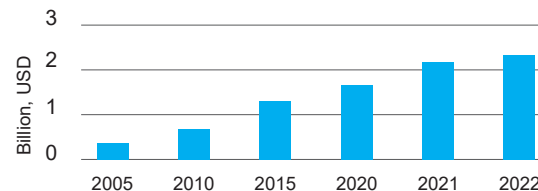**Est. 1983**
Headquarters: **Taipei, Taiwan**

INDUSTRIES SERVED

Industry 4.0, Industrial IoT, Embedded Computing, Medical, Retail, Logistics

$8.83B MARKET CAP
(Jan., 2023)

HONORS & AWARDS

- No.5 in Best Taiwan Global Brands
- No.17 in Top 50 Global Automation Vendors
- No.9 in Top 100 Industrial IoT Companies
- Red Dot Product Design Award
- iF Product Design Award

Interbrand

CONTROL

IoT ONE

reddot design award

iF

WORLD'S LARGEST IPC COMPANY

Advantech IPC WW Market Share

41%

- ● Advantech
- ● Other IPC Companies

Source: OMDIA – Market Share estimates for Industrial PCs: World, 2022 Edition

$2.31B 2022 REVENUE

Billion, USD

	2005	2010	2015	2020	2021	2022

KEY ECO-SYSTEM PARTNERS

arm

intel partner Titanium

Microsoft

Micron

AMD Embedded Solutions

nvidia ELITE PARTNER

NXP GOLD PARTNER

Canonical Ubuntu

and more...

QUALITY SYSTEMS IN PLACE

- ISO9001
- ISO14001
- ISO13485
- ISO17025
- ISO27001
- ISO45001
- TL9000
- RoHS
- WEEE
- SONY GP
- REACH

1.8 MILLION+ sq. ft.

MANUFACTURING PLANTS

Linkou, Taiwan

- 8 SMT lines
- Engineering sample services
- Complex product lines
- Flexible & quick production

Kunshan, China

- 11 SMT lines
- Chassis design & production
- Mature product lines
- Cost-effective production

Nogata, Japan

- 4 SMT lines
- Japan design center, CTOS service, logistics center, repair center

WORLDWIDE OFFICES

Manufacturing	3
On-site service	4
Design centers	11
CTOS centers	16
Repair centers	17
Logistics centers	20

More than 90 offices globally!

8700+ EMPLOYEES

Regional Service and Customization Centers

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Hochiminh	84-28-3836-5856

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