

ADVANTECH

Enabling an Intelligent Planet

Compact & Modular DAQ Solution

- Advantech Overview
- Market Trend
- iDAQ Series Introduction
- Case Studies
- Product Portfolio



ADVANTECH iAutomation
Premier Partner



Modular I/O for
Mixed-Measurements



Scalable and
Synchronized



Flexible
Communication
Interfaces



Rugged for Outdoor
Applications

Ihr
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ADVANTECH

Enabling an Intelligent Planet

Est. **1983**

Headquarters: **Taipei, Taiwan**

INDUSTRIES SERVED

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



\$10.2B MARKET
CAP (USD)
(March, 2025)



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

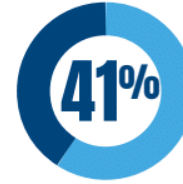


WORLD'S LARGEST IPC COMPANY

Advantech IPC WW Revenue Share

● Advantech ● Other IPC Companies

Source: OMDIA – Market Share estimates for
Industrial PCs: World, 2024 Edition



\$1.87B 2024
REVENUE
(USD)

KEY ECO-SYSTEM PARTNERS

intel

Microsoft



Micron

AMD

Canonical
Ubuntu

TEXAS
INSTRUMENTS

arm

NXP

Qualcomm

MEDIATEK

and more...

QUALITY SYSTEMS IN PLACE

- ISO9001
- ISO14001
- ISO13485
- ISO17025
- ISO27001
- ISO45001
- TL9000
- ISO50001
- RoHS
- WEEE
- SONY GP
- REACH

1.8 MILLION+ sq. ft.

MANUFACTURING PLANTS

Linkou, Taiwan



- 9 SMT lines, 16 system lines
- Engineering sample services
- Complex product lines
- Flexible & quick production

Kunshan, China



- 12 SMT lines, 13 system lines, 6 chassis lines
- Chassis design & production
- Mature product lines
- Cost-effective production



Nogata, Japan

- 4 SMT lines, 1 system line
- 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!

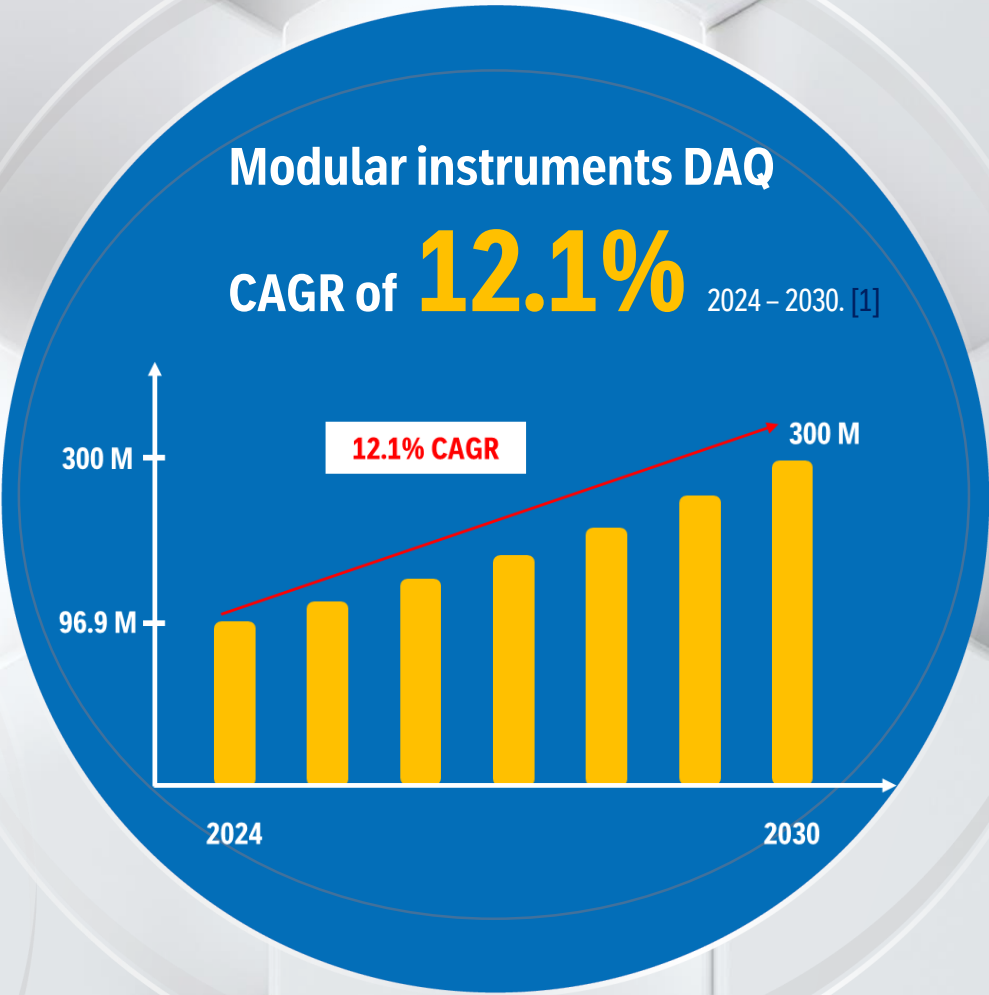
8800+
EMPLOYEES



Market Trend

Driven by **Edge Computing** trends, the market is shifting from plug-in DAQ to modular, standalone systems—addressing challenges such as long-range data transmission, complex testing, and space constraints.

Modular DAQ instruments enable **real-time processing**, **flexible deployment**, and **simplified integration** to meet evolving test and measurement demands.



[1] Grand View Research. Data Acquisition (DAQ) Modules - Modular Instruments Market Statistics. [Source](#)

iDAQ Series: Modular, High-Speed DAQ Built for the Edge

Addressing challenges like limited space, synchronized high-speed acquisition, and complex integration, iDAQ delivers a rugged, modular DAQ platform with customizable I/O, seamless synchronization, and USB/Ethernet connectivity for efficient, reliable mixed-signal acquisition.



Compact, Rugged & Versatile

Simplifies measurement setups with durable and flexible connectivity.



High-Speed, Precise & Synchronized

Scalable, synchronized I/O enables 1 MS/s, 24-bit mixed-signal and multi-sensor acquisition with precision.



Simplify DAQ Deployment

DAQNavI SDK streamlines development with multi-OS support, built-in tools, and sample code.



Semiconductor Equipment

Wafer testing & Early earthquake detection



EV Autopart

Component validation & NVH reliability testing



Electronics Manufacturing

PHM & production traceability for EOL testing



Electric Power & Renewable Energy

Vibration & Partial discharge monitoring



Modular design for
Mixed-Measurements



Scalable &
Synchronized



Flexible Communication
Interfaces



Rugged for Outdoor
Applications

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Key Features

Plug-and-Play solution for Versatile Measurement



- **Unified Modules:** Various iDAQ modules integrated into a single virtual device with simplified control.
- **High Resolution:** Up to 24-bit.
- **High Speed:** Up to 1 MS/s per channel.
- **Sensor-Specific Modules:** Designed for sound, vibration, strain, and load measurements.



Rugged, Compact Design for Harsh Environments

- **Compact Size:** 100 mm (H) × 178 mm (W) ; 278 mm (W) with AMAX-5580 Edge Controller.
- **Wide Temperature Range:** -40 to 70°C (USB series: -20 to 60°C)
- **Aluminum Alloy Enclosure:** Enhances noise shielding and EMI protection.
- **DB15 Connector:** Vibration-resistant; tested to 5 Grms random vibration and 30 G shock.



Easy Scalability and Expandability for Future Growth

- **Hot-Swappable I/O Modules:** Flexibly insert into the chassis to quickly build custom systems.
- **Variety of Base Units:** USB, Ethernet, and standalone options with multiple slot configurations for easy expansion.
- **Configuration Files:** Simplify duplication of acquisition parameters.
- **Clock and Trigger Sync:** Achieved through backplane.



Free and Easy-to-Use SDK for All Tasks and Devices

- **Intuitive Setup:** Easy device configuration with graphical interfaces and predefined profiles.
- **Language & Language Support:** Compatible with C#, Python, .NET, C and LabVIEW..
- **Real-Time Tools:** Utilities for fast data acquisition and analysis.
- **Device Flexibility:** Works with a wide range of Advantech DAQ devices.

Compact, Reliable & Flexible

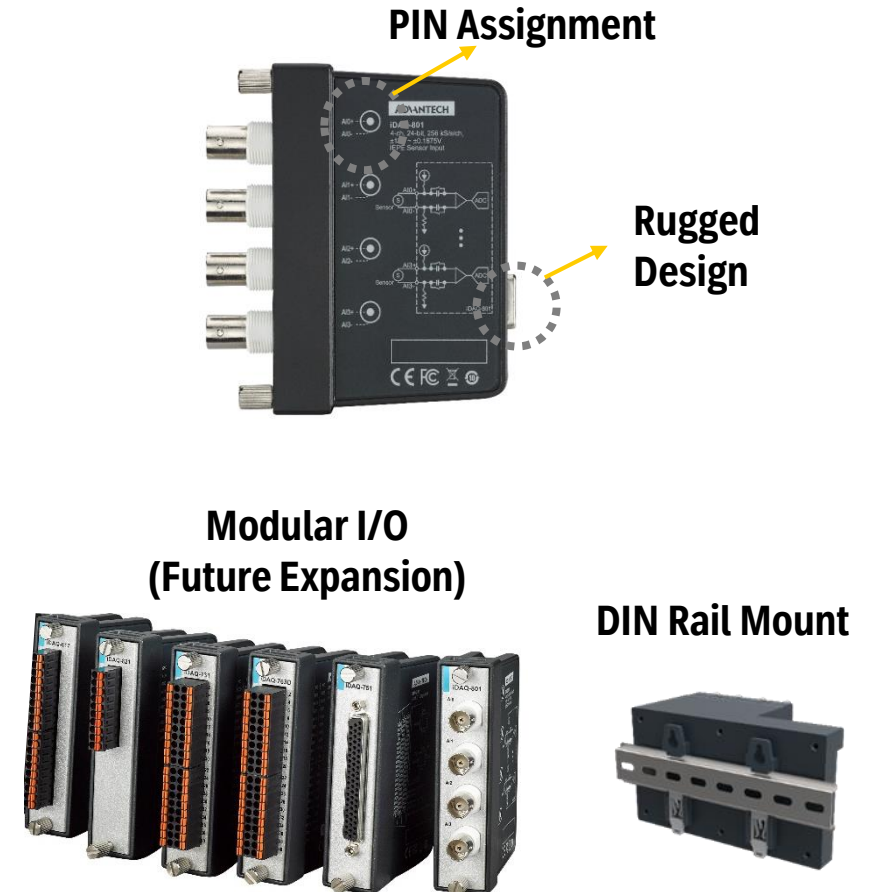
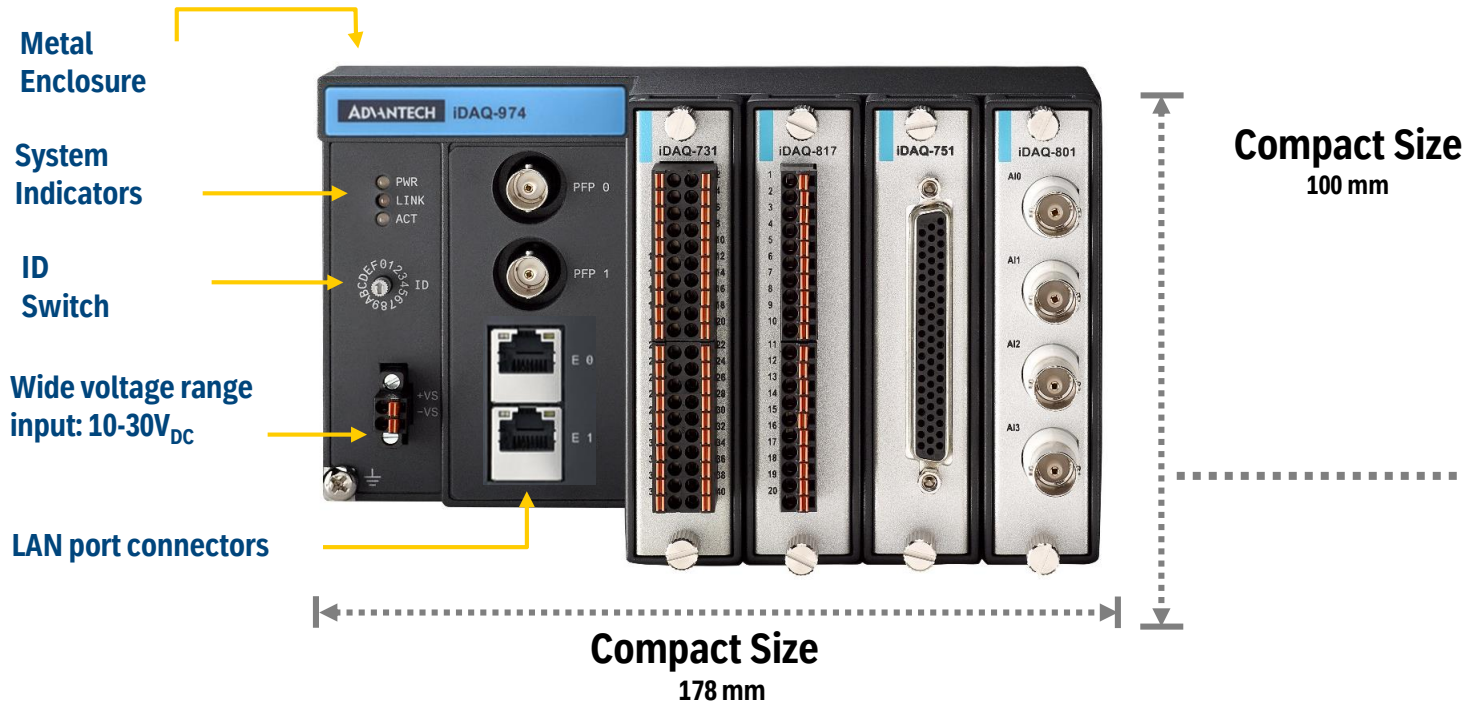
Designed to deliver robust performance in harsh environments with a scalable, future-proof design to meet evolving measurement demands.

- **Robust Performance in Harsh Environments**

iDAQ offers a compact, reliable, and flexible acquisition solution with a rugged metal enclosure that ensures stable performance under challenging conditions.

- **Scalable Design for Future-Proof Solutions**

Its modular design and diverse I/O modules enable seamless scalability to meet evolving measurement demands.



Easy to Scale. Easy to Sync.

Streamlined integration with modular I/O and seamless sync for diverse, multi-channel sensor data.

- **Synchronized Measurement for Enhanced Accuracy**

iDAQ system enables synchronized measurement across diverse modules, easily integrating vibration, temperature, strain, or analog/digital signals into customized setups. With real-time synchronization between multiple modules, it effectively addresses complex testing scenarios, ensuring greater accuracy and efficiency for various applications.

Expand Channel Counts

Scale Sensor Connection
16-ch IEPE Input



Synchronization
Fusion

Multi-Function

Mixed Signal Capability
16-ch AI, 4-ch AO, 16 DI/16 DO



Synchronization
Fusion

Mixed Measurement Type

Conditional Monitoring
4-ch Vibration, 8-ch Temperature, 4-ch Bridge Type



Synchronization
Fusion



DAQNavi: One Platform. Local to Remote.

Single DAQ platform for local USB and remote Ethernet — all powered by DAQNavi.

DAQNavi

Local Connection *Close & Direct*



USB Connection

- Plug-and-play USB connectivity
- Separated DAQ device, ease of maintenance



All-in-one + AMAX-5000

- One-stop standalone, small scale
- Local data collection with data processing/data logging

Remote Extension *Far & Wide*



Ethernet Connection

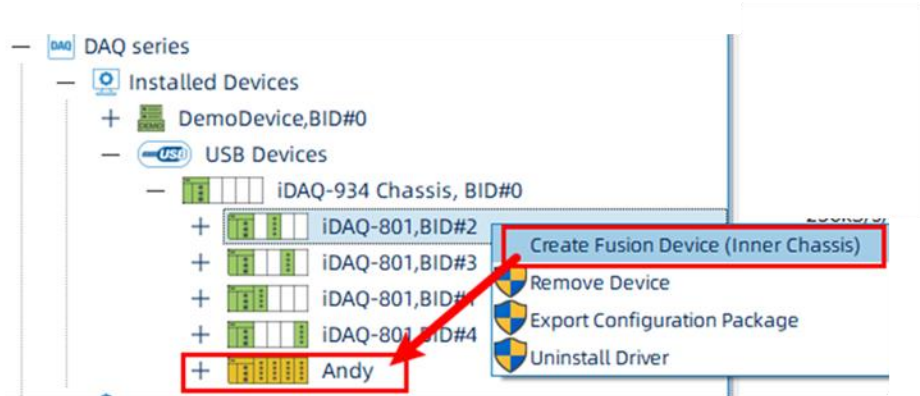
- Ready-to-deploy Ethernet networking
- Remote connection for larger measurement range



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Fusion: From Setup to Sync-up – All in a Click.

Simplify Setup. Streamline Code. Synchronize Smarter.



Create Fusion with One Simple Click.



Simplify

- Setup
- Coding
- Configuration



```
void BDAQCALL OnDataReadyEvent0(...)  
{  
    int32 returnedCount = ...;  
    ...  
    WaveformAiCtrl * waveformAiCtrl0 = (WaveformAiCtrl *)sender  
    { ... }  
}  
void BDAQCALL OnDataReadyEvent1(...)  
{  
    int32 returnedCount = ...;  
    ...  
    WaveformAiCtrl * waveformAiCtrl1 = (WaveformAiCtrl *)sender  
    { ... }  
}  
void BDAQCALL OnDataReadyEvent2(...)  
{  
    int32 returnedCount = ...;  
    ...  
    WaveformAiCtrl * waveformAiCtrl2 = (WaveformAiCtrl *)sender  
    { ... }  
}  
void BDAQCALL OnDataReadyEvent3(...)  
{  
    int32 returnedCount = ...;  
    ...  
    WaveformAiCtrl * waveformAiCtrl3 = (WaveformAiCtrl *)sender  
    { ... }  
}
```

```
void BDAQCALL OnDataReadyEvent0(...)  
{  
    int32 returnedCount = ...;  
    ...  
    WaveformAiCtrl * waveformAiCtrl0 = (WaveformAiCtrl *)sender  
    { ... }  
}
```

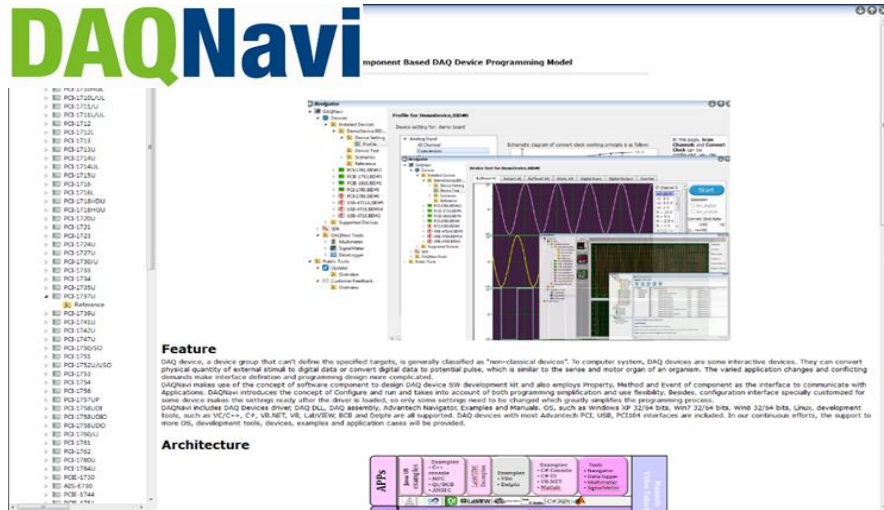
Simple. Clean. Streamlined



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DAQNavi SDK: Powering Efficient DAQ Development

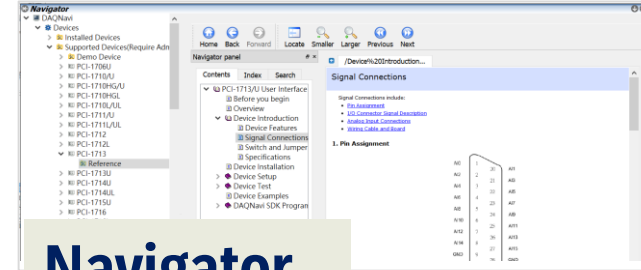
Designed to streamline DAQ application development by providing cross-platform drivers, APIs, and tools for fast, flexible system integration.



- **Streamlined Toolkit for Fast, Flexible DAQ Deployment**

DAQNavi SDK is an all-in-one toolkit for developing DAQ applications with Advantech devices, offering drivers, APIs, and examples for fast integration across Windows, Linux, and ARM platforms.

Utility



Navigator

- **Comprehensive Utility for Simple, Efficient DAQ Setup**

Navigator is a comprehensive utility with a UI, offering hardware references, device configuration, calibration, testing scenarios, and programming references throughout the entire development cycle.

```
root@toLinux1804-Default-string:/opt/advantech/tools# ./dndev /dd:LDAQ-821,BID#17 -detail
Device description you have entered:LDAQ-821,BID#17
Find 1 devices on PC by your input.
Detail information of device 0 (LDAQ-821,BID#17)
Device Number: 0
Description: LDAQ-821,BID#17
ProductID:0x84B
Board ID: 17
Driver version: 4.0.4.0
DLL version: 4.0.4.0
#1/Slot#1
```

DNDEV

- **Lightweight Tool for Fast, Remote Device Management**

DNDEV is a lightweight, command-line device management tool without a UI, supporting firmware updates, calibration, information queries, and remote device scanning functions.

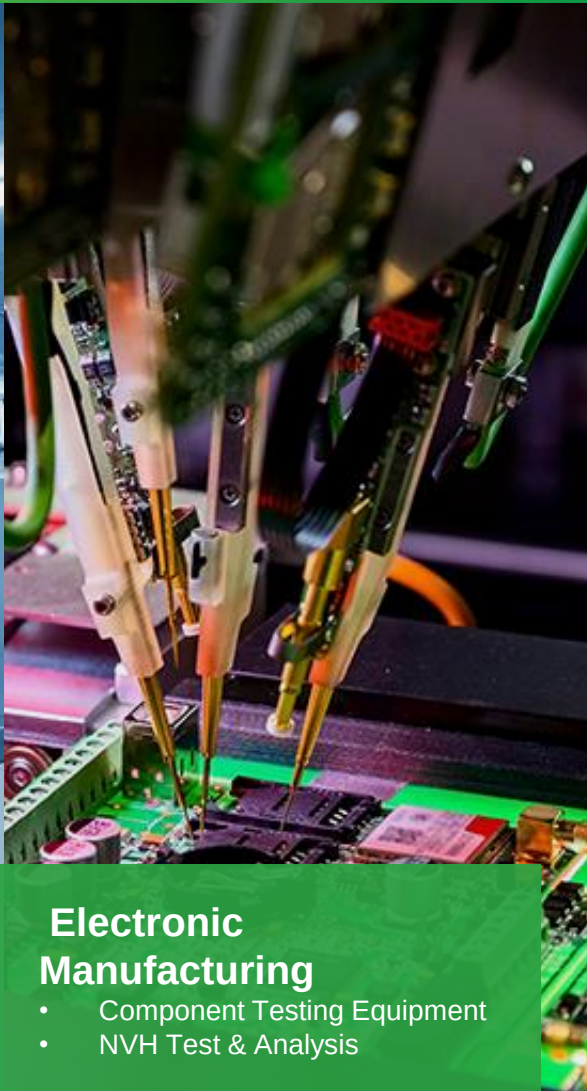


High-Growth Market to Target



Semiconductor

- Wafer Testing Equipment
- Early Earthquake Detection



Electronic Manufacturing

- Component Testing Equipment
- NVH Test & Analysis



EV Autopart

- PHM for Manufacture Equipment
- Production Traceability Application



Electric Power & Renewable Energy

- Partial Discharge Monitoring
- Vibration Monitoring for Wind Turbines



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Micro-Vibration Measurement System Ensures Semiconductor Fab Safety During Earthquakes

Case Study 1



Overview

Semiconductor manufacturing requires extreme precision and is highly sensitive to vibrations from internal or external sources, including earthquakes. Micro-vibration systems, essential in earthquake-prone Taiwan, detect initial P-waves, providing 5–30 seconds early warning before destructive S-waves arrive, protecting equipment, ensuring safety, and minimizing damage.

Challenges / Requirements:

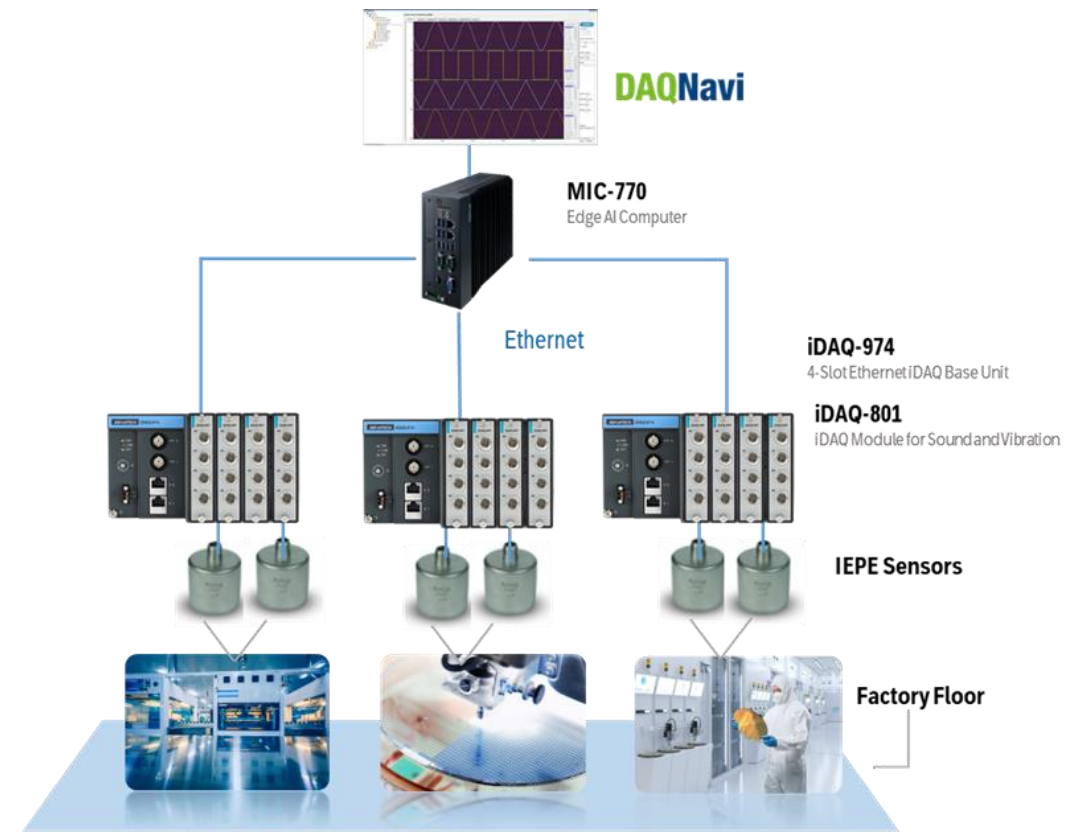
- Detect micro-vibrations (2–100 Hz, <50 $\mu\text{m/s}$ amplitude)
- High-end system for subtle vibration identification
- IEPE sensors installed between building floors
- DAQ modules with wide dynamic measurement range
- Synchronization across DAQ modules for simultaneous acquisition

Solution:

- iDAQ-974 Ethernet chassis holds up to four iDAQ-801 cards for distributed fab vibration monitoring
- iDAQ-801 DSA module (4-ch, 24-bit, 256 kS/s, IEPE) captures micro-vibrations with lab-grade accuracy
- Gigabit Ethernet + PTP ensure phase-aligned data across multiple floors, no long analog runs
- DAQNavi SDK with Python/LabVIEW APIs speeds integration of early-warning analytics

Benefits:

- Early warning up to 30s before damaging seismic waves
- Precise, synchronized vibration monitoring across 64 nodes
- Fast setup and easy system scaling with DAQNavi SDK





Overview

NVH (Noise, Vibration, Harshness) is key to vehicle quality and comfort. While traditional cars face low-frequency engine noise, EVs struggle with high-frequency motor noise. With one-third of vehicle failures NVH-related, automakers invest up to 20% of R&D to reduce noise and enhance ride experience.

Challenges / Requirements:

- Support 32-channel microphone input with IEPE/ICP compatibility
- Up to 256kS/s per channel for high-resolution acoustic capture
- Sampling clock synchronization across all channels and chassis
- Phase-aligned acquisition for accurate sound source localization
- Hot-swappable I/O modules for easy maintenance and minimal downtime

Solution:

- iDAQ-934/938 chassis supports 4 to 8 DAQ modules for flexible NVH system configuration
- Compatible with MIC-770 fanless embedded system for reliable edge computing
- DAQNavi SDK supports multiple programming languages, including Python
- Ideal for both new deployments and system upgrades
- Modular design allows rapid setup tailored to specific project needs

Benefits:

- Synchronized voltage, current, torque, and encoder measurement ensures accurate powertrain analysis
- High-speed, high-resolution data acquisition enables real-time EV testing and performance validation
- Turnkey integration with DAQNavi SDK shortens setup time and reduces development workload



High-performance Power Analyzer for Testing of Electrical Vehicles

Case Study 3



Overview

This project focuses on a car manufacturer applying specific testing and measurement tools for EV powertrains during their development and testing stages. The goal is to ensure that each individual component, as well as the entire powertrain system—including control mechanisms, motor operation, and drive signal feedback—meets stringent quality standards. Only after passing these comprehensive tests can the system proceed to on-road trials.

Challenges / Requirements:

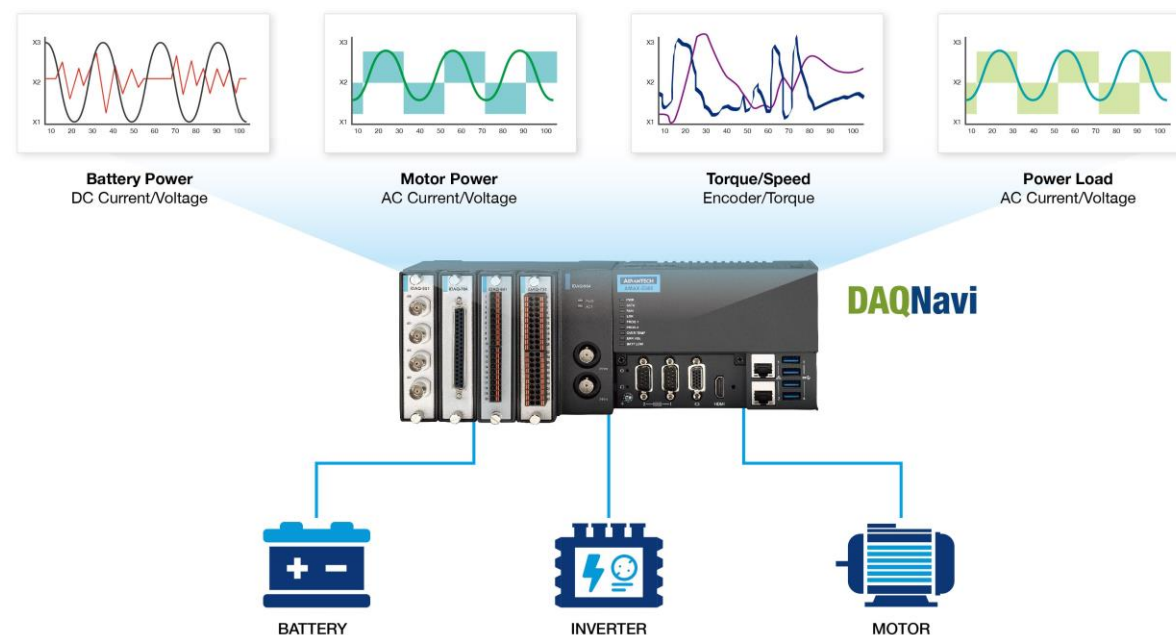
- Mixed signal type sampling: voltage, current, torque, encoder...etc.
- Synchronized sampling
- All-in-one system for local data analytics

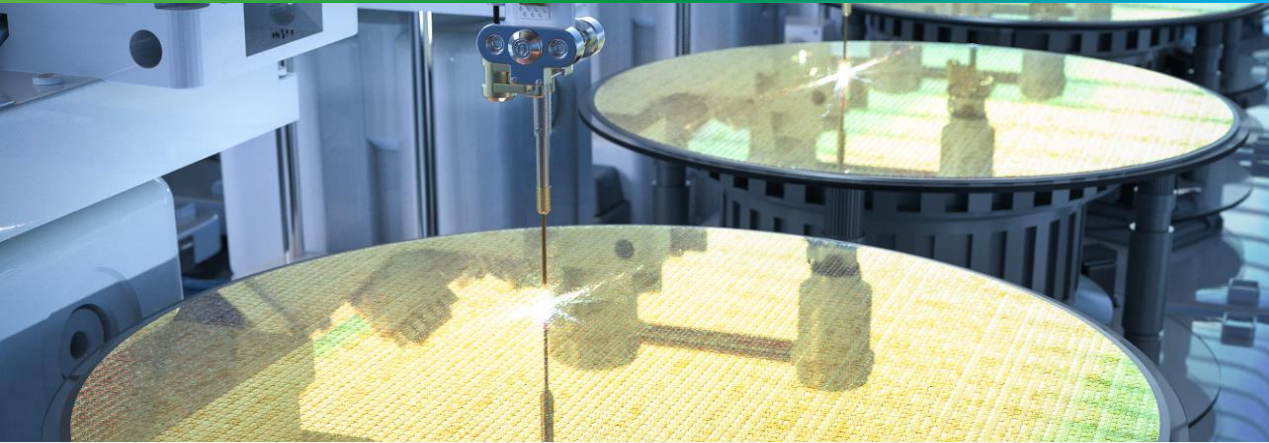
Solution:

- AMAX-5580, iDAQ-964 as computing and data acquisition platform
- iDAQ-841 for current, voltage and torque measurement and iDAQ-784 for encoder, speed measurement
- All modules provide buffered acquisition, synchronized together for post analysis

Benefits:

- Mixed-signal acquisition with just two DAQ models simplifies system setup
- Compact, synchronized design streamlines wiring and saves space
- Plug-and-play architecture ensures easy installation and maintenance





Overview

The system is monitoring and controlling the process recipe & condition during the fabrication process. The etching process uses plasma or laser to remove the material on the wafer. It needs to control the power of the RF that generates the plasma, so that the etching process becomes repeatable. The atmosphere and temperature should be set at a steady status. The sensors are distributed inside the chamber for different measurement requirements, such as temperature, etching power, pressure...etc.

Challenges / Requirements:

- 64-ch analog input, sampling rate up to 200kS/s
- Easy to maintain, hot swappable I/O modules
- Small dimension and easy system integration

Solution:

- iDAQ-817*8 + iDAQ-938 for 64-ch measurement.
- Hot-swappable iDAQ modules and USB interfaced base unit
- Compact size with easy signal connections

Benefits:

- High-density DAQ system combines multiple measurements in one compact setup
- Plug-and-play design enables fast deployment and low-maintenance operation



MIC-770

Edge AI Computer

USB



iDAQ-938

8-slot USB 3.0 iDAQ Base Unit

iDAQ-817

200kS/s, 16-bit, 8-ch Analog Input iDAQ Module





Overview

The stamping press is a machine used to shape or cut metal by deforming it with a die. To generate the cutting/forming action, the process follows a specific traveling trajectory formed by a mechanism such as a mechanical linkage or cam. The traveling trajectory, stamping speed, and motor feedback are crucial ingredients of the process quality. Getting these data back could help engineers improve the process quality.

Challenges / Requirements:

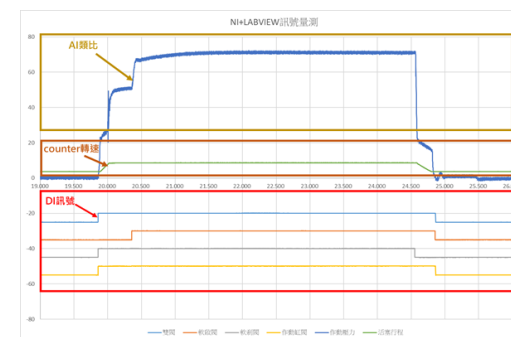
- Mixed signal acquisition: voltage/current, vibration, encoder (speed, trigger), digital Inputs
- Synchronous acquisition for all the signals, and trigger by encoder tick
- Small dimension, plug and play that can be installed on a cart

Solution:

- iDAQ-801 + iDAQ-817 for vibration, current, and voltage acquisition
- iDAQ-784 for encoder acquisition, and position compare triggering
- iDAQ-731 for all the control signals
- Plug and play base unit iDAQ-934 providing USB3.0 connectivity and timing synchronization

Benefits:

- Integrated synchronous acquisition among different types of signals
- Ease of signal connection, smaller space consuming
- Plug and play, easy maintenance



MIC-770
Edge AI Computer

USB

iDAQ-934
4-Slot Ethernet iDAQ Base Unit



**iDAQ-801 + iDAQ-817 +
iDAQ-784 + iDAQ-731**
iDAQ Module for mixed
measurement



Rotation Speed

Torque (voltage, current)

Digital I/Os

Vibration





Overview

The condition monitoring and predictive maintenance becomes more and more important gradually, especially for the factories that automation is fully introduced, and some places that rarely reached by human such as off-shore wind turbine. The systems monitor the critical parts of the machine, generating alarms whenever abnormal phenomenon is observed. The remote engineers can start planning the maintenance schedule after receiving those alarms.

Challenges / Requirements:

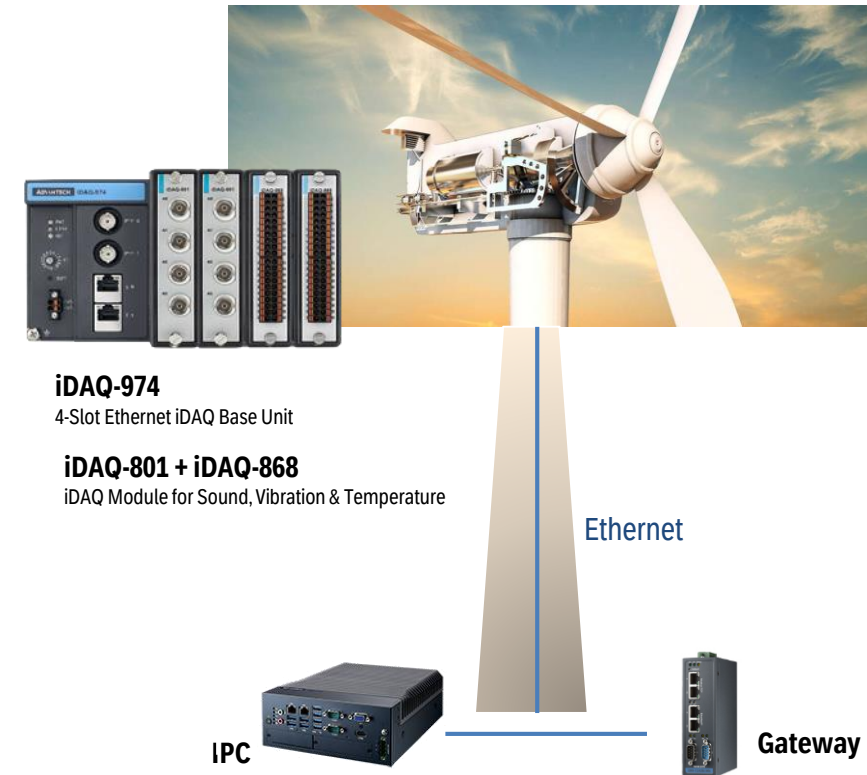
- Durable system that runs 7/24/365 in vibrant and high temperature/humidity environment
- Vibration, temperature monitoring at sampling rate 1KS/s
- Deploying separately from distance > 10m

Solution:

- iDAQ series that could endure 5G random vibration, and -40~70C temperature
- iDAQ-801 + iDAQ-868 for vibration and temperature acquisition
- iDAQ-974 for Ethernet connectivity for acquisition in different places

Benefits:

- Remote access enables centralized monitoring and control
- Simplified wiring and compact design reduce installation space
- Plug-and-play system allows quick setup and low-effort maintenance



iDAQ-974

4-Slot Ethernet iDAQ Base Unit

iDAQ-801 + iDAQ-868

iDAQ Module for Sound, Vibration & Temperature

Ethernet

IPC

Gateway



High-Speed Distributed DAQ System for Bridge Structural Health Monitoring

Case Study 7



Overview

Bridge health monitoring is critical for ensuring structural safety and longevity. Vibrations from traffic, wind, or earthquakes can become dangerous if they match the bridge's natural frequency, causing energy buildup and damage. Advantech's rugged distributed data acquisition system offers a reliable solution for real-time vibration monitoring, enabling early detection of risks and timely maintenance to prevent failures and extend the bridge's service life.

Challenges / Requirements:

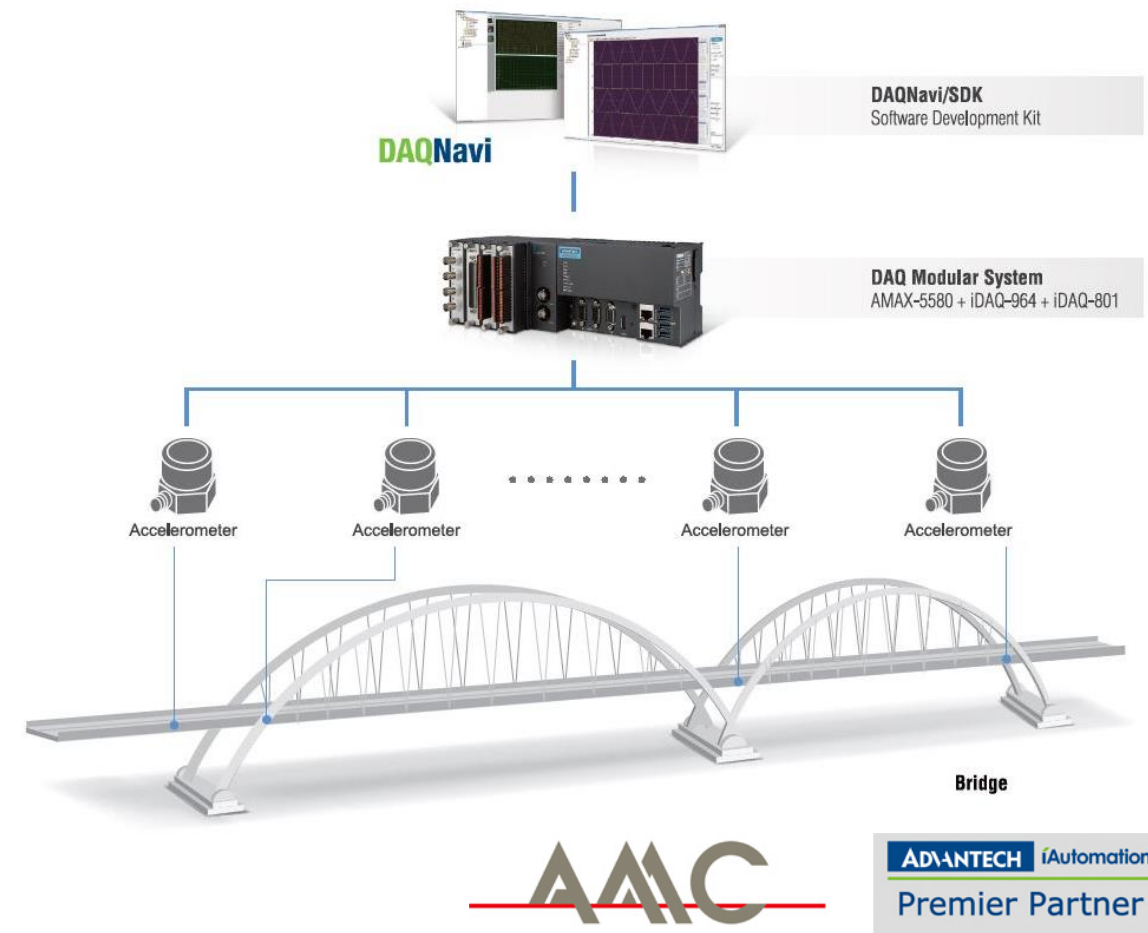
- Support 32 IEPE accelerometers across bridge spans
- Enable vibration modeling and comparison for health assessment
- Onsite DAQ deployment to shorten cables and lighten backend load
- Hardware must resist weather and humidity for outdoor use
- Python API required for direct data access and integration

Solution:

- Real-time vibration monitoring with AMAX-5580, iDAQ-964, and iDAQ-801
- High-resolution data acquisition with 256kS/s sampling rate, 24-bit resolution, and built-in anti-aliasing filter for accurate frequency analysis
- 100m node spacing via EtherCAT for wide coverage
- Rugged, outdoor-ready design with -20°C to 60°C temperature range and EMI-resistant aluminum chassis
- DAQNavi SDK with Python API allows seamless integration with custom algorithms and software development

Benefits:

- High-speed, multi-channel synchronized acquisition
- All-in-one solution from sensing to computing
- Easy integration with existing algorithms via Python API
- Faster development and lower maintenance cost



iDAQ Chassis/ Base Unit

iDAQ Base Unit: iDAQ-900 series

With multiple base unit options (USB, Ethernet, or standalone), the iDAQ-900 chassis supports plug-and-play setup and a wide 10–30VDC power input range, enabling easy deployment across various industrial scenarios.



1. Metal Enclosure
2. System Indicators
3. ID Switch
4. Wide voltage range input: 10-30VDC
5. LAN port connectors/Lockable USB 3.0 Up & Downstream Ports
6. Module Slots (4/8 slot options available)
7. Rear Mounting Hole
8. Programmable Function Port (for synchronization)



iDAQ-934

4-Slot USB 3.0
iDAQ Base Unit



iDAQ-938

8-slot USB 3.0
iDAQ Base Unit



iDAQ-964

4-slot Industrial DAQ Chassis
Module for AMAX-5000



iDAQ-974

4-Slot Ethernet
iDAQ Base Unit



iDAQ Analog I/O Modules

iDAQ Analog I/O Module: iDAQ-800 series

The iDAQ-800 series supports a wide range of measurement types with selectable digital filters and high-speed, high-resolution acquisition—up to 1 MS/s per channel and 24-bit resolution.

With 600 VRMS isolation and synchronized buffered acquisition across iDAQ modules, it ensures reliable, accurate performance for complex testing environments.



- ✓ Voltage
- ✓ Current
- ✓ Sound & Vibration (IEPE/ICP)
- ✓ Strain gauge: Full, half, quarter bridge
- ✓ Load cell
- ✓ RTD
- ✓ Thermocouple
- ✓ LVDT

Analog Input/ Output Modules

- iDAQ-817: 8-ch, 16-bit, 200 kS/s AI
- iDAQ-841: 8-ch, 16-bit, 1 MS/s/ch AI
- iDAQ-821: 4-ch, 16-bit, 10 kS/s/ch AO

Sensor Input Modules

- iDAQ-801: 4-ch, 24-bit, 256 kS/s/ch IEPE sensor input
- iDAQ-815: 8-ch, 24-bit, 400 S/s RTD input
- iDAQ-868: 16-ch, 24-bit T/C input
- iDAQ-871: 4-ch, 24-bit, 25.6 kS/s/ch 3-in-1 bridge input
- iDAQ-873: 8-ch, 24-bit, 25.6 kS/s/ch quarter-bridge input



iDAQ Digital I/O Modules

iDAQ Digital I/O Module: iDAQ-700 series

The iDAQ-700 series features digital input debounce filtering, hardware interrupt support, and synchronized buffered acquisition across iDAQ modules with 600 VRMS isolation.

Its counter function supports programmable trigger output, built-in digital filters, and position comparison, enabling precise control and flexible triggering through iDAQ chassis integration.



- ✓ Digital Input: Isolated, TTL
- ✓ Digital Output: Isolated, TTL, PhotoMOS Relay
- ✓ Encoder Counting / Pulse Counting
- ✓ Frequency Measurement
- ✓ PWM I/O
- ✓ Delayed Pulse Generation
- ✓ Compare Output (Encoder)
- ✓ Timer/Pulse output

Digital Input/ Output Modules

- iDAQ-731: 16-ch isolated DI & 16-ch universal isolated DO
- iDAQ-751: 48-ch TTL DI/O
- iDAQ-763D: 16-ch solid-state relay (SSR) DO

Sensor Input Modules

- iDAQ-784: 4-ch counter & encoder



FAQ

Q: What kind of sensors can iDAQ system connect to?

A: The iDAQ system offers a wide range of modules for different types of signal source. You can connect voltage, IEPE/ICP, strain gauge based sensors (quarter-bridge, half-bridge, and full-bridge), load cells, thermocouple, RTD, LVDT, and current. Refer to individual iDAQ specification for more information.

Q: What's the sampling rate offered by iDAQ system?

A: Each iDAQ module provides different sampling rate. Their range is from lowest 10S/s (high resolution mode of iDAQ-815 & iDAQ-868) to the highest 1MS/s/ch (iDAQ-841). Refer to individual iDAQ specification for more information.

Q: How does iDAQ system achieve timing synchronization across modules in the base unit?

A: There are 2 aspects, in terms of the timing synchronization. First is the physical hardware layer, the backplane in the base unit connects all the signal together. On the other hand, in the software configuration layer, Advantech designed Device Fusion function to configure the modules requiring synchronization to a virtual device that all the settings would simultaneously apply to all the modules, synchronize every module together.

Q: How do I implement the iDAQ system with my existing system in software? Is the software free-of-charge?

A: Advantech provides DAQNav SDK that includes API, software manual, utilities for helping you through from device testing to system integration. You can integrate the iDAQ system with the programming using DAQNav API. It provides all the essential interfaces to configure and get data from the modules. And of course, the DAQNav SDK is free-of-charge.

Q: What kind of programming languages does iDAQ support?

A: iDAQ is supported by DAQNav. The supported programming languages are: C, C++, QT, C#, VB.NET, Python, Java, MATLAB, LabVIEW.

Q: What are the options available if I need a flexible or more specific DAQ solution besides iDAQ?

A: In addition to iDAQ, we offer a range of DAQ solutions to fit different needs, including Plug-and-Play USB DAQ Modules and DAQ Cards. These alternatives provide flexible, easy-to-install options for various applications, allowing you to choose the best fit based on your specific testing requirements and system setup.

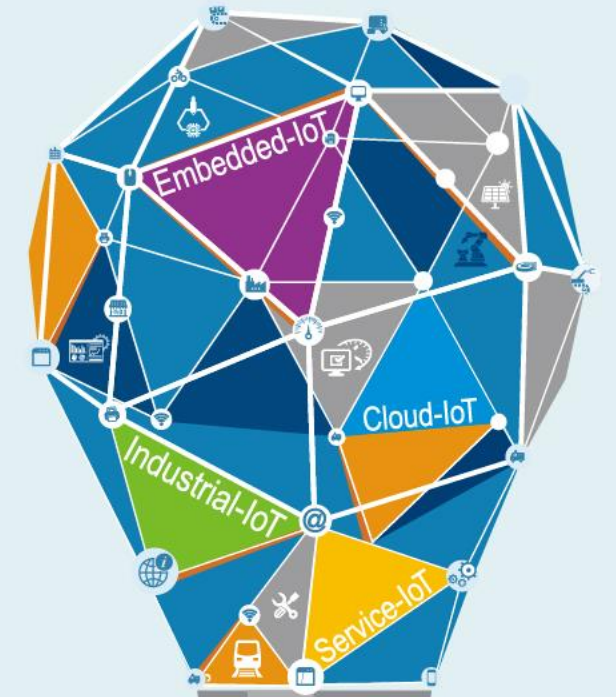


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