

Software and Industry Solutions

- 1-2 WISE-PaaS/IIoT & WebAccess Software
- 1-5 iFactory & M2I/CNC Solution Ready Package
- 1-7 E&E & M2I/E&E Solution Ready Package
- 1-9 Intelligent Motion Control and Machine Vision
- 1-20 Power & Energy Solution
- 1-24 Intelligent Transportation Platforms





WebAccess Software

Introduction

The recent emergence of the Internet of the Things (IoT) and its surround technology eco-system promises significant future business opportunities until the year 2025. With more and more investment going into developing integrated IoT applications and cloud services, software has become the crucial factor for success in the IoT era.

As one of its core IoT solutions, Advantech's WebAccess offers not only a human-machine interface (HMI) and supervisory control and data acquisition (SCADA) software solution, but also an IoT software framework that serves as a software platform for IoT and cloud applications.

With Advantech WebAccess, a comprehensive browser-based IoT application software, users can easily monitor and manage projects via a web browser. For the IoT device layer, Advantech WebAccess supports multiple protocols and drivers for connecting up to 350 controllers and devices, making WebAccess a flexible and suitable software platform for all I-IoT applications and projects. Additionally, WebAccess provides a foundation for IoT data collection and management with its open architecture and open interfaces, which facilitate the development of various vertical applications.

To satisfy demands for industrial IoT (IIoT) and Industry 4.0 services, a variety of cloud-specific features, such as plug-and-play device configuration, cloud-based dashboards, and big data connectivity, are included in the WebAccess Cloud software package in an effort to provide an easy tool for connecting IoT devices and conducting big data analysis and predictive maintenance.

WebAccess Architecture



WebAccess Focused Solutions

Factory Automation Solution



Electricity power system: 220/110 KV high voltage power monitoring, emergent power generator, dynamic/static uninterruptible power supply,

waste water treatment, and reclamation

electric bus, high voltage switch gear,

Water system: raw water supply, ultra pure water supply,

- and low voltage power meter
 Gas system: toxic gases detection, gas cabinet operation, valve box operation, and general gases
- HVAC system: clean room operation, acid exhaust, process cooling water, and general airconditioning
- **Water Treatment Solution**



- Water resource distribution system
- Raw water distribution system
- Large-scale water supply pumping system
- SCADA system for tap water
- Booster pump station monitoring and control system
- Urban tap water pipeline monitoring control system
- City pipeline distribution optimization system
- Remote management system for city sewage pipelines
- Monitoring and control system for sewer pump stations.
- SCADA system for large sewage plant
- Performance management for large sewage plan

Oil & Gas Solution



Building Energy Management Solution



- WebAccess is used to collect and manage data transmissions from RTUs to provide an analysis tool for monitoring the operating status of oil wells
- For oil pipeline monitoring, WebAccess serves as gateway software for converting data from each gateway device into the standard protocol before transmission to the control center
- Communicating with intelligent devices, WebAccess acts as remote control software for monitoring and controlling devices in the field
- Stand-alone buildings
 - Commercial buildings, hospitals, restaurants, and office buildings
- Building complexes
 - Franchised restaurants, shopping malls, furniture stores, shoe stores, supermarkets, book stores, and convenience stores
 - Financial groups, shopping centers, campuses, and telecommunication stations

the version of the ve

La Ele

Software and Industry Software and Industry Industrial Server

.

Industrial I/O and Video Solutions

Enabling IoT & Industry 4.0 with WISE-Paas Alliance and WebAccess

Introduction

Advantech's key strategies for the next decade are to provide integrated IoT solution platforms. The Advantech WISE-PaaS Edge Intelligence Platform offers a diverse range of software that can be applied and integrated into domain-focused SRPs. This platform provides a wide range of software and cloud-based service solutions from industrial data/video acquisition, analysis, and visualization to cloud platform services and dashboard functions, thus enabling IoT at all system layers and realizing IoT-powered business models in various vertical markets. Join Advantech's WISE-PaaS VIP program and enjoy IoT success by leveraging WISE-PaaS's comprehensive solutions.





WebAccess/SCADA **Industrial IoT Application Software** Platform

- Enables 100% web-based remote engineering, monitoring, and control
- Driver support for major PLCs, PACs, I/O modules, CNCs. network switches, and computer platforms
- Redundant SCADA, ports, and devices for high availability
- Supports multiple databases for data connectivity and data fusion
- HTML5-based dashboard for cross-browser. cross-platform data visualization and data analysis
- Provides flexible open interfaces for easy development and integration of third-party applications
- Plug-and-play functionality ready for private cloud solution
- Online software license authentication for cloud computing virtual machines



WebAccess/MCM

- **Machine Condition Monitoring Softwave**
- Dynamic signal acquisition and analysis
- Real-time monitoring and alarm notification
- Provides feature extraction algorithms for data processing
- Remote management for distributed monitoring solutions
- Integrated with WebAccess/SCADA
- Ensures easy setup without additional programming



WebAccess/HMI

HMI Runtime Development Software

- Smart screen management
- Project-based management for multiple applications
- Software support for a diverse range of machines
- Provides efficient tools for easy customization
- Boosts performance with simulations
- . Enhanced data security



WebAccess/CNC

WebAccess/CNC

CNC Machine Networking Solution

- Automatically generates CNC projects for WebAccess/SCADA software
- Supports CNC machine and I/O device monitoring
- Supports leading CNC network controllers Provides CNC machining status and PLC register
- monitoring Provides CNC availability queries and NC file transfer functionality
- Provides historical CNC alarm and operation queries
- Supports all features and full functions of WebAccess/SCADA software



WebAccess/NMS

Network Management System

- Cross-browser compatible •
- Supports all Advantech Ethernet-based products
- Automatically generated topology .
- PoE, ring, wireless, cellular connection indication



WISE-PaaS/EnSaaS

Platform for Enabling IoT Cloud Services

- Connect, monitor, and manage millions of IoT assets Managed SQL, NoSQL, and time-series databases for app developers
- Visualization dashboard for deriving actionable insights
- Quickly create powerful cloud apps using a fully managed platform

iFactory & M2I /CNC (Machine to Intelligence) Solution Ready Package Introduction

With the evolution of industrial automation, factories are getting smarter and more digital. To accelerate the implementation of smart manufacturing in industry 4.0, Advantech's iFactory Solution Ready Packages (SRP) and Machine to intelligence (M2I) solutions play critical roles in IOT integration from the network edge to the cloud.

iFactory SRPs



Advantech's iFactory SRPs allow for easily data acquisition from shop-floor modules via multiple communication protocols such as Modbus, OPC UA, and MQTT, and automatically and display information on a real-time dashboard. Advantech's iFactory SRPs enable traditional factories to rapidly transform into streamlined, high-output, intelligent factories.

M2I/CNC SRPs



M2I solutions are cloud-based solutions with a wide-range of industrial app services in order to make machines accessible for intelligent connection, monitoring, and predictive maintenance. M2I SRPs aim to optimize the efficiency of intelligent machines for automation and manufacturing operations.

WO. M2I/CNC OEE Service 되는 M2I/CNC Tool & Life **Time Mgt. Service** M2i/CNC OEE Dashboards for Situation Room **CNC Monitoring API** CNC SFR API CNC SPC API Industrial · CNC Availability Monitoring CNC Quality Monitoring Tool Magazine & Tool Wear CNC Performance Monitoring · Yield Rate Summary Real-time Machine Status WIP Info, By machines Management **APPs** (SRPs) Historical Status Timeline Production History Defect Summary Spindle Health Prediction **Configuration Portal Push Notification User Management** Machine Grouping Dash Video Server List Alarm Report Machine Data Model Service 0 0 0 Device Information Visualization - Dashboard Data Infrastructure Analytics Services-Al mongo DB PostgreSQL 🚫 influxdb WISE-PaaS/Dashboard TensorFlow Caffe? (ONNX PaaS Rabbit MO. WISE-PaaS/EnSaaS IoT Hub aws - 阿里云 laaS Azure openstack. MQTT/AMQP MQTT/RESTful NC Program and Operation Data Collection Multiple CNC Protocols Shop Floor Report (SFR) Supported Edge MES WebAccess/CNC · FANUC/ HEIDENHAIN/ Servo Loading Intelligence MITSUBISHI/ SIEMENS Tool Offset Statistical Process Control (SPC) Coordinates and Macro Variables BROTHER

M2I/CNC Software Diagram





iFactory & M2I/CNC Solutions

M2I/CNC Intelligent CNC Machine Management Solution



Visual OEE and Cross-Factory CNC Management empowered by Cloud-Service

M2I/CNC solution provides an essential SRP for CNC machine real-time production monitoring, alarm report, and availability analysis. With a strong focus on CNC machine monitoring, this package can be applied to enable efficiency and utilization of Intelligent CNC machine management.

Key Features:

- Cloud-based service: equipped with cloud-based industrial apps enable a convenient cross-factory management in CNC machines and apply to multiple scenarios.
- Real-time production overview with processing details: using visual dashboard for production monitoring in both production lines and single machine to optimize processing operation.
- Alarm Management for Machine Monitoring: Top machine error messages, ranking and duration record help to identify key issues and optimize with alarm management.

Equipment Connectivity Solution



Advantech's CODESYS solution enables flexible real-time machine control programming for a wide range of factory automation operations, including motion and vision control, and pick and place machine control. Featuring a softPLC design, Advantech's CODESYS solutions support multiple fieldbus protocols, specifically EtherCAT, CANopen, PROFINET, and EtherNET.

Key Features:

- Reduced development time: applications are integrated and can be edited using a single interface that supports all PLCopen IEC 61131-3 programming languages (FBD,LD,IL,ST,SFC).
- Real-time dual fieldbus data acquisition: supports real-time dual fieldbus data acquisition of PROFINET and EtherCAT communications.
- Real-time EtherCAT soft motion control: supports CODESYS certified PLCopen motion POCs for single or multi-axis movement of electronic CAMs/gears etc.

Overall Effectiveness Monitoring Solution (OEE)



Enable Intelligent Machine Management with a Real-time Dashboard

Overall equipment effectiveness (OEE) refers to the percentage of planned production time that is truly productive. Advantech's OEE solution optimizes operations for convenient real-time machine monitoring including status change, availability, and downtimes as key indicators. With real-time data on a dashboard, machine availability can be monitored and machine downtime managed to improve operational efficiency.

Key Features:

- Automatic recording of machine status: real-time machine status (downtimes, availability, duration), data acquisition from wireless shop-floor modules, automatic uploads to server.
- Suitable for general use: easily apply to general machines with stack lights with non-invasive tools in production lines.
- Real-time dashboard for analysis: visual dashboard provides machine availability, downtime alarms, and streamlined balance rates.

Process Visualization Solution



Enhance Productivity with ThinManager Thin-Client Solution

ThinManager solution is developed based on thin client options that are fully compatible with Rockwell Automation's ThinManager software. ThinManager series solutions provide a sustainable and scalable automation platform for boosting productivity by increasing production efficiency and minimizing system downtime through centralized management.

Key Features:

- Centralized client management: all server applications and thin client devices can be managed from a centralized control room using a single interface.
- Advanced data security: ThinManager software features powerful visualization, encryption, and authentication to ensure data security.
- Multi-tasking with visualization: superior visualization with virtual screening can be displayed including multi-monitors, multi-sessions and screen tiling functions.

oftware and Industry olutions

Industrial Server

ħ

1

Intelligent HMI and

•

ndustrial Communicatio

.

Industrial I/O and Video Solutions

Automation Computer and Controllers

ntelligent Systen

Energy & Environment Solution Ready Package

Energy and Environment Solution Ready Package Overview

As energy and environment issues are important concerns for the public, Advantech has developed solution ready packages (SRP) for energy and environment applications with industrial IoT technologies focusing on the process of sensing, control monitoring, remote communication, and smart data management. By combing these technologies with WebAccess and WISE-PaaS edge intelligence platform that performs information integration and data analysis, our SRPs are designed to be widely used in a wide variety of energy and environment industries.

Remote Equipment Monitoring and Efficiency Optimization

Each energy and environment SRP is integrated with intelligent sensing, communication, and real-time analysis capabilities that allow users to obtain the operating status of any machine at any time to ensure efficient resource usage.

Event Monitoring for Real-Time Alarms

With 3G/4G communication technology, event alerts can be transmitted in real-time from remote sites to the control center, allowing field personnel to respond promptly to minimize accidents and losses.

Remote Equipment Diagnostics and Predictive Maintenance

Collates operating status data from key components, thereby increasing equipment life, while reducing maintenance costs.

Visualized and Integrated WISE-PaaS Cloud Platform

Integrated data is gathered from a wide area and big data analysis and information visualization provides management level intelligence for decision-making to optimize operational efficiency.

Machine to Intelligent Solution and Management

Advantech energy and environment Machine-to-Intelligence (M2I) SRP allows equipment builders to easily overview the operational status of their machines and facilities. Advantech offers various M2I solutions based on market demands.





Machine to Intelligence (M2I) Solution

With our Machine-to-Intelligence (M2I) SRP which includes power inverter, water pump, HVAC and transformer, equipment builders can easily get the operating status of their machines and facilities. By integrating different M2I SRP into vertical system SRP, system integrators can build up solar power, water treatment, and pollution management solutions, while opening up new opportunities in operation maintenance services to businesses in IIoT.



Energy Management Solution (EMS)

Advantech EMS integrates the hardware/software required to optimize energy efficiency. By collecting data from all energy-consuming devices and generating analysis reports, the solution enables management to identify excessive energy usage and implement improvements.

Key Features:

- Intuitive browser-based graphics dashboard.
- Energy consumption statistics and analysis tools.
- Simple management platform for easy maintenance.



Advantech SPMS aims to improve the efficiency of power generation and reduce the cost of operations and maintenance. With the help of high performance integrated hardware/software, our SPMS solution is able to realize accurate data acquisition, perform remote management, and analyze mass data from all power stations.

Key Features:

- Centralized operation with unmanned remote sites.
- Scalable architecture which works in plants of any size.
- Analyzing and optimizing power station efficiency.





1-9

Motion Control Overview

Motion Control Solutions

Advantech intelligent motion control product division provides solutions to OEM machine makers and system integrators. The core technologies are based on state-of-art DSP/FPGA/ SoC processors, Advantech's own softmotion kernel for trajectory and control, EtherCAT motion bus, and configuration utilities. With our softmotion kernel, users can leverage the new, high performance computing hardware and latest application functions supported in the kernel, to enhance machine features and performance. With the support of EtherCAT open standard protocol, users can leverage high speed cycle times for high performance synchronous motion control, and the Ethernet cable connection saves wiring costs.

Application-Ready Embedded Motion Control

In any vertical specific application, customers are looking for application-ready control platforms. The main reasons for this consideration are system integrity and system stability. Compared with plug-in motion controllers plus industrial PCs, application-ready motion control platforms provide well-integrated systems, pre-validated to guarantee stability. Furthermore, the concept of solution selling can bring higher add-on value to system integrators and machine builders.

Motion Control Technology

There are three basic types of motion control system: point-to-point, contouring, and synchronization.

Point-to-Point (PTP) Motion

Point-to-point (PTP) movement is the most basic form of motion control. The principle function of the PTP is to position the tool from one point to another within the coordinate system. It is used when precise start and stop position is important, but the path is irrelevant. Velocity, time, and acceleration can be defined for point-to-point moves, allowing the controller to construct either a T or an S-curve move profile.



Contouring (Continuous Trajectory)

To achieve contoured motion, a series of points is provided during programming, and the motion controller extrapolates a smooth line or curve from these points. Unlike point-to-point motion, contouring guarantees that the system passes through each point, using either linear or circular interpolation. Between the points, linear or circular interpolation is performed, leading to a contour described by a succession of linear segments. In a contoured move, a time to complete the move is specified, but the actual move profile is determined by the motion controller.



Synchronization

All synchronization controllers follow the master/slave principle. Where the master can freely move with any motion profile under control of any speed curve and one or several slaves exactly follow the master motion in terms of position and speed. The control is based on incremental position feedback by means of encoders on both sides. Many applications just use a measuring wheel with encoder instead of a master drive. It is possible to preset every speed or gear ratio by means of adjustable impulse scaling factors.



A Broad Array of Products for Motion Control

Advantech's full product offering accommodates all your motion control needs.

Point to point motion (PTP)

Model	Туре	Feature
PCI-1245L	Pulse	PTP
PCI-1245LIO	Pulse	PTP + I/O Expansion

Contouring (continuous trajectory)

Model	Туре	Feature
PCI-1245E/85E	Pulse	Path
PCI-1245V/85V	Pulse	Path + Compare Trigger

Synchronization

Model	Туре	Feature
PCI-1245/65/85	Pulse	Synchronous Control
PCI-1203/PCIE-1203	EtherCAT	Synchronous Control



Motion Control Overview

EtherCAT

EtherCAT (Ethernet Control Automation Technology) is a high-performance, Ethernetbased fieldbus industrial network system. The protocol is standardized in IEC 61158 and applies to automation applications that need faster and more efficient communications. Short data update times with precise synchronization make EtherCAT suitable for real-time requirements in automation technology.

Functional Principle

In EtherCAT network, the Master sends Ethernet frames through all of the slave nodes. The Standard Ethernet packet or frame is no longer received, interpreted, and copied as process data at every node. Instead, slave devices read the data addressed to them and input data are also inserted in the same time while the telegram passes through the device, processing data "on the fly". Typically the entire network can be addressed with just one frame.



Data exchanges are cyclically updated between EtherCAT Masters and Slaves. Data in EtherCAT frames is transported directly within the IEEE 802.3 Ethernet frame using Ether type 0x88a4 and are processed by the EtherCAT slave controller on the fly. Each EtherCAT datagram is a command that consists of a header, data, and a working counter. The datagram header indicates what type of access the master device would like to execute:

Read, write, read-write

Access to a specified slave device through direct addressing

Access to multiple slave devices through logical addressing

Logical addressing is used for the cyclical exchange of process data. The header and data are used to specify the operation that the slave must perform, and the working counter is updated by the slave to let the master to know that a slave has processed the command. Every EtherCAT datagram ends with a 16-bit working counter (WKC). The WKC counts the number of devices that were successfully addressed by this EtherCAT datagram. EtherCAT datagrams are processed before receiving the complete frame. In the case that the data is invalid, the frame check sum is not valid and the slave will not set data for the local application.



Topology

EtherCAT supports a variety of network topologies, including line, tree, ring, and star. The line and tree topologies are more conducive to fieldbus applications because they require fewer connections and utilize a much simpler and more flexible cabling schema that switches and hubs are not necessary for lines or trees topology. Inexpensive industrial Ethernet cable can be used between two nodes up to 100m apart in 100BASE-TX mode. EtherCAT makes a pure bus or line topology with hundreds of nodes possible without limitations. Up to 65,535 devices can be connected to EtherCAT, so network expansion is almost unlimited.

EtherCAT supports individual nodes to be connected/disconnected during operation. If one of the slaves in the network is removed, the rest of the network can continue to operate normally. EtherCAT also enables other communication features such as cable redundancy or master redundancy with Hot Standby.

Synchronization

Distributed clocks (DC) mechanism provides highly precise time synchronization between slaves in an EtherCAT network, which is equivalent to the IEEE 1588 Precision Time Protocol standard. By using distributed clocks, EtherCAT is able to synchronize the time in all local bus devices within a very narrow tolerance range. All EtherCAT slaves are provided with an internal clock (system time/local time). One EtherCAT slave is used as a reference clock and distributes its clock cyclically.

Possible misalignment between the reference clock and the clocks of the other slaves are caused when a slave is switched on and the internal free-running register that holds the current time is reset to zero. Unfortunately, this action doesn't happen at the same time, and this result in an initial offset among clocks that has to be compensated.

Typically, masters send a broadcast to all other slaves in the system. Having received the message, slaves will latch the value of their internal clock. There are two latch values, one is receiving, and the other is returning back. Thus, the master can read all latched values and calculate the delay for each slave. Delays will be stored into an offset register. In the following, the master will send a message periodically to all other slaves in the EtherCAT network to make the first slave the reference clock and forcing all other slaves to set their internal clock by the calculated offset. Because synchronization between slaves in DC mode is done by internal clocks in hardware, EtherCAT guarantees the time jitter is less than 1us.

Diagnosis with Exact Localization



EtherCAT is an ultra-fast I/O system. To reach the best high-speed communication, high communication accuracy is demanded. EtherCAT comprises a wide range of systems with inherent diagnostic features which help detect and locate system errors precisely. Every EtherCAT datagram ends with a 16-bit working counter (WKC) to count the number of devices that were successfully addressed by this EtherCAT datagram. The Master can check the data exchange situation by WKC in the same cycle and the error frame can be detected by analyzing the nodes' error counters. The slave application will be executed only as the frame is received correctly. The automatic evaluation of the associated error counters enables precise localization of critical network sections.

Bit errors during transmission are detected reliably by the analysis of the Cyclic Redundancy Check (CRC) check sum. CRC is an error-detecting code commonly used in digital networks and storage devices to detect accidental changes to raw data. In addition to error detection and localization protocols, transmission physics and topology of the EtherCAT system allows an individual guality monitoring of every single transmission path.

1-11

SoftMotion Introduction

Advantech's SoftMotion Introduction

SoftMotion is Advantech's important core technology in the equipment automation field. Compared to ASIC motion control solutions, Advantech's Machine Automation Team independently developed its own SoftMotion control technology and uses the FPGA (Field Programmable Gate Array) and DSP (Digital Signal Processing) as the core-computing hardware platform. Because of SoftMotion excludes the inherent limitations of ASIC specifications, Advantech is able to offer the expertise of professional motion control for our customers and provides custom firmware to optimize device control as well as to minimize the need for additional programming. Through SoftMotion technology enhancements, Advantech offers critical technologies in EMA (Electronic Machine Automation) and TMA (Traditional Machine Automation) fields. Meanwhile, based on the three motion control architectures (centralized, distributed and embedded), Advantech's comprehensive product offering helps our customers to continuously progress their technologies to create win-win opportunities.

SoftMotion Function Table

1+	em	Description	PCI-122014	PCI-12401	PCI-1245	PCI-12451 IO	PCI-1245E	PCI-1245V	PCI-1245	PCI-1203	PCIE-1203L-64AE
			10112200	101-12400	T OFT245L	101-1243EIO	PCI-1285E	PCI-1285V	PCI-1285	(6/10/16/32axis)	(64axis)
		JOG Move MPG	~	✓ ✓	✓ ✓	×	✓ ✓	✓ ✓	×	-	-
		T&S-curve	✓	~	✓	✓	✓	~	~	✓	~
		Programmable	~	~	~	~	~	~	~	~	~
		acc. and dec. Point to point	✓	✓	✓	✓	✓	1	1	✓	×
	Single-Axis Motion	motion Position									
		/ Speed Override	✓	✓ 	✓	✓	✓	~	~	~	~
		Velocity motion Backlash	~	~	✓ /	✓ /	✓ /	<i>✓</i>	v /	<i>√</i>	√
		compensation Superimposed	-	-	Ŷ	Ŷ	Ŷ	v	v	Ŷ	v
		move	-	-	-	-	-	-	~	~	-
		Stop up to 4 groups	1 Group	1 Group	1 Group	2 Group	2 / 4 Group	2 / 4 Group	2/3/4 Group	6 Group	6 Group
		Line 2-axes Circular	2 axis ✓	2/3 axis ✓	2 axis	2/3 axis 2 axis	2 axis	2/3 axis ✓	2/3 axis ✓	2/3 axis ✓	2/3 axis
Motion	Multi-Axis Motion	Speed	-	-	-	-	-	~	~	~	2/3 axis
Function	(Group)	Helical	-	-	-	-	-	-	\checkmark	\checkmark	-
		Pause & Resume	-	-	-	~	~	\checkmark	\checkmark	~	-
	Home	16 home mode	√	✓	√	✓	√	√	✓ 3 tables	√	√
		Table	✓	~	-	-	3 tables (10K poins)/ 4 tables (7K poins)	3 tables (10K poins)/ 4 tables (7K poins)	(10K poins)/ 3 tables (10K poins)/ 4 tables (7K poins)	6 tables, size: 7k points	-
	Motion	Start / End motion list	~	~	-	-	✓	\checkmark	\checkmark	\checkmark	-
	Trajectory Planning	line trajectory: up to 8 axes	2-axis Line	2/3-axis Line	-	2/3-axis Line 2-axis Direct	2-axis Line/Direct	2/3-axisLine, 2~8 axis Direct	2/3-axis Line, 2~8 axis Direct	2/3-axis Line, 1~8 axis Direct	-
		Add arc trajectory	\checkmark	~	-	-	-	✓	~	✓	-
		Add Dwell	-	-	-	-	✓	×	✓	✓	-
		Start/Sop/ Beneat	~	\checkmark	-	-	\checkmark	\checkmark	\checkmark	~	-
		Auto Blending	-	-	-	-	-	-	✓	✓	-
	Gantry	Master & Slave Synchronized motion	-	-	-	-	-	-	\checkmark	\checkmark	-
	Speed Forward	Master & Slave Synchronized	-	-	-	-	-	-	✓	1	-
	Tangentia	al Following	-	-	-	-	-	-	✓	✓	-
	E-1 E-1	Gear CAM	-	-	-	-	✓ -	-	✓ ✓	✓ ✓	-
	Error check	Error status, Watchdog	✓	✓	✓	✓	✓	~	~	✓	1
Application Function	Position Window	Position	-	-	-	-	-	-	~	✓	-
	trigger Position	Position Latch	-	-	_	-	-	✓	√	✓	-
	Latch Multi-axis	Information Simultaneously									
	Simultaneous Start / Stop	Start/Stop	-	-	~	~	-	-	~	~	~
	PT/PVT	Position/ Velocity/Time Planning	-	-	-	-	-	-	-	\checkmark	-
	Torque Limit	Position/ Torque Limit	-	-	-	-	-	-	-	✓	-
		Axis Stop	√	√ .(✓	✓	✓	✓	1	✓	~
	Avic Interrupt	Axis Compare Axis Error	-	-	~	~	~	~	✓ ✓	~	-
Intorrent	Axis interrupt	Axis Latch	-	-	-	-	-	-	√ ./	✓ √	-
interrupt		Axis VH Start Axis VH Stop	-	-	✓ ✓	✓ ✓	✓ ✓	✓ ✓	× ✓	× 	× ×
	Group	Group Stop	✓	✓	×	×	×	×	✓	×	×
	Interrupt	Group VH Start	-	-	✓ ✓	<i>✓</i>	✓ ✓	✓ ✓	<i>✓</i>	<i>✓</i>	<i>✓</i>
	Single	Up to 8	✓ (2 Channel)	✓ (2 Channel)	* -	• -	* -	4 / 8 Channel	4/6/8 Channel	-	-
Trigger	Compare Table	channels Up to 2	(2 0 mar mor)	(2 Officianio)				√ C Criamio	√ × ×		
Function	Compare Linear	channels (Table size:	*	*	-	-	-	*	*	-	-
	Compare	100K points)	•	Y	-	1001 1000	-	*	8DI, 8DO	-	
	DAQ		-	-	-	16DI, 16DO	-	-	(PCI-1265)	-	-





Motion Card Product Selection Guide

Centralized Motion Control Solutions

		T	1 Prov	1 an	Marca.	Mr.	1500	1000	A COLOR
	Category			Motio	on Control			Motion	Control
	Bus				PCI			P	CI
	Model	PCI-1220U	PCI-1240U	PCI-1243U	PCI-1245L	PCI- 1245LIO	PCI-1245E PCI-1285E	PCI-1245V PCI-1285V	PCI-1245 PCI-1265 PCI-1285
	Number of Axis	2	4	4	4	4	4/8	4/8	4/6/8
Axis	Linear Interpolation	✓	\checkmark	-	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
	2/3-axis Circle Interpolation	✓	\checkmark	-	-	2-axis	-	\checkmark	\checkmark
	Encoder Channels	2	4	-	4	4	4/8	4/8	4/6/8
	Limit Switch Input Channels	4	8	8	8	8	8/16	8/16	8/12/16
	Home Input Channels	2	4	4	4	4	4/8	4/8	4/6/8
su	Emergency Stop Input Channels	1	1	1	1	1	1	1	1
ctio	Slow Down Limit Switches	4	8	-	8	8	8/16	8/16	8/12/16
Ľ.	General Purpose DI Channels	6	12	8	16	32	16/32	16/32	16/32/32
ed	Servo On Output Channels	2	4	-	4	4	4/8	4/8	4/6/8
lvanc	General Purpose DO Channels	8	16	8	16	32	16/32	16/32	16/32/32
Ac	Analog Input Channels	-	-	-	-	-	-	-	2 (PCI-1265 only)
	BoardID Switch	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
	Position Compare	✓	\checkmark	-	-	-	-	-	\checkmark
	Position Latch	-	-	-	-	-	-	-	\checkmark
	Dimensions (mm)	175 x 100	175 x 100	175 x 100	175 x 100				



Motion Latch & Category Encoder Control Trigger Bus ISA PCI ISA Model PCL-839+ PCI-1274 PCI-1784U PCL-833 Number of Axis З 4 Axis Linear Interpolation ~ _ --2/3-axis Circle Interpolation _ 4 4 3 Limit Switch Input Channels 6 8 _ Home Input Channels З 4 -Emergency Stop Input Channels 1 Advanced Functions Slow Down Limit Switches 6 8 -_ 16 4 4 (General) 2 Servo On Output Channels 4 General Purpose DO Channels 16 4 4 Analog Input Channels -BoardID Switch ✓ √ Position Compare 12 -Position Latch 12 Dimensions (mm) 185 x 100 175 x 100 185 x 100 185 x 100

Embedded Machine Automation Solution



Model N	ame	MVP-3245		
Chassis	Input Voltage	DC 24V		
	Power	24W MAX (1A @ 24V)		
	CPU	Intel Atom E3825 1.33G dual-core		
Hardware	Memory	2G		
	Storage	32G mSATA		
	Graphic	D-SuB15 Port		
	Ethernet	2 x 10/100/1000 Mbps, RJ45 connector		
Communication	USB	4 x USB 2.0		
	Serial	2 x RS-232, DB9 connector		
Physical	Dimensions (W x H x D mm)	250 x 160 x 85		

EtherCAT Solution Product Selection Guide

EtherCAT Master Control Card





Model		PCI-1203	PCIE-1203L		
	Axis	6/10/16/32	64		
	General Purpose DI Channels	8	-		
anced ctions	General Purpose DO Channels	4	-		
Adv Fun	Remote Motion	1024-CH DI and 1024-CH DO 128-CH AI and 128-CH AO	1024-CH DI and 1024-CH DO 128-CH AI and 128-CH AO		
	Remote I/O	32 Servo Drive Max.	64 Servo Drive Max.		
Dimensions (L x H)		175 x 100 mm	175 x 100 mm		
Connectors		2 x RJ45, D-sub 15	2 x RJ45		



Software and Industry Solutions

Industrial Server









	EtherCAT Slave										
Model	AMAX-4830	AMAX-4833	AMAX-4834	AMAX-4856	AMAX-4850						
Isolated Digital Input	16	32	-	32	16						
Isolated Digital Output	16	-	32	32	-						
PhotoMOS Relay Output	vtoMOS		-	-	8						
Relay Output	-	-	-	-	-						
Analog Input	-	-	-	-	-						
Analog Output	-	-	-	-	-						











	EtherCAT Slave									
Model	AMAX-4860	AMAX-4855	AMAX-4862	AMAX-4817	AMAX-4820					
Isolated Digital Input	8	32	16	-	-					
Isolated Digital Output	-	-	-	-	-					
PhotoMOS Relay Output	-	16	-	-	-					
Relay Output	8	-	16	-	-					
Analog Input	-	-	-	8	-					
Analog Output	-	-	-	-	4					



Terminal Board & Cable Selection Guide

Motion Card



-15

EtherCAT







PC-based Programmable Motion Control Solutions

MAS Controller Introduction

The MAS controller is a PC-based programmable motion controller, which is developed using the Motion Studio software development tool. It features a range of built-in debugging tools, is programmed using BASIC programming languag, can be easily integrated motion control and machine vision solution.

Open platform multi-axis controller

- Seamlessly integrated motion control, machine vision, I/O
- Open standard interface for communication, database

One Programming Tool - Motion Studio

- Easy to program with BASIC language to shorten learning curve
- Extensive debugging tools for machine control applications
- Faster to learn, program and service

Real-Time SoftMotion Kernel

Motion Studio

- Max 6 axes interpolation, trajectory planning and tracking
- Rich motion functionalities for XYZ table. SCARA control



Motion Studio

Motion Runtime

I/O

Vision

3rd Party Controller



A single programming tool for every aspect of an machine automation project minimizes training needs, solidifies overall integration and eliminates communication problems between engineering disciplines.

The user can easily program by BASIC programming language, using many debugging tools to help develop, Communicate with the outside hardware through controller's standard interface and connect to the database. in addition, users can also use the Motion Studio industry function block to quickly build a project, so as to improve the reusability, reduce the time of equipment development.

Debugging Tool

Terminal

- Variable Watch
- I/O Viewer
- Motion test tool
- Parameter Viewer
- VR Management tool
- Breakpoint Operation
- Single Step Debugging
- C-integration
- 3D Path
- CAM Editor Tool
- Coding help

Modbus

Motion

Function Blocks

Cylinder control

Machine Vision Task

Programmable Encryption

Virtual Controller

DXF

Gcode

Path Link

XYZ table/ SCARA control

MAS Controller Product Selection Guide

	Mode	MAS-3245-LG	MAS-5242-LG	MAS-5242-EG	MAS-5282-EG	MAS-5202-EG	MAS-5283-LG
	OS	WIN7 Embedded	WIN7 Embedded	WIN7 Embedded	WIN7 Embedded	WIN7 Embedded	WIN7 Embedded
	CPU	Intel Celeron J1900	Inter Core I3	Inter Core I3	Inter Core I3	Inter Core I3	Inter Core I3
	Memory	4GB DDR3	4GB DDR3	4GB DDR3	4GB DDR3	4GB DDR3	4GB DDR3
	Storage	mSATA 32GB	500G	500G	500G	500G	500G
	DI/O	32DI/32DO	16DI/16DO	16DI/16DO	32DI/32DO	-	32DI/32DO
	Serial Ports	2 x RS232/422/485	2 x RS232	2 x RS232	2 x RS232	2 x RS232	2 x RS232
	LAN Ports	2 x 10/100/1000M	2 x 10/100/1000M	2 x 10/100/1000M	2 x 10/100/1000M	2 x 10/100/1000M	2 x 10/100/1000M
	USB 3.0	1 x USB 3.0	-	-	-	-	-
	USB 2.0	4 x USB 2.0	4 x USB 2.0	4 x USB 2.0	4 x USB 2.0	4 x USB 2.0	-
	Number of Axis	4	4	4	8	16	8
	Encoder Channels	4	4	4	8	-	8
	T&S Velocity curve	~	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
	Linear Interpolation	2/3-axis Linear	2-axis Linear	2/3-axis Linear	2/3-axis Linear	2/3-axis Linear	2-axis Linear
	Circular Interpolation	2-axis Circular	-	2-axis Circular	2-axis Circular	2-axis Circular	_
	Helix Interpolation	~	-	\checkmark	\checkmark	\checkmark	-
	Continuous interpolation	~	-	\checkmark	\checkmark	\checkmark	-
Motion	MPG&JOG	~	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Functions	Position Compare	✓	-	\checkmark	\checkmark	\checkmark	-
	Position Latch	~	-	\checkmark	\checkmark	\checkmark	-
	Simultaneously Start/Stop	~	-	\checkmark	\checkmark	\checkmark	-
	E-Gear	~	-	\checkmark	\checkmark	\checkmark	-
	E-CAM	~	-	\checkmark	_	-	_
	Gantry	~	-	\checkmark	\checkmark	\checkmark	-
	Tangential Following	~	-	\checkmark	\checkmark	\checkmark	-
	Position window output	✓	-	\checkmark	\checkmark	\checkmark	-
	Programming Language			Motion	BASIC		
Motion	Number of Task			1	0		
Studio	Debugging Tool	Terminal; Variable	Watch; I/O Viewer; N Single Step Debug	lotion test tool; Para ging; C-integration;	meter Viewer; VR Ma 3D Path; CAM Edito	anagement tool; Bre r Tool; Coding help	eakpoint Operation;
	Function Blocks		Cylinder control: E	XE: Goode: Virtual	Controller: Program	mable Encryption:	





Machine Vision Introduction

Introduction

Machine vision is used in every manufacturing market, from food beverage, pharmaceuticals, automotive, semiconductor to general manufacturing, the human eye inspection and response is too slow and unreliable for the demanding manufacturing process nowadays, replacing human inspection with machine vision can go further in the automating factory operation, the majors applications are quality assurance, production automation and identification

The era of Industry 4.0 is upon us, the scope of the factory will change dramatically, not only the ability to produce, but to produce with the most flexibility and efficiency, machine vision plays an important role in achieving 100% quality control in manufacturing, reducing costs, increase flexibility and ensuring a high level of customer satisfaction to fit the demands of smart manufacturing.

The move from analog to digital is prevalent, and the GigE Vision become the most significant interface in this market, Advantech provides high performance GigE Vision solutions, an open PC-based architecture, including industrial camera, computing platform, frame grabber for the traceability, alignment, gauge, identification and inspection application to fulfill the requirements for versatile machine vision applications.

Selection Guide



Application Stories

Backend semiconductor packaging inspection machines

The semiconductor industry has some of the most demanding applications, requiring a combination of extreme accuracy and precision combined with high throughput. Keeping up with innovations in packaging, the challenges to achieve this drastically increase. The fast-paced progress towards greater densities and finer dimensions are pushing the limits of vision systems.

Advantech suggested an intelligent GigE Vision frame grabber, DSP-based multi-axis motion control card and compact modularized system for direct integration in spaceconstrained machine to accomplish high-precision, high productivity IC packaging inspection. The solution adopts an industrial grade computer to combine PCIE-1174, four-channel intelligent GigE Vision frame grabber with include a dedicated FPGA (Field Programmable Gate Array) to reconstruct images before transmitting them in real time to the host PC via DMA (Direct Memory Access). This then frees up the host PC's processor and ensures there is no frame or packet loss during image acquisition.

Improve fabric quality in textile industry

Textile manufacturing is a very complex process. Weaving is the most basic process which involves interlacing a set of vertical threads (called the warp) with a set of horizontal threads (called the weft).

The new optical web inspection system can detect the warp thread break less one second and ease of use and maintenance. Accordingly, Advantech suggested the UNO-3283G, an Intel i7 Fanless Automation Computer with 2 x GbE, 2 x mPCle, HDMI, DVI-I, and PCIE-1172, two channel intelligent GigE Vision frame grabber with include a dedicated FPGA (Field Programmable Gate Array) to reconstruct images before transmitting them in real time to the host PC via DMA (Direct Memory Access). This then frees up the host PC's processor and ensures there is no frame or packet loss during image acquisition. To further aid installation and maintenance, this series also includes the use of PoE (Power over Ethernet) and Ad Hoc protocol which, like DHCP, doesn't require a specific IP address and enables System Integrators (SI) to simply plug the camera in and go.

Implement the product traceability in food & beverage

As the market demand for food safety increases, traceability is getting more attention in the food and beverage industry as well as the packaging industry. One of the world's leading providers of beverage containers would like to identify the bar codes, characters and numbers one the ink-jet printing labels at a 7 unit per second run rate. Advantech provided the multiple camera, PC-based automated optical identification system to identify the bar code, data code, and the character on the beverage container, the system consists of AIIS-1240, 4-CH PoE compact vision system with Intel[®] Core[™] i7 CPU; Inspector Express, a graphical user interface machine vision application software specifically designed to simplify the design and deployment of automated inspection on the factory floor; QCAM-GM0640-120CE, 0.3 Megapixel industrial camera, features with the PoE (Power over Ethernet) to simplify installation and maintenance.

Vision system and robotics ensure finished product quality in automotive industry

In the automotive industry, quality control is an extremely important part. Most of time, there are engineers to verify the interiors and exteriors, including dash board, door, seat, light, and color for the finished product quality check. In one of the largest automotive groups, there are about 100 items in the finished product check list and the client was looking for a quality check system to perform the inspection automatically. To automate the quality check of the parts in different vehicles, a flexible and extensible system had to be created, and due to numbers of characteristic, the system integrators designed the AOI (Automated Optics Inspection) system with multiple-camera and robots for high flexibility and efficiency. To satisfy this case, Advantech suggested PCIE-1674E, four channel GigE Vision frame grabber and QCAM-GM2500-014CE, 5.0 Megapixel industrial camera including PoE (Power over Ethernet) function, to simply the installation and maintenance. Besides these, there are other products to help provide the client with the desired functionality. The UNO-3283G, an Intel i7 Fanless Automation Computer with 2 x GbE, 2 x mPCIe, HDMI, DVI-I, and the PC-1756, a 64-ch Isolated Digital I/O PCI Card for digital signal path to provide the total solutions in this case.

Machine Vision Selection Guide

Frame Grabbers









Software and Industry Solutions

Industrial Server . ٦. Intelligent System

Intelligent HMI and

1 Automation Computers

0

. Industrial I/O and Video Solutions

N	lodel Name	PCIE-1172	PCIE-1174	PCIE-1672E	PCIE-1674E					
	Input Voltage	12 V _{DC} (direct from PCIe slot, total Ma	x. 18W or AT/ATX system pow	ver input					
Power	Overload Current Protection	Present								
nequirements	Connection		AT/ATX Power Jack							
	Output PoE Power	48 VDC PoE Pow	48 VDC PoE Power output, total Max. 18W (total Max. 60W with AT/ATX system power input)							
	Operating Temperature	0 ~ 50°C (32 ~ 122°F)								
Environment	Storage Temperature		-20 ~ 80°C	(-4 ~ 176°F)						
	Operating Humidity	5 ~ 95% RH								
Mechanics	Dimensions (W x D)		185 x 110 mn	n (7.3" x 3.9")						
	Compatibility		IEEE8	02.3af						
	Speed	1000	Mbps	10/100/10	000 Mbps					
	No. of Ports	2	4	2	4					
GiaE Vision	Port Connector	8-pin RJ45								
	Bus Interface	PCI Express® x 4								
	Jumbo Frame		91	(B						
	GigE Vision Offload Engine	\checkmark	\checkmark	-	-					
	ESD		8KV (air), 4ł	<v (contact)<="" th=""><th></th></v>						
Cofety.	EFT		21	<ν						
Salety	Surge Protection		11	<v< th=""><th></th></v<>						
	Isolation Protection		2.5	.5 KV						
	No. of Channels	2 input and output	4 input and output	-	-					
Digital Input/	Input/Output range	0-30V opt	o-isolated	-	-					
Output	Max. frequency	1K	Hz	-	-					
	Digital input interrupt	Falling and rising edg	ge, normal and invert	-	-					



Model Name	QCAM- GM0640-300CE	QCAM- GM1300-060DE	QCAM- GC1300-060CE	QCAM- GM1600-060DE	QCAM- GM2500-014DE	QCAM- GC2500-014CE	QCAM- GM3800-010CE	QCAM- GC4600-007CE
Resolution	640 x 480	1280 x 1024	1280 x 1024	1600 x 1200	2592 x 1944	2592 x 1944	3856 x 2764	3072 x 2048
Frame Rate	300	60	60	60	14	14	10	7
Sensor	Python 300, CMOS	e2V EV76C560, CMOS	e2V EV76C560, CMOS	e2V EV76C570, CMOS	Aptina MT9P031, CMOS	Aptina MT9P031, CMOS	Aptina MT9J003, CMOS	Aptina MT9F002, CMOS
Shutter	Global Shutter	Global Shutter	Global Shutter	Global Shutter	Rolling Shutter	Rolling Shutter	Rolling Shutter	Rolling Shutter
Sensor Size	1/4"	1/1.8"	1/1.8"	1/1.8"	1/2.5"	1/2.5"	1/2.3"	1/2.3"
Pixel Size (µm)	4.8 x 4.8	5.3 x 5.3	5.3 x 5.3	4.5 x 4.5	2.2 x 2.2	2.2 x 2.2	1.67 x 1.67	1.4 x 1.4
Color Format	Mono	Mono	Color	Mono	Mono	Color	Mono	Color
Interface				Gigabit	Ethernet			
Dimensions (L × W × H) mm				42 x 4	2 x 29			
Lens Mount				C/	CS			
Operating Temperature				0 ~ 5	50°C			
Power Consumption	<2.6 W	<2.6 W	<2.6 W	<2.7 W	<2.7 W	<2.7 W	<3.7 W	<3.7 W



Energy Solution Overview

Introduction

The successful management of power and energy applications is becoming increasingly critical as new energy sources, distributed across a much wider area than fossil fuels, become increasingly important. The informatization, intellectualization, and energy development of these new energy sources will change the traditional model, from a single communication model without response, to an alarm-to-intercommunication unified model. Advantech, as a leading manufacturer of industrial PCs for power and energy applications, provides intelligent components, from smart meters, IEC-61850-3 certified industrial computers, intelligent wireless gateways, to SCADA software, substation automation system development, and energy management. Through a host of innovative products and solutions, Advantech has shown itself to be one of the key enablers of Industrial IoT and Industry 4.0.

Integrated Power Management

SCADA Application

In Smart Substations, it's essential to be able to remotely monitor substation devices from a central management center. To achieve this, high performance computing platforms integrate HMI/DATA collection, data monitoring, environmental status, which help operators accurately evaluate their devices' status and take action.

- Application Requirements
 - Reliable IEC 61850-3 certification
 - High-performance computing platform
 - AMT/ TPM

- Cyber Security for Smart Grids

There are different grades of network protection priorities in a substation, and use in these environments needs reliable cyber security. This requires a software firewall or comparable hardware firewall devices to prevent illegal and unauthorized user access.

- Application Requirements
 - Reliable IEC 61850-3 certification
 - High-performance Ethernet
 - Virtual Machine/ TPM

- Communication & Data Gateway with IEC 61850

Within a substation, various devices use a wide variety of protocols, such as IEC-60870-101/103/104, Modbus or other private rules. The status and information of these devices needs to be accurately monitored and collected through a gateway computer with a unified communication transition protocol. It's very important that transfer devices use various protocols to unify the IEC-61850 protocol.

- Application Requirements
 - Reliable IEC 61850-3 certification
 - Multiple communication interfaces support
 - Isolated serial ports, Ethernet ports, IRIG-B

- Auxiliary Safety Monitoring

Along with modern computing and network communication technology, electricity system automation becomes more important, especially for safety related applications. The goal is to avoid issues of traditional substation such as non-precaution and non-linkage conditions. Advantech's computers and devices provide safety related information acquisition and monitoring, such as environmental parameters, facility parameters, and access guard status and other unusual conditions.

- Application Requirements
 - On-board or expansion IO for data acquisition
 - Communication protocol support for monitoring sensors

- Primary Device Monitoring

In smart substations, traditional primary devices including transformers, GIS, CT/VT, Thunder and other isolated switches, normally operate without precaution, monitoring unified communication protocols. Along with the development of modern smart substations, the IEC-61850 standard is latest trend in substation applications and primary device monitoring. To meet these requirements, Advantech provides IEC-61850 compliant computer platforms for data communication and transmission which keeps primary devices operating normally.

- Application Requirements
 - Flexible I/O, communication interfaces and protocol support
 - Highly reliable computing platform



Distributed Energy Monitoring in Renewable Energy

With the increasing construction of solar power plants, customers are finding it difficult to handle issues of the number of communication protocol requests, unstable communication networks on distributed farms and no high-efficiency or intelligent monitoring software. This means traditional solar power monitoring solutions can not satisfy modern fast developing solar operation requirements.

Advantech provides high-performance computing platforms, total data acquisition modules, communication protocol gateways, network communications, and cloud software solutions with multiple communication protocols and stable Ethernet or wireless network support, network switchboards and remote monitoring software.

- Data Acquisition Using Multiple Communication Protocols

There are many types of electrical equipment in solar power farms, such as inverters, combiner boxes, and intelligent or non-intelligent power meters, which need the support of a diverse range of communication protocols. For device data acquisition Advantech provides communication platforms compatible with these protocols.

- Application Requirements
 - X86/ RISC-based gateway platforms
 - Multiple serial ports / network ports
- IEC-60870 / Modbus / DNP3 protocol support

- Wireless Communication on Distributed Solar Power

Distributed solar power farms are scattered over vast and remote areas, and establishing stable communication networks is not easy. To reduce wiring costs and maintain reliability, Advantech provides gateways capable of supporting 2G/3G/Wi-Fi/4G wireless for stable networks with data integrity.

- Application Requirements
 - 2G/3G/Wi-Fi/4G wireless
 - Reliable platform with integrated intelligent software

Remote Monitoring and Maintenance

The operating status of solar power plants (especially solar panels) directly affects power generation efficiency and capacity. Comprehensive centralized monitoring and scientific management is important. Due to the characteristics of wide areas and long distances, Advantech provides remote control solutions for helping administrators immediately understand the operational status of the plant through handheld devices or PCs. This helps with the timely control and maintenance of equipment while enhancing the efficiency and safety of solar power plants.

Distributed Energy Monitoring in Energy Consumption

In order to reduce production costs and increase product profitability, manufacturing factories require integrated monitoring management and optimization measures to manage their high energy-consuming facilities. Advantech not only provides practical and easy-to-implement energy management solutions, but also has a full range of product portfolios, including smart meters, data acquisition modules, and control hosts, as well as and back-end management platforms to offer complete solutions for enterprises to achieve energy efficiency.

High Energy-consuming Equipment Monitoring Application

Since harmonics can have a significant impact on electrical distribution systems and the critical facilities they need, Advantech's energy management solution used equipment failure diagnosis and prevention mechanisms to provide analytical information through monitoring harmonic currents generated by non-linear electronic loads, so as to improve production efficiency and reduce maintenance and energy costs.

Factory Facility Monitoring Application

By providing real-time energy consumption data to accurately grasp the key moments, Advantech's factory facility monitoring systems are aimed at controlling high consumption facilities such as lighting, HVAC (heating, ventilation and air conditioning), and UPS (uninterruptible power supply). A time-of-use pricing service was used to adjust the use and operation of the facility according to the actual power usage and electricity tariff, saving energy costs.

WebAccess Based Remote Energy Management Solution

For factory energy consumption, Advantech WebAccess SCADA software is able to implement remote management, energy consumption status overview, energy saving potential assessment, and recommend practical measures, energy monitoring and reporting analysis, etc. to effectively achieve energy savings and cost control.

X86-based Industrial Automation Computers Selection Guide

Energy Solution Platforms

NEW

	NEW			(NEW		
		1		R.			
Model Name	ECU-4685	UNO-4671A	ECU-4674	ECU-4574	ECU-4784 Xeon	UNO-4673A/4683	ECU-4784
Certification	IEC 61850-3/IEEE 1613 China Electricity Certificate IV level	IEC 61850-3 / IEEE 1613 Compliant China Electricity Certificate IV level	IEC 61850-3 / IEEE 1613 Compliant China Electricity Certificate IV level	IEC 61850-3/IEEE 1613 China Electricity Certificate IV level	IEC 61850-3/IEEE 1613 China Electricity Certificate IV level	IEC 61850-3/IEEE 1613 Compliant China Electricity Certificate IV level	IEC 61850-3/IEEE 1613 China Electricity Certificate IV level
CPU	Intel Skylake Celeron 3955U 2.0GHz	Intel Atom D525 1.8GHz	Intel Atom N2600 1.66GHz	Intel Atom N2600 1.66GHz	Intel SkyLake Xeon E3-1505L Quad-core 2.0GHz	Intel Atom D510, 1.6 GHz Intel Core i7, 2.0 GHz	Intel Haswell Core i7 4650U 1.7GHz dual-core, i3 4010U 1.7GHz, Celeron 2980U 1.6GHz
RAM	4G DDR3L SDRAM	4GB DDR3 SDRAM	2G DDR3 SDRAM	2G DDR3 SDRAM	16G DDR4 SDRAM with ECC	2GB DDR2 SDRAM 4GB DDR3 SDRAM	8G DDR3L SDRAM 16G DDR3L SDRAM
Display	VGA	VGA	VGA	VGA	VGA/DVI	VGA/DVI-I	VGA/DVI
Serial Ports	8 x Isolated RS-232/422/485 (Terminal Block)	2 x Isolated RS-232, 4 x Isolated RS- 422/485, 4 x Isolated RS-485	2 x isolated RS-232 1 x IRIG-B 16 x Isolated RS- 232/485	2 x isolated RS-232 8 x isolated RS- 232/485	2 x Isolated RS-232 (Standard) 8 x RS-232/422/485 (Terminal Block)	2 x Isolated RS-232/422/485	2 x Isolated RS-232 (Standard) 8 x RS-232/422/485 (Terminal Block)
Ethernet Ports	6 x 10/100/1000Base-T	2 x 10/100/1000Base-T and 4 x 10/100 Base-T RJ-45	2 x 10/100/1000Base-T 6 x 10/100Base-T	2 x 10/100/1000Base-T 6 x 10/100Base-T	8 x 10/100/1000Base-T	2 x 10/100/1000, 4 x 10/100 Base-T RJ-45	8 x 10/100/1000Base-T
USB Ports	Six (One internal)	4 (1 x internal)	5 (1 x internal)	5 (1 x internal)	6 (1 x internal)	6 (1 x internal)	6 (1 x internal)
Expansion	-	PCI-104	1 x PCI 104	1 x PCI 104	2 x PCI/PCIE	-	2 x PCI/PCIE
Onboard I/O	-	-	8 x isolated DI, 8 x isolated DO	-	-	-	-
Watchdog Timer	✓	\checkmark	\checkmark	\checkmark	-	\checkmark	\checkmark
CompactFlash Slots	One Internal (mSATA)	One Internal	1 x Internal (CF)	1 x Internal (CF)	1 x Internal (CFast)	One Internal	1 x Internal (CFast)
2.5" HDD Expansion	2 x SATA	1 x SATA	2 x SATA	2 x SATA	2 x SATA	1 x SATA	2 x SATA
Operating Systems	WES7, Windows7, Windows 8, Windows Server 2012R2, Windows Server 2008R2(64bits), Windows Embedded 8 64-bit	WES2009, WES7, Windows CE 6.0 and Linux	WES7, Windows7, Linux	WES7, Windows7, Linux	WES7, Windows7, Windows 8, Windows Server 2012R2, Windows Server 2008R2(64bits), Windows Embedded 8 (64bits)	WES7, Windows XP Embedded, Windows (XP, Windows CE 6.0, Linux, QNX, Win10, Win7, Windows Server 2008R2/ 2012/ 2012R2	WES7, Windows7, Windows 8, Windows Server 2012R2, Windows Server 2008R2(64bits), Windows Embeddec 8 (64bits)
Mounting	1U Rack-Mount	2U Rackmount	2U Rackmount	1U Rackmount	-	2U Rackmount	2U Rackmount
Anti-Vibration	2 G w/mSATA, 1 G w/HDD	2 G w/CF, 0.5 G w/HDD	2 G w/CF, 1 G w/HDD	2 G w/CF, 1 G w/HDD	-	2 G w/CF, 1 G w/HDD	2 Gw/CF, 1 Gw/HDD
Anti-Shock	30 G w/mSATA, 20 G w/HDD	30 G w/CF, 20 G w/HDD	30 G w/CF, 20 G w/HDD	30 G w/CF, 20 G w/HDD	-	30 G w/CF, 20 G w/HDD	30 G w/CF, 20 G w/HDD
Operating Temperature	-20 ~ 70°C (-4 ~ 158°F)	-20 ~ 60°C (-4 ~ 140°F)	-20 ~ 70°C (-4 ~ 158°F)	-20 ~ 70°C (-4 ~ 158°F)	-20 ~ 60°C with 50% CPU/ I/O loading, without 2D/3D -20 ~ 45°C with 100% CPU/ I/O loading	-20 ~ 70°C (-4 ~ 158°F)	-20 ~ 70°C (-4 ~ 158°F)
Power Consumption Typical	22W	30 W	24 W	24 W	35 W	45 W	22W (i7 dual-core) 24.2W (Celeron)
Power Requirements	Supports Redundant Power Input 100 ~ 240 V _{Ac} or 100 ~ 240 V _{Dc} Power 2: 100 ~ 240 V _{Ac} or 100 ~ 240 V _{Ac} or	Supports Redundant power input Power 1: 100 ~ 240 V _{AC} or 100 ~ 240 V _{DC} Power 2: 100 ~ 240 V _{AC} or 100 ~ 240 V _{DC}	Supports Redundant power input 100 ~ 240 V _{Ac} or 100 ~ 240 V _{Ac} or Power 2: 100 ~ 240 V _{Ac} or 100 ~ 240 V _{Ac} or	Supports Redundant power input Power 1: 100 ~ 240 Vac Vac or 100 ~ 240 Vac Power 2: 100 ~ 240 Vac or 100 ~ 240 Vac	Supports Redundant power input Power 1: 100 ~ 240 Vac Vac or 100 ~ 240 Vac Power 2: 100 ~ 240 Vac or 100 ~ 240 Vac	Supports Redundant power input Power 1: 100 ~ 240 Vac or 100 ~ 240 Vac Power 2: 100 ~ 240 Vac or 100 ~ 240 Vac	Supports Redundan Power Input 100 ~ 240 V _{AC} or 100 ~ 240 V _{DC} Power 2: 100 ~ 240 V _{AC} or 100 ~ 240 V _{DC}
Dimensions (W x D x H)	440 x 280 x 44 mm	440 x 220 x 88 mm (17.3" x 8.6" x 3.4")	440 x 220 x 88 mm (17,3" x 8.6" x 3.4")	440 x 272 x 44 mm (17,3" x 8.6" x 3.4")	440 x 280 x 88 mm	440 x 220 x 88 mm (17.3" x 8.6" x 3.4")	440 x 280 x 88 mm
Weight	5.5 kg	~ 5.5 kg	~ 6.0 kg	4.6 kg	-	~ 6.0 kg	~ 6.0 kg
Ordering Information	ECU-4685-LC24SAE	-	ECU-4674-A53SAE ECU-4674- LBA53SAE	ECU-4574-A53SAE	ECU-4784-E56SAE	-	ECU-4784-D55SAE ECU-4784-D56SBE ECU-4784-E15SAE ECU-4784-C25SAE

RISC-based Industrial Communication Gateway





	-	1
	Annual	

Module Name	ECU-1251	ECU-1152	ECU-4553	
Certification China Electricity Certificate IV level		China Electricity Certificate IV level	CE/FCC/CCC	
CPU	TI Cortex A8 800MHz	TI Cortex A8 800MHz	TI Cortex A8 800MHz	
RAM	DDR3L 256MB	DDR3L 512MB	DDR3L 1GB	
Serial Ports	4 x Isolated RS-232/485	6 x isolated RS-232/485	16 x isolation RS-232/485	
Ethernet Ports	2 x 10/100 Base-T	2 x 10/100 Base-T	4 x 10/100 Base-T	
CAN	-	-	2 x CAN 2.0B	
Display	-	-	VGA	
USB Ports	1	1	1	
Storage	2 x SD (Micro-SD)	2 x SD (Micro-SD)	2 x SD (Micro-SD)	
Watch Timer	\checkmark	\checkmark	\checkmark	
Power Requirements	10 ~ 30 V _{DC}	10 ~ 30 V _{DC}	100 ~ 240 Vac or 100 ~ 240 Vac	
Operating System	RT-Linux 3.12	RT-Linux 3.12	RT-Linux 3.12	
Mounting	Wall-mount/ DIN-rail	Wall-mount/ DIN-rail	1U Rack-mount	
Anti-vibration	2G w/Micro-SD	2G w/Micro-SD	2G w/Micro-SD	
Anti-shock	10G w/Micro-SD	10G w/Micro-SD	10G w/Micro-SD	
Operating Temperature	-40 ~ 70°C	-40 ~ 70°C	-40 ~ 70°C	
Typical Power Consumption	2.4W	2.4W	6.6W	
Dimensions	140 x 96.5 x 30 mm	170 x 110 x 32.2 mm	440 x 220 x 44 mm	
Weight	1.5 kg	1.5 kg	4.5 kg	



Intelligent Transportation Platforms

Comprehensive Solutions for Modernizing Infrastructure

Advantech collaborates with partners to provide reliable platform solutions that facilitate intelligent transportation in cities worldwide. Leveraging over a decade of experience, Advantech has invested resources into designing and developing innovative product offerings aimed specifically at the transportation industry. These products include automatic fare collection systems, wayside control equipment, rolling stock management solutions, and traffic surveillance systems. By enabling intelligent transportation systems, Advantech achieves its vision of realizing smart city technologies.



Product Offerings

AFC Controller

ITA-1000 Series

AFC controller series features fanless design and rich I/O to support various applications such as automatic gate machines, ticket vending machines, automatic fare collection systems, and more. It also supports self-service equipment and kiosk applications due to its compact and lightweight design.

Rugged-design Platform

ITA-2000 Series

Wayside controller series provide various applications such as communication-based train control, wayside signaling, and train control system. Our wayside controller system includes CTC and ATC systems that provide a secure monitoring and operating environment.

Rolling Stock Controller

ITA-5000 Series

Rolling stock controller caters for rolling stock applications including driver machine interface, passenger information system,

vehicle monitoring system and more. Advantech in-train products are EN 50155 and EN50121-3-2 railway standard certified, which enable them to withstand high levels of vibration to enhance their longevity.



ARS-P3800/2800



Advantech ARS-P series is fanless Passenger Information

System, EN 50155 certified specially for rolling stock applications. It features a stretched LCD panel, with high brightness to ensure easy readability even in light-insufficient environments. It serves as a reliable platform to provide passenger information on a wide range of vehicles.

Panel Controller

ITA-7000 / 8000 Series

ITA-7000 series is a fanless Passenger Information System, EN 50155 certified specially for rolling stock applications. Its stretched LCD panel ensures easy readability even in light-insufficient environments. ITA-8000 series is a fanless touch panel PC for human machine interface. The panel's small, ultra-flat design offers space savings for installation in driver cabins, while the configuration flexibly allows it to be adjusted for specific applications and different train models.



Software and Industry Solutions

Industrial Server 5 Intelligent System Intelligent HMI and Monitors Automation Computers and Controllers ndustrial Communication Remote I/O Module Industrial I/O and Video Solutions

Intelligent Transportation Platforms

			(注意:二章		
Model	Name	ITA-1501	ITA-1611	ITA-1711	ITA-2111
	CPU	i.MX6 Quad Cortex-A9	Intel [®] Celeron™ J1900	Intel [®] Celeron™ J1900	Intel [®] Atom™ E3845
	CPU TDP	5W	10W	10W	10W
	Frequency	1.0 GHz	2.0 GHz	2.0 GHz	1.91 GHz
Processor System	Core Number	4	4	4	4
	L2 Cache	1MB	2MB	2MB	2MB
	BIOS	-	AMI SPI 64Mbit	AMI SPI 64Mbit	AMI SPI 64Mbit
	Chipset	-	-	-	-
	Technology	Single channel DDR3 1066	Dual channel DDR3 1333	Dual channel DDR3 1333	Dual channel DDR3 1333
	Capacity	Up to 2GB	Up to 8GB	Up to 8GB	Up to 8GB
Memory	Onboard Memory	2GB	4GB	4GB	4GB
	DIMM Slot	-	1	1	1
	Graphic Memory	Freescale i.MX6 integrated Hardware accelerators	Shared with system memory up to 256MB	Shared with system memory up to 256MB	Shared with system memory up to 256MB
	Multiple Display	Dual	Dual	Dual	Dual
Display	Display Interface	VGA +HDMI or 2 x VGA Single channel: 1920 x 1080 @ 60 Hz Dual channel: 1920 x 1080 @ 60 Hz	2 x VGA or VGA + DVI-D or VGA + LVDS Single channel max: 1920 x 1080 @ 60Hz Dual channel max: 1920 x 1080 @ 60Hz	2 x VGA or VGA + DVI-D or VGA + LVDS Single channel max: 1920 x 1080 @ 60Hz Dual channel max: 1920 x 1080 @ 60Hz	VGA + DVI-D Single channel max: 1920 x 1080 @ 60Hz Dual channel max: 1920 x 1080 @ 60Hz
	Controller	1 x RTL8211E	2 x Intel® I211	2 x Intel® I211	4 x Intel® I210-IT
Ethernet	Speed	10/100/1000 Mbps	10/100/1000 Mbps	10/100/1000 Mbps	10/100/1000 Mbps
	Connector	1 x RJ45	2 x RJ45	2 x RJ45	4 x RJ45
	Onboard Slot	1 x SD	1 x mSATA	1 x mSATA	1 x mSATA
Storage	HDD/SSD	1 x 2.5" SSD	1 x 2.5" HDD/SSD	1 x 2.5" HDD/SSD	1 x 3.5" or 2 x 2.5" HDD/SSD
Ĵ	Easy Swap Module	-	-	1	-
	Mini PCle	1	1	1	1
	PCle	-	-	-	-
Expansion Interface	PCI	-	-	-	-
	PCI104	-	-	-	1
	ITA-EM	-	-	-	-
	Display	VGA +HDMI or 2 x VGA	2 x VGA or VGA + DVI-D or VGA + LVDS	2 x VGA or VGA + DVI-D or VGA + LVDS	VGA + DVI-D
	Audio	1 x Speaker-out with 2 x 4W amplifier, 1 x Mic-in	1 x Speaker-out with 2 x 4W amplifier, 1 x Mic-in	1 x Speaker-out with 2 x 4W amplifier, 1 x Mic-in	1 x Speaker-out with 2 x 4W amplifier, 1 x Mic-in
I/O	Ethernet	1	2	2	4
	USB3.0	-	1	1	1
	USB2.0	6	5	5	6
	СОМ	Up to 6 ports	Up to 6 ports	Up to 14 ports	10
	Digital I/O	-	8 GPIO	Up to 24 DI and 24 DO	
Power	Input Range	DC 12V	DC 9V~36V	DC 9V~36V	AC 100V~240V or DC 110V
Physical Characteristics	Dimensions (W x H x D)	188 x 66 x 129 mm (7.28" x 2.59" x 5.11")	200 x 70 x 190 mm (7.87" x 2.75" x 7.48")	200 x 100 x 190 mm (7.87" x 3.93" x 7.48")	427 x 44 x 325 mm (19.0" x 1.73" x 12.79")
Environment	Operating Temperature	0 ~ 60 °C (With SSD)	-25 ~ 60 °C (With SSD) 0 ~ 40 °C (With HDD)	-25 ~ 60 °C (With SSD) 0 ~ 40 °C (With HDD)	-25 ~ 60 °C (With SSD) 0 ~ 40 °C (With HDD)
	EMC	CE, FCC, CCC	CE, FCC, CCC	CE, FCC, CCC	CE, FCC, CCC
Certification	Safety Certifications	UL, CB, CCC	UL, CB, CCC, BSMI	UL, CB, CCC, BSMI	UL, CB, CCC
	Other	-	-	-	EN 50121-4

1-26 Selection Guide

Intelligent Transportation Platforms

			A HERE	- 9900		
Mode	I Name	ITA-2211	ITA-2231	ITA-5231	ITA-5612	ITA-5831
	CPU	Intel [®] Atom™ E3845	Intel [®] Core™ i7- 6822EQ	Intel [®] 6th Gen. Core™ i7/i5/i3	Intel®Atom™ X7-E3950	Intel® 6th Gen. Core™ i7/i5/i3
	CPU TDP	10W	25W	25W	12W	25W
Processor	Frequency	1.91 GHz	2.0 GHz	Up to 2.0 GHz	Up to 2.0 GHz	Up to 2.0 GHz
System	Core Number	4	4	4/2	4	4/2
	L2 Cache	2MB	8MB	8/6/3MB	2MB	8/6/3MB
	BIOS	AMI SPI 64Mbit	AMI SPI 128Mbit	AMI SPI 128Mbit	AMI SPI 128Mbit	AMI SPI 128Mbit
	Chipset	-	Intel [®] QM170	Intel [®] QM170	-	Intel [®] QM170
	Technology	Dual channel DDR3 1333	Dual channel DDR4 2133	Dual channel DDR4 2133	Dual channel DDR3L 1600	Dual channel DDR4 2133
Memory	Capacity	Up to 8GB	Up to 32GB	Up to 16GB	Up to 8GB	Up to 16GB
	Onboard Memory	4GB	16GB	8GB	4GB	8GB
	DIMM Slot	1	1	1	1	1
	Graphic Memory	Shared with system memory up to 256MB	Shared with system memory up to 512MB Dual	Shared with system memory up to 512MB	Shared with system memory up to 256MB	Shared with system memory up to 512MB
	inallipio Bioplay				DVI-I + DVI-D	DVI-I + DVI-D
Display	Display Interface	VGA + DVI-D Single channel max: 1920 x 1080 @ 60Hz Dual channel max: 1920 x 1080 @ 60Hz	DVI-I + DVI-D Single channel max: 1920 x 1200 @ 60Hz Dual channel max: 1920 x 1200 @ 60Hz	DVI-I + DVI-D Single channel max: 1920 x 1200 @ 60Hz Dual channel max: 1920 x 1200 @ 60Hz	(Optional) Single channel max: 1920 x 1200 @ 60Hz Dual channel max: 1920 x 1200 @ 60Hz	(Optional) Single channel max: 1920 x 1200 @ 60Hz Dual channel max: 1920 x 1200 @ 60Hz
Ett. and	Controller	2 x Intel [®] I210-IT	1 x Intel [®] i219LM and 1 x Intel [®] i210-IT	1 x Intel [®] i219LM and 2 x Intel [®] i210-IT	3 x Intel® i210-IT	3 x Intel® i210-IT
Ethernet	Speed	10/100/1000 Mbps	10/100/1000 Mbps	10/100/1000 Mbps	10/100/1000 Mbps	10/100/1000 Mbps
	Connector	2 x RJ45	2 x RJ45	3 x M12 X-coded(F)	3 x M12 X-coded(F)	3 x M12 X-coded(F)
	Onboard Slot	1 x mSATA	1 x M.2 (with SATA interface)	1 x mSATA	1 x mSATA	1 x mSATA
Storage	HDD/SSD	1 x 3.5" or 2 x 2.5" HDD/SSD	2 x 3.5" or 3 x 2.5" HDD/SSD	-	-	-
	Easy Swap Module	-	-	Max to 4 x 2.5" SSD or 3 x 2.5" HDD	2 x 2.5" SSD	Max to 3 x 2.5" SSD or 2 x 2.5" HDD
	Mini PCle	1	1	3	1 (Shared Slot with mSATA)	3
Expansion	PCle	-	-	-	-	-
Interface	PCI	-	-	-	-	-
	PCI104	1	1	-	-	-
	ITA-EM	3	3	4	-	2
	Display	VGA + DVI-D	DVI-I + DVI-D	DVI-I + DVI-D	1 x DVI-I	1 x DVI-I
	Audio	1 x Speaker-out with 2 x 4W amplifier, 1 x Mic-in	1 x Speaker-out with 2 x 4W amplifier, 1 x Mic-in	1 x Speaker-out with 2 x 4W amplifier, 1 x Mic-in	1 x Speaker-out with 2 x 4W amplifier, 1 x Mic-in	1 x Speaker-out with 2 x 4W amplifier, 1 x Mic-in
	Ethernet	2	2	3	3	3
I/O	USB3.0	1	4	2	2	2
	USB2.0	6	3	1 x USB2.0 with M12 A-coded(F) 4-pin	-	1 x USB2.0 with M12 A-coded(F) 4-pin
	СОМ	2	2	2	1	2
	Digital I/O	-	-	4 DI and 4 DO	8 GPIO	4 DI and 4 DO
Power	Input Range	AC 100V~240V or DC 110V	AC 100V~240V or DC 110V	Optional DC 24/48/72/110V input compliant with EN50155 class S2/C2	Optional DC 24/48/72/110V input compliant with EN50155 class S2/C1	Optional DC 24/48/72/110V input compliant with EN50155 class S2/C1
Physical Characteristics	Dimensions (W x H x D)	483 x 88 x 325 mm (19.0" x 3.46" x 12.79")	483 x 88 x 325 mm (19.0" x 3.46" x 12.79")	427 x 88 x 200 mm (19.0" x 3.46" x 7.87")	205 x 72 x 210 mm (8.07" x 2.83" x 8.26")	220 x 88 x 200 mm (8.66" x 3.46" x 7.87")
Environment	Operating Temperature	-25 ~ 60 °C (With SSD) 0 ~ 40 °C (With HDD)	-25 ~ 60 °C (With SSD) 0 ~ 40 °C (With HDD)	EN 50155 TX -40 ~ 70 °C (With SSD)	EN 50155 TX -40 ~ 70 °C (With SSD)	EN 50155 TX -40 ~ 70 °C (With SSD)
	EMC	CE, FCC, CCC	CE, FCC, CCC	CE, FCC, CCC	CE, FCC, CCC	CE, FCC, CCC
Certification	Safety Certifications	UL, CB, CCC	UL, CB, CCC, BSMI	UL, CB, CCC, BSMI	UL, CB, CCC, BSMI	UL, CB, CCC, BSMI
	Other	EN 50121-4	EN 50121-4	EN 50155, EN 50121-3-2, EN 50121-4, EN 45545	EN 50155, EN 50121-3-2, EN 45545	EN 50155, EN 50121-3-2, EN 50121-4, EN 45545

Model Name		ARS-P3800	ARS-P2800/P2800D	ITA-7220/7220D	
Computer System	CPU	AMD [®] Embedded G-Series GX- 217GA dual-core (1.65 GHz) SoC	Intel [®] Celeron [®] J1900 quad-core (2.00 GHz)	Intel [®] Celeron [®] J1900 quad-core (2.00 GHz)	
Computer System	Memory	DDR3 1600MHz 204-pin SODIMM (up to 8GB)	DDR3 1600MHz 204-pin SODIMM (up to 8GB)	DDR3L 1333MHz 204-pin SODIMM (up to 8GB)	
Storage mSATA		1 x mSATA SSD (64 GB default)	1 x mSATA SSD (64 GB default)	1 x mSATA SSD (64 GB default)	
Graphics Chipset		Radeon™ HD8280E, max. 450 MHz	Intel® HD Graphics, max. 688 MHz	Intel [®] HD Graphics, max. 688 MHz	
	Display Type	38" TFT LCD panel, max. resolution 1920 x 540	28" TFT LCD panel, max. resolution 1920 x 357	22" TFT LCD panel, max. resolution 1920 x 1080	
Display	Brightness	800 nits	1000 nits	400 nits	
	Contrast Ratio	5000:1	6500:1	1000:1	
Ethernet	LAN	10/100/1000 Mbps (M12 A-coded)	10/100/1000 Mbps (M12 A-coded)	10/100/1000 Base-T Ethernet interface (M12 X-coded)	
Touch Panel	Touch Type	-	-	-	
	Function Keys	-	-	-	
I/O	USB	1 x USB 2.0 (M12 A-coded), 1 x USB 2.0 (Type A)	1 x USB 2.0 (M12 A-coded), 1 x USB 2.0 (Type A)	1 x USB 2.0 (M12 A-coded)	
	Video Output	1 x HDMI	1 x DVI-D	1 x DVI-D	
Digital I/O	Input/Output	-	-	-	
Software	Opearting System	Linux Ubuntu 16.04	Linux Ubuntu 16.04	Linux Ubuntu 16.04	
Power	Input Voltage	$110 V_{\text{DC}}$ (±40%, selectable), 4-pole M12 connector	24/48/72/110 V _{DC} (±40%), 4-pole M12 connector	24/48/72/110 V _{DC} (±40%), 4-pole M12 connector	
	Operating Temperature	EN 50155 T1: -25 ~ +55 ℃	EN 50155 T1: -25 ∼ +55 °C	EN 50155 T1: -25 ~ +55 ℃	
Enviornment	Vibration, Shock	EN 50155	EN 50155	EN 50155	
	Ingress Protection	IP-54	IP-54	IP-40	
Physical Characteristics	Dimensions (W x H x D)	1065 x 342 x 63 mm (42.0 x 13.5 x 2.5 in)	814 x 178 x 56 mm (32.0 x 7.0 x 2.2 in)	575 x 299 x 56 mm (23 x 12 x 2.2 in)	
	Weight	11 kg (24.3 lb)	8.3 kg (18.3 lb)	7 kg (15.4 lb) / 6.5 kg (14.3 lb)	
Certifications	Railway Related	EN 50155, EN 50121, IEC 61373, (EN 45545 compliant)	EN 50155, EN 50121, IEC 61373, IEC 60571, (EN 45545 compliant)	EN 50155, EN 50121, IEC 61373, IEC60571 (EN 45545)	
	EMC, Safty	CE/FCC Class A, UL	CE/FCC Class A, UL	CE/FCC Class A, UL	

Industrial I/O and Video Solutions



Intelligent Transportation Platforms







Model Name		ITA-7170	ITA-8120	ITA-8101	
Computer System	CPU	Intel [®] Celeron [®] J1900 quad-core (2.00 GHz)	Intel [®] Atom™ x7-E3950 quad-core (2.00 GHz)	Intel [®] Atom™ x7-E3950 quad-core (2.00 GHz)	
	Memory	DDR3L 1333MHz 204-pin SODIMM (up to 8GB)	DDR3L 1600MHz 204-pin SODIMM (up to 8GB)	DDR3L 1600MHz 204-pin SODIMM (up to 8GB)	
Storage	mSATA	1 x mSATA SSD (64 GB default)	1 x M.2 2242 SSD (64 GB default)	1 x M.2 2242 SSD (64 GB default)	
Graphics	Chipset	Intel [®] HD Graphics, max. 688 MHz	Intel® HD Graphics, max. 650 MHz	Intel® HD Graphics, max. 650 MHz	
	Display Type	17" TFT LCD panel max. resolution 1920 x 1080	12.1" TFT LCD panel, max. resolution 1024 x 768	10.4" TFT LCD panel, max. resolution 1024 x 768	
Display	Brightness	400 nits	500 nits	400 nits	
	Contrast Ratio	600:01:00	700:1	500:1	
Ethernet	LAN	10/100/1000 Base-T Ethernet interface (M12 X-coded)	10/100/1000 Mbps (M12 X-coded)	10/100/1000 Mbps (M12 X-coded)	
Touch Panel	Touch Type	-	Projected capacitive touchscreen with support for two-finger multi-touch control	Projected capacitive touchscreen with support for two-finger multi-touch control	
	Function Keys	-	32 front-facing keys with tactile feedback that comply with UIC612-01 requirements	32 front-facing keys with tactile feedback that comply with UIC612-01 requirements	
I/O	USB	1 x USB 2.0 (M12 A-coded)	1 x USB 2.0 (M12 A-coded)	1 x USB 2.0 (M12 A-coded)	
	Video Output	1 x DVI-D	2 x RS-422/485 (M12 A-coded)	2 x RS-422/485 (M12 A-coded)	
Digital I/O	Input/Output	-	5-ch / 1-ch, isolated (M12 A-coded)	5-ch / 1-ch, isolated (M12 A-coded)	
Software	e Opearting Linux Ubuntu 16.04		Linux Ubuntu 16.04, Windows 10	Linux Ubuntu 16.04, Windows 10	
Power	wer Input Voltage 24/48/72/110 V _{DC} (±40%), 4-pole M12 connector		24/48/72/110 V_{DC} (±40%), 4-pole M12 connector	24/48/72/110 V_{DC} (±40%), 4-pole M12 connector	
	Operating Temperature	EN 50155 T1: -25 ~ +55 °C	EN 50155 T3: -25 ~ +70 °C (85 °C for 10 minutes)	EN 50155 T3: -25 ~ +70 °C (85 °C for 10 minutes)	
Enviornment	Vibration, Shock	EN 50155	EN 50155	EN 50155	
	Ingress Protection	IP-40	IP-65 front cover	IP-65 front cover	
Physical	Dimensions (W x H x D)	483 x 248 x 56 mm (19.0 x 9.8 x 2.2 lb)	350 x 260 x 73 mm (13.8 x 10.2 x 2.9 in)	310 x 214 x 73 mm (12.2 x 8.4 x 2.9 in)	
Characteristics	Weight	5.5 kg (12.1 lb)	5 kg (11 lb)	4.5 kg (9.9 lb)	
Certifications	Railway Related	EN 50155, EN 50121, IEC 61373, IEC60571 (EN 45545)	EN 50155, EN 50121, IEC 61373, IEC 60571, (EN 45545 compliant)	EN 50155, EN 50121, IEC 61373, IEC 60571, (EN 45545 compliant)	
	EMC, Safty	CE/FCC Class A, UL	CE/FCC Class A, UL	CE/FCC Class A, UL	