Integrated IoT Solutions & Services

Realize Ubiquitous Connectivity and IoT Applications
Realize Ubiquitous Connectivity and IoT Applications

Embedded devices all around us are being transformed into “Interconnected Smart Devices.” All these devices need communication bridges to pass raw data through the network to reach central servers for processing. For devices installed at remote, unattended and harsh environments, a stable and reliable communication bridge between the end device and the central server is a must. As a global leader in the embedded computing market, Advantech is committed to collaborating with our partners and customers to help you develop the IoT world.

With years of experience, Advantech provides comprehensive embedded product ranges and customer-centric design-in services to help customers develop reliable and innovative intelligent embedded computing solutions. To address the market for IoT applications, Advantech is dedicated to accelerating the development and deployment of IoT by connecting legacy devices to the cloud and applying intelligent analytics to help transform businesses. Advantech provides a full selection of embedded products and services to fulfill application needs in many vertically-focused markets.

The IoT Era is Here...

The term Internet of Things (IoT) is a hot topic in the industry. All of us are looking for advanced connectivity and the implementation of devices, systems and services that go beyond traditional M2M that cover a variety of protocols, domains and applications. According to Gartner, the IoT installed base will grow to 26 billion units by 2020, and according to IDC, the global IoT market will hit $7.1 trillion. So, knowing how to seize all these opportunities will be a key challenge for each industry.
Technology & Development

- IoT Chip Integration
- Modular Design & Turnkey Solutions
- IoT Software Built-in
- Manageability, Connectivity, Security

Solutions & Services Coverage

- Intel Moon Island IoT Gateway (IPD2.0 S/W Package)
- Intel Quark IoT Gateway
- Freescale iMX6 IoT Gateway & Sensor Controller

Industrial Partner Cooperation

Design Concept

- Compact & Modular Design
- Network Connectivity
- Easy Installation

IoT S/W Built-in

- Remote Management
  - Active Control
  - Advanced Security
- Cloud Services
  - Device Gateway to Cloud’s Communication

Sensor Integration

- 802.15.4e
- BLE
- Low Power WiFi
- UHF RFID

IoT Software Solutions

Advantech provides complete IoT software services. SUSIAccess makes it easier for embedded developers to securely connect, manage, and control data from the sensor, gateway, system and cloud layers. SUSIAccess as a service platform provides IoT software tools that help fulfill the different requirements of each layer, and also act as a bridge with standard protocol communications to simplify development, integration, and deployment.

WISE-Cloud
SUSIAccess

IoT Gateway & Systems

Advantech embedded IoT gateways & intelligent systems analyze and transmit data from end devices, accelerating decision making that results in increased efficiencies. This helps customers acquire the intelligence to drive new design innovations, making business transformation a profitable action rather than a challenge.

WPAN Gateway & Nodes

The most important element in IoT solutions is data acquisition. Advantech provides a wide range of reliable wireless sensor solutions for M2M communications including IEEE 802.15.4, Zigbee, UHF RFID and SubG (900MHz, 860MHz and 433MHz) RF technologies. All sensor nodes support multiple sensor interfaces and power inputs, and flexible configuration for diverse applications.
Although IoT has been talked about for many years, it has not been until recently that enterprises have begun to pursue IoT solutions. What are the market and technology factors that have turned IoT into reality and why now?

- Governments and businesses are driving the development of smart cities
- Key segments like industrial automation, energy & utilities, transportation, building automation, and medical services are requiring new approaches to improvements in efficiency and reduction of cost
- Lower manufacturing costs are driving the proliferation of smart devices in the market
- Advancement in computing power is providing the backbone to process massive quantities of data from IoT devices
- The prevalence of wired and wireless communications is making interconnectivity possible
Transportation
- Smart Roads
- Traffic Management & Control

Home Automation
- Energy & Water Use
- Intrusion Detection Systems

Intelligent Retail
- Interactive Multimedia
- Supply Chain Control
- Smart Product Management
What Your Truck Fleet Can Tell You

It's a challenge for truck logistics companies to ensure that products such as pharmaceuticals or fresh food goods are stored in optimal conditions during transportation and are punctually delivered. A damaged refrigeration unit, an open door, or mechanical problems with the vehicle can prove to be catastrophic for a refrigerated shipment. Building an effective system to closely monitor storage temperatures during transit is crucial to business success.

• Advantech’s UTX-3115 embedded, wide-range temperature box computer, bundled with Intel® Gateway Solutions for IoT works perfectly as a gateway solution to filter, transport and analyze data collected from sensors like cargo temperature, door and hitch.
• SUSIAccess remote management software makes remote monitoring and managing data from sensors to gateways easier, increasing operational efficiencies.

How to Take Full Control in Food Production Lines

Food sanitation and safety are top priority issues for food manufacturers. Traditionally, manufacturers check key status points during each phase of the production process. However, in order to improve food/beverage quality, the key is to find an ideal gateway solution that can operate in harsh environments whilst monitoring sensors communicate temperature, humidity, and other values on the production line. This ensures production lines are ready to run at start-up.

• The ARK-1123L embedded fanless box PC is an ideal gateway solution to enable seamless and secure data flow between sensors and the cloud. ARK-1123L offers affordable computing and rich network communication through WiFi, 3G or physical GbE LAN. And, with palm-size computers and a variety of mounting options (VESA, DIN Rail, Wall mount), ARK-1123L can be easily installed in a NEMA chassis to fulfill this space-critical application.
• Built-in Advantech SUSIAccess remote management software for real-time remote monitoring and system security enhances maintenance efficiency.
How Safe Is The Bridge You're Crossing

Bridges are one of the key links in transportation infrastructures. Increasing seismic activity around the world has been identified as a threat to the strength of bridges. Although we can minimize seismic effects on bridges with refined construction specifications and materials, we also need a real-time monitoring system on standby to monitor the health of the bridge. Some of the bridges are located in remote areas and therefore the monitoring system must have remote management, Wi-Fi and/or 3G communications capabilities.

• Advantech UBC Communication Gateway Series (UBC-200 & UBC-220) can collect multiple raw data from the bridge sensors and send it to the control center in the cloud to process into useful information.
• The UBC-200/UBC-220 is efficient for 24/7 operations and equipped with Wi-Fi or 3G module options for remote management support.

How Retailers Can Keep up with Customers

The retail industry is undergoing a major transformation, changing how customers shop and how retailers run business. More and more retailers continue to invest in enhancing operations by optimizing the personal experience of their customers. And given the fact that 70% of buying decisions are made on the spot, RFID is fast becoming a key technology to bolster retail effectiveness, enabling increases in revenue of between 12 ~ 25%.

• Advantech's RFID Reader WISE-3142R can capture real-time data for stock manageability and traceability.
• WISE-3142R can interact with Advantech's DS-570 signage player, which is equipped with rich I/O and superb graphics capability, and incorporates built-in software that detects when a shopper picks up an item which triggers related ads and recommendations on nearby displays. It can also collect data for customer preference analysis.
The shift from isolated systems to connected intelligent platforms requires not only performance and connectivity, but also the creative design of smaller, rugged edge devices. In this new era of connected computing technology, intelligent systems add value as standalone systems. They have evolved from their roots in M2M concepts to fully-fledged networks that communicate with each other and the cloud. For devices installed in remote, unattended and harsh environments, a stable and reliable communication bridge between the end device and central server is crucial. Embedded IoT Gateways can fulfill that requirement. They are efficient, stable, operate 24/7, and are built with extremely reliable hardware that’s easy to integrate with back-end maintenance/operating systems. Advantech embedded IoT gateways not only transport data but also analyze it as well from end devices, accelerating decision making and resulting in increased efficiency. This helps customers acquire the intelligence to drive new design innovations, making business transformation a profitable action rather than a challenge.

### IoT Gateway Features

**Network connectivity**

IoT gateways should have sufficient networking ability to link I/O sensors, acting as a bridge between the sensors and the cloud, with the objective of collecting data and passing it from the I/O sensor to the cloud.

**Low power consumption**

There are many of IoT devices in real world applications, creating a huge requirement for power. That’s why IoT gateways should be designed with low power consumption in mind.

**Intelligent data analysis**

IoT gateways offer instant responses and actions as part of their solution. More than a communication bridge, IoT gateways should also be able to share specific workloads from the cloud server.

**Easy implementation**

IoT gateways are usually installed in different environments with multiple missions, which explains why they should be easily adaptable and able to be implemented anywhere.
**x86-based Gateways**

In general, many developers consider x86-based IoT gateways to perform better in terms of processing capability, rich operating system (OS) support, and low-power consumption, as well as being lower in cost. Years of x86-based hardware development has established a large pool of design resources and a set of specifications adhered to by key companies that deliver x86-based solutions. These design specifications, spanning the boundaries of hardware and software, include I/O peripherals common to x86 platforms. Many of these development resources are available off-the-shelf, enabling development teams to quickly build working proof-of-concept applications at minimal cost with minimal effort. These readily available technology resources also translate to lower production costs for the final product.

**RISC-based Gateways**

The ARM-based architecture has been widely adopted in building IoT applications because of its low-power and low-cost benefits, with limited processing resources and minimal system and storage requirements. Compared with x86-based platforms, RISC-based gateways offer customers an alternative for applications that require basic data analysis capability while enjoying lower power consumption.

### x86 & RISC-based Gateway Comparison

<table>
<thead>
<tr>
<th>CPU Architecture</th>
<th>Computing Power</th>
<th>Power Consumption</th>
<th>Connectivity</th>
<th>Recommended Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>x86</td>
<td>Can process data from 2,000+ I/O sensors</td>
<td>5~10 Watts</td>
<td>HDMI, micro HDMI, VGA, USB3.0, USB2.0, micro USB2.0, Audio, DCIN, Reset, antenna</td>
<td>UTX-3115 (Wide Temperature Embedded Box PTCRB, GCF certified)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ARK-1123L (Ultra-small Fanless Embedded Box PC (-30 ~ 70 °C))</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DS-570 Digital Signage Player</td>
</tr>
<tr>
<td>RISC</td>
<td>Can process data from 100-2,000 I/O sensors</td>
<td>Under 2 Watts</td>
<td>HDMI, USB2.0, Audio-out GbE, Reset, antenna</td>
<td>UBC-200 RISC Compact Box</td>
</tr>
</tbody>
</table>

### Intel® Gateway Solutions for the Internet of Things

Embedded IoT gateways offer pre-integrated Intel® Gateway Solutions for the IoT, an integrated solution based on Intel® Quark™ SoC X1000 Series and Atom™ processors, which bundles together Wind River IDP2.0 technology, McAfee security functionality, and a wide variety of connectivity protocols, developer tools, and programming environments. By providing pre-integrated, pre-validated hardware and software building blocks, the gateways connect legacy and new systems, and enable seamless and secure data flow between edge devices and the cloud. Currently UTX-3115*, UBC-200*, ARK-1123L* are bundled with Intel® Gateway Solutions for the IoT.

**Key Benefits**

- Delivers an integrated, pre-validated, and flexible open-computing gateway platform, including foundational hardware, software, and security building blocks to allow fast solution development and deployment.
- Enables building scalable solutions with standards-based interfaces to securely connect and aggregate data from the edge to the cloud.
- Enables business innovation on proven technologies across computing, communications, manageability, and security.

*Check Page 13 for Product Info.*
Advantech Wireless IoT Solutions
The Next Generation of Wireless Data Acquisition Solutions

Under the IoT Framework, interconnection and communication from Machine to Machine (M2M) are the key elements. Advantech WISE Series provide WPAN gateways and node devices with corresponding web services and remote management capability for Smart City/IoT applications. To help customers easily and quickly build wireless IoT environments, Advantech integrates WPAN RF solutions with value-added SUSIAccess IoT software for centralized monitoring and intelligent communication capabilities. Wireless network technologies include IEEE 802.15.4e Smartmesh, Zigbee, Bluetooth Low Energy (BLE), SubG (433MHz, 868MHz, etc.), WiFi, Cellular and GPS protocols. The first of Advantech’s WISE Series is targeted toward IEEE 802.15.4e Smartmesh solutions which are designed for Wireless Sensor Networks with a client-server structure for controller and node devices.

Connect to 200 Node Devices
with 99.999% network reliability

WPAN Gateway
WISE-3000 Series

Multiple RF Design
4 RF antennas to support GPS, WiFi, cellular and WPAN communication

IP-Based Design
6LoWPAN compliant for TCP/IP applications

Network Security
Message integrity, access control, confidentiality, replay protection, DoS resistance

Extreme Low Power
Node battery life can last 5~10 years

Multiple Sensor Combination
Temperature, humidity, water, gas, structural integrity, etc.

WPAN Gateways
• IEEE 802.15.4e
• BLE
• Low Power WiFi

WPAN Node Devices
• Sensor Node
• I/O Node
• RFID Node

SUSIAccess for IoT
• Data Acquisition
• Remote Monitoring
• Remote Configuration
**Advantech WPAN Controllers, WISE-3000 Series**

Advantech WISE-3000 Gateway series deliver wire-like data reliability and performance in a low power cost-effective design that's ideal for IoT applications. Being 6LowPAN-compliant (IPv6 over Low power Wireless Personal Area Networks), WISE-3000 series are all IP-based devices that allow universal TCP/IP adoption to fulfill IoT demands for cloud computing and big data applications.

**WISE-3000 Series**

WISE-3000 series are an ARM-based platform with an integrated 6LowPAN manager module for node management. WISE-3310 provides 200-node management capability and WISE-3320 supports 100 nodes. With an optional multiple-RF design, WISE-3000 series are able to serve as an IoT data gateway through Ethernet, WiFi, or cellular protocols for cloud connectivity. Advantech also provides a standalone gateway controller, WISE-3301, which uses an external USB connection to any x86 platform. With Advantech’s WISE-3301 WPAN agent software package, a customer’s x86 system can become an IoT data gateway and be able to remotely monitor data and devices.

- **Time Synchronized**
  - Low power routers
  - No packet collisions

- **Channel Hopping**
  - Longer effective range
  - Better link stability

- **Centrally Managed**
  - Quality of Service guarantees
  - Forensic data

**Advantech WPAN Nodes**

Advantech WISE-3000 series node devices have a 6LowPAN communication carry board plus a functional board with different enclosures for different application environment demands. Functional-wise, WISE-3000 series node devices provide:

- **Ultra Low Power**
  - Time Synchronized Mesh Protocol (TSMP) wireless nodes only turn on for the periods of scheduled communication in order to maintain low power consumption.

- **Designed with Diverse Housings**
  - Indoor, outdoor, rugged and waterproof designs for different environmental needs

**Sensor Nodes**

Sensor nodes, including bundling sensors together for specific applications, and M12 sensor interfaces for external sensor connectivity.

- **Gas**
  - CO, CO2, NH3, NO2, SH2, O2, O3, H2, CH4, Isobutane, Ethanol, Hydrocarbons

- **Water**
  - pH, ORP, DO, conductivity, nitrates, phosphates, liquid flow, level sensor

- **Structural Health**
  - Crack detection, accelerometer, displacement, soil moisture

- **Smart Roads**
  - Magnetic field, light sensor (LDR), actuator relay, ultrasound, crack sensor, water and ice detection

**I/O Nodes**

I/O nodes provide analog, digital, UART, RS-422/485, Modbus, CANBus; varies by model.

- **DI/DO with power relay**
- **16-bit Analog input**
- **RS-422/485**
Advantech WISE-Cloud (PaaS)

With the maturation of web technology and emergence of the Internet of Things (IoT), a web interface for managing applications through cloud technology has become an essential technology. To satisfy the real needs of enterprises, Advantech proactively invests in relevant research and development. Advantech’s WISE-Cloud (Wireless IoT Sensing Embedded) Platform as a Service (PaaS) is a cloud platform that provides the infrastructure for building, deploying, and managing applications and services. By adopting Advantech’s WISE-Cloud, IoT solution developers can rapidly build and deploy applications, or expand cloud applications into Software-as-a-Service (SaaS) applications, ensuring a faster time to market.
SUSIAccess as a Core Engine

SUSIAccess is the core engine that delivers software packages for developing the WISE-Cloud platform according to the demands of various IoT solutions. By ensuring interoperability among hardware/software components, systems, and platforms, SUSIAccess enables machine-to-machine communication. The three main offerings of SUSIAccess are as follows: (1) Sensor and Device Management, for connecting sensors and devices to the cloud using standard MQTT, TR-069, OMA, and OSGi protocols; (2) Cloud Services, for providing web services and adopting an open infrastructure for big data analytics; and (3) IoT SDK, for simplifying application and service development. Thus, SUSIAccess enables IoT solution developers to easily and effectively construct IoT cloud solutions.
## Product Selection Guide

**Advantech IoT Gateway & Systems**

<table>
<thead>
<tr>
<th>Model Name</th>
<th>UTX-3115</th>
<th>ARK-1123L</th>
<th>UBC-200</th>
<th>UBC-220</th>
<th>UBC-221</th>
<th>DS-570</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>Intel® Atom™ Dual Core E3826 processor</td>
<td>Intel Atom E3825 Dual Core SoC processor</td>
<td>Freescale ARM Cortex-A9 i.MX6 Dual/Quad 1 GHz processor</td>
<td>Freescale ARM Cortex-A9 i.MX6 Dual/Quad 1 GHz processor</td>
<td>Intel X1000 400 MHz</td>
<td>Intel® Celeron® N2930 low power Quad-Core™ SoC processor</td>
</tr>
<tr>
<td>Connectivity</td>
<td>1 x Half-size Mini PCIe slot for WiFi/3G module 1 x Full-size Mini PCIe slot for WiFi/3G/mSATA module 2 x GbE PTCRB, GCF certified</td>
<td>1 x Full-size Mini PCIe, Supports WiFi or WWAN module 1 x Half-size Mini PCIe, Supports mSATA module 1 x Intel GbE</td>
<td>1 x mini-PCIe w/ SIM socket for WiFi/3G module supported 1 x GbE 1 x SD socket</td>
<td>2 x mini-PCIe w/ SIM socket for WiFi/3G module supported 1 x GbE 1 x SD socket</td>
<td>1 x mini-PCIe w/ SIM socket for WiFi/3G module supported 2 x Fast Ethernet (One w/ PoE) 1 x SD socket</td>
<td>Highly expandable via internal mini-PCIe interface (e.g. WLAN, 3G or TV tuner)</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-20 ~ 60° C</td>
<td>-30 ~ 70° C</td>
<td>0 ~ 60° C</td>
<td>0 ~ 40° C</td>
<td>0 ~ 40° C</td>
<td>0 ~ 40° C (32 ~ 104° F) (w/ HDD); -10 ~ 70° C (14 ~ 158° F) (w/ extended temp. memory &amp; SSD)</td>
</tr>
<tr>
<td>Dimensions (WxHxD)</td>
<td>138.5 x 35.98 x 116.4 mm</td>
<td>133.8 x 43.1 x 94.2 mm</td>
<td>108 x 79 x 30 mm</td>
<td>120 x 89 x 30 mm</td>
<td>120 x 89 x 30 mm</td>
<td>220 x 44.2 x 150 mm</td>
</tr>
</tbody>
</table>

**WPAN Controller — WISE-3000 Series**

<table>
<thead>
<tr>
<th>Model Name</th>
<th>WI SE-3310</th>
<th>WI SE-3320</th>
<th>WI SE-3301</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU/MCU</td>
<td>Freescale i.MX6 Dual Cortex-A9 1.0GHz and Linear/ Dust LTC5800 Cortex M3</td>
<td>TI Siera AM3352 Dual Cortex-A8 1.0GHz and Linear/ Dust LTC5800 Cortex M3</td>
<td>Linear/Dust LTC5800 Cortex M3</td>
</tr>
<tr>
<td>Network Standard</td>
<td>IEEE 802.15.4e Mesh Network</td>
<td>IEEE 802.15.4e Mesh Network</td>
<td>IEEE 802.15.4e Mesh Network</td>
</tr>
<tr>
<td>Wireless Node</td>
<td>Up to 200 wireless nodes</td>
<td>Up to 100 wireless nodes</td>
<td>Up to 100 wireless nodes</td>
</tr>
<tr>
<td>PoE Support</td>
<td>-</td>
<td>One 3af PSE/ One 3at PD</td>
<td>-</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-10 ~ 60 °C</td>
<td>-20 ~ 70 °C</td>
<td>-40 ~ 85 °C</td>
</tr>
<tr>
<td>Dimensions (WxHxD)</td>
<td>178 x 30 x 117 mm</td>
<td>178 x 30 x 117 mm</td>
<td>80 x 25 x 60 mm</td>
</tr>
</tbody>
</table>
## WPAN Node Selection

### Sensor Node

<table>
<thead>
<tr>
<th>Model Name</th>
<th>WISE-1020</th>
<th>WISE-3010-Parking</th>
<th>WISE-3021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Name</td>
<td>WISE-1020</td>
<td>WISE-3010-Parking</td>
<td>WISE-3021</td>
</tr>
<tr>
<td>MCU</td>
<td>Linear/Dust LTC5800 Cortex M3</td>
<td>Linear/Dust LTC5800 Cortex M3 and Ti MSP430</td>
<td>Linear/Dust LTC5800 Cortex M3 and Ti MSP430</td>
</tr>
<tr>
<td>Network Standard</td>
<td>IEEE 802.15.4e Mesh Network</td>
<td>IEEE 802.15.4e Mesh Network</td>
<td>IEEE 802.15.4e Mesh Network</td>
</tr>
<tr>
<td>Interface</td>
<td>AI x 4/ UART x 1/ DIDO x 7</td>
<td>-</td>
<td>M12 Connector</td>
</tr>
<tr>
<td>Default Sensor</td>
<td>-</td>
<td>Low-field magnetic sensor</td>
<td>-</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40 ~ 85 °C</td>
<td>-40 ~ 85 °C</td>
<td>-40 ~ 85 °C</td>
</tr>
<tr>
<td>Dimensions (WxHxD)</td>
<td>178 x 117 x 30 mm</td>
<td>TBD</td>
<td>TBD</td>
</tr>
<tr>
<td>Suggested Sensor Integration</td>
<td>Communication Platform</td>
<td>Vehicle Detection, Ground Temperature</td>
<td>pH, ORP, DO, conductivity, nitrates, phosphates, liquid flow, level sensor</td>
</tr>
</tbody>
</table>

### I/O Node

<table>
<thead>
<tr>
<th>Model Name</th>
<th>WISE-3150</th>
<th>WISE-3151</th>
<th>WISE-3152</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Name</td>
<td>WISE-3150</td>
<td>WISE-3151</td>
<td>WISE-3152</td>
</tr>
<tr>
<td>MCU</td>
<td>Linear/Dust LTC5800 Cortex M3</td>
<td>Linear/Dust LTC5800 Cortex M3 and Ti MSP430</td>
<td>Linear/Dust LTC5800 Cortex M3 and Ti MSP430</td>
</tr>
<tr>
<td>Network Standard</td>
<td>IEEE 802.15.4e Mesh Network</td>
<td>IEEE 802.15.4e Mesh Network</td>
<td>IEEE 802.15.4e Mesh Network</td>
</tr>
<tr>
<td>Channels</td>
<td>6 (Differential/ Non-Isolation)</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Power Input</td>
<td>unregulated 10–30VDC</td>
<td>unregulated 10–30VDC</td>
<td>unregulated 10–30VDC</td>
</tr>
<tr>
<td>Voltage Resolution</td>
<td>16 bit; ±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V</td>
<td>4,000 VDC</td>
<td>2,000 VDC</td>
</tr>
<tr>
<td>Current Resolution</td>
<td>15 bit; ±20 mA, 14 bit; 0 – 20 mA 13.5 bit; 4 – 20 mA</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>-</td>
<td>4,000 VDC</td>
<td>2,000 VDC</td>
</tr>
<tr>
<td>Interface Connectors</td>
<td>-</td>
<td>2 x plug-in terminal blocks (RS-422/485)</td>
<td>-</td>
</tr>
<tr>
<td>Contact Rating (Resistive)</td>
<td>-</td>
<td>-</td>
<td>250 VDC @5A, 30 VDC @3A</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40 ~ 85 °C</td>
<td>-40 ~ 85 °C</td>
<td>-40 ~ 85 °C</td>
</tr>
<tr>
<td>Dimensions (WxHxD)</td>
<td>119 x 37 x 78 mm</td>
<td>119 x 37 x 78 mm</td>
<td>119 x 37 x 78 mm</td>
</tr>
</tbody>
</table>
## Embedded Wireless Modules

<table>
<thead>
<tr>
<th>Model Name</th>
<th>EWM-W135H</th>
<th>EWM-W142H</th>
<th>EWM-W150H</th>
<th>EWM-W151H</th>
<th>EWM-W158F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wireless Standard</strong></td>
<td>IEEE 802.11 a/b/g/n (2.4 and 5 GHz)</td>
<td>IEEE 802.11 b/g/n (2.4 GHz)</td>
<td>IEEE 802.11 b/g/n (2.4 GHz)</td>
<td>IEEE 802.11 b/g/n (2.4 GHz)</td>
<td>IEEE 802.11 a/b/g/n (2.4 and 5 GHz)</td>
</tr>
<tr>
<td><strong>Tx/Rx</strong></td>
<td>2Tx/ 2Rx MIMO</td>
<td>2Tx/ 2Rx MIMO</td>
<td>1Tx/ 1Rx</td>
<td>1Tx/ 1Rx</td>
<td>2Tx/ 2Rx MIMO</td>
</tr>
<tr>
<td><strong>Data Rate</strong></td>
<td>Up to 300 Mbps</td>
<td>Up to 300 Mbps</td>
<td>Up to 150 Mbps</td>
<td>Up to 150 Mbps</td>
<td>Up to 300 Mbps</td>
</tr>
<tr>
<td><strong>MiniPCIe card Interface</strong></td>
<td>PCIe signal</td>
<td>PCIe signal</td>
<td>USB signal</td>
<td>PCIe signal</td>
<td>PCIe signal</td>
</tr>
<tr>
<td><strong>Temperature Range</strong></td>
<td>Operating: -10 to +70 °C</td>
<td>Operating: 0 to +60 °C</td>
<td>Operating: 0 to +70 °C</td>
<td>Operating: 0 to +80 °C</td>
<td>Operating: -40 to +85 °C</td>
</tr>
</tbody>
</table>

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## Worldwide Offices

### Greater China
- **China**
  - Beijing: 86-10-6298-4346
  - Shanghai: 86-21-3832-1616
  - Shenzhen: 86-755-8212-4222
  - Chengdu: 86-28-8545-0198
  - Hong Kong: 852-2790-5118
- **Taiwan**
  - Neihu: 886-2-2792-7818
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